

*The Mathematical Genius of F.M. Dostoevsky:
Imaginary Numbers, Statistics, Non-Euclidean Geometry, and Infinity*

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A Dissertation presented to the Graduate Faculty of the University of Virginia in
Candidacy for the Degree of Doctor of Philosophy

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University of Virginia
August 2016

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To my loving parents, Elizabeth Marsh and Alan Soloway

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Abstract

Prior to becoming a man of letters, F.M. Dostoevsky (1821-1881) studied at the Main Engineering School [*Glavnoe inzhenernoe uchilishche*] in St. Petersburg from 1838 to 1843. Although most scholars discount the lasting legacy of his engineering studies, the literary aesthetics of his works communicate an awareness of mathematical principles and debates. In the context of nineteenth-century Russian literature, Dostoevsky is perhaps the only major novelist to have embedded explicit mathematical expressions and terminology in his prose. His works, for example, contain references to “square roots”, “logarithmic tables”, “repeating decimals”, and the curious equation, “ $2 \times 2 = 5$.”

After he was arrested, submitted to mock execution by firing squad, and sentenced to penal servitude in Siberia for his involvement in the revolutionary Petrashevsky Circle in 1849, most of his books and journals from the period of his education were confiscated, and destroyed by the Third Section of the Russian Secret Police. This dissertation reconstructs the curriculum and readings that Dostoevsky encountered during his studies, and connects such sources to the mathematical references and themes in his published works. Whereas scholars tend generally to underestimate, or even outright ignore the legacy of his studies at the Main Engineering School, my project presents his education as a formative period of his artistic development.

This dissertation unearths subtexts in works by Dostoevsky, reiterating veins of mathematical thought, which evolved throughout Classical Antiquity, the Renaissance, and the Scientific Revolution. Extending the arguments set forth in Liza Knapp’s 1996 book *The Annihilation of Inertia: Dostoevsky’s Metaphysics*, this dissertation illuminates mathematical elements and discourses derived from a selection of his most popular literary texts, including *Zapiski iz podpol’ia* (1864), *Prestuplenie i nakazanie* (1866), *Igrok* (1867), *Son smeshnogo cheloveka* (1877), and *Brat’ia Karamazovy* (1881). Whereas Knapp explores the formulation of Dostoevsky’s existential philosophy in relation to his knowledge of Newtonian mechanics and physics, my project considers his knowledge of geometry and number theory as the disciplines that contributed to the holistic conception of his metaphysical ideas. His works, for instance, convey explicit acknowledgement of Non-Euclidean geometric principles devised by Nikolai Lobachevsky (1792-1856), and implicit allusion to advances in complex number theory proposed by Leonhard Euler (1707-1783). Both Lobachevsky and Euler conducted research in Russia that seems to have reached the attention of Dostoevsky during his schooling and subsequent reading.

As an artist, Dostoevsky participated in multifarious polemics. He engaged contrasting worldviews in the formulation of his own synergistic outlooks, combining principles from the traditions of literature, spirituality, and mathematics. By engaging the sources from which Dostoevsky derived such integrative inspiration, and studying his narrative methods, this dissertation explores his interdisciplinary imagination. The genius of Dostoevsky can be viewed through a new lens that aligns his creative insights with the foundational frameworks of modern mathematics.

Key terms: F.M. Dostoevsky, Engineering, Mathematics, Leonhard Euler, Nikolai Lobachevsky, Utilitarian Calculus, Non-Euclidean Geometry, Complex Number Theory,

Acknowledgements

In the fall semester of 2010, I started investigating the mathematical education of F.M. Dostoevsky in RUSS 5110 Rise of the Russian Novel, taught by Professor Julian Connolly at the University of Virginia. The development of this dissertation largely grew out of my final research paper for the course, titled, “The Mathematical Aesthetics of Dostoevsky’s Linguistics, and the Significance of Syntactic Patterns for Themes of Existentialism in his Short Fiction.” Although I did not begin the paper until 2010, the premise of this project had already been fermenting in my thoughts for several years, after I first read *Notes from Underground* in the 2008 seminar, HUM 395 *Russian Literature and Thought in the 1860s*, taught by Gary Saul Morson at Northwestern University.

The 2001 translation of *Notes from Underground* by Michael Katz that was assigned to the class provides special commentary on the matrix-like arrangement of the sentence structure in Dostoevsky’s prose. While reading the original Russian text alongside the English translation, I became fascinated by the complexity of his prose, conveying dynamic interactions of individual personalities, deep psychological insights, and rich intertextual commentary relating to diverse arenas of inquiry and debate. His literary works communicate themes related to science and mathematics both on an explicit level, i.e. through direct allusions to thinkers, theories, concepts, and discourses, and on also an implicit level, realized in the aesthetic arrangement of his language and narrative structures.

The unique syntax of Dostoevsky reflects an artful weaving of words, or *pletenie sloves*, a Russian literary tradition dating back to Epiphanius the Wise, a fifteenth-century hagiographer

from Rostov.¹ Following the tenets of this prolonged literary ethos, purposeful word selections, grammatical structures, and even the aural phonological resonance of a given text participate in the signification of themes underlying the primary motivations of the author. In the recognition that *pletenie sloves* often entails a negative connotation with respect to excessive literary flourishes, the style of Dostoevsky perhaps more aptly coincides with a concept devised by Roman Jakobson, “the poetry of grammar.”² The more that I read Dostoevsky, the more I become convinced that his writings contain subtexts concerning mathematical and philosophical ideas, accessible only to audiences aware of his interdisciplinary acumen.

Dostoevsky possessed unique sensitivities stemming from an array of different concentrations. His background in engineering, for example, sets him apart from other authors of the same period.³ The narrative methods, descriptive sensitivities, and ideological arguments set forth in his literary works convey not only surface details stemming from the lives and tribulations of his characters, but also deeper philosophical dialogues, concerning, for instance, the fabric of *being*, the relationship of humankind to the universe, and the intrinsic correlations between thought and action. The formulations of appropriate responses to these “eternal, accursed questions” hold great consequence for individuals striving to establish more meaningful, sustainable communions with other people and the whole of humanity.⁴

¹ Alexis Klimoff, “Russian Literature and Orthodoxy: Outline of Main Trends to 1917” in *The Orthodox Christian World*, ed. Augustine Casiday (New York: Routledge, 2012), 518; Alexandar Mihailovic, “Mikhail Bakhtin and Russian Orthodoxy,” in *Corporeal Words: Mikhail Bakhtin’s Theology of Discourse* (Evanston, IL: Northwestern University Press, 1997), 9-10.

² Roman Iakobson, “Poeziia grammatiki i grammatika poezii” in *Semiotika*, (Moscow: Raduga, 1983), 462.

³ Although Mikhail Lomonosov (1711-1765) possessed scientific expertise, his artistic works belong to an earlier period than the one that coincided with and gave rise to the creative genius of Dostoevsky.

⁴ «Вечные вопросы, проклятые вопросы»; Nikolai Berdiaev describes the “accursed questions” in his 1909 essay, «Философская истина и интеллигентская правда» “*Philosophical Verity and Intelligentsia Truth*”, but they have been the subject of scholarly and epistemological debate dating back centuries. See Nikolai Berdiaev, “Filosofskaia istina i intelligentskaia pravda” in *Dukhovnyi krizis intelligentsia: stat’i po obshchestvennoi i religioznoi psikhologii* (Petersburg, Obshchestvennaia pol’za, 1910), 174.

In the spring semester of 2014, I was fortunate to have received a Foreign Study Grant from the Graduate School of Arts and Sciences at the University of Virginia to conduct archival research on this topic in both Moscow and St. Petersburg. I owe special thanks to my dissertation advisor, Professor Julian Connolly, and my Director of Graduate Studies, Professor Edith Clowes, who wrote letters in support of my grant application. Furthermore, I owe thanks to Professor John Arch Getty of the UCLA History Department, and his educational organization Praxis International, for helping me to obtain my Russian visa, and to establish academic affiliation with the International University in Moscow as a visiting researcher.

While working in Moscow from January until March of 2014, I inspected primary source works, including personal letters, notebooks, and texts concerning the life and writings of Dostoevsky at the Russian State Archive of Literature and Art, the Russian State Military Historical Archive, the State Literary Museum, the Russian State Library, and the Apartment-Museum of F.M. Dostoevsky. From March until May of 2014, I lived in St. Petersburg, where I examined collections at the Russian National Library, the Russian State Historical Archive, the Archive of the Russian Academy of Sciences, and the Literary Memorial Museum of Dostoevsky. The associated travels immersed me in the culture and atmosphere that served as the focal setting for some of the most memorable works by the novelist.

In addition to examining primary source materials at these archives, I encountered key secondary works illuminating relevant features of the variegated artistic imagination of Dostoevsky. Several of these works proved especially edifying, including *The Worldview of Dostoevsky* [*Mirosozertsanie Dostoevskogo*, 1923] by Nikolai Berdiaev, *Petersburg of Dostoevsky: A Historical Guide* [*Peterburg Dostoevskogo: istoricheskii putevoditel'*, 2014] by Lev Lur'e, *The Geometry of Dostoevsky* [*Geometriia Dostoevskogo*, 1960] by Vladimir Gubailovskii, *Dostoevsky and Mathematics* [*Dostoevskii i matematika*, 2009] by Aleksandr Matveev, *Toward the Question of Work on "The Awareness of Non-Euclidean Geometry by*

Dostoevsky” [“*K voprosu o rabote «Vospriiatie Dostoevskim neevklidovoi geometrii»*,” 1997] by Franz German, and *Ivan Karamazov as Mathematician* [*Ivan Karamazov kak matematik*, 2003] by Fabian Heffermehl. These works appear at various degrees of frequency in the notes to this dissertation, but they all helped me to conceive of arguments related to the scope and trajectory of mathematical discourses in the writings of F.M. Dostoevsky, and his interdisciplinary education at the Main Engineering School.

At the Russian National Library in St. Petersburg, moreover, I found important source material regarding the popular dissemination of scientific and mathematical texts in nineteenth-century journals and periodicals. I perused microfiche of “Scientific News” [«*Uchenye izvestiia*»], a weekly column of ongoing research and debate in *The St. Petersburg Gazette* [*Sankt-Peterburgskie vedomosti*], as well the journals that featured the original publications of Dostoevsky’s prose. Additionally, I obtained copies of Dostoevsky’s physics textbook, *Popular Mechanics* [*Obshcheponiatnaia mekhanika*] by Nikolai Pisarevskii, and delved into an 1843 compendium of works by Leonhard Euler published by the Imperial Academy of Sciences in St. Petersburg that was made available to cadets at the Main Engineering School.

I would be remiss if I did not express special thanks to Tatiana Iur'evna Burmistrova and Mikhail Sergeevich Neshkin, directors of the Russian State Military Historical Archive (*RGVIA*) for helping me to procure copies of documents from the chancellery records of the Main Military Engineering School from 1838-1843. According to the circulation records at RGVIA, I was the first non-Russian scholar to have accessed funds 351 and 544, containing materials about the school from the period of Dostoevsky’s enrollment. Just prior to leaving Russia in May of 2014, I obtained high-resolution digital scans of more than 400 pages of records detailing the historical development of the Main Engineering School from *RGVIA*. I purchased these documents with funds from the Arts, Humanities, and Social Sciences (AHSS) Summer Research Grant, and I am

grateful for the support of Assistant Vice President of Graduate Studies Phillip Trella for providing me with the financial means to obtain these rare materials.

Throughout June of 2014, I participated in the Summer Research Laboratory in Russian, Eastern European, and Eurasian Studies at the University of Illinois. My involvement in the Summer Research Laboratory would not have been possible without the support of the Arts, Humanities, and Social Sciences (AHSS) Summer Research Grant, and the Center for Global Inquiry and Innovation Grant (CGI²). I owe thanks to Brian Owensby, the Director of CGI² Awards Committee, and Professor Cliff Maxwell, Assistant to the Vice Provost for International Programs, as well as David Cooper of the Russian, East European, and Eurasian Center (REEEC) at the University of Illinois for awarding me additional travel funds to participate in the translation workshop at the Summer Research Laboratory. Additionally, I am indebted to Joe Lenkart of the Slavic Reference Service at the University of Illinois for helping me to identify and obtain key bibliographic resources.

I also owe thanks to George Crafts and Elena Dimov of Alderman Library at the University of Virginia for helping me to navigate Russian archival holdings prior to my research excursions to Moscow and St. Petersburg. After returning to the U.S., the Interlibrary Loan Specialists at the University of Virginia, moreover, helped me to obtain copies of two mathematical works that Dostoevsky engaged during his studies by Nikolai Brashman: the 1836 *Course of Analytic Geometry* [*Kurs analitecheskoi geometrii*] and the 1837 *Theory of Equilibrium of Solid and Liquid Bodies or Statics and Hydrostatics* [*Teoriia ravnovesiia tel tverdykh i zhidkikh ili statika i gidrostatika*]. Scanned fragments of these sources were delivered to me electronically by archivists at the National Library of Finland in Helsinki.

Professor Karen Parshall deserves special acknowledgement for allowing me to audit her course, MATH 5030 History of Mathematics. Her tremendous knowledge of mathematics and its evolution as a professional discipline has enhanced my insight into the curriculum that

Dostoevsky encountered as a student. Participating in her course improved my understanding of the holistic trajectory of mathematics, and clarified my understanding of related concepts and debates. She possesses an incredible talent for explaining complicated mathematical operations in a comprehensible fashion. Her class has inspired many facets of the ensuing analysis.

At the beginning of the 2014-2015 academic year, it was a tremendous honor to have been named a Buckner W. Clay Fellow of the Institute of Humanities and Global Cultures. The funds received from this fellowship supported dissertation research and writing efforts until my defense in May of 2016. Throughout the 2015-2016 academic year, I was fortunate to have been invited to participate in the Mellon Graduate Teaching Seminar for Excellence in the Humanities, “Pluralism in Society,” led by Professors Alison Levine and Denise Walsh. My involvement in the seminar has allowed me to share ideas with other scholars also pursuing interdisciplinary projects, and to consider more critically the organization and trajectory of my project in its holistic development. The course has made me a better teacher and scholar, and has deepened the kind of thinking that I engage in my research, analysis, and correspondence.

Furthermore, it has been a pleasure to work with all of the members of my dissertation committee: Professors Edith Clowes, Julian Connolly, Katia Dianina, and Craig Huneke. They have been instrumental in helping me to conceive of this project in its ambitious interdisciplinary realization, and I greatly appreciate all of their continued support. I am thankful for the efforts of Professor Edith Clowes, who shared exciting resources with me, and wrote letters of support that culminated in my research trip to Russia, and facilitated my attendance in a variety of academic programs and conferences. My primary advisor, Professor Julian Connolly, also deserves special recognition and thanks for sharing his vast wealth of knowledge pertaining to Dostoevsky, writing numerous letters of recommendation, and evaluating the various drafts that went into the development of this project. Under his guidance, I have acquired key skills as a reader and researcher. This dissertation has benefited immensely from his guidance, and I have gained

unique insights from attending his course, RUTR 2730 Dostoevsky. It has been a remarkable privilege to work with him. I am also thankful for the contributions of Professor Dianina, who serves as the secondary reader on my committee, and Professor Huneke, hailing from the Department of Mathematics. Writing this dissertation has been challenging, but I have learned a great deal regarding the process of formulating a large research topic, collecting bibliographic materials, and composing a large written narrative expounding my own argumentative positions relative to those of other specialists in the field.

Last, but not least, I am thankful for the support of my family, without whom, this project would never have come to fruition. My loving, supportive, and caring parents, Elizabeth Marsh and Alan Soloway, my sister Kathryn, my uncles Charles, Ed, and Kevin, my aunts Abby and Diane, and my godparents Sandra and Daniel Cohen have fostered my development as a person and scholar. They have shared with me their unique perspectives, guided my development as an adult, and given me the confidence to see this project through to its completion. I am forever grateful for their support, and for inspiring me to pursue my passions in literature, mathematics, research, writing, and the arts. Finally, although they are no longer living, I am grateful for the legacies of my grandparents, Kathryn and Joseph Marsh, and Evelyn and Myles Soloway, who made personal sacrifices so that their children and grandchildren could earn degrees, and pursue the rewards of higher knowledge.

Notes on Translation and Transliteration

Russian names, titles, and citations included in this dissertation conform generally to the conventions of the American Library Association and Library of Congress (ALA-LC) transliteration system. Changes have been made, however, to coincide with the expectations of a broad English-speaking readership. For example, names ending in *-ii* have been changed to *-y*, such as Dostoevsky, Chernyshevsky, and Nikolaevsky, as opposed to Dostoevskii, Chernyshevskii, and Nikolaevskii, respectively. Similarly, the transliteration of Cyrillic soft sign as apostrophe – ‘ has been omitted in the names of popular characters, e.g. Raskolnikov, instead of Raskol’nikov, but citations of sources containing soft sign include the apostrophe vis-à-vis the prescriptions of the ALA-LC. Additionally, the transliteration of *ë* will appear in formal citations and titles as *-e*, but in popular names as *-yo*, e.g. Fyodor, Alyosha, etc.

In citing translations and secondary works, preference has been given to the ALA-LC system, even if the associated author(s) or translator(s) follow different transliteration conventions. For instance, Constance Garnett refers to Razumihin, as opposed to Razumikhin, and Joseph Frank cites Nikolay Strahov, instead of Nikolai Strakhov. Throughout the bibliography, the standard ALA-LC transliteration has been preserved. In various passages, italics have been added for emphasis. At each instance, a footnote indicating the nature of the emphasis is included. If no such note appears, the italics represent the original author’s emphasis.

Where appropriate, locations and other selected proper nouns are largely referred to by their English forms. Generally, at the first mention of an individual work or journal, the original Russian title is provided with its English equivalent and year of publication in parentheses. In subsequent commentary and analysis, preference may be given to the English version of the title to resonate with a general readership. In quoting original Russian sources, I have presented translations of the associated fragments in the primary narrative of the dissertation, while providing the original Cyrillic in the footnote, along with the corresponding bibliographic citation. Passages originally written in older Cyrillic orthographic systems have been converted to reflect the conventions of modern printed Russian.

All quotations from Dostoevsky’s collected works are cited from *Polnoe sobranie sochinenii v tridtsati tomakh*, ed. and annotated by G.M. Fridlender et al., 30 volumes, (Leningrad: Nauka, 1972-1990). For the sake of concision, *Polnoe sobranie sochinenii v tridtsati tomakh* is cited parenthetically with the abbreviation *PSS*, followed by the volume and page number. Where applicable, the book number is also included, following the abbreviation “bk”.

Unless otherwise noted, Russian translations have been provided by the author. The ensuing analysis, however, gives special attention to the translations of Constance Garnett, out of the consideration that these texts are the most commonly read versions of Dostoevsky by Western audiences. Mathematical sources from Classical Antiquity, the Renaissance, and the Scientific Revolution appearing in French, German, Latin, and Greek, have largely been translated by other authors, whose names appear in the corresponding footnotes and bibliographic entries. Quotations from original texts in Russian, Greek, French, German, and Latin can be found in the associated footnotes, however, they may reflect a diversity of orthographic styles from various chronological periods. Lastly, the various spellings of Euclidian and Euclidean appear interchangeably in relevant secondary works. This paper prefers Euclidean, following the orthographic preference of Carol Apollonio in *Dostoevsky’s Secrets: Reading Against the Grain* (2009).

Chronology of Biographical Events

1821: Fyodor Mikhailovich Dostoevsky is born in Moscow on October 30, in the Mariinsky Hospital for the Poor, the second of seven children. His father, Dr. Mikhail Andreevich Dostoevsky, works as a physician at the hospital, and his mother Maria Fyodorovna, the daughter of a Muscovite merchant family, tends to matters of the home. The family lives in an apartment directly adjacent to the hospital grounds.

Fyodor and his old brother Mikhail (b. 1820) receive schooling lessons at home. After reaching adolescence, the brothers attend the Ekaterinsky and Aleksandrinsky day schools in Moscow, where they study Russian literature, language arts, and French, while also studying mathematics under the astronomer, Aleksandr Nikolaevich Drashusov (1816-1890).

1831: Dostoevsky's parents purchase a small country estate at Darovoe, in the Zaraiskii District, about 170 km southeast of Moscow. The family spends summers at the estate. These sojourns provide Fyodor his first close interactions with the Russian peasantry.

1833: Fyodor and Mikhail enroll in the day school of Monsieur Souchard in Moscow, where they receive intensive French language instruction.

1834-1836: The brothers leave home to attend the boarding school of L. I. Chermak in Moscow. Mastery of Latin is required for admission, and since the brothers did not receive instruction in Latin from Monsieur Souchard, Dr. Dostoevsky decides to remedy this deficiency by delivering Latin lessons to his sons personally. Dr. Dostoevsky requires his sons to stand stiffly at attention, accustoming them to the rigors of martial discipline. Dr. Dostoevsky is a stern teacher who often loses his temper when his sons do not perform to his liking. At Chermak's boarding school, Fyodor commences his lifelong relationship with literature, and delves into his passions for reading and writing.

1836: Maria Fyodorovna dies from tuberculosis. Struggling to care for all of his children, Dr. Dostoevsky sends Fyodor and Mikhail to St. Petersburg to enroll in the boarding school of K. F. Kostomarov. Dr. Dostoevsky gives his sons the inflexible directives to prepare for the entrance examinations at the Main Engineering School.

1837: Fyodor and Mikhail pass their entrance examinations. Mikhail, however, is deemed unfit to enroll, after medical examiners diagnose him with early symptoms of consumption.

1838: While Fyodor enrolls at the Main Engineering School, Mikhail gets medical treatment, recuperates, and enters military service. He is sent to Revel, modern-day Tallinn in Estonia, where he serves at a Russian military outpost, and enrolls in engineering classes as a student in correspondence.

1839: Dr. Dostoevsky dies, and there are rumors that he has been murdered by his serfs on the outskirts of the village of Cheremoshnia near Darovoe. The cause of death is hemorrhage of the throat, which could have been the result of an apoplectic stroke, or alternatively, the result of strangulation according to the account of Fyodor Mikhailovich's younger brother, Andrei. The family decides to let matters rest, and the local police do not pursue a criminal investigation.

1841: Fyodor passes his general examinations, and advances to the rank of a junior officer. He becomes a candidate for *engineer of specialization* [*inzhener po spetsial'nosti*], and pursues advanced coursework in drafting. He sends his brother his first literary efforts, now lost: two historical dramas, *Mary Stuart*, and *Boris Godunov*.

1842: Mikhail marries Emily von Ditmar, and in November, their son is born. Fyodor becomes godfather to his nephew, who is also his namesake.

1843: Fyodor graduates from the Main Engineering School, receives the rank of a junior lieutenant, and begins working in the blueprint section of the State Engineering Department in Petersburg, where he designs railroad bridges and fortifications. He publishes his first literary work, a translation of Balzac's *Eugénie Grandet*.

1844: Fyodor resigns from his commission to devote his full attention to literature. He rents an apartment near the Fontanka with his former classmate D. Grigorovich, where he finishes *Poor Folk* [*Bednye liudi*] in November.

1845: Submits early drafts of *Poor Folk* to Petersburg critics. Vissarion Belinsky embraces him as a “new Gogol”. Commences writing *The Double* [*Dvoinik*].

1846: *Poor Folk* appears in *Petersburg Miscellany* [*Peterburgskii sbornik*], a journal edited by N.A. Nekrasov. Dostoevsky publishes *The Double* in *Fatherland Notes* [*Otechestvennye zapiski*], only to receive negative criticism from readers, who had previously praised his literary talents.

1848: Publishes a series of short stories, including *White Nights* [*Belye Nochi*], *A Weak Heart* [*Slaboe serdtse*] and *Christmas Tree and a Wedding* [*Elka i svad'ba*] in *Fatherland Notes*.

1849: Joins the progressive socialist literary discussion group, the Petrashevsky Circle. Dostoevsky is considered a figure of interest for the police, for publicly reading Belinsky's “Letter to N.V. Gogol” (1847) on three occasions. Additionally, Dostoevsky attempts to build a private printing press to disseminate materials subversive to the state. According to tsarist law, all printing presses at the time had to be mandated by state authorities, and subjected to regulatory censorship. Fyodor is arrested on April 23. After being held prisoner for eight months in the Petropavlovsk Fortress in St. Petersburg, he learns that he has been sentenced to death. On December 22, he is marched with fellow prisoners to Semyonovsky Square, and is tied to a post before a firing squad. Just as the firing squad readies their rifles, a mounted courier delivers word that Tsar Nikolai I has commuted his death sentence to eight years of penal servitude in Siberia.

1850: Arrives at maximum-security prison labor camp in Omsk. Meets wives of the Decembrists, members of a rebellion against the Tsar that culminated in 1825, who followed their husbands to the Siberia.

1854: Obtains release from the prison camp in March on the agreement that he enlist in the Seventh Line Battalion at Semipalatinsk. During his compulsory military service, he meets his future wife, Maria Dmitrievna Isaeva, who is married at the time.

1855: Maria Dmitrievna's husband dies from excessive alcoholism. Fyodor and Maria begin a romantic courtship.

1857: Fyodor marries Maria Dmitrievna.

1859: Returns to St. Petersburg with Maria Dmitrievna after 10 years of exile.

1860: Fyodor and Mikhail found the literary journal *Time* [*Vremia*]. Publishes the first two chapters of *Notes from the House of the Dead* [*Zapiski iz mertvogo doma*] in *Russian World* [*Russkii Mir*]. The work receives critical acclaim.

1862: Agrees to publish *Notes from the House of the Dead* in book form. Finds a socialist leaflet on his doorstep, reading, “Kill the monarchists! Kill them in the streets and squares if they dare to go out!” Violence sweeps St. Petersburg spurred on by radical revolutionaries. Fyodor travels abroad, and collects notes for a serialized travelogue. Visits Aleksandr Herzen in London. Maria Dmitrievna suffers from consumption. Begins romantic affair with Apollinaria Suslova.

1863: Publishes his serialized travelogue, “Winter Notes on Summer Impressions” [*“Zimnie zapiski o letnikh vpechatleniakh”*] in *Time*. The journal is forced to close after featuring a politically controversial article by Nikolai Strakhov. Fyodor obtains money from the State Literary Fund to go abroad again, and he reunites with Suslova in Paris, where she informs him of her affair with Salvador, a Spanish student, who ends up leaving her after several days. Fyodor and Suslova continue their travels across Europe. Fyodor loses everything in the casinos and gambling halls along the Rhine. To recuperate his losses, he writes Mikhail with an urgent request for money, and a strategy to publish a new literary journal, *The Truth* [*Pravda*]. The state censors reject this initial title, and the name of the journal is changed to *Epoch* [*Epokha*].

1864: Publishes *Notes from Underground* [*Zapiski iz podpol'ia*] in *Epoch* in two serial installments from January to April. Maria Dmitrievna dies from tuberculosis on April 15. In July, Mikhail dies from similar symptoms.

1865: Travels to Wiesbaden, gambles, loses, and begins to write *Crime and Punishment* [*Prestuplenie i nakazanie*]. Begins romantic affair with Anna Korvin-Krukovskaya, older sister to the first esteemed Russian female mathematician, Sofia Kovalevskaya (1850-1891). Proposes to Anna, and she accepts his engagement, but the couple never marries.

1866: Publishes serialized installments of *Crime and Punishment* in *The Russian Messenger* [*Russkii vestnik*], edited by Mikhail Katkov. In dire financial straits from mounting gambling debts, Dostoevsky negotiates a 3,000-ruble advance from the publisher F.T. Stellovsky to produce a new novel, namely *The Gambler* [*Igrok*]. Upon accepting the advance, however, Dostoevsky agrees that if he fails to furnish the novel by November 1, Stellovsky would acquire the rights to publish his complete works, and *all* of his future works without granting compensation to the author for a period of nine years. To meet this pressing deadline, Dostoevsky hires Anna Grigorievna Snitkina, a young stenographer, who transcribes the novel through dictation. With her help, he meets the deadline, and retains the rights to his complete and future works. During this time, Dostoevsky falls in love with Anna Grigorievna Snitkina.

1867: Marries Anna Grigorievna on February 15. Begins drafting *The Idiot* [*Idiot*]. Obtains permission from the state to receive treatment for epilepsy in Germany. The couple moves to Dresden. He gambles, and loses everything, including his wedding ring and winter coat.

1868: Birth of daughter, Sofia, who dies five months later. The couple moves to Italy. Publishes serialized installments of *The Idiot* in the *Russian Messenger*.

1869: Birth of his daughter Liubov' in Dresden. Works on *Demons* [*Besy*] and *The Eternal Husband* [*Vechnyi muzh*].

1871: The family returns to Russia. He vows to stop gambling, and upholds his promise throughout the remainder of his life. Birth of son, Fyodor, in July. Publishes serialized installments of *Demons* in *The Russian Messenger* from 1871-1872. The St. Petersburg Court of Commerce summons him for a hearing on the case of his outstanding debts. He loses the case, and pays large sums to settle his accounts.

1873: Becomes editor of *The Citizen* [*Grazhdanin*], a conservative journal. His articles from *Citizen* would later appear in the 1873-1881 anthology, *Diary of a Writer* [*Dnevnik pisatel'ia*]. Publishes *The Idiot* in book form. The first printing of 2,000 copies sells out in just a few days.

1874: Transfers the rights for all of his works to his wife, Anna Grigorievna. Resigns from his post as editor of *The Citizen*, and travels to Ems, Germany to receive treatment for emphysema and epilepsy.

1875: Publishes *Raw Youth* [*Podrostok*] in *The Fatherland Notes*. Anna Grigorievna gives birth to their second son, Aleksei.

1876: Publishes *A Gentle Creature* [*Krotkaia*] in *Diary of a Writer*.

1877: Publishes "Dream of a Ridiculous Man" ["Son smeshnogo cheloveka"] in *Diary of a Writer*.

1878: His son, Aleksei, dies following a severe epileptic fit. Starts working on *The Brothers Karamazov* [*Brat'ia Karamazovy*], and agrees to print the work in serialized installments in *The Russian Messenger*. Impressed by his literary celebrity, Tsar Aleksandr II summons the author to court, and introduces him to the Royal Family. Dostoevsky declares his open support for the monarchy, and delivers public readings and lectures at universities, philanthropic organizations, and institutions supporting humanities and the arts.

1879: First installments of *The Brothers Karamazov* appear in print. The family relocates to country estate at Staraia Russa. Tsar Aleksandr II survives several assassination attempts. Radical socialists continue to coordinate violent revolutionary activities.

1880: Delivers famous Pushkin speech at a Moscow festival held in memory of the great Russian poet. In December, publishes the rest of *The Brothers Karamazov*. The first printing of 3,000 copies sells out within several days. Health deteriorates noticeably, as his emphysema worsens.

1881: Suffers an internal hemorrhage at 3 A.M. on Monday, January 26. He dies two days later on January 28. Family holds funeral ceremony at the Tikhvin Cemetery at the Aleksandr Nevsky Monastery in St. Petersburg, the resting place of many other great thinkers, including Vasili Zhukovsky, Ivan Krylov, Pyotr Tchaikovsky, Igor Stravinsky, and Leonhard Euler. Revolutionaries assassinate Tsar Aleksandr several weeks later on March 13.

Preface

Dostoevsky embodies one of the only nineteenth-century Russian authors to have embedded explicit references to mathematicians and their corresponding theories in his prose. In *The Brothers Karamazov*, for example, Ivan expresses consternation to Alyosha at his inability to reconcile whether parallel lines intersect in infinity, arguing that his “Euclidean, earthly mind” could neither confirm nor deny hypothetical solutions to the underlying problem.¹ Selections of other characters, such as the Underground Man in *Notes from Underground*, Raskolnikov in *Crime and Punishment*, Aleksei Ivanovich in *The Gambler*, and the Ridiculous Man in “Dream of a Ridiculous Man,” likewise, voice commentary infused with allusions to mathematical thinkers, concepts, and controversies. This dissertation explicates the origins and roles of such discourses in the writings of F.M. Dostoevsky, and investigates the import of mathematics for influencing social and moral thought throughout the lifetime of the author and his subsequent legacy.

This dissertation proceeds by acknowledging that his awareness of mathematics informed his understanding of metaphysical debates, and vice-versa. By examining the interdisciplinary genius of F.M. Dostoevsky, this dissertation offers original frameworks for engaging mathematical themes central to his popular literary works. There is a tendency among scholars to deemphasize, or even to ignore outright the lasting legacy of his education at the Main Engineering School from 1838-1843, but his writings communicate manifold, generally vaguely understood, connections to mathematics and the sciences. To elucidate the content and development of such diverse mathematical ideas in the works of Dostoevsky, this dissertation comprises an introduction, five main chapters, conclusion, appendix, and bibliography.

¹ “I have a Euclidean, earthly mind, and how could I solve the problems that are not of this world.” «у меня ум эвклидовский, земной, а потому где нам решать о том, что не от мира сего.» (PSS 14, 241).

The Introduction surveys prominent episodes in the life and writings of F.M. Dostoevsky, reflecting the reciprocal nature of his artistic method and mathematical imagination. Close attention is paid to canonical biographies, such as those by Joseph Frank, Leonid Grossman, Konstantin Mochulsky, and Orest Miller, as well as prominent works of literary criticism, including selections by Mikhail Bakhtin, Harold Bloom, Boris Engelhardt, Liza Knapp, and Victor Terras. The existing body of scholarship on the education of Dostoevsky primarily concerns the evolution of his character, political inclinations, and artistic tastes during his schooling, as opposed to the actual content of his studies. This dissertation, accordingly, provides an original examination of the mathematical and scientific curricula that Dostoevsky engaged as a student and junior officer, and investigates how his creative literary works came to reflect his participation in broader intellectual discourses. The Introduction underscores recurring interdisciplinary aesthetics in his writings, and traces the lasting influence of the author on contemporaries and subsequent generations of thinkers in a variety of different fields.

Chapter One examines the educational experience of Dostoevsky at the Main Military Engineering School. Titles and excerpts from his examinations and textbooks emphasize the array of mathematical ideas that Dostoevsky encountered throughout his studies. The official chancellery records of the school derived from special funds at the Russian State Military Historical Archive in Moscow, as well as the commemorative album by Maksim Maksimovskii provide a new historical lens through which readers gain insight into the education and development of Dostoevsky. Excerpts from his letters, diary entries, and journalistic accounts of his involvement in the fiftieth anniversary of the school in 1869, moreover, shed light on the exercises, activities, and events that Dostoevsky encountered as a student. The recollections of his family members, classmates, and instructors, moreover, illustrate key external perspectives of the author during the difficult years of his education.

Considering that France and Russia competed for European hegemony, the founding of the Main Engineering School, moreover, served as the tsarist response to the 1794 founding of the *École polytechnique* in Paris. Fearing that Russian military and industrial capabilities would fall further behind those of Western Europe, state officials charged with overseeing the school modeled the course offerings, research endeavors, and military exercises of the school on those already initiated in the West. A brief comparative examination of the two schools illuminates how the curriculum at the Nikolaevsky Military Engineering School reproduced elements of scientific education and inquiry devised by French counterparts.

Chapter Two explores *Notes from Underground*, the work by Dostoevsky that perhaps most notoriously features mathematical themes. The story includes explicit references to “square roots”, “logarithmic tables”, “ $2 \times 2 = 5$ ”, and commentary on the infinite. Implicit features of the text also contribute to the realization of these mathematical themes. The structure of the novel, for instance, reflects Dostoevsky’s conception of the existential condition, understood as the indeterminate reciprocity of consciousness and the physical world, or theory and experimental empiricism. Part I, “Underground” [*Podpol’e*] takes place solely within the internal monologue of the solipsistic protagonist, whereas Part II, “Apropos of Wet Snow” [*Po povodu mokrogo snega*] reveals the tribulations of the Underground Man from both first-person and external vantage points, highlighting his excruciatingly awkward interactions with others. The two parts signify different kinds of mathematics: theoretical and applied. If Part I expresses theory, then Part II demonstrates the incompatibility of pure theory when implemented in “real” events.

This dissertation offers the interpretative supposition that the Underground Man represents various mathematical ideas, including the imaginary unit i , as well as an anthropomorphized *reductio ad absurdum*, or a proof by contradiction. To confirm the power and virtue that he assigns himself in isolated consciousness, the Underground Man follows the testing methodology of *regula falsi*, or the process of assigning arbitrary values to solve for

unknowns in a given problem. As an intended *quod erat demonstrandum*, or "that which had to be proven", Dostoevsky argues the inferiority of lonesome rationality relative to the sum of the body and the spirit in the composition of *living life*, while also defending free will.

In the literary universe of Dostoevsky, freedom is paramount. As a theme that originated, arguably, in *Notes from the House of Dead* [*Zapiski iz mertvogo doma*] based on his experiences in Siberian prison camps, and which continued in *Notes from Underground*, as well as other subsequent works, Dostoevsky affirms that people will act against their own self-interest to assert their own agency and autonomy. Progressivists throughout the nineteenth century upheld the belief that human beings commit crimes, wars, and atrocities, simply because they do not understand their own benefit. Even when mathematical and scientific methods allow human subjects to maximize the utility derived by all parties a given exchange, Dostoevsky highlights the psychological and spiritual prerogatives of individuals to act contrary to these computations to assert their right to choose for themselves what to do, or what not to do. Free will, desire, and spirituality run counter to the corollary enslavement of scientific determinism, understood as absolute predictability and the immutable certainty of mathematical calculation.

Chapter Three examines mathematical themes in *Crime and Punishment*. Raskolnikov, like the Underground Man, resents his social station, and to aspires to achieve self-realization in a society that denies him freedom and respect. In the formulation of Nietzsche, he strives to assert his will to power. In this regard, themes from "Underground" reappear in different contextual proportions. Raskolnikov's heinous act of murdering the pawnbroker and her meek half-sister Liza reflect his drives to dictate not only the systemic rules governing his own life, but also those of others. The book serves as an allegorical examination of the motivations for murder, considering in particular, utilitarian calculus, or the ideological system devised by Jeremy Bentham (1748-1832) and John Stuart Mill (1806-1873) equating morality with the maximization of utility. Taken to the extreme, utilitarian calculus would justify transgressions

and atrocities in pursuit of a supposed greater good. In the frameworks of utilitarian calculus, the ends justify the means, sanctioning individual acts, which other ethical codes would deem immoral or impermissible. Again through the mathematical method of *regula falsi*, Dostoevsky tests, in a meticulous sequence, the array of philosophical arguments that would justify murder.

The characters of Dostoevsky express a pervasive worry that their lives will all be for naught. They strive towards great deeds, but nearly always fall short of their expectations. The legacy of human action exists only so far as people remember it. Entire lives, consequently, remain precariously situated on the precipice of oblivion. Whereas Liza Knapp situates this anxiety in the context of the inertia, the ensuing analysis of this dissertation grounds this intellectual panic in the frameworks of mathematics, with respect to limits, infinity, and the infinitesimal. In reconciling the relationship between action and thought, how does the individual create sustainably positive legacies to avoid becoming a non-entity, a null set?

In discrete mathematics, zero represents a point on the number line that can be used to establish relative claims regarding the status of other values, e.g. x is greater than 0, or y is less than 0. Set theory, in contrast, upholds the notion that the null set, as the expression of non-entity, remains ubiquitously present in all other sets. The null set is a subset of every possible set, including itself. It is the concept marked by the absence of anything and anyone. While the null set can exist as a relative entity for evaluating all other values, in set theory, it is more appropriate to consider *nothingness* as the underlying ontological basis of *somethingness*. Death, as the metaphorical expression of complete absence or non-existence, in this regard, is not a

finality. In regard to sets, and the phenomenon of life, nothing always retains the potential to become something.²

Chapter Four assesses the interplay of probability, spirituality, and free will as predicated upon unpredictability in *The Gambler* with reference to the personal life and private writings of Dostoevsky. If one fully understood the vast array of intrinsic variables acting upon the outcomes of a given event, would the associated calculations of probability not always yield certain results? When the outcome is undetermined, then perhaps there is always a *chance* that the event will turn out one way, and not another. What is the nature of *chance*, and how does it necessarily relate to *choice*? If our humanity is predicated upon choice, does the individual devoid of choice remain human? Furthermore, this chapter surveys unique features of Dostoevsky's religiosity in relation to his understanding of mathematical systems.

Lastly, Chapter Five evaluates the metaphysical consequences of Non-Euclidean geometry, hypothetical conceptions of the infinite, the fallibility of scientific determinism, and intertextual discourses communicating existential themes in "Dream of a Ridiculous Man" and *The Brothers Karamazov*. The chapter explores interpretations of elements participating in extended debates concerning the nature of being, and ontological status of life after death. Mathematical problems from classical antiquity, such as Zeno's Paradox of Achilles and the Tortoise, disputes between Plato and Aristotle concerning forms and empiricisms, as well as differentiating the "indefinitely great" from "infinite" comprise important philosophical subtexts of the two works.

² This theme is echoed in the epigraph to *The Brothers Karamazov*, from the Gospel of John, chapter 12, verse 24: "Verily, verily, I say unto you, except a corn of wheat fall into the ground and die, it abideth alone: but if it die, it bringeth forth much fruit." «Истинно, истинно говорю вам: если пшеничное зерно, падши в землю, не умрет, то останется одно; а если умрет, то принесет много плода» (PSS 14, 5); see also *The Holy Bible*, Revised Standard Version (New York: Oxford UP, 1973), 1306.

Out of the consideration that philosophy did not develop in Russian culture as an independent, professional discipline until the turn of the twentieth century, the Russian novel entailed extra-literary proportions. The rise of the Russian novel, consequently, coincided not only a new artistic form, but also a synergistic medium, in which characters internally and externally experience the ramifications of philosophical arguments following the evaluative investigations of their author-creators. Dostoevsky, correspondingly, is as much a philosopher as he is an author. Both “Dream of a Ridiculous Man” and *The Brothers Karamazov* contain revealing commentary regarding the dimensional constructs of existence, the immortality of the soul, and the hypothetical premise of alternate realities.

During his education, Dostoevsky struggled with algebra, but consistently excelled in geometry. This consideration lends itself readily to metaphorical readings of his literary works. He wrestled incessantly with unknown values, but fluently diagrammed and navigated the interconnected dimensions of space. As a perfect theoretical construct, space is defined, largely, by what you make of it. You can move it, bend it, turn it, invert it, put things into it, or remove what is already there. Consequently, for the author-artist, space is a subjective construct. The conception of space, therefore, reflects human consciousness, and possesses immense *imaginary* potential to correspond to any *desired* variety of permutated forms.

Tracing the legacy and resonance of mathematical concepts in the conclusion, this dissertation explores briefly the treatment of Non-Euclidean geometry in Russian culture following the publication of *The Brothers Karamazov*. Turgenev's 1882 prose poem, *Istina i pravda*, for example, calls into question the significance of geometric principles for the interactions of ordinary individuals, and perhaps sarcastically interrogates the revelations of Ivan

and Alyosha in Chapter III, "The Brothers Get Acquainted" in Book V, *Pro and Contra*.³ In the twentieth century, Evgenii Zamiatin, likewise examines a selection of mathematical themes using a variety of motifs popularized by Dostoevsky.

As additional objectives of the conclusion, I summarize my findings, outline questions to be addressed with additional research, and gauge the resonance of Dostoevsky's mathematical ideas in international developments across diverse academic concentrations. Albert Einstein, sensing these same proclivities, for example, famously affirmed, "If you ask in whom I am most interested at present, I must answer Dostoevsky—Dostoevsky gives me more than any scientist, more than Gauss!"⁴ How do contemporary readers regard the curious appearance of these mathematical references and themes in his creative fiction, and what role did they play in shaping historical events and cultural developments of the twentieth century?

The appendix to the dissertation features a concise summary of the development of mathematics in Imperial Russia to elucidate the intellectual and professional atmosphere that gave rise to the education and imagination of Dostoevsky. Aside from providing background information to stimulate interest in further reading, the appendix communicates developments in mathematics from the time of Peter the Great to the start of the nineteenth century to demonstrate the kinds of ideas and research that culminated before Dostoevsky enrolled at the Main Engineering School. Special attention has been given to social contexts at the Academy of Sciences in Petersburg, technical universities, and developments in industrialization to shed new

³ I.S. Turgenev, "Istina i pravda" in *Polnoe sobranie sochinenii i pisem* (Moscow: Khudozhestvennaia literatura, 1975-1978), tom 8, 472.

⁴ «Wenn Sie aber fragen, wem ich zurzeit das stärkste Interesse entgegen bringe, so kann ich darauf erwidern: es ist Dostojewski! Mir gibt Dostojewski mehr als irgend ein Wissenschaftler, mehr als Gauss!»). Albert Einstein cited by Alexander Moszkowski in *Einstein the Searcher*, tr. H.L. Brose, London, 1921, 185; see also V.G. Kisun'ko "A. Einshtein i gumanitarnye aspekty estestvennonauchnogo znaniia", in Borisovskii et al., *Iskusstvo*, 246-294; Alexander Vucinich, *Einstein and Soviet Ideology* (Stanford, CA: Stanford UP, 2001), 181. The quotation was also popularized in Russian translation: «Достоевский даёт мне больше, чем любой научный мыслитель, больше, чем Гаусс!». As cited by Grigorii Pomerants, "Euclidean and Non-Euclidean Reason," in *The New Russian Dostoevsky*, trans. and ed. Carol Apollonio, (Bloomington, IN: Slavica, 2010), 75.

light on the progression of mathematics as a professional discipline in Russian life. These elements demonstrate the evolution of the intellectual atmosphere that Dostoevsky engaged first as a student, and second, as a pivotal figure of world literature.

Commentary on Research Materials

Compared to other nineteenth-century authors, materials related to Dostoevsky are dispersed widely throughout the Russian Federation. As Igor Volgin describes in his introductory remarks to the 1997 text, *The Dostoevsky Archive: Firsthand Accounts of the Novelist from Contemporaries' Memoirs and Rare Periodicals* by Peter Sekirin, “The fate of Dostoevsky’s manuscripts is different from, for example, that of the manuscripts by Alexander Pushkin or Leo Tolstoy, which were concentrated exclusively in one place (the Pushkin House in St. Petersburg and the Tolstoy Museum of Moscow).”¹ This tendency reflects the breadth of the travels and occupations of the author. Starting from his childhood in Moscow, to his young adulthood in St. Petersburg, to Siberia in chains along the worker’s way [*rabochii put’*] and compulsory military service following his arrest in 1849, to his earliest excursions of Western Europe in 1862, Fyodor Mikhailovich Dostoevsky was a man constantly on the move. Relevant artifacts and materials belonging to the artist, consequently, are scattered across Russia.

The thematic and geographic departmentalization of Russian archives has contributed to the dispersal of materials related to his life and writings. The Russian National Library (RNB) and The Institute of Russian Literature Archive (IRLI) in the Pushkin House of St. Petersburg contain samples of the author’s original works, as does the Central State Archive of Literature and Art (RGALI) in Moscow. Additionally, documents pertaining to his education at the Nikolaevsky Military Engineering School in St. Petersburg, as well as his testimony in the Petrashevsky trials of 1849, are held in the Russian State Military Historical Archive (RGVIA) in Moscow.² In 1955, the Central State Military Archive (TsGvia) in Leningrad was liquidated,

¹ Igor Volgin, “Introduction” to *The Dostoevsky Archive: Firsthand Accounts of the Novelist from Contemporaries' Memoirs and Rare Periodicals*, ed. and comp. Peter Sekirin (Jefferson, NC: McFarland, 1997), 9.

² During Soviet times, RGVIA was known as TSGVIA [ЦГВИА], the Central State Military Historical Archive.

and its associated holdings were largely transferred to RGVA.

Other records related to his arrest, interrogation, and imprisonment, however, are held in the State Archive of the Russian Federation (GARF) in Moscow. The majority of these materials have been preserved in digital formats and made accessible to the public. Unfortunately, the original notebooks and manuscripts from the education of Dostoevsky mostly did not survive, as they were confiscated and destroyed by the Third Section of the Russian Secret Police.³

Reconstructing his education, consequently, is easier said than done.⁴ This dissertation approaches the question through secondary sources not always belonging directly to Dostoevsky, including materials derived from the chancellery records of the Nikolaevsky Military Engineering School from the time of his enrollment preserved at RGVA, letters to his contemporaries, state educational directives, publications regarding scientific research and

³ Dostoevsky initially endured the suspicion of state authorities for having rendered three public readings of Vissarion Belinsky's 1847 letter to N.V. Gogol. The letter criticized the satirical novelist for his promotion of serfdom, and rejection to the premise of social mobility expressed in *Vybrannye mesta iz perepiski s druz'iami* [*Correspondence with Friends*, 1846]. Despite the sociological commentary of his novels, which seemed to lambaste the hypocrisy and inequalities of Russian society, Gogol the author upheld conservative political opinions. Dostoevsky read the letter twice at the Palm-Durov Circle, and once at a gathering of the Petrashevsky Circle. Presumably, police informants heard rumors of the readings, but they may have received the information directly from undercover informants. When Dostoevsky was arrested in 1849, his vocal opposition to serfdom supplemented more serious charges of designing and building of an illegal printing press. Although the press was not finished, it would have allowed the group to disseminate subversive literature and propaganda without have to submit material to the approval of state censors. Consequently, the police had special motivation to confiscate any and all materials reflecting Dostoevsky's engineering notes, as they could be used, presumably, in the right hands to manufacture additional presses. Harold Bloom, "Introduction" to *Bloom's Biocritiques: Fyodor Dostoevsky*, (Philadelphia: Chelsea House, 2005), 6; Igor Volgin, "Introduction" to *The Dostoevsky Archive: Firsthand Accounts of the Novelist from Contemporaries' Memoirs and Rare Periodicals*, 9; K.A. Lantz, *The Dostoevsky Encyclopedia*, 35.

⁴ According to I.D. Iakobovich, "During the examination of the inventories of the archive, it was found that against the titles of many archival files for the period of interest to us from 1837 to 1843 there is a blank label, "withdrawn", or "none". «При просмотре описей архива обнаружилось, что против названий многих архивных дел за интересующий нас период с 1837 по 1843 г. имеется глухая помета "выбыло," "нет"». I.D. Iakubovich, "Dostoevskii v glavnom inzhenernom uchilishche (materialy k letopisi zhizni i tvorchestva pisatel'ia)" in *Dostoevskii. Materialy i issledovaniia*, ed. G.M. Fridlender, Vol. 5 (Leningrad: Nauka, 1983), 179.

school functions, as well as the recollections of his family members, classmates, and teachers.⁵

Accounting for the degree with which Dostoevsky engaged interdisciplinary topics is difficult for biographers and bibliographers to gauge adequately. Although he read widely, and embedded elements from extended polemics in his prose, historical and literary analyses largely rely on educated conjecture to assess how deeply he researched questions and topics from the associated curricula of his scholarship at the Main Engineering School. At this initial juncture, it is necessary to provide a general disclaimer that some speculation is required to assess how thoroughly Dostoevsky delved into his coursework.

The appearances of mathematical references and themes in his textbooks and private reading materials do not prove incontrovertibly that the author fully internalized concepts from his studies. In academia, professors frequently skip over units in textbooks, and modify course expectations from year to year. While copies of his grades, personal letters, and several mathematics textbooks are known to scholars today, his notebooks from his education have largely vanished. The materials that have survived, coupled with the interpretation of references in his published works, however, allow for the informed inference of his engagement with extended mathematical and scientific discourses.

To augment the primary arguments concerning the role of mathematics in the imagination of F.M. Dostoevsky, a great many other notable sources were consulted. The substantial 2011 bibliography *Index of the Productions of F.M. Dostoevsky and Literature About Him in Russian* [*Ukazatel' proizvedenii F.M. Dostoevskogo i literatury o nem na russkom iazyke*] by Sergei Belov lists thousands of primary and secondary source writings pertaining to the life and literary works of Dostoevsky. Prominent biographies, moreover, such as though published by R. Belknap

⁵ According to the circulation records at RGVIA, I.D. Iakubovich is the only other scholar besides myself to have requested the chancellery records of the Main Engineering School. This archive fund contains chancellery records describing the academic process of the Main Engineering School from 1837-39 and 1841-42, during the directorship of General-Lieutenant B.L. Shargorstom.

(1990), A. Dolinin (1922), Joseph Frank (1976; 1983; 1986; 1995), L. Grossman (1924) R.L. Jackson (1984, 1993), K. A. Lantz (1993-1994), O. Miller (1883), K. Mochulsky (1967) and V. Terras (1984) all provide compelling syntheses of the diverse life experiences of the authors, tracing the trajectories of his writings, philosophical ideas, and cultural legacies. In a similar regard, the 1990 collection, *F.M. Dostoevsky in the Recollections of his Contemporaries* [*F.M. Dostoevskii v vospominaniakh sovremennikov*], edited by K. Tiunkina presents impressions of the novelist by his family members, classmates, and instructors during the key period of his education at the Main Engineering School from 1838-1843.

The 2005 *Library of F.M. Dostoevsky: A Scientific Description of the Attempt of Reconstrunction* [*Biblioteka F.M. Dostoevskogo: opyt rekonstruktsii nauchnoe opisaniie*] compiled by N.F. Budanova et al., published by the Russian Academy of Sciences Institute of Russian Literature Pushkin House includes an abridged inventory of personal reading materials belonging to the author. The text serves as an excellent updated supplement to Leonid Grossman's 1919, *The Library of Dostoevsky from Unpublished Materials* [*Biblioteka Dostoevskago po neizdannym materialam*], published by A.A. Ivasenka in Odessa. In an 1854 letter to his brother Mikhail, Dostoevsky professed his deep connection to his library by affirming, "Books are my life, my sustenance, my future"⁶ The author was such a great lover, borrower, and lender of books, newspapers, and journals that any attempt to catalogue his vast knowledge undoubtedly presents an incomplete cross section of his vast literary awareness of canonical works, concepts, and movements in a variety of subject concentrations.

Leading up to his arrest in 1849, Dostoevsky borrowed freely from the library of Mikhail Petrashevsky, which contained a large collection of foreign texts, including works by Pierre-Joseph Proudhon, Charles Fourier, Louis Blanc, D.F. Strauss, Gustave de Beaumont, and Eugène

⁶ «Книги- это жизнь, пища моя, моя будущность!» (PSS: 28, bk 1, 173).

Sue.⁷ Petrashevsky even possessed several “forbidden books,” pertaining to subjects deemed too sensitive by state censors, usually in the arenas of politics, religion, and sociology.⁸ Even in the less repressive climate of Tsar Aleksandr II, few of these texts appeared subsequently on the personal bookshelves of Dostoevsky following his return from exile. Dostoevsky frequented the library at the Main Engineering School, museums, public libraries, theatrical performances, public talks, and exhibitions. His personal interactions and written correspondence with journalists, critics, playwrights, and artists instantiate his substantial knowledge of extended interdisciplinary discourses. In short, he was a learned man of immense proportions, and a great many sources need to be considered to provide for a sufficiently comprehensive examination of the various ideas and dialogues he engaged throughout his development as an author.

The prospect of gathering and organizing such materials entails no easy mission. It amounts to the task of recreating an image of the author from the sum of recollections, anecdotes, written records, and artifacts pertaining to his life and works. Following the death of Dostoevsky in 1881, Anna Grigorievna Dostoevskaia led successful efforts to compile an archive concentrated in the “Dostoevsky Room” created in the Moscow Historical Museum under her direct supervision; however, some of these documents disappeared during the Civil War.⁹ These

⁷ K. A. Lantz, *The Dostoevsky Encyclopedia* (Westport, CT: Greenwood Publishing Group, 2004), 403; Stephen Kirby Carter, *The Political and Social Thought of F.M. Dostoevsky* (New York: Routledge, 2014), 46; Joseph Frank, *Dostoevsky: The Seeds of Revolt, 1821-1849* (Princeton, NJ: Princeton University Press, 1979), 241-242.

⁸ Ibid. 403

⁹ Boris Tikhomorov, former President of the Russian Dostoevsky Society, is currently writing a historical mini-series for television regarding the disappearance of materials related to the life and writings of Dostoevsky during the Russian Civil War. Of particular relevance, the original manuscripts of *The Brothers Karamazov* disappeared during this period. The associated texts may have contained illuminating plans or clues concerning the intended sequel to the novel that Dostoevsky never published. See Galina Artemenko, “Taina «Brat’ev Karamazovykh»” in MR7.ru, 8 February 2016. Accessed online at <<http://mr7.ru/articles/126005/>>.

efforts persisted until her own death in 1918.¹⁰ In the 1930s, moreover, scholarly study of Dostoevsky's works was effectively limited by Soviet censors.¹¹ From the collection assembled by Anna Grigorievna, V.S. Nechaeva compiled *A Description of the Manuscripts of F.M. Dostoevsky* [*Opisanie rukopisei F.M. Dostoevskogo*] in 1957, during the period of relaxed ideological censorship referred to as "the Thaw" [*ottepel'*].¹²

Information on mathematical texts that the author referred to throughout his studies stem from the chancellery records of the Nikolaevsky Military Engineering School held at RGVIA, as well as key biographies. Although historians and literary scholars have explored different facets of his education, there are noticeable gaps concerning the content of his coursework and particular academic focus. This dissertation reconstructs the curriculum that Dostoevsky encountered during his study at the school from 1838-1843.

While conducting archival research in Russia in the spring of 2014, I had the opportunity to inspect his original algebra and geometry textbooks, logarithmic tables, Latin dictionary, select course descriptions, and observations recorded by school instructors and administrators. The Memorial Apartment Museum of F.M. Dostoevsky in St. Petersburg featured brief excerpts from his school materials, examination marks, and original correspondences from the time of studies as part of a special exhibit on the life of the author. Some of these materials were also available on microfiche at the Russian State Archive of Literature and Art (*RGALI*).

At the Archive of the Russian Academy of Sciences (*Nauchno-spravochnaia biblioteka - PFA RAN*), I inspected several original texts by Leonhard Euler. The 1843 compendium of Euler's work published by the Academy of Sciences provides a condensed summary of his most

¹⁰ Igor Volgin, "Introduction" to *The Dostoevsky Archive: Firsthand Accounts of the Novelist from Contemporaries' Memoirs and Rare Periodicals*, ed. and comp. Peter Sekirin (Jefferson, NC: McFarland, 1997), 7-8.

¹¹ *Ibid* 7-8

relevant research findings translated into the Russian vernacular. While Dostoevsky did not seem to own this compendium, the work would have been widely known to students and junior officers studying at the Main Engineering School under the tutelage of Mikhail Ostrogradsky, who both wrote and edited sections of the text. Although I did not have the opportunity to visit archives devoted to Nikolai Lobachevsky in Kazan and Nizhnii Novgorod, I still managed to peruse a selection of his correspondence on microfilm at RGALI, and inspected late nineteenth-century reprints of his seminal works at the Russian State Library in Moscow, as well as the Russian Academy of the Sciences in St. Petersburg.

Survey texts developing the historical trajectory of mathematics, such as the 1996 reader, *The History of Mathematics*, by John Fauvel and Jeremy Gray, assigned by Professor Karen Parshall in MATH 5030, as well as the 2011 *A History of Mathematics* by Carl B. Boyer and Uta S. Merzbach improved my understanding of the development of mathematics as a professional discipline. Professor Parshall provided recommendations for a number of compelling secondary texts, including the canonical titles by Alexander Vucinich: *Science in Russian Culture: A History to 1860* (1963), *Science in Russian Culture, 1861-1917* (1971), and *Einstein and Soviet Ideology* (2001). These sources, combined with evidence derived from the writings of Euclid, Plato, Zeno, Aristotle, Cardano, Galileo, Kant, Descartes, Euler, Gauss, and Lobachevsky drastically improved my ability to contextualize mathematical concepts and debates central to the scholarship, published works, and diverse artistic legacies of F.M. Dostoevsky.

Mathematical Terminology

Real number line (*veshchestvennaia chislovaia os'*) is the linear continuum whose points are all real numbers. The real number line expresses the set of all real numbers, denoted by \mathbb{R} , and represents the union of all rational and irrational numbers. Viewed as a geometric space, the real number line comprises Euclidean space of dimension one, i.e. length.

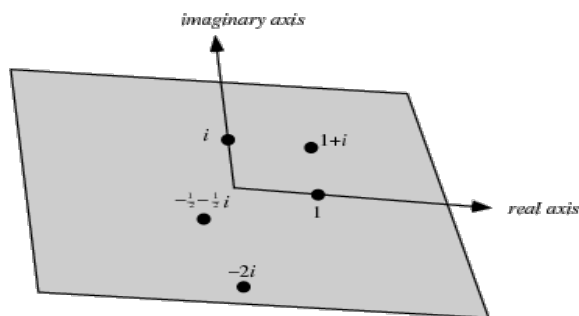
Real number (*veshchestvennoe chislo*) is any value that exists as a point on the continuum of the real number line.

Imaginary unit (*mnimaia edinitsa*) is the unit, denoted by i , defined by the property $i^2 = -1$. The term imaginary is used because there is no real number with a negative square root.

Imaginary number (*mnimoe chislo* or *voobrazhaemoe chislo*) is a number that can be written as a real number multiplied by the imaginary unit. It takes the form bi where b is a real number, and i is the imaginary unit, e.g. $7i$.

Complex number (*kompleksnoe chislo*) is a number that can be expressed in the form $a+bi$ where a and b are real numbers and i is the imaginary unit.

Complex plane (*kompleksnaia ploskost'*) is the set of all complex numbers, comprising a plane defined by two axes, one the set of all real numbers, i.e. the real number line, and the other the set of all imaginary numbers. The plane, indicated by the gray parallelogram in the diagram below, comprises a space of dimension two, i.e. area, however, it is anachronistic to consider this space in Euclidean terms, since Euclid only conceived of positive real numbers in *The Elements*. The plane extends the real number system \mathbb{R} into the complex number system \mathbb{C} .



Left: Eric W. Weisstein, "Complex Plane" for Wolfram MathWorld. Reproduction permission (July 2016).

Integer (*tseloe chislo*) is a number that can be written without a fractional component. The set of integers, often denoted by \mathbb{Z} , consists of zero (0), the *natural numbers* (1,2,3...), and their additive inverses (i.e. the negative integers, -1, -2, -3...).

Positive number (*polozhitel'noe chislo*) is a real number greater than zero.

Negative number (*otritsatel'noe chislo*) is a real number less than zero. Negative numbers entail a slightly different set of arithmetic rules than those governing other numerical entities, e.g. a negative multiplied by a negative results in a positive number, and a negative multiplied by a positive will yield a negative. A number raised to a negative exponent will yield the fraction, in which the number raised to the positive counterpart of the original exponent appears in the denominator. For instance, $5^{-3} = 1/(5 \times 5 \times 5) = 1/125$. The general formula follows: $a^{-n} = 1/a^n$

Rational Number (ratsional'noe chislo) is any number that can be expressed as the quotient or fraction p/q of two integers, p and q , provided the denominator q does not equal zero. Every integer is a rational number.

Irrational Number (irratsional'noe chislo) is any number that cannot be expressed as a ratio of two integers. Irrational numbers are expressible only as decimal fractions where the digits continue forever with no repeating pattern. Some examples are the square root of 2, and the square root of 3.

Transcendental number (trantsendentnoe chislo) is any number that cannot be the root of a polynomial equation, i.e. an expression consisting of variables and coefficients involving the operations of addition, subtraction, multiplication, and non-negative integer exponents, with rational coefficients. Every transcendental number is also an irrational number. Examples of transcendental numbers are π (3.141592654...) and Euler's e , the base of the natural logarithm, (2.7182818...).

Logarithm (logarifm) is the exponent to which another fixed value, the base, must be raised to produce that number. For example, the logarithm of 1000 to base 10 is 3, because 10^3 is 1000: $1000=10 \times 10 \times 10$. For any two real numbers b and x , where b is positive, and $b \neq 1$, the notation $x=\log_b(y)$ infers $y=b^x$. Parentheses are often included for clarity. In computer programming, "log x " without reference to a particular base ($_b$) implies the common base of 10.

Euler's number (chislo Eilera), or e , is an irrational, transcendental constant, denoted by lowercase e , that appears repeatedly in nature and mathematical formulas, including nonlinear increase or decrease (e.g. growth and decay, compound interest, etc.), the statistical "bell curve", and even the study of the distribution of prime numbers. Approximately, e is equal to 2.718, however, its value has been calculated to 869,894,101 decimal places by mathematician Sebastian Wedeniwski. The value of e is calculated by adding an infinite sum of factorials. In mathematics, the factorial of a non-negative integer n , denoted by $n!$, is the product of all positive integers less than or equal to n . For example, "three factorial" is written as "3!" and means $3 \times 2 \times 1 = 6$. As the quotient of the factorials diminishes asymptotically as x approaches infinity, an approximate value of e , or ~ 2.718 is derived by calculating:

$$e = 1/0! + 1/1! + 1/2! + 1/3! + 1/4! + 1/5! \dots = \sim 2.718$$

After "five factorial", we find:

$$e = 1.0 + 1.0 + .5 + .1667 + .0417 + .0083 = 2.7167$$

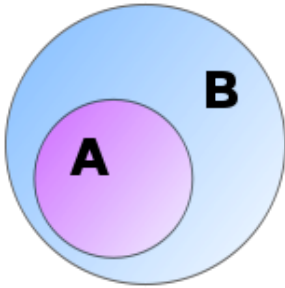
Natural logarithm (natural'ny logarifm) of a number is its logarithm to the base e , where e is Euler's number. The natural logarithm function, denoted by \ln , entails the following identities: if $x > 0$, then $e^{\ln(x)} = x$, and $\ln(e^x) = x$. Today, most standard calculators process \ln functions. In Dostoevsky's era, slide rules and the rote memorization of logarithmic tables were required to approximate values, instead of determining the resulting numbers by means of lengthy calculations. For example, $\ln(7)$ is approximately equal to 1.9459. That is,

$$e^{1.9459} = 6.99 \text{ or } \sim 7$$

Set (mnozhestvo) in mathematics is a collection of distinct objects, considered as an object in its own right. Sets are conventionally denoted with capital letters. The objects that make up a set (also known as the *elements* or members of a set) can be anything: numbers, people, letters, etc.

Subset (podmnozhestvo) is a set of which all the elements are contained in another set.

Superset (nadmnozhestvo) with respect to another set, is a set such that each of the elements of the other set is also an element of the original set.



The Euler Diagram to the left expresses the relationship between the conceptual entities of *subset* and *superset*. A is a proper *subset* of B, and conversely, B is a proper *superset* of A. To draw a parallel, A could express ‘dogs’, and B could express ‘animals’, to demonstrate the relationship in visual terms that all dogs are animals, but not all animals are dogs.

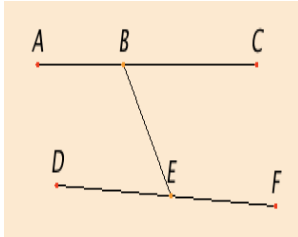
Above: Eulerian Diagram by Chris Martin. Fair-use permission via Wikimedia Commons.

Null set (nul’- mnozhestvo), which is also sometimes referred to as the empty set (*pustoe mnozhestvo*) is the unique set having no elements, denoted by the symbol \emptyset , or $\{\}$. Its cardinality, or the count of elements in a given set, is zero. Since there are no elements of \emptyset , the null set has no elements that are not also in any other set. The null set is vacuously present in every other set. Axiomatically, it follows that \emptyset is a subset of every set.

Undefined (neopredeliaemyi) can have several different meanings in mathematics, depending on the context. In geometry, the concepts of “point,” “line,” and “plane” express ideas that have enough intuitive appeal that we may safely use them as a starting place for extended mathematical reasoning and speculation. In *Elements*, published around 300 B.C.E., Euclid defines a *point* as “that which has no part,” a *line* as “a breadthless length”, and a *plane* as a “surface which lies evenly with the straight lines on itself.” Since these terms refuse physical realizations, mathematicians attempt to establish abstract properties that the associated undefined terms satisfy. Such properties, which are *assumed* to be true, are called *axioms* or *postulates*. In arithmetic, certain mathematical operations, usually concerning conceptions of both the infinite and infinitesimal, including division by zero, and zero to the power of zero, are intrinsically indeterminate. In algebra, a function is said to be “undefined” at points not in its *domain*, i.e. the input values for which the function is defined. For example, in the *real number system*, $f(x) = \sqrt{x}$ is undefined for negative x , i.e. since no such *real* values exist for the function f .

Euclidean geometry (Evklidova geometriia) or *Elementary Geometry (elementarnaia geometriia)* is a mathematical system attributed to the Alexandrian Greek mathematician Euclid. It begins by assuming a small set of intuitively appealing axioms, and deducing from them many other related propositions and theorems. Euclid’s 13-volume *Elements* was the first to show that geometric axioms and theorems could be organized according to a system based on logic and deductive reasoning. Originally, *Elements* served as a pedagogical compendium of all mathematical knowledge developed to 300 B.C.E. Arguably, *Elements* is the most important mathematical text ever written. Re-examinations of Euclid’s fifth postulate, or the *parallel*

postulate, have given rise to the frameworks of non-Euclidean geometry. In his original formulation, Euclid outlines the postulate in the following manner: “if a straight line falling on two straight lines makes the interior angles on the same side less than two right angles, the two straight lines, if produced indefinitely meet on that side on which are the angles less than the two right angles.”



In the diagram to the left, if angle ABE plus angle BED is less than two right angles, then lines AC and DF will meet when extended in the direction of A and D. By describing the situation as such, Euclid very cleverly avoids taking a stance on the ontological basis of infinity, which at the time, was a hotly contested question dividing mathematicians subscribing to Plato’s Forms, on one hand, and those promoting Aristotelian Empiricisms on the other. The Scottish mathematician John Playfair (1748-1819) devised a slightly different formulation of the postulate, affirming, “In a plane, given a line and a point not on it, at most one line parallel to the given line can be drawn through the point.”

Above: Diagram by David E. Joyce. Reproduction permission (July 2016).

Non-Euclidean geometry (neevklidova geometriia) arises as a distinct study in mathematics by replacing Euclid’s *parallel postulate* with an alternative axiomatic rule, or by changing the metrics of the set of real numbers, that is, the measurable distance between elements of that set. Euclid gingerly avoided deliberations on the infinite, a topic that scholars hotly contested in Classical Antiquity. If extended to infinity, the two parallel lines in Euclid’s formulation would remain separated by a constant distance, and never intersect. To reiterate Playfair’s postulate, “In a plane, given a line l , and a point A not on it, at most one line parallel to the given line can be drawn through A.

In hyperbolic geometry, alternatively, there are infinitely many lines through A not intersecting l , while in elliptic geometry, any and all lines through A intersect l . The concave (hyperbolic) or convex (elliptic) curvature of space entails different geometric assumptions. Around 1813, Carl Friedrich Gauss was among the first to offer conjecture on these ideas, and then around 1830, János Bolyai and Nikolai Lobachevsky independently published treatises on hyperbolic space. Albert Einstein’s Theory of General Relativity suggests that the substance of space itself is curved, thereby creating additional applications for Non-Euclidean geometry in astronomy, communications, and particle physics.

Associated Computational Resources

In addition to the arguments presented in the enclosed dissertation, associated materials on the web serve to augment the primary written narrative submitted to the committee. Readers may wish to refer to the WordPress site hosted on University of Virginia servers at the URL below:

<https://pages.shanti.virginia.edu/Dostoevsky_Project/>.

Aside from making the research materials, interpretative frameworks, and select findings of this dissertation more accessible to a general readership, the WordPress site features a variety of multimedia resources intended to encourage the collaborative inspection of the life and writings of F.M. Dostoevsky. Digital applications, moreover, incorporated into the site help to shed new light on the array of mathematical discourses embedded in his literary works, and to survey the diverse legacies of his interdisciplinary insights and sensitivities. The integration of NowComment and Diigo into the site, for example, allow different readers to share their reactions and mark-ups in the marginalia of electronic pages. Wordclouds and statistical information pertaining to the frequency of lexical units derived from concordances and digital publications of primary source writings, furthermore, highlight the prevalence of mathematical ideas in individual works, as well as throughout the complete corpus of texts by Dostoevsky.

In several key respects, this website will allow future scholars to continue delving into the questions explored in this dissertation. A selection of applications will be developed and included in the site to promote the increased accumulation of new evidence pertaining to the presentation of mathematical and scientific concepts in works by Dostoevsky. Natural Language Processing programs and algorithms, for instance, will be used to scan for additional patterns in the syntax and morphology of Dostoevsky's prose communicating mathematical themes. Similarly, network analysis tools developed by UVa SHANTI (Sciences, Humanities and Arts Network of Technological Initiatives) will illuminate whether shifting interpersonal relationships in his novels and short stories contribute to the realization of interdisciplinary motifs.

Ideally, the reconstruction of the education of the novelist at the Main Engineering School will be of value not only to Dostoevsky scholars, but to a range of Slavists and historians. Dostoevsky was not the only the 19th-century artist to have encountered the diverse curricular offerings in mathematics and the applied sciences at state military institutions in St. Petersburg. Mikhail Lermontov, Tsesar Cui, Modest Mussorgsky, Konstantin Trutovsky, and Dmitrii Grigorovich all studied in various branches of the Nikolaevsky Military Academy. In the subsequent period of 20th-century, Dmitrii Zamiatin carried on the legacy of infusing his literary works with allusions to his studies in engineering and navigation. Arguably, Dostoevsky participated in a burgeoning literary form involving the mixing genres and methods of different subject concentrations. This project, in both its primary written narrative and associated web publication, reflects the outset to a larger project tracing the cultural representations of and reactions to scientific advancements developed in Russia and Eastern Europe. The insights that I have this gained from this project will one day contribute to a monograph that extends the argumentative framework of Alexander Vucinich's *Science in Russian Culture* into literature, theater, film, and the visual arts. Art and science and inextricably linked. Studies that uphold them as entirely separate intellectual domains fail to grasp their dynamic interconnectedness. The merging of scientific inquiry and artistic expression entails incredible possibilities.¹

¹ See Julio M. Ottino and Gary Saul Morson, "Building a Bridge Between Engineering and the Humanities" in *The Chronicle of Higher Education*. Vol 62, Issue 23. 19 February 2016. Accessed online at: <<http://chronicle.com/article/Building-a-Bridge-Between/235305>>.

Introduction

Although he struggled as a student and military cadet, his enrollment at the Main Engineering School in St. Petersburg from 1838 until 1843 exposed him to scientific ideas that would come to undergird his psychological perspicacity, penetrating descriptive talents, and the overarching formulation of his existential philosophy.¹ Dostoevsky famously described his authorial process in an undated notebook entry toward the end of his life: “I am only a realist in the highest sense. I depict all the depths of the human soul.”² The mathematical training and sensitivities that he derived from his studies informed his realist approaches.

Select memorable characters in works by Dostoevsky describe similar educational experiences to those that the author encountered during his studies at the Main Engineering School. Father Zosima, for instance, spent eight years at “the military cadet school in Petersburg.”³ Reflecting on his studies, Zosima affirms, “in the novelty of my new surroundings there, many of my childish impressions grew dimmer, though I forgot nothing. I picked up so many new habits and opinions that I was transformed into a cruel, absurd, almost savage creature. A surface polish of courtesy and society manners I did acquire together with the French

¹ The name of the school changed several times throughout its historical development, but perhaps most memorably in 1855, when it was renamed *Nikolaevskoe voenno-inzhenernoie uchilishche*, [*Nikolaevsky Military Engineering School*] in honor of Tsar Nikolai I. In addition to the main *uchilishche* [school], the institution also housed the *voenno-inzhenernaia akademiia* [academy] that adopted the ranks of the Russian military. Cadets, ensigns, junkers, and conductors often trained in the *uchilishche*, before entering the *akademiia* as lower officers. Consequently, historians and literary scholars refer to the institution by a variety of translated nomenclature. Joseph Frank refers to the institution as “the Academy of Military Engineers”, whereas Konstantin Mochulsky calls it the “School of Engineering”. This dissertation prefers The Main Engineering School, the literal translation of *Glavnoie inzhenernoie uchilishche*, its title when Dostoevsky enrolled in 1838. Joseph Frank, *Dostoevsky: A Writer in His Time* (Princeton, NJ: Princeton UP, 2012), 51; Konstantin Mochulsky, *Dostoevsky: His Life and Work*, ed. and trans. Michael A. Minihan (Princeton, NJ: Princeton UP, 1967), 120.

² «[Я] лишь реалист в высшем смысле, то есть изображаю все глубины души человеческой» (*PSS* 27, 65).

³ «В Петербурге, в кадетском корпусе, пробыл я долго, почти восемь лет». (*PSS* 14, 268).

language.”⁴ The Underground Man, additionally, describes his education at a St. Petersburg school. Although he provides unfavorable recollections of his school, readers generally infer that he was immersed in military sciences based on the professions of his former classmates in state posts, combined with his overriding pessimism toward technology social positivism. Kirilov in *Demons*, likewise, embodies yet another jaded engineer.

The appearance of his earliest original works in 1845 and 1846 suggests that Dostoevsky turned his attention to literature, even before he became a professional artist. Creative writing, very likely, comprised an activity that he performed at the expense of focusing on his assigned coursework in drafting and engineering. Lieutenant-General A.I. Savel’ev, for instance, describes that Dostoevsky had begun writing *Poor Folk* already in his first year of study.⁵ In the November 1877 edition of *Diary of a Writer*, similarly, Dostoevsky describes that some of the language which appeared in *The Double* emanated from his time at the Main Engineering School, i.e. 1843-1844. Dostoevsky discusses his apparent coinage of the verb ‘*stushevat’sia*’, for instance, meaning to ‘efface oneself’, or ‘pull in one’s horns,’ and attributes its ostensible usage to the parlance of his fellow classmates, recounting the harrowing experience of completing exercises and examinations before public audiences of peers and instructors.⁶ Despite

⁴ «[И] с новым воспитанием многое заглушил из впечатлений детских, хотя не забыл ничего. Взамен того принял столько новых привычек и даже мнений, что преобразился в существо почти дикое, жестокое и нелепое. Лоск учтивости и светского обращения вместе с французским языком приобрел...» (*PSS* 14, 268).

⁵ “Forty years later, during one of my meetings with F.M. Dostoevsky, when I recalled his night writing activities in the military company, owing especially to the circumstance that I sometimes disturbed him to study at night, he told me that he had actually then been writing the novel, *Poor Folk*.” «Сорок лет спустя при одном из моих свиданий с Ф.М. Достоевским, когда я припомнил его ночные письменные занятия в роте, особенно то обстоятельство, что я мешал ему иногда заниматься ночью, то он мне сказал, что он тогда действительно писал роман *Бедные люди*». A.I. Savel’ev in *Biografiia, pis'ma i zametki iz zapisnoi knizhki F.M. Dostoevskogo* (St. Petersburg: Tip. A.S. Suvorina, 1883), 43.

⁶ See the November 1877 entry titled, “A History of the Verb ‘*stushevat’sia*’: “The bon mot was invented in the class of the Main Engineering School, precisely the one I was in with my classmates.” «Словцо это изобрелось в том классе Главного инженерного училища, в котором был и я, именно моими однокурсниками» (*PSS* 26, 66).

the rigors of his studies in mathematics, Dostoevsky had already begun to sense his true passion for literature, which undoubtedly pulled him away from mathematics, but not completely.

Though lacking a tangible multitude of mathematical references, the early writings of Dostoevsky embody the gradual retreat of the author from the fields of engineering and the applied sciences. Aspects of *Poor Folk* and *The Double* communicate opening glimpses of his artistic genius, temporarily preoccupied by a range of subjects, which, admittedly, he did not love, but all the same shaped his perceptive abilities, thought processes, and aesthetic leanings. While this dissertation does not divulge full analyses of mathematical elements in the earliest published texts, *Poor Folk* and *The Double* reveal subtle elements of his experiences at the Main Engineering School, which reappear, arguably, throughout his entire corpus of works. References to these opening stories largely serve to enhance the critical treatment of trends in his more widely-read novels, but the texts undoubtedly represent prospective arenas for future research regarding the evolution of his interdisciplinary mindset and creative process.

Most biographers and historians subscribe to the notion that Dostoevsky never truly enjoyed his studies at the Main Engineering School, arguing that the completion of his academic degree reflected his desire to live up to the wishes of his deceased father, or to fulfill materialistic objectives in securing a reliable income, as opposed to demonstrating his genuine intellectual curiosities in the sciences. Dmitrii Grigorovich, a classmate of Dostoevsky, recalled his education as a series of “memories that brought back a painful feeling.”⁷ Dostoevsky, likewise, endured the hardships of the school, but he also derived insights that set him apart from other authors. Pupils generally do not profess loving, let alone liking school, but they nevertheless derive knowledge, skills, and sensitivities from their studies. Schooling, moreover, tends to be an activity that quietly builds character, and unnoticeably germinates new ideas in malleable and

⁷ F.M. Dostoevskii, *Pis'ma*, ed. A.S. Dolinin, vol. 4. (Moscow, 1928-1959), 235; Joseph Frank, *Dostoevsky: A Writer in His Time* (Princeton: Princeton UP, 2010), 43.

restless young minds. At times, it may be arduous, or even painful, especially when corporal punishment is still used as a means of exacting discipline, but maturation, new perspectives, and even inspiration simmer to the surface all the same.

Education, moreover, is not purely intellectual. Teenage emotions are unpredictable, and the reasons for not liking a particular course of study can stem from sour interpersonal relations, just as much as a distaste for the pedagogical offerings of a school. While Dostoevsky remained friendly with several classmates for the rest of his life, he lost touch with the vast majority of his peers, and even later counted several of them as adversaries. Ivan Berezhetskii, for example, is widely accepted to have been the autobiographical model for the unnamed schoolmate, whom the Underground Man describes in Chapter Three of Part II in *Zapiski iz podpol'ia*, as a friend who later became an enemy.⁸

In the context of a lonely aside, the Underground Man declares contemptuously in a mode of Romantic Schillerism, “I did have a sort of a friend once, but by that time I was already a tyrant in my soul; I wanted to exercise complete authority over his soul, I wanted to implant in him a contempt for his surroundings...But when he devoted himself to me entirely, I began to hate him and repelled him.”⁹ The Underground Man reiterates the isolation that Dostoevsky endured at the Main Engineering School as a retreated into books and his studies to avoid interacting with the rest of his classmates, whom he “hated terribly.”¹⁰ His lack of friends and close acquaintances at the school contributed to his overarching distaste for his studies.

While the curriculum at the school emphasized mathematics and the sciences, there were also opportunities for pursuits in the humanities. Dostoevsky took French, German and Russian

⁸ Joseph Frank, *Dostoevsky: A Writer in His Time*, 44; Konstantin Mochulsky, *Dostoevsky: His Life and Work*, 15.

⁹ “«Был у меня раз как-то и друг. Но я уже был деспот в душе; я хотел неограниченно властвовать над его душой; я хотел вселить в него презрение к окружавшей его среде...но когда он отдался мне весь, я тотчас же возненавидел его и оттолкнул от себя» (PSS 5, 140).

¹⁰ «Я ненавидел их ужасно» (PSS 5, 140).

language courses, participated in seminars on Orthodox Christianity, subscribed to foreign-language library collections, and edited the newspaper, *Revel'skii sniatok*.¹¹ Though most graduates of the school found careers in the military, others found employment in humanitarian disciplines and the arts. Two students, the musician Mikhail Chikhachyov and Ignatii Bryanchaninov, upon finishing the officer courses, entered St. Sergius' Monastery as novices.¹² Dostoevsky and his classmate Grigorovich became authors, another Trutovsky became a painter, and shortly later, Cesar Cui, one of the renowned composers from the Mighty Five graduated in 1855 after studying music and engineering at the school simultaneously.¹³

Before his arrest, Dostoevsky likely endured pangs of jealousy watching classmates, whom he ostensibly deemed less-qualified than himself, ascend the table of civil and military

¹¹ By commenting on his involvement in the publication of *Revel'skii sniatok*. Lieutenant-General A.I. Savel'ev explicates that the interests of Dostoevsky gravitated more toward the humanities than the sciences. A brief reference to the newspaper, *Revel'skii sniatok* appears on page 79 of *The Seeds of Revolt* by Joseph Frank. Frank, however, incorrectly translates «сняток» as a “a small fish, a smelt.” Vladimir Iliashevich, citing Dahl's dictionary, in contrast, argues that the word originates from the verb «снять», meaning 'to remove,' and more appropriately refers to the “top of something cut away,” such as the “crème de la crème.” Curiously enough, it seems unlikely that the paper was actually intended for students of the Main Engineering School. As the word, «Ревельский» in its title would suggest, the target audience of the publication was the larger detachment of Russian military engineers in Reval, modern-day Tallinn, where his brother Mikhail was stationed and enrolled as a student “in correspondence,” while he recuperated from symptoms of consumption. Dostoevsky's involvement in the publication, likely, was prompted by both familial and literary motivations. The paper facilitated extended periods of excused leave, which also allowed him to visit with Mikhail. Unfortunately, the Russian National Archive system, [*Portal Arkhivy Rossii*], does not show any surviving copies of the newspaper, nor does the current manifestation of the Main Engineering School, the Military-Engineering Technical University (VITU) possess original printings. Upon recommendations from the Slavic Reference Service, I expanded the bibliographic search to Estonia, which still did not produce surviving copies. While the publication may have been lost in fire, flood, or warfare, it was likely similar to the American periodical, *Stars and Stripes*, read by active and inactive members of the American military. A.I. Savel'ev in *F.M. Dostoevskii v vospominaniakh sovremennikov*, ed. M. Tiun'kina (Moscow: Khudozhestvennaia literatura, 1990), 167; Joseph Frank, *The Seeds of Revolt* (Princeton: Princeton UP, 1976), 79; Vladimir Iliashevich, *F.M. Dostoevskii. Zagadka “Revel'skogo sniatka” on Sait russkoi kul'tury v pribaltike*, 2004. Accessed online at: <<http://www.baltwillinfo.com/Dost/dost-22.htm - beggin>>.

¹² Konstantin Mochulsky, *Dostoevsky: His Life and Work*, 11. Mochulsky alludes to the possibility that Dostoevsky may have come into contact with this “secret mystical spirit” at the school during his studies.

¹³ Orest Miller, *Biografiia, pis'ma i zametki iz zapisnoi knizhki Dostoevskogo*, 46; Arthur Elson, *Modern Composers of Europe* (Boston: L.C. Page & Co, 1904), 252; Peter Sekirin, *The Dostoevsky Archive: Firsthand Accounts of the Novelist from Contemporaries' Memoirs and Rare Periodicals*, 51; A.F. Nazarov, *Tsezar' Antonoovich Kiui* (Moscow: Muzyka, 1989), 21.

ranks, while he struggled in poverty trying to become an author. Still, the consideration that Dostoevsky maintained extended contact with his classmates and instructors illustrates that his education was not entirely a negative experience. He even appeared at the 50th anniversary of the school in 1869, and spoke at the honorary lunch commemorating the career of his mechanics instructor, General-Lieutenant Savel'ev.¹⁴ In light of his literary accomplishments, Dostoevsky was one of nine alumni of the school invited to deliver speeches at the reunion event. The anniversary was celebrated with great fanfare, including parades, marching bands, and appearances by the royal family of Tsar Aleksandr II.¹⁵ Accepting the thesis that Dostoevsky wholeheartedly despised his studies perhaps reflects the narrow departmentalization of concentrations in the humanities. There is an overarching hesitancy among literary scholars to engage with mathematics, just as scholars in the sciences rarely engage creative literary fiction.



¹⁴ “Jubilei A.I. Savel’eva,” *Istoricheskii Vestnik*, 1884. No. 3. March, 629; P.A. Ivanov, “Po povodu stat’i na jubilee Nikolaevskoi Akademii i uchilishcha,” in *Sankt-Peterburgskie Vedomosti*, No. 325, January 1869, 2-3.

¹⁵ M. Maksimovskii, *Istoricheskii ocherk: Razvitiia Glavnago inzhenernago uchilishcha 1819-1869*, 7-8.

Previous page image on the left: 1869 portraits of speakers at the 50th anniversary of the Main Engineering School announced in *Vsemirnaia Illiustratsiia*.¹⁶ Dostoevsky appears in the top right corner of the announcement.

Previous page image on the right: Poster from the 50th-anniversary celebration of the school.¹⁷

As a peculiar and timid youth, coping with the death of his mother from tuberculosis in 1836, and the alleged murder of his father in 1839, Dostoevsky found it difficult to connect to his classmates, and to immerse himself fully in school activities.¹⁸ One of his close friends and classmates, Dmitrii Grigorovich describes how Dostoevsky “already then exhibited traits of unsociability, stayed to one side, did not participate in diversions, sat and buried himself in books, and sought a place to be alone.”¹⁹ Konstantin Trutovsky, another classmate in his small circle, affirmed that Dostoevsky “always had a serious look about him, and I simply cannot imagine laughing or having fun with a group of friends. I don’t know why, but at school, he carried the name “Photius.”²⁰ Throughout his studies, the young author remained largely aloof.²¹

¹⁶ “Tubilei glavnago inzhenernogo uchilishcha” in *Vsemirnaia illiustratsiia*, St. Petersburg, 1869 (No. 52), 409. Fair-use reproduction from *Vsemirnaia Illiustratsiia*, 1869, accessed on microfiche during the Summer Research Lab at the University of Illinois in June of 2014.

¹⁷ Image provided by Elena Stankevich, *Dostoevskii i inzhenernoi zamok*, Virtual'nyi filial russkogo muzeia, 2015. Reproduction permission (July 2016).

¹⁸ Rachel Thomas, “Ideas Imbued and the Exploration of Experience: The Works of Fyodor Dostoevsky” in *Fyodor Dostoevsky*, ed. Harold Bloom (Langhorne, PA: Chelsea House Publishers, 2005), 69.

¹⁹ «Федор Михайлович уже тогда выказывал черты необщительности, сторонился, не принимал участия в играх, сидел, углубившись в книгу, и искал уединенного места». D. Grigorovich in *F.M. Dostoevskii v vospominaniakh sovremnikov*, ed. K. Tiunkina, vol. 1 (Moscow, 1990), 106.

²⁰ «Вид его всегда был серьезный и я не могу себе представить его смеющимся или очень веселым в кругу товарищей. Не знаю почему, но он у нас в училище носил название Фотия.» Konstantin Mochulsky, *Dostoevsky: His Life and Work*, 15. In the assessment of Mochulsky, “Photius” may refer to the fanatical archimandrite (in the world Pyotr Spassky) who regarded himself as “the Savior of the Church and the Fatherland,” and exercised an unfortunate influence over Aleksandr I, or perhaps to the great 9th century Byzantine Patriarch and champion of the Eastern Church. While a selection of his schoolmates may have known of the historical legacy of the name in Eastern Orthodoxy, it seems more probable to suggest that the derisive nickname stuck because of the phonological similarities between Photius and Fyodor. This nickname, moreover, reflects the early spiritual inclinations of Dostoevsky. As cited in K.V. Mochul'skii, *Dostoevskii: zhizn' i tvorchestvo*, (Paris: YMCA-Press, 1980), 18.

Unlike other students, whose families possessed rank, wealth, and influence, Dostoevsky sprang from humbler origins. His father, Dr. Mikhail Andreevich Dostoevsky, was a noble of relatively low rank. In 1827, Dr. Dostoevsky was promoted to the rank of collegiate assessor (eighth class).²² His sons' names were entered into the registry of Moscow's hereditary nobility, and he received the order of St. Anna third class for "especially zealous medical service" at the Mariinsky Hospital for the Poor in the northern outskirts of Moscow in 1828.²³ Other cadets of the school, in contrast, hailed from bloodlines that had belonged to the nobility for centuries. Throughout his studies, Dostoevsky struggled to maintain stable finances. He could not even afford to pay the matriculation fee of 950 rubles, for example, and managed to enroll at the school, thanks only to a generous monetary gift from Aleksandr and Aleksandra Kumanin, his mother's godparents.²⁴ Dostoevsky always had a difficult relationship with money, and the compulsive gambling habits that he developed later in life only exacerbated his pecuniary problems. Even in these early years, the author wrestled with poverty and debt.

While Dostoevsky struggled to pay for tea, and made do with ragged boots during the frigid St. Petersburg winter, students who had made "gifts" to examiners were admitted to the

²¹ Throughout his five years at the Main Engineering School, Dostoevsky seems to have befriended only a handful of his classmates: Ivan Berezhetkii (1820-1869), Nikolai Vitkovskii (1820-1892), Dmitrii Grigorovich (1822-1900), Konstatin Trutovsky (1826-1893), and Nikolai Beketov (1827-1911). His closest friend during this period, arguably, Ivan Shidlovsky (1816-1872), did not even attend the Main Engineering School, but rather worked as a civil servant in the Ministry of Finance. Shidlovsky was a friend from childhood, and he was among the first to take Dostoevsky's literary aspirations seriously. He served as a something of a mentor to the young author. Orest Miller, *Biografiia, pis'ma i zametki iz zapisnoi knizhki Dostoevskogo*, (St. Petersburg: Tipografiia A.S. Suvorina, 1883), 46; Joseph Frank, *Dostoevsky: A Writer in His Time*, 51.

²² Leonid Grossman, *Dostoevsky: A Biography*, trans. Mary Mackler (New York: Bobbs-Merrill Co., 1975), 14.

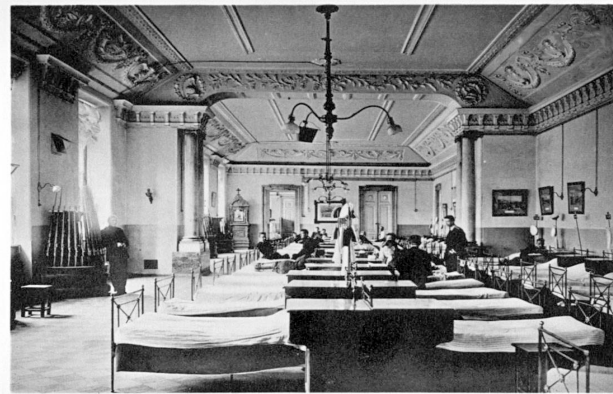
²³ Joseph Frank, *Dostoevsky: A Writer in His Time*, 6.

²⁴ (PSS 28, bk. 1, 47); David Lowe and Ronald Meyer, *Fyodor Dostoevsky: Complete Letters, 1832-1859* (Ann Arbor: Ardis, 1988), 36

school without payment for matriculation.²⁵ His perceived social inferiority during this period established his acute awareness of the injustices of the Russian bureaucracy. Following the style of Gogol, his literary works convey the plights of the *raznochintsy*, “those of miscellaneous rank”, such as merchants, students, medical workers, clerical servants, and minor officials, etc., who comprised a growing social estate in nineteenth-century Russian life.²⁶



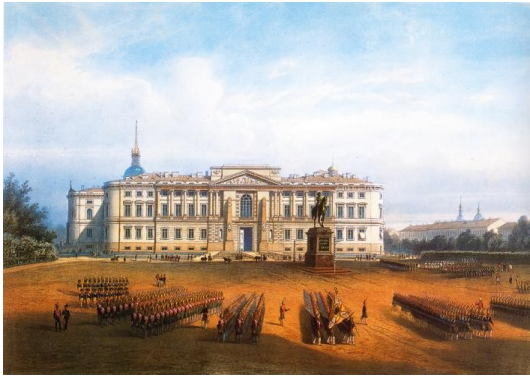
Библиотека Академии и училища.



Большая камера 1-й роты.

²⁵ Ibid. 46; see also a letter dated 5-10 May 1839 in which Fyodor Mikhailovich implores his father to send him money, ironically arguing that “he won’t die of hunger if he doesn’t drink tea”, and new boots “to make his way to the camps”: «Что же; не пив чаю, не умрешь с голода. Проживу как-нибудь! Но я прошу у Вас хоть что-нибудь мне на сапоги в лагери; потому что туда надо запастись этим.» (PSS 28, bk. 1, 58). Joseph Frank (41), however, calls into question the urgency of Dostoevsky’s requests for funds from his father to make his stay at the training camps more bearable. Count Peter Semenov recounts, “I lived in the same camp with him, in the same linen tents...and I got along without my own tea (we received some in the morning and the evening), without any more boots than I was issued, and without a trunk for my books, although I read as much as F.M. Dostoevsky. As a result, all of this was not actual need, but simply a desire not to be different from other comrades who had their own tea and boots and trunk.” «Я жил в одном с ним лагере, в такой же полотняной палатке <...> и обходился без своего чая <...>, без собственных сапогов, довольствуясь казенными, и без сундука для книг, хотя я читал их не менее, чем Ф. М. Достоевский. Стало быть, все это было не действительной потребностью, а делалось просто для того, чтобы не отстать от других товарищей, у которых были и свой чай, и свои сапоги, и свой сундук.» P. P. Semenov in *F.M. Dostoevskii v vospominaniakh sovremnikov*, ed. K. Tiunkina, vol. 1, 120.

²⁶ Elise Kimerling Wirtschafter, “The Groups Between: *Raznochintsy*, Intelligentsia, Professionals”, in *The Cambridge History of Russia: Volume 2, Imperial Russia, 1689-1917*, ed. Dominic Lieven (New York: Cambridge UP, 2006), 251.



Above and bottom of previous page: The black and white pictures above and on the previous page appear in the 1903 *Album of the Nikolaevsky Engineering School* [*Al'bom Nikolaevskago Inzhernogo Uchilishcha*], compiled by R. Golik and A. Vil'borg.²⁷ Although the pictures depict the facilities of the school in a later period, when it was known by a different name, the classrooms and student quarters remained largely unchanged from the time of Dostoevsky's enrollment. The painting in the lower-left is titled, "Military Exercises on the Parade Grounds of the Engineering Castle" ["*Uchen'ia na platsu u Inzhenernogo zamka*"] by I. Sharleman', depicts formation and marching activities, which cadets would be asked to perform as part of their courses in the military sciences.²⁸ In addition to the grounds immediately adjacent to the school, cadets would sometimes hold exercises on the Field of Mars [*Marsovoe pole*], a large lawn adjacent to the Summer Garden [*Letnii sad*], which when not used by detachments of the armed forces, served as a park for the St. Petersburg public.

The greed, aggression, sycophantism, and blind ambition of his classmates perhaps influenced his ultimate decision to leave the profession of engineering in 1844. In the very first letter to his father after the commencement of his classes in the 1838, Dostoevsky reports, "I cannot say anything good about my comrades."²⁹ Hazing and bullying were rampant, and administrators often ignored situations when influential members of the nobility perpetrated infractions, or disregarded the rules of conduct. Bullying and intimidation among the student body were generally tolerated by teachers and commanding officers, so long as an external sense of rank and file was upheld.³⁰

²⁷ Fair-use reproduction of 1903 photographs.

²⁸ "Military Exercises on the parade Grounds of the Engineering Castle" by I Sharleman' provided by Elena Stankevich. Reproduction permission (July 2016).

²⁹ Letter dated February 4, 1838, «[O] товарищах ничего не могу сказать хорошего» (*PSS* 28, bk. 1, 46).

³⁰ F. Joseph Frank, *Dostoevsky: A Writer in His Time*, 42.

Recalling episodes from his education, Dostoevsky describes the negative impressions of his peers that persisted in his memory more than twenty years later: “What examples I saw before me! Children of thirteen already reckoning out their entire lives: where they could attain rank, what is more profitable, how to rake in cash (I was in the Engineers), and what was the fastest way to get a cushy, independent command!”³¹ This egoistic striving appears prominently in literary works by Dostoevsky, as does the willing submission of individuals to serve as lackeys to ascend the table of ranks in the acquisition of status and acceptance. The character of Andrei Lebeziatnikov, for instance, in *Crime and Punishment*, possesses a surname formed from the verb *lebezit*, meaning 'to fawn, or act in a servile manner in order to gain favor.' Pyotr Luzhin, similarly, whose surname means ‘puddle,’ reflects a personality type willing to sacrifice moral virtue for materialistic advancement and power over others, such as Dunia. The Underground Man, likewise, views the company of Simonov, Trudoliubov, Ferfichkin as pretentious sycophants to the wealthy and influential Zverkov.

Despite voicing unabashedly negative assessments of his classmates, Dostoevsky performed his mathematical coursework diligently. Like a selection of his protagonists, including Raskolnikov, Arkadii Dolgorukii, and Ivan Karamazov, Dostoevsky embodied the conflicted student. Education, on one hand, represented a pragmatic means for wealth, status, and power, but on the other, it expressed the drive of human curiosity to understand the mysterious dynamics of existence. While part of the personalities of the author undoubtedly craved material comfort and stability, the spiritual side of Dostoevsky regarded these materialistic motivations as base relative to the more noble aims of grasping the underlying mystic properties of life in its enigmatic splendor, and forging meaningful relationships with others. While Dostoevsky may have detested the majority of his peers, his studies at the Main Engineering School allowed him

³¹ F. M. Dostoevskii, *Pis'ma*, edited and annotated by A.S. Dolinin (Moscow, 1928-1959), vol. 4, 267. As cited in *Ibid.* 42.

to undertake his more primary artistic objectives: to solve the riddle of man, to parse his contradictions, and to elucidate the intrinsic unknowns of life.

Predominantly, literary historians and biographers, including Joseph Frank, David Magarshack, Konstantin Mochulsky, and K.A. Lantz accept the notion that Dostoevsky categorically hated his years at the Main Engineering School. Frank remarks, for example, that “Dostoevsky’s life in the academy was a long torture, and he always looked back on the decision to send him there as a woeful mistake.”³² Mochulsky, likewise, describes that “without the least enthusiasm, Dostoevsky drudged through the lectures, examinations, the camping exercises; he submitted with difficulty to the stringent drilling; he crammed for the detested mathematics courses....in this depressing palace where Emperor Paul I was killed.”³³ Lieutenant-General A.I. Savel’ev echoes this sentiment, describing Dostoevsky and Grigorovich studied “literature, really more than science....The lectures on history and philology by Turunov and Plaksin occupied Dostoevsky more so than the integral calculus lessons by Ter-Stepanov and Chernevsky.”³⁴ While Frank expounds that Dostoevsky retreated into literature to escape “a milieu dominated by physical violence, military harshness, and iron discipline,” the young author seems to have excelled in, and perhaps even enjoyed his courses in mathematics and the sciences.³⁵

In a letter written to his father on June 5, 1838, Dostoevsky explains, “Just imagine, for all the intellectual subjects I have perfect scores, so that I have 5 points more than the first student for all subjects except drawing. But they pay more attention to drawing than to

³² Joseph Frank, *Dostoevsky: A Writer in His Time*, 41.

³³ Konstantin Mochulsky, *Dostoevsky: His Life and Work*, 120.

³⁴ «Оба они занимались литературою более, нежели наукою; Достоевского более занимали лекции истории и словесности Турунова и Плаксина, чем интегральные исчисления, уроки Тер-Степанова, Черневского». A.I. Savel’ev in *F.M. Dostoevskii v vospominaniakh sovremennikov*, ed. M. Tiun’kina (Moscow: Khudozhestvennaia literatura, 1990), 167.

³⁵ Joseph Frank, *Dostoevsky: A Writer in His Time*, 41.

mathematics. This grieves me a great deal.”³⁶ Scholars question the sincerity of this statement, as Fyodor Mikhailovich often appealed to his father for supplementary allowances. However, the repetition of these sentiments throughout his correspondence in this period demonstrate his genuine intellectual curiosity for mathematics.

Списокъ

3^{го} Кондукторскаго класса

на основании ученических экзаменов 1884 года

28.

		<i>имя отцовъ</i>	<i>баллы</i>	
<i>№</i>	<i>№</i>	<i>Фамилия</i>	<i>баллы</i>	<i>Замечание Конференціи</i>
1	1	Перовскихъ	9.7	
14	2	Козушкиски	8.7	
8	3	Достоевскій	8.9	<i>Первый отличенный ученикъ</i>
3	4	Донцова	8.9	
2	5	Визурова	8.7	<i>во 2^й Кондукторскій классъ...</i>
7	6	Тригоркина	8.6	
9	7	Канаркинетъ	8.4	<i>Молоде Перовскихъ шлохоты</i>
10	8	Скрябинскій	8.3	
5	9	Молотой	8.1	<i>баллы 9.7. на Конференціи,</i>
21	10	Каврайскій	7.9	
6	11	Мотыльковъ	7.8	<i>во уваженіи особеннаго гра-</i>
25	12	Патонъ	7.8	
12	13	Карпова	7.8	<i>дѣленія и отличнаго со-</i>
11	14	Моравскій	7.7	
15	15	Витковскій	7.7	<i>дѣленія, полагаясь на клас-</i>
16	16	Варяковъ 2	7.6	
14	17	Зелодкинъ	7.4	<i>ную сумму востановить сум-</i>
20	18	Андреевскій	7.3	
17	19	Ноголинъ	7.2	<i>мушка 10 балловъ</i>
19	21	Торчиновъ	7.2	
24	21	Камарскій	7.1	<i>Останутъ въ томъ же клас-</i>
18	22	Василькова	7.1	
13	23	Серебряковъ	7.1	<i>съ на другой годъ.</i>
26	24	Врацановичъ	7.0	
23	25	Шельковъ	6.9	
29	26	Воробьевъ 2	6.4	
20	27	Ситиковъ	6.7	
27	28	Николаевъ	6.4	
31	29	Масловъ	5.7	
30	30	Соболевъ	5.5	
28	31	Трибуцкій	5.1	
32	32	Крамарскій	4.5	

Андрей & Андрей & Андрей & Андрей,
Томасъ & Майръ & Митрофанъ.

³⁶ «Вообразите, что у меня почти из всех умственных предметов полные баллы, так что у меня 5 баллов больше 1-го ученика из всех предметов, кроме рисованья. А на рисованье смотрят более математики. Это меня очень огорчает.» (PSS 28, bk. 1, 48).

Previous page: final grades for the third conductor class of the Main Engineering School from the 1838-1839 academic year. In his first full year of study, Dostoevsky finished third in his class of 32 cadets. His name appears third from the top of the roster of his classmates.³⁷

The proclivities that Dostoevsky possessed for recognizing, navigating, and replicating *systems*, understood as the variable sum of intertwined processes, indicate abstractly the foundations of his mathematical genius. While Dostoevsky fluently comprehended the importance of systems in his mathematics coursework and examinations, his literary works espouse skepticism toward individuals professing intimate knowledge of the principles governing interpersonal relationships, individual psychologies, and the mutual reciprocity between thought and action. Characters who too ardently subscribe or yield themselves to a given system, be it fate, Newtonian mechanics, or utilitarian calculus, are inherently suspicious. Human beings are complex entities, who tend to rebel against any system predicating the finalization of their agency and free will.

Notwithstanding this overarching critique of mathematical systems relative to the nature of human subjects, in the context of nineteenth-century Russian literature, Dostoevsky is perhaps the only major novelist to have embedded explicit mathematical expressions, equations, and terminology in his prose. The Underground Man, for example, considers the ramifications of accepting the illogical proposition that $2 \times 2 = 5$, while simultaneously affirming that life is not “merely the extractions of square roots.” Raskolnikov, likewise, considers the tenets of utilitarian calculus to justify, at least in part, the murder of the wretched pawnbroker and her innocent younger sister, Liza. Alyosha and Ivan Karamazov, furthermore, directly evoke non-Euclidean geometric principles in metaphysical discussions regarding the dimensional composition and trajectory of the soul, and its theoretical convergence with the assumed premise of an afterlife.

³⁷ *Glavnoe inzhenernoe uchilishche*, RGVIA fund 351, op.1, d.522, 28. Reproduction permission (May 2014).

In addition to these well-known examples, a great many other of Dostoevsky's characters, predominately male protagonists, engage mathematical ideas. Null sets, probabilities, doublings, refractions, infinitely repeated zeroes, decimal sequences, alternate universes, and even the profession of engineering itself feature prominently in his works. Since Dostoevsky was a masterful "*detail évocateur*", these numerical and geometric elements, which most readers overlook, or attribute to his eccentric personality.³⁸ These mathematical elements convey content that is just as relevant as his repeated visual motifs, such as the inscription of the globe on Raskolnikov's pawned pocket watch, Sonia's plaid shawl, Stavrogin's little red spider, and Ivan Karamazov's sticky little green leaves.³⁹ Explicit references to these numerical discourses, combined with the more subtle implications of his precise language, allegorical adaptations of arguments from the natural philosophy of classical antiquity, and the merging of disciplinary approaches reflect his fascination with mathematics. To understand Dostoevsky more fully as an artist, it is helpful to evaluate and understand his particular mathematical way of thinking.

By investigating his education at the Main Engineering School, this dissertation attempts to explain the appearance of mathematical themes that seem incongruous with other popular literary works of the nineteenth century. Why did he include these mathematical elements in his prose, and where did he first encounter them? Accepting the hypothesis that Dostoevsky acquired a solid base of mathematical education in the years during and leading up to his schooling, what specialized skills and insights did he derive from his studies? What materials did instructors present in his coursework, and what mathematical ideas did he pursue in his independent reading? Similarly, how did his understanding of mathematical systems inform the conveyance of philosophical ideals, interpersonal relations, and the dynamics of social change?

³⁸ Victor Terras, *Reading Dostoevsky* (Madison, WI: University of Wisconsin Press, 1998), 9

³⁹ *Ibid.* 9

The appearance of mathematical motifs in works by Dostoevsky imparts an ostensible contradiction. If the significance of Russian culture defies calculation and quantification according to Western standards of scientific progressivism, why then does Dostoevsky impart his existential philosophy in a narrative mode relying on mathematical frameworks? Dostoevsky, accordingly, does not fully reject mathematics or rationality. Rather, he assesses the incompleteness of its models and engages the unanswerable questions challenging humanity to reexamine more thoughtfully the essence of existence.⁴⁰ Mathematics, in this vein, is not purely a quantitative discipline. If life were all arithmetic, then calculators would possess the answer to every problem. He inverts criticisms levied against Russia and its mystical spirituality, generally expressed in mathematical and scientific terms. Throughout his works, Dostoevsky proceeds to interrogate these reproaches in the consequential medium of their own argumentative logic.

This technique is perhaps reflected in an exchange between Alyosha and Ivan Karamazov, where the latter praises his younger brother for “turn[ing] his own words against him,” echoing an utterance attributed to Lord Polonius in *Hamlet*.⁴¹ While arithmetic in its discrete sense would seem to impart perfect and incontrovertible scientific truths, certain operations, such as division by zero, and raising zero to the zero power defy conceptualization. When processing expressions involving these select operations, calculators yield the befuddling

⁴⁰ Dostoevsky attempts to bridge “logic and ratiocination (*razum*)” with the “Orthodox virtue of total submission and self-abnegation (*smirenie*).” See Edith Clowes, “Self-Laceration and Resentment: The Terms of Moral Psychology in Dostoevsky and Nietzsche” in *Freedom and Responsibility in Russian Literature: Essays in Honor of Robert Louis Jackson* (Evanston, IL: Northwestern UP, 1995), 119.

⁴¹ Ivan Karamazov attributes to this quotation to Lord Polonius in *Hamlet* in response to Alyosha’s objection of the premise that man created the devil, just as he did he did God. Curiously enough, this quotation by Polonius does not seem to appear in the original English of *Hamlet*, but it may have been included in adapted Russian translations. Regardless of the status of the line in the original play, it reflects the premise of inverting the logic a given line of argumentation inward on itself. “I think if the devil doesn't exist, but man has created him, he has created him in his own image and likeness.' 'Just as he did God then?' observed Alyosha. ‘It’s wonderful how you can turn words,’ as Polonius says in *Hamlet*,’ laughed Ivan. ‘You turn my words against me. Well, I am glad. Yours must be a fine God, if man created Him in his image and likeness. «А ты удивительно как умеешь оборачивать словечки, как говорит Полоний в «Гамлете», - засмеялся Иван. – Ты поймал меня на слове, пусть, я рад. Хорош же твой бог, коль его создал человек по образу своему и подобию.» (PSS 14, 218).

results of “undefined” or “does not compute.” Mathematics tells humanity much about the world, but not everything. Laypeople often mistakenly regard mathematics as a purely quantitative field, when it actually comprises a qualitative discipline. While mathematics tells us much about the universe, it still reflects the doubts and debates of individuals charged with explaining and modeling the underlying dynamics of the mysterious world in which we all live.

In his 1997 article, “*Toward the Question of Work on ‘The Awareness of Non-Euclidean Geometry by Dostoevsky’*” [“*K voprosu o rabote «Vospriiatie Dostoevskim neevklidovoi geometrii»*”], literary historian Frants German presents an array of hypotheses to account for the origins of Dostoevsky’s knowledge of the specific mathematical advances proposed by Nikolai Lobachevsky. Liza Knapp, likewise, relates her own parallel interpretations of the origins of these discourses in her 1996 book, *The Annihilation of Inertia: Dostoevsky and Metaphysics*. E.I. Kiiko, for one, suggests that Dostoevsky encountered a review of Lobachevsky’s research by the German mathematician G. Helmholtz in the August 1876 edition of *Knowledge [Znanie]*.⁴² Another hypothesis points to Nikolai Strakhov, a friend and colleague of Dostoevsky, who mentions Lobachevsky in a letter to L.N. Tolstoy dated 12 October 1876.⁴³ Both German and Knapp allude to the possibility, moreover, that Dostoevsky heard of Lobachevsky while traveling throughout Western Europe, but ultimately dismiss this conjecture on the grounds that the mathematician would have been known by the highest academic circles in Germany.⁴⁴

Although Lobachevsky not translated into French until 1866, Carl Friedrich Gauss (1777-1855) became aware of the Russian geometer long before his works were praised widely in the

⁴² Gel'mgolts [Helmholtz, Hermann von]. "O proiskhozhdenii i znachenii geometricheskikh aksiom" *Znanie* 8, no. 2 (1876): 1-26. As cited in Liza Knapp, *The Annihilation of Inertia: Dostoevsky and Metaphysics*, (Evanston, IL: Northwestern UP, 1996), 187.

⁴³ Frants German, “K voprosu o rabote «Vospriiatie Dostoevskim neevklidovoi geometrii»” in *Voprosy literatury*, No. 5, 1997, 156-68; Liza Knapp, *The Annihilation of Inertia: Dostoevsky and Metaphysics*, 187.

⁴⁴ Marvin J. Greenberg, *Euclidean and Non-Euclidean Geometries: Development and History* (New York: W.H. Freeman and Co., 1993), 184.

West.⁴⁵ The mathematician Johann Bartels (1769-1836) taught Gauss in Germany, before relocating to Kazan, where he became an academic advisor of sorts for Lobachevsky.⁴⁶ The consideration that both Gauss and Lobachevsky shared the same mentor perhaps facilitated their academic correspondence. In 1842, upon Gauss' recommendation, Lobachevsky was even elected to the Göttingen Scientific Society [Göttingen Gessellschaft der Wissenschaften].⁴⁷ However unlikely, Dostoevsky may have encountered reports of Lobachevsky in his travels abroad, as early as 1862.

As yet another possibility, Professor Igor' Volgin at Moscow State University (and Vice President of the International Dostoevsky Society) proposes that Dostoevsky first learned of non-Euclidean geometry from his professor Mikhail Ostrogradsky (1801-1862), during his days at the Main Engineering School. As an elected member of the Academy of Sciences, Ostrogradsky effectively suppressed Lobachevsky's earliest papers, which were submitted for publication at the Russian Academy of Sciences in 1823.⁴⁸ Although academicians rejected his 1826 treatise, *A Condensed Explanation of the Principles of Geometry with a Strict Proof for the Theory Regarding Parallels*, [Szhatoe izlozhenie nachal geometrii so strogim dokazatel'stvom teoremy o parallel'nykh], Lobachevsky managed to include the associated controversial ideas in his 1829

⁴⁵ Gauss was elected as a corresponding member of the St. Petersburg Academy of Sciences in 1801. At the outset of this relationship, Gauss communicated with his foreign colleagues in German, French, and Latin. However, at the age of 62, Gauss decided to learn Russian to read primary publications. Presumably, this decision came about largely because of his interest in the research of Lobachevsky. Gauss alleged to have "reached conclusions upholding the basis of Non-Euclidean geometry before Lobachevsky, but abstained from publishing his opinions, fearing that his ideas would embroil him in controversy." In 1846, Gauss wrote to H.C. Schumacher, "I have not found anything in Lobachevski's work that is not new to me, but the development is made in a different way from the way I had started and, to be sure, masterfully done by Lobachevski in the pure spirit of geometry." As cited in Seth Braver, *Lobachevski Illuminated* (Washington: Mathematical Association of America, 2011), xiv.

⁴⁶ Athanase Papadopoulos, "Preface to Lobachevsky's 1886 biography" in *Pangeometry* (Zurich: European Mathematical Society, 2010), 218.

⁴⁷ Ibid. 220.

⁴⁸ Ibid. 220. See also Leonard Mlodinow, *Euclid's Window: The Story of Geometry from Parallel Lines to Hyperspace* (New York: Simon and Schuster, 2010), 119; Andrey Popov, *Lobachevsky Geometry and Modern Nonlinear Problems* (New York: Springer, 2014), 10.

text, *On the Beginnings of Geometry* [*O nachalakh geometrii*], published in *Kazan Messenger* [*Kazanskii vestnik*]. The work conveys the foundations of Non-Euclidean Geometry.⁴⁹

Ostrogradsky represents a pivotal figure in relation to the mathematical thought of Dostoevsky. In his own academic work, Ostrogradsky popularized the mathematical research of Leonhard Euler, and encouraged university instructors to use Eulerian methods in various pedagogical arenas, but especially in engineering and the applied sciences, where the successes of calculus and algebra produced fruitful results. The consideration that Ostrogradsky possessed direct knowledge of both Euler and Lobachevsky, and worked directly with Dostoevsky at the Main Engineering School, signifies his importance for the overall development of the author's interdisciplinary worldview. Although Ostrogradsky was hesitant to accept the radical theories of Lobachevsky, he conceivably introduced Dostoevsky to pressing research questions and debates at the forefront of mathematics in the mid-nineteenth century.

German entertains yet another possibility that Dostoevsky first learned of Lobachevsky through Sofia Vasil'evnaia Kovalevskaia (1850-1891), the first major female Russian mathematician, and the first woman appointed to a full professorship in Northern Europe at Stockholm University.⁵⁰ Prior to marrying Anna Grigorievna, Fyodor Mikhailovich courted Sofia Kovalevskaia's older sister Anna Vasil'evnaia Korvin-Krukovskaia. They met in 1865, and Dostoevsky frequently visited the family.⁵¹ Even after he broke off the engagement, Dostoevsky and his second wife Anna Grigorievna Snitkina maintained friendly relations with Sofia

⁴⁹ George Bruce Halsted, "Translator's Preface" to *The Theory of Parallels* by N.I. Lobachevsky (Chicago: Open Court Publishing, 1914), 8.

⁵⁰ Kovalevskaia made important contributions to partial differential equations, mechanics, and analysis. See: Barbara Alpern Engel, *Mothers and Daughters: Women of the Intelligentsia in Nineteenth-Century Russia* (Evanston, IL: Northwestern University Press, 2000), 83.

⁵¹ Woodford McClellan, *Revolutionary Exiles: The Russians in the First International and the Paris Commune* (New York: Routledge, 2005), 98.

Kovalevskaia.⁵² Sofia even visited the author and his family at their dacha in Staraia Russa, while the author was busy composing *The Brothers Karamazov*.⁵³

As another alternative interpretation, Dostoevsky's niece, Evgeniia Andreevna, married Mikhail Rykachyov, a doctor of physics at the Academy of Sciences.⁵⁴ Rykachyov likewise, may have introduced the author to non-Euclidean geometry. While German and Knapp present numerous historical literary interpretations concerning the initial inception of Dostoevsky's awareness of Lobachevsky, ultimately, he refuses to subscribe to a single explanation. Instead, he presents a holistic mathematical milieu that Dostoevsky experienced and engaged throughout his entire artistic development. This dissertation endorses the importance of the entire historical context that gave rise to mathematical elements in the writings of Dostoevsky, but assigns special significance to his education at the Main Engineering School as the period when he directly engaged the associated concepts and ideas in concentrated scientific studies.

In developing this historical context, German links Dostoevsky to Lobachevsky not through a tangible connection, but instead by referencing the library of the novelist. German suggests that Dostoevsky first encountered Non-Euclidean ideas not through the direct inspection of Lobachevsky, but rather indirectly in the writings of Immanuel Kant. He compares Dostoevsky's presentation of space in *The Brothers Karamazov* with the metaphysical

⁵² "Remembering the broken engagement of Dostoevsky with Anna Vasil'evna, A.G. Dostoevsky writes: "This, however, did not impede the friendly relations of the sister with Dostoevsky in the last years of his life." "Вспоминая неудавшуюся помолвку Достоевского с Анной Васильевной, А.Г. Достоевская пишет: «Это, однако, не помешало дружеским отношениям сестёр с Достоевским в последние годы его жизни.»" Anna Grigorievna Dostoevskaia in "*F.M. Dostoevsky v vospominaniiakh sovremennikov*," Vol. 2 (Moscow: *Khudozhestvennaia literatura*, 1990), 498. As cited in Frants German, "Vospriatie Dostoevskim neevklidovoi geometrii" in *Voprosy literatury*, No. 5, 1997.

⁵³ "Sweet Fedia! Don't be angry that I'm not home. I returned before 5 o'clock, and will be with Isaeva, Semyonova, Zhalkar, *Kovalevskaia*, and Rybachyova." «Милый Федя! Не сердись, что меня нет дома: я отправилась до 5 часов и буду у Исаевой, Семёновой, Жалкар, *Ковалевской*, и Рыбачёвой». Anna Grigorievna Dostoevskaia, *Vospominaniia*, (Moscow: Pravda, 1987), 260. As cited in Frants German, "К вопросу о работе «Vospriatie Dostoevskim neevklidovoi geometrii»," 161.

⁵⁴ Frants German, "К вопросу о работе «Vospriatie Dostoevskim neevklidovoi geometrii»," 161-162.

formulations expressed in the canonical 1781 text by Kant, *Critique of Pure Reason* [*Kritik der reinen Vernunft*]:

If it is possible that there are extensions of different dimensions, then it is also very probable that God has really produced them somewhere. For his works have all the greatness and diversity that they can possibly contain. Spaces of this kind could not possibly stand in connection with those of an entirely different nature; hence such spaces would not belong to our world at all, but would constitute their own worlds....In a metaphysical sense, more worlds could exist together, but here is also the condition under which it might also be probable that many worlds really exist. For if the only possible kind of space is a three-dimensional one, then it would be possible for the other worlds that I assume to exist apart from the one in which we exist to be spatially connected with ours, for the spaces are of one and the same kind.⁵⁵

The spiritual writings of Father Zosima, similarly, allude to the possibility of “other worlds,” just as Ivan and Alyosha Karamazov debate whether the negation of infinity would preclude virtue, and by extension, God as the source of all morality. It is possible that Dostoevsky situates his ontological position in response to both Kant and Lobachevsky. Although operating in different subject concentrations, both Kant and Lobachevsky express the possibility for different worlds to overlap, converge, or “be spatially connected” in the dimensional unity of existence.⁵⁶

The extent of Dostoevsky’s knowledge of Kantian philosophy is a matter of dispute, but he was, indeed, familiar with *Critique of Pure Reason*.⁵⁷ Dostoevsky’s personal library included

⁵⁵ Immanuel Kant and Eric Watkins, *Kant: Natural Science*, trans. Jeffrey B. Edwards and Martin Schönfeld, (Cambridge, UK: Cambridge UP, 2012), 28.

⁵⁶ Alexander Vucinich, “Nikolai Ivanovich Lobachevskii: The Man Behind the First Non-Euclidean Geometry” in *ISIS*, Vol. 53, No. 4 (Dec., 1962), 473.

⁵⁷ In a letter to his brother Mikhail dated 22 February 1854, Fyodor Mikhailovich requested that Kant’s *Critique of Pure Reason* be sent to him in Omsk. “Send me the Koran, “Critique of Pure Reason” by Kant, and if somehow it is possible to send unofficially in this position, then send me without fail, Hegel, but in particular regard to Hegel, “The History of Philosophy.” «Пришли мне Коран, “Critique de raison pure” Канта и если как-нибудь в состоянии мне переслать не официально, то пришли непременно Гегеля, в особенности Гегелеву “История философии”» (*PSS* 28, bk. 1, 173). See also N.F. Budanova, *Biblioteka F.M. Dostoevskogo: opyt rekonstruktsii nauchnoe opisaniye*, (St. Petersburg: Nauka, 2005), 8.

an annotated 1877 biography of Kant by A.V. Grube.⁵⁸ Ia. E. Golosovker (1963) and Evgenia Cherkasova (2009) insist that Dostoevsky studied Kant carefully.⁵⁹ Joseph Frank (1976) and James P. Scanlan (2002), on the other hand, are more incredulous to accept the significance of *Critique of Pure Reason*, but they allude to the likelihood that Dostoevsky first learned of Kant through his readings of N.M. Karamzin.⁶⁰ Kant and Karamazin met in 1789, and the latter recorded impressions of their philosophical exchanges in *Pis'ma russkogo puteshestvennika* (*Letters of a Russian Traveler*).⁶¹ In light of the fact that Dostoevsky requested a copy of *A Critique of Pure Reason* from his brother in 1854, and that his library included a biography of the philosopher, this dissertation acknowledges that Kant could have also been the source that piqued Dostoevsky's interest in the existential underpinnings of geometric frameworks.

While Golosovker and Cherkasova explore references to Kant in Dostoevsky's literary works, no one has yet grounded the origins of these ideological discourses in his engineering education, and his associated knowledge of mathematics. This dissertation proceeds by acknowledging that his awareness of metaphysical debates informed his understanding of mathematical frameworks, and vice-versa. In addition to explicit references to Kant and Lobachevsky, works by Dostoevsky exemplify connections to a broad range of mathematical concepts, thinkers, and disputes.

⁵⁸ A.V. Grube, *Biograficheskie kartinki*, Izd. Knigopradavtsa A.L. Vasil'eva, (Moscow: Universitetskaia tipografiia [Katkov], 1877), 335. In addition to Kant, the text also included biographies of Raphael Sanzio, Peter Paul Rubens, Galileo Galilei, Sir Isaac Newton, Blaise Pascal, Carl Linnaeus, Georges Cuvier, François Arago, James Watt, George Stephenson, Abraham Gottlob Werner, Joseph von Fraunhofer, David Garrick, Bertel Thorvaldsen, Ludwig Van Beethoven, Felix Mendelssohn-Bartholdy, Lord Byron, Walter Scott, Johann Kepler, William Pitt, and William Penn. This work familiarized Dostoevsky with a variety of diverse thinkers and their contributions to different ideological discourses. N.F. Budanova, *Biblioteka F.M. Dostoevskogo: opyt rekonstruktsii nauchnoe opisaniie*, 163.

⁵⁹ Ia. E. Golosovker, *Dostoevskii i Kant*, 1963; Evgenia Cherkasova, *Dostoevsky and Kant: Dialogues on Ethics*, 2009.

⁶⁰ James P. Scanlan, *Dostoevsky the Thinker* (Ithaca: Cornell UP, 2002), 22; Joseph Frank, *Dostoevsky: The Seeds of Revolt, 1821-1849*, 57.

⁶¹ *Ibid.* 22

As Mikhail Bakhtin and Viacheslav Ivanov point out, Dostoevsky's awareness of dialogues from Classical Antiquity, the Renaissance, and the Scientific Revolution contributed to the holistic formulation of his existential philosophy, founded at least implicitly, I argue, in mathematical models.⁶² The mathematical crux of his worldview involves Plato and Aristotle, Kant, Hume, and Hegel, Mill and Bentham, just as much as widely recognized thinkers of pure mathematics, including Pythagoras, Archimedes, Euler, Lobachevsky, Newton, and Leibniz. In the ancient world, the study of natural philosophy encompassed mathematics, sciences, and music, but did so, primarily through the vehicle of dialogic narrative. This tendency persisted throughout the Middle Ages and the Enlightenment, as well. Consequently, Dostoevsky participates in a kind of neo-Natural Philosophy. His works examine the quandaries of *being* not through the enumeration of mathematical formulae and proofs, but through the ideological weighing of argumentative logic conveyed in the mythopoetic medium of the novel.

Bakhtin was among the first literary scholars to identify the “polyphony” [*polifoniia*], or “heteroglossia” [*raznorechie*] in Dostoevsky's literary works.⁶³ Bakhtin asserts, in the opening chapter of his 1929 canonical work, *Problemy poetiki Dostoevskogo*, [*The Problems of Dostoevsky's Poetics*], that Dostoevsky was, in fact, the creator of the polyphonic novel.⁶⁴

Unlike the productions of other 19th-century Russian novelists, “what unfolds in works is not a

⁶² M.M. Bakhtin, *Problems of Dostoevsky's Poetics*, trans. Caryl Emerson (U of Minnesota Press, 1993), xxxii; M.M. Bakhtin, *Problemy poetiki Dostoevskogo* in *Sobranie sochinenii v semi tomakh*, Vol. 6, 43; see also V. I. Ivanov, “Dostoevskii i roman-tragediia,” in *Borozdy i mezhi: Opyty esteticheskie i kritikicheskie* (Moscow: Musaget, 1916), 5.

⁶³ It is interesting that Bakhtin uses the words '*polifonia*' and '*mnozhestvennost*' to describe the many-sidedness of Dostoevsky's narrative voice. The former, '*polifonia*', expresses Greek origins. *Polyphony* or *polyphonos*, denotes a “variety of sounds” as in music, and conveys the characteristic of “having many sounds or voices,” from '*polys*', 'many', and '*phone*,' meaning 'voice, sound'. The latter term '*mnozhestvennost*', however, derives from Slavic linguistic origins, and contains the same root as the Russian word for a mathematical set, '*mnozhestvo*'.

⁶⁴ M. M. Bakhtin, *Problems of Dostoevsky's Poetics*, 7. «Достоевский – творец полифонического романа. Он создал существенно новый романный жанр.»; M.M. Bakhtin, *Problemy poetiki Dostoevskogo* in *Sobranie sochinenii v semi tomakh*, Vol. 6, (Moscow: Russian Humanitarian Scientific, 1963), 11.

multitude of characters and fates in a single objective world, illuminated by a single authorial consciousness, but a plurality of consciousnesses with equal rights, and each with its own world, that combine, but are not merged in the unity of the event.”⁶⁵ His characters observe the world differently, and their ascribed successes or failures as individuals hinge upon their ability to approximate and empathize with how others experience the uncanny phenomena of existence.

By interrogating human intellect and the unpredictable turns of fortune and opinion, Dostoevsky demonstrates that a person is always so much more than meets the eye. His protagonists tend to suffer from the recognition that their thoughts do not align with their actions and physical surroundings. The narrative of the mind accommodates a multiplicity of ideas, contradictions, and disparate intentions, which unfold often with volatile consequences. Although readers readily intuit hypocrisy in this tendency, the incongruity occurs at a deeper level concerning the possessive power of ideas, the fluidity of fancy, and the striving of human ambition in variable contextual particulars.

The human psyche left to its own devices in isolation is more susceptible to misguided ideas than those who interact with friends, family, acquaintances, and even strangers. Without social exchange, a flawed idea gradually surmounts and supersedes the majestic experience of living life, *zhivaia zhizn'*.⁶⁶ When communicated to others, however, this same *inner* voice

⁶⁵ Ibid. 6. «Не множество характеров и судеб развертывается в его произведениях, но именно множественность равноправных сознаний с их мирами сочетается здесь, сохраняя свою неслиянность, в единство некоторого события»; see also M.M. Bakhtin, *Problemy poetiki Dostoevskogo in Sobranie sochinenii v semi tomakh*, Vol. 6, 11.

⁶⁶ The phrase «Живая жизнь» is a prominent theme in the works of Dostoevsky. The Underground Man describes that he feels oppressed by the “unfamiliar sensation of living life that made it hard to breathe,” before the final farewell of Liza. ««Живая жизнь» с непривычки придавила меня до того, что даже дышать стало трудно» (*PSS* 5, 176). Andrei Versilov, similarly, affirms in *Podrostok*, “I only know, that it has always been that of which *living life* flows, that is, not mental and not juicy, but on the contrary, lively and joyous; so that the highest idea, from which living life flows, is decisively necessary... It must be something terribly simple, very ordinary, and conspicuous, every day and every minute.” «Знаю только, что это всегда было то, из чего истекала живая жизнь, то есть не умственная и не сочная, а, напротив, нескучная и веселая; так что высшая идея, из которой она истекает, решительно

changes through collective reflection. What, at first, belongs wholly to the realm of the mind, projects into physical environs, where it undergoes critical debate and inspection by multiple participants in shared cultural and material constructs. Although it is easy to get lost in thought, or to forget contemplations in the narrative of fleeting memory, ideas comprise the impetus of change, be they of either a progressive or *retrograde* nature.⁶⁷

While ideas express intangible uncertainties, they nevertheless make an impression on both the subject and the object of a given argument. Ideas, accordingly, function according to the same laws of Newtonian mechanics that govern the movements of all bodies in the physical world. Thoughts propel from person to person via a kind of intrinsic ideological momentum, just as they also succumb to inertia when people refuse to internalize them fully.⁶⁸

Out of the consideration that the *voice* of an individual allows for internal thoughts and ideas to be projected into interpersonal settings, the activity of speaking aloud deserves special status in the works of Dostoevsky. Dialogue assumes priority over monologue, and the verbal expression of an attitude or argument causes ripples of collaborative reflection and debate in the

необходима...это должно быть нечто ужасно простое, самое обыденное и в глаза бросающееся, ежедневное и ежеминутное...» (*PSS* 13, 178). According to the Author's Notes of *Zapiski iz podpol'ia*, the term appeared in literary and journalistic discourses disseminated by prominent Slavophiles in the 19th century, including A.S. Khomiakov, Iu. S. Samarina, I.V. Kireevsky. For additional commentary on *zhivaia zhizn'*, see F.N. Foinitskii, *Russkaia rech'*, 1981, (No.2) 10-11.

⁶⁷ Dostoevsky was particularly fond of the word "retrograde". His characters often utter the word sarcastically to establish a juxtaposition between empirical, liberal rationality, generally associated with the West, and idiosyncratic, mystic spirituality typically ascribed to Russia. Although the word 'retrograde' demonstrably entails negative connotations, Dostoevsky uses the word ironically to describe the sincerity, humility, and compassion of his national culture in the terminology of scientific progressivists when confronting ostensibly backwards ideas, defying reason or material advantage.

⁶⁸ Liza Knapp, *The Annihilation of Inertia: Dostoevsky and Metaphysics*, 10-11.

social fabric of life.⁶⁹ This concern also lends itself to the life of F.M. Dostoevsky in respect to the fact that he fell in love with, and subsequently married his stenographer, Anna Grigorievna Snitkina. Communication between free and distinct individuals is paramount. Ideas in isolation harden, inspire spite, and lead to habits that hinder the development of the mind, body, and spirit.

Recognizing that the protagonists in works by Dostoevsky largely cannot make sense of the world around them, there exists an inherent disconnect between what they expect of reality, and what they actually encounter. In the context of his stories, the intentions of ideas and physical circumstance seldom align. As a primary theme underlying his literary works, Dostoevsky examines the mutually dependent relationship between thought and action. If thoughts are determined by external realities, and internal deliberations influence the perception and experience of material environs, does one necessarily hold predominance over the other?

The distinguishing core of an individual, consequently, far exceeds a bodily mass of tissue, fat, blood, fingerprints, DNA, etc. The individual is an “unfinalizable” vessel of ideas, dreams, and desires, subject to capricious whim, and full of inconsistencies.⁷⁰ At any two given moments, the individual may embody two or more contradictory traits, opinions, and personality types. Every thought that impresses upon the deliberations of the individual expresses the

⁶⁹ Bakhtin interprets the monologue as a fundamentally unethical narrative medium. He explains “monologism, at its extreme, denies existence outside itself of another consciousness with equal rights and equal responsibilities, another *I* with equal rights (*thou*). With a monologic approach (in its extreme pure form) *another person* remains wholly and merely an object of consciousness, and not another consciousness in and of itself...Monologue is finalized and deaf to other’s response, does not expect it and does not acknowledge it any force. Monologue manages without the other, and therefore to some degree materializes all reality. Monologue pretends to be *the ultimate word*. It closes down the represented world and represented persons.” In addition to stressing the importance of the spoken word, the works of Dostoevsky also emphasize the profundity of non-verbal communication. The intensity of thought often subsumes the bodies of individuals (perhaps the eyes, most noticeably) and their feelings can often be understood by those closest to them without uttering a single word. Non-verbal communication all the same requires more than one participant. Following once more the apt summation of Bakhtin, “two is the minimum for life, the minimum for existence.” M.M. Bakhtin, *Problems of Dostoevsky’s Poetics*, ed. and trans. Caryl Emerson (Minneapolis: University of Minnesota Press, 1984), 252, 292-293.

⁷⁰ M. M. Bakhtin, *Problems of Dostoevsky’s Poetics*, 58.

potential for changing attitudes and conduct. Dostoevsky even describes this propensity relative to his own personality in the sense that certain contemplations would impart such a strong impression that they would elicit physiological reactions in his posture, demeanor, and countenance. On occasion, especially vivid thoughts would give way to an epileptic fit. The correlation was so strong that Dostoevsky referred to the combined physiological and cognitive stimuli as “thought-feelings”.⁷¹ The external appearance of the individual, consequently, reflects the variable basis of internal reflections. In short, we are essentially defined by our “*ideas*”.

In the 1925 essay, “*Ideologicheskii roman Dostoevskogo*” [“The Ideological Novel of Dostoevsky”], Boris Engelhardt aptly characterizes the propensity of characters in works by the author to function as “ideas incarnate”.⁷² His heroes stand for different ideological positions and personality types. Raskolnikov, for example, contemplates being himself a “great man” on a par with Napoleon, Mohammed, or Lycurgus. Stavrogin, similarly, exemplifies the amoralistic attitudes of radical revolutionaries, following the socialist and progressivist rhetoric of Nikolai

⁷¹ A. Lunacharsky, *On Literature and Art*, trans. Y. Ganuskin (Moscow: Progress Publishers, 1973), 36.

⁷² Engelhardt conceives of Dostoevsky’s novels as texts instilled with cultural and sociological ideological positions. Sensing the appearance of ideas not limited to sociocultural discourses, Mikhail Bakhtin defines Dostoevsky’s primary genre more broadly as *ideinyi roman*, that is, a novel infused with ideas: “Engelhardt begins with a sociological and cultural-historical definition of the Dostoevskian hero. Dostoevsky’s hero is a déclassé member of the intelligentsia, cut off from cultural tradition, from the soil and the earth, a representative of an ‘accidental tribe.’ Such person enters into special relations with the idea: he is defenseless before it and its power, for he is not rooted in objective reality and is deprived of any cultural tradition. He becomes a ‘person of the idea’, a person possessed by an idea. An idea becomes for him an idea-force, omnipotently defining and distorting his consciousness and his life. The idea leads an independent life in the hero’s consciousness: in fact it is not he but the idea that lives, and the novelist describes not the life of the hero, but the life of the idea in him. ... This is the origin of that generic definition of the Dostoevskian novel as an ‘ideological novel.’” M. M. Bakhtin, *Problems of Dostoevsky’s Poetics*, 22; «Б.М. Энгельгардт исходит из социологического и культурно-исторического определения героя Достоевского. Герой Достоевского—оторвавшийся от культурной традиции, от почвы и от земли интеллигент-разночинец, представитель ‘случайного племени.’ Такой человек вступает в особые отношения к идее: он беззащитен перед нею и перед ее властью, ибо не укоренен в бытии и лишен культурной традиции. Он становится ‘человек идеи,’ одержимым от идеи. Идея же становится в нем идеей-силой, всевластно определяющей и уродующей его сознание и его жизнь. Идея ведет самостоятельную жизнь в сознании героя: живет, собственно, не он – живет идея, и романист дает не жизнеописание героя, а жизнеописание идеи в нем Отсюда вытекает жанровое определение романа Достоевского как ‘романа идеологического’» in M.M. Bakhtin, *Problemy poetiki Dostoevskogo in Sobranie sochinenii v semi tomakh*, Vol. 6, 30-31.

Chernyshevsky (1828-1889) and Mikhail Bakunin (1814-1876). Sonia, furthermore, serves as the emblematic portrayal of selfless Christian meekness and divine, patient wisdom. Like the personages in a Platonic dialogue, the characters of Dostoevsky represent philosophical paradigms. They are ideological discourses infused with the force of life.

In his copy of the Gospel, which for several years served as his sole reading material during his incarceration in Siberia, Dostoevsky underlined the following passage from Hebrews 11.1: “Faith gives substance to our hopes and makes us certain of realities we do not see.”⁷³ While scholars often point to this line as an indication of his spiritual reawakening as an Orthodox Christian, we should note that the verse also resonates with his mathematical background. Despite the surface divisions demarcating the distinct disciplinary studies of theology and mathematics, both fields engage questions regarding the essential composition and fluctuation of the human condition according to the dynamic sum of concealed forces.

The convergence of hope and faith corresponds to the interaction of the material and spiritual life. The exhortations of Father Zosima in Book Six of *The Brothers Karamazov*, “The Russian Monk”, for example, come to resemble the teachings of the sixth-century mystic, Saint Isaac of Nineveh, who preached that “the delight of the mysteries of visible created things is the first summit of knowledge.”⁷⁴ The visage of a human being, accordingly, is an especially

⁷³ «Вера же есть осуществление ожидаемого и уверенность в невидимом.» in *К Евреям* 11.1; *The Holy Bible*, Revised Standard Version (New York: Oxford UP, 1973), 1465. Konstantin Mochulsky points out that “religious questions are never posed in works prior to his servitude in Siberia”; Konstantin Mochulsky, *Dostoevsky: His Life and Work*, 120.

⁷⁴ Dostoevsky owned and annotated an 1858 Slavonic translation of Isaac’s sermons and recorded wisdom, *Slova podvizhnicheskije* [*Selfless words*]. See: *Mystic Treatises of Isaac of Nineveh*. Tr. A.J. Wensinck (Wiesbaden, 1969), 34. As cited in Victor Terras, *A Karamazov Companion: Commentary on the Genesis, Language, and Style of Dostoevsky’s Novel* (Madison, WI: University of Wisconsin Press, 2002), 23; Sergei Hackel, “The Religious Dimension: Vision or Evasion? Zosima’s Discourse in *The Brothers Karamazov*,” in *New Essays on Dostoyevsky*, ed. Malcolm V. Jones and Garth M. Terry, (Cambridge: Cambridge UP, 1983), 145.

perplexing “created thing.”⁷⁵ Considering that consciousness is generative, furthermore, every *word* comprising even the slightest inkling conjured up from the miraculous wellspring of thought inspires its own array of tangential mysteries.⁷⁶ In the presiding model, invisible worlds exist within everyone and everything. Rationality and spirituality operate by different means, toward similar ends: to make invisible mechanisms known to the human condition.

Humans are neither computers, nor “organ stops” [*organinyi shtiftik*], whose potential far exceeds that of a mere number cruncher, or a cog in the social machine of civilization.⁷⁷ People are defined by their capacity for complex thought, posing questions that run counter to widely-held assumptions, and processing the implications of findings and results that do not coincide with previously held beliefs. Doubt is an intrinsic part of the human experience, while belief, in respect to intellect, expresses the intrinsic connection between individuals and what they cannot prove, but sense at the core of their being to be true. While the concerns and processes by which pursuits in mathematics and the sciences may differ from those of theology, liturgy, epistemology, and literature, they seek the common goal of bringing the invisible to light.

In *The Brothers Karamazov*, Dostoevsky alludes to overriding Russian educational priorities of the late nineteenth century in the sentiments expressed by the young Kolia Krasotkin, who announces that out of all the academic disciplines, he “respects only mathematics

⁷⁵ Victor Terras, *A Karamazov Companion: Commentary on the Genesis, Language, and Style of Dostoevsky's Novel*, 23

⁷⁶ With respect to his familiarity with the Gospel, Dostoevsky senses the religious significance of the Incarnate Word of God in Orthodox theology, emanating from John 1:1 “In the beginning was the Word, and the Word was with the God, and the Word was God.” Language separates humanity from other creatures, and as such, linguistic ability and the various structural components of communicative, verbal messages acquire providential proportions. *The Holy Bible*, Revised Standard Version (New York: Oxford UP, 1973), 1286.

⁷⁷ The *Underground Man* presents this metaphor of the “organ stop” while framing the rhetorical question of whether man truly possesses his own faculties apart from those determined by quantitative laws: «Ну что за охота хотеть по табличке? Мало того; тотчас же обратится он из человека в органный штифттик или вроде того; потому, что же такое человек без желаний, без фоли и без хотений, как не штифттик в органном вале? Как вы думаете? Сосчитаем вероятности, --может это случиться или нет?» (*PSS* 5, 114).

and the natural sciences.”⁷⁸ Although Alyosha Karamazov dispels Kolia of this view, the ascribed intellectual sentiments also reflect the prescriptive educational values vocalized by Aleksandr Gertsen (1812-1870) and Dmitrii Pisarev (1840-1868). The motto also signifies, moreover, the predominant educational emphasis that Dostoevsky encountered during his own studies at the Main Engineering School.

While both Gertsen and Pisarev stressed the importance of the sciences and mathematics in popular print, the former perhaps left a more prominent impression on the young minds of Russian society after asserting in 1856, “Without the natural sciences, there is no salvation for modern man.”⁷⁹ Despite the notion that Kolia demonstrates the reckless abandon of his adolescence, he eventually develops into a sympathetic character, who gains new insights and appreciations under the tutelage of Alyosha Karamazov.⁸⁰ Like Kolia, Dostoevsky sensed the significance of mathematics and the sciences at an early age, but opted ultimately to use this inspiration only tangentially in the pursuit of different professional and interpersonal aims.

Themes derived from Dostoevsky’s literary works, and the cultural focus on mathematics and the sciences communicated by the likes of Gertsen and Pisarev underscore neo-Classical

⁷⁸ «Я уважаю одну математику и естественные». (PSS 14, 497).

⁷⁹ «Без естественных наук нет спасения современному человеку». Aleksandr Gertsen, “Byloe i dumy”, *Poliarnaia Zvezda*, 1856, book 2, 134. See also the sentiments of D.I. Pisarev: «математика развивает силу мышления и что математические науки представляют непрерывную цепь истин, вытекающих одна из другой по логической необходимости. У нас математика есть не что иное, как собрание сочинений Боско или Пинета; это ряд удивительных фокусов, придуманных бог знает зачем, и бог знает какую эквилибристическую человеческого мышления». In this quotation, Pisarev refers to the magician-charlatanism of Giovanni Bartolomeo Bosco (1793-1863) and Giovanni Giuseppe Pinette (1750-1803), who earned great profits and fame in Russia through sleight-of-hand illusions, and the flamboyant spectacle of pseudoscientific principles for entertainment sake. D.I. Pisarev, “Nasha universitetskaia nauka” in *Sochineniia*, Vol. 5 (St. Petersburg: Tipografiia A. Golovachova, 1866), 6.

⁸⁰ After carefully studying the schedules and dimensions of trains, Kolia, on a reckless bet with other village boys, lies flat upon the railroad tracks, letting a locomotive pass over him. He emerges from the stunt unscathed, but his character assumes an air of brashness and unpredictability, tempered by the patience and wisdom of Alyosha Karamazov.

reimaginings of the famous adage generally attributed to Pythagoras: “All is number.”⁸¹ Mathematics expresses the invisible language of the universe, whose movements, patterns, and participants would all seem random, chaotic, and reckless without an underlying, unifying numerical basis or system. This basis, be it a mechanism designed by God, or otherwise, expresses the outset of solutions corresponding to a great multitude of riddles and mysteries. Galileo reiterates these sentiments in *The Assayer*, affirming, “the great book of nature can only be read by those who know the language in which it is written, and this language is mathematics.”⁸² For most people, the primary perception of the world comes through tangible experience. Individuals lead their lives, tending only to engage other people, things, places, etc., and not the abstract mechanics governing the indeterminate composition and dynamic interactions of entities and energies in the miraculous manifestation of life.

Mathematics, consequently, functions as a metaphor for rational knowledge challenged by human psychology. As the indeterminate sum of unfinalizable personalities and insights, humans yield to variable emotions, attitudes, contradictions, and prejudicial perspectives, creating a world of seemingly infinite complexity. The conflict between the egoistic drives for power, freedom, and autonomy and the selfless desire to relinquish advantage for the betterment of others, furthermore, contributes to the intrinsic spontaneity of humanity.

If it is possible to calculate discrete values of elements discerned in nature, and to determine their abstract laws, fluctuations, and correlations, can the same arithmetic operations be applied to individuals and their societies to render them utterly predictable? In other words, if one can calculate the square or square root of a given value observed in nature, could one then also complete such operations in regard to the complex product of a human personality? Literary

⁸¹ Gabriele Cornelli, *In Search of Pythagoreanism: Pythagoreanism as an Historiographical Category* (Boston, Walter de Gruyter, 2013), 145.

⁸² Galileo Galilei, "The Assayer" in *The Essential Galileo*, trans. Maurice A. Finocchiaro (Indianapolis: Hackett Publishing, 2008), 183.

scholars, for instance, widely attribute the appearance of the doppelgänger in *The Double* to the projection of guilt in the mind of the protagonist for having ruined his engagement with Klara Olsuf'evna. However, could not the manifestation of Goliadkin Jr. be construed as kind of exponential experiment on the part of the author to imagine the square of his hero?⁸³

Dostoevsky, in this vein, engages the quandary of depicting parts of human beings relative to the corresponding whole of their respective personalities.⁸⁴ In *Notes from Underground*, for example, the figure of the Underground Man represents the component of intellect, in juxtaposition to the unified entirety of his being, comprising also, in the assessment of Dostoevsky, a physical body and spirit. The trope of the trinity recurs more prominently in *The Brothers Karamazov*, and Dostoevsky presents each part as equally important for preserving the health, dignity, and sustainability of human life.⁸⁵

⁸³ There have been several popular interpretations of the appearance of the double in the novel, none of which, however, relate the question to the mathematical proclivities and curiosities of the author. Otto Rank, for instance, attributes the bifurcation as a coping mechanism on the part of Goliadkin to reconcile his guilt, regret, and self-hate for spoiling his relationship with Klara Olsuf'evna, by proposing marriage to a lowly German woman, Karolina Ivanovna. The double could be seen as a kind of fugue state, or a projection of what Goliadkin wishes to be in the context of his society driven by status and wealth. Alternatively, the appearance of the double could be explained as a supernatural occurrence, following the literary devices of German Romanticism. Goliadkin Jr. could be viewed as a demonic doppelgänger, or evil twin in a style coinciding with the styles of E.T.A. Hoffman in *Story of Lost Reflection* (1815) or Robert Louis Stevenson in *The Strange Case of Dr. Jekyll and Mr. Hyde* (1886). Alternatively, Dostoevsky may have intended for psychological, supernatural, and mathematical explanations for the manifestation of the double to appear in the novel, purposely blurring the lines of any single interpretation. Otto Rank, *The Double: A Psychoanalytic Study*, ed. and trans. Harry Tucker (Chapel Hill, NC: University of North Carolina Press, 2011), 3-4. As cited by Julian Connolly in RUTR 2370 Dostoevsky, University of Virginia, 11 February 2016.

⁸⁴ Dostoevsky formulates his take on this conundrum, arguably, in response to the writings of Gogol. In the 1835-1836 short story, *Nos* [*The Nose*], Collegiate Assessor Platon Kuzmich Kovalyov awakens one morning to discover that his nose is missing. As the satirical farce progresses, Kovalyov discovers with dismay that his nose has taken on a personality of its own, and has even managed to attain higher status in society than he himself. The work conveys a paradox: how can the part of a body overshadow its whole?

⁸⁵ Julian W. Connolly, *Dostoevsky's The Brother's Karamazov*, (New York: Bloomsbury, 2013), 22.

According to D.S. Mirsky, “Dostoevsky deals in the elusive calculus of fluid values.”⁸⁶

The mathematical tendencies in Dostoevsky’s prose and argumentative organization comprise recognizable subtexts that enrich interdisciplinary, metaphysical themes for readers who know to look for them. A research study conducted by analysts at Thomson Reuters in 2015 found that Dostoevsky is the most cited Russian author in the world’s scientific community with 7,800 references, followed by Tolstoy with 6,400, and Pushkin with 5,200.⁸⁷ In this same study, it was found that *The Brothers Karamazov* topped the list of Russian novels cited in international scientific texts.⁸⁸ The argumentative methods and narrative aesthetics of Dostoevsky resonate noticeably with scientists and mathematicians.

⁸⁶ D. S. Mirsky, *A History of Russian Literature from Its Beginnings to 1900*, trans. Francis J. Whitfield (Evanston, IL: Northwestern UP, 1999), 280.

⁸⁷ Aleksandr Chernykh, “Russkomu miru nashli mesto v mirovoi nauke: uchenye otsenili vliianie Dostoevskogo, Tolstogo, i Pushkina,” in *Kommersant*, 16 December 2015. Accessed online at: <<http://www.kommersant.ru/doc/2878370>>.

⁸⁸ *Ibid.*

**Chapter One:
Dostoevsky's Education at the Main Military Engineering School, 1838-1843**

“We are engineers!”¹

~Tsar Nikolai I to his sons, ca. 1838

“Brilliant feats of engineering and field officers in all campaigns of Russian troops in Turkey, Poland, the Caucasus, Central Asia, and especially in Sevastopol, where these same feats were committed before my very eyes, have left a deep impression upon my heart. A variety of other services and deeds, and labors across all sectors of construction, are no less remarkable. These are the fruits of the very thought of the unforgettable General-Inspector of the Engineering Division, which 50 years ago was realized in the establishment of the Main Engineering School.”²

~Grand Duke Nikolai Nikolaevich the Eldest, 1869

“In these days, the angel of topology and the devil of abstract algebra fight for the soul of each individual mathematical domain.”³

~Hermann Weyl, 1939

Upon the state ratification of reforms proposed by Engineer-General Karl Opperman (1766-1831), the St. Petersburg Engineering School opened in 1810.⁴ The school offered two related degree tracks, which continued as established academic career paths throughout the time that Dostoevsky enrolled in engineering studies. The lower three-year program trained junior officers in general engineering studies, and the upper two-year program allowed cadets to focus on a particular specialization. Contemporary Russian universities still maintain this two-tier system, and the title of *engineer by specialization*, [*inzhener po spetsial'nosti*] is generally

¹ «Мы—инженеры!». As cited in Boris Tarasov, *Nikolai Pervyi: rytsar' samoderzhaviia*, (Moscow: OLMA Press, 2006), 25

² «Замечательное постепенное усовершенствование оборонительных преград на обширных окраинах нашего отечества; приведение крепостей Империи в положение вполне соответствующее современному состоянию военного искусства; блестящие подвиги инженерных и саперных офицеров в всех подходах русских войск в Турции, в Польше, на Кавказе, в Средней Азии, а в особенности в Севастополе, где эти подвиги совершались на Моих глазах и глубоко запечатлелись в Моем сердце; самые разнообразные другие, не менее замечательные, работы по всем отраслям строительного дела, - вот плоды той мысли незабвенного Генерал инспектора по Инженерной части, которая за 50 лет тому назад осуществилась в учреждении Главного Инженерного Училища». Letter from Grand Duke Nikolai Nikolaevich the Elder, the son of Tsar Nikolai I, commemorating the 50th-anniversary of the Main Engineering School, November 1869.

As cited in M. Maksimovskii, *Istoricheskii ocherk: Razvitiia Glavnago inzhenernago uchilishcha 1819-1869* (Sankt Peterburg: Tipografiia imperatorskoi akademii nauk, 1869), i.

³ Hermann Weyl, “Invariants” in *Duke Mathematical Journal* No. 5 (1939), 500.

⁴ M. Maksimovskii, *Istoricheskii ocherk: Razvitiia Glavnago inzhenernago uchilishcha 1819-1869*, 23.

conferred after five years of academic coursework at an institution of higher learning.⁵ Despite several setbacks, Dostoevsky completed both degree programs at the Main Engineering School: the first general degree in 1841, and the advanced specialty degree in drafting in 1843.⁶

To understand the intellectual atmosphere that Dostoevsky encountered throughout his studies, it is helpful to survey briefly the historical development of the Main Engineering School, and to consider how leaders of state and key political events shaped its associated curricula. The school was officially founded in 1819, but its origins date back to several earlier manifestations of the military institution that provided formal instruction in applied sciences to elite members of the Russian armed forces.⁷ In 1804, for example, the *St. Petersburg School of Education of Engineering Conductors* [*Sankt-Peterburgskaia shkola obrazovaniia inzhenernykh konduktorov*] opened in the barracks of the Cavalry Regiment on the northern outskirts of St. Petersburg.⁸ Conceived of jointly by Engineer-General Pyotr Sukhtelen (1751-1836) and *Poruchik*-Lieutenant Ivan Kniazsev (1754-1829), the St. Petersburg School of Education of Engineering Conductors offered a two-year degree program in specialties that would transfer to specific stations and ranks in the army. Roughly 50 conductors, or non-commissioned officers, enrolled in its first year of

⁵ A. Chuchalin, O. Boev, and A. Kriushova, "Quality Assurance in Engineering Education and Modernization of Higher Education in Russia," in *Engineering Education Quality Assurance: A Global Perspective*, ed. Arun Patil and Peter Gray (Springer Science & Business Media, 2009), 87-88.

⁶ Dostoevsky completed his coursework in 1842, having attained the rank of sublieutenant (*podporuchik*). His specialization was engineering blueprint design. After passing his graduate comprehensive exams in the spring of 1843, Dostoevsky spent the summer with Mikhail in Reval, before landing a post in the blueprint section of the Engineering Department in Petersburg later that same year. Konstantin Mochulsky, *Dostoevsky: His Life and Work*, 18-19; see also Orest Miller in *The Dostoevsky Archive: Firsthand Accounts of the Novelist from Contemporaries' Memoirs and Rare Periodicals*, ed. and comp. Peter Sekirin, 48; Peter Sekerin, "Biographical Chronology" in *The Dostoevsky Archive: Firsthand Accounts of the Novelist from Contemporaries' Memoirs and Rare Periodicals*. 289.

⁷ M. Maksimovskii, *Istoricheskii ocherk: Razvitiia Glavnago inzhenernago uchilishcha 1819-1869*, 25.

⁸ *Ibid.* 22-23; see also M. I. Lalaev, *Istoricheskii ocherk voenno-uchebykh zavedenii: podviedomstvennykh glavnomu ikh upravlenii* (St. Petersburg: Tipografiia Glavnago upravlenia voenno-uchebykh zavedenia , 1880), 91; C.F. Platonov, *Lektsii po russkoi istorii* (Petrozavodsk: Izd. A.O. Folium), 629.

operation.⁹ Before transforming into the St. Petersburg Engineering School [*Sankt-Peterburgskoe inzhenernoe uchilishche*] in 1810 upon the proposal of General-Engineer K.I. Opperman, the school conferred 62 degrees by specialization.¹⁰

After the peace of Tilsit of 1807, the Russian Emperor Aleksandr I undertook a plan of cooperation with Napoleon, and a group of French engineers arrived in St. Petersburg to participate in cooperative engineering efforts.¹¹ Multinational instructors operating under the auspices of the *Department of Water Communications* [*Departament vodnykh kommunikatsii*] coordinated the organization of the *Institute of the Corps of Engineers of Ways of Communication* [*Institut korpusa inzhenerov putei soobshcheniia*].¹² Although French engineers soon left when the political climate made it unfavorable for them to continue their stay in St. Petersburg, following the invasion of Russia by Napoleon in 1812, they imparted key knowledge of engineering practices and methods to specialists, who were familiar enough with local politics, the organization of local labor forces, and the availability of economic resources to bring engineering projects to fruition.¹³ In addition to the Russian practitioners who received this instruction, foreign nationals in the employ of the state also participated in these exchanges. Baltic Germans, for example, who arguably represented one of the largest ethnic minority groups in Petersburg, were already assimilated into local culture and the administrative assembly of state

⁹ The school's enrollment figures dropped during the Napoleonic Wars, when prospective engineers often enlisted directly in the armed services without first pursuing additional degrees of specialization. Russian losses at the Battle of Austerlitz (1806), led by Tsar Aleksandr I himself, and the Battle of Friedland (1807) demonstrated the pressing imperatives to improve and codify engineering standards in Russian military education to match the ostensibly superior capabilities of the French. Ibid. 23; see also J. Holland Rose, *The Revolutionary and Napoleonic Era, 1789-1815* (Cambridge: Cambridge UP, 2013), 173-174.

¹⁰ N.A. Danilov, *Stoletie voennago ministerstva 1802-1902: Istoricheskii ocherk razvitiia voennago upravleniia v Rossii*, ed. D.A. Skalon, (St. Petersburg: tipografiia L.O. Pangelova, 1902), 146.

¹¹ Stephen P. Timoshenko, "The Development of Engineering Education in Russia," *Russian Review*, No. 15 (1956), 174.

¹² Ibid. 174

¹³ Ibid. 174

institutions.¹⁴ While the Institute of the Corps of Engineers of Ways of Communication was not directly affiliated with the St. Petersburg Engineering Institute, instructors and researchers of the two schools often shared research materials, personnel, and facilities.

Mikhail Ostrogradsky, for instance, took up a post at the Institute of the Corps of Engineers of Ways of Communication in 1830, following his acceptance of a faculty position at the Main Engineering School in 1828.¹⁵ He held these two positions simultaneously, while also pursuing related research projects in the applied sciences. His post as an elected member of the Russian Academy of Sciences, moreover, demonstrates his diverse involvement in state pedagogical initiatives concerning engineering. Having produced important texts on physics, analytical geometry, astronomy, and ballistics, Ostrogradsky was entrusted by Tsar Nikolai I with the responsibility of overseeing all mathematics instruction in Petersburg military academies.¹⁶ When student performance and the overarching instructional reputation of the Main Engineering School worsened in the mid-1830s, Ostrogradsky took up a teaching post at the school to lecture young cadets on mathematics and mechanics.¹⁷

¹⁴ Baltic Germans comprised one of the largest ethnic minority groups in Petersburg. They started to immigrate to Russia en masse during the time of Peter the Great. Although Baltic Germans accounted for just 1% of the national population of Russia, this demographic disproportionately resided in the capital of Petersburg, and they frequently held posts in state institutions. According to Dr. Hans von Eckardt, at the outset of the reign of Tsar Aleksandr II (1855-1881), the Ministry of Posts and Telegraphs was 62% German, the Ministry of War- 46%, the Ministry of Communications- 36%, Civil Administration- 32%. Other government organizations in Petersburg featured similar statistical imbalances of Baltic Germans relative to other ethnic groups throughout the Russian Empire. As cited by Fred C. Koch, *The Volga Germans: In Russia and the Americas from 1763 to the Present* (University Park: Pennsylvania State University Press, 1978), 195-196; see also Angela E. Stent, *Russia and Germany Reborn: Unification, the Soviet Collapse, and the New Europe* (Princeton, NJ: Princeton UP, 1998), 4.

¹⁵ Ibid. 3; see also Ravi Agarwal and Syamal Sen, *Creators of Mathematical and Computational Sciences* (New York: Springer, 2014), 245.

¹⁶ Galina Kichigina, *The Imperial Laboratory: Experimental Physiology and Clinical Medicine in Post-Crimean Russia* (New York: Rodopi, 2009), 79.

¹⁷ A.I. Maron, "Obshchie pedagogicheskie vzgliady M.V. Ostrogradskogo," in *Mikhail Vasil'evich Ostrogradskii (k 200-letiiu so dnia rozhdeniia)* in *Istoriko-matematicheskie issledovaniia*, Vol. 4 (Moscow: OGIZ, Gos. Izd.-vo tekhniko-teoreticheskoi literatury, 1951), 124-125.

As Napoleon advanced on Russia in 1812, enrollment figures at the St. Petersburg Engineering School dropped significantly, as young men enlisted directly in the armed forces without pursuing technical specialties to repel the French military occupation of Russian territories.¹⁸ When thousands of Russian troops, serfs, and private citizens lost their lives due to the shortsightedness of commanders and military practitioners, state officials redoubled efforts to advance state educational preparations in engineering fields in the period following the defeat of Napoleon at the Battle of Waterloo in 1815.¹⁹ After the Napoleonic Wars, state authorities quickly organized plans for the conception of the Main Engineering School.

Casting aside grievances and prejudices toward the French, Russian authorities wasted little time reincorporating foreign experts into the primary engineering centers in St. Petersburg and Moscow. In 1820, for example, Tsar Aleksandr I invited Gabriel Lamé (1795-1870) and Benoît Paul Émile Clapeyron (1799-1864) to teach at the Institute of the Corps of Engineers of Ways of Communication.²⁰ They produced several key treatises on the stability of arches, which contributed directly to the construction of the cathedral of Saint Isaac in St. Petersburg.²¹ Other French engineers, including Henri-Émile Bazin (1829-1917), Alexander Fabre (1782-1833) and Michel Potier (1786-1855), contributed the development of hydraulics, introduced advances in stone-cutting technology, and successfully systematized Russian course offerings in descriptive and analytic geometry.²²

¹⁸ George Nafziger, *Napoleon's Invasion of Russia* (New York: Presidio Press, 1998), 1.

¹⁹ Alexander Mikaberidze, *Russian Officer Corps of the Revolutionary and Napoleonic Wars, 1795-1815* (New York: Savas-Beatie LLC, 2005), xxix; see also Dominic Lieven, *Russia against Napoleon: The Battle for Europe, 1807 to 1814* (Bloomington: Indiana UP, 2009), 195.

²⁰ Stephen P. Timoshenko, "The Development of Engineering Education in Russia," 174.

²¹ *Ibid.* 174

²² *Ibid.* 174; see also Sigítias Saladzhinskas, Briute Juodagalviene, and Ina Pankrashovite, "Pioneers of Teaching Descriptive Geometry in the Universities of Krakow and Vilnius," in *The Journal of Polish Society for Geometry and Engineering Graphics*, Vol. 26 (2014), 61-62.

Following the defeat of Napoleon, Tsar Aleksandr I appointed his younger brother Grand Duke Nikolai I to serve as the General Inspector of Military Engineers, and the Commander of the First Guards Division.²³ Nikolai considered himself to be an engineer after receiving private instruction from the Western tutors in the burgeoning disciplines of mathematics and the sciences.²⁴ He reorganized military units, and founded new institutions to improve the quality of education made available to members of the armed services. In 1817, Nikolai asked the court military theorist General Antoine-Henri Jomini (1779-1869) to draw up proposals for a central military engineering academy to be founded in the Imperial capital of St. Petersburg. The envisioned school would “provide the most intelligent officers in the army with the fundamental vocational skills required of general staff officers, and to serve as a forum for the development of strategic theory.”²⁵ Tsar Aleksandr approved these initiatives, and the Main Engineering School (*Glavnoe inzhenernoe uchilishche*) opened in 1819.²⁶

The curriculum of the Main Engineering School began with introductory lectures on the following topics: contemporary tactics of the different services with the use of terrain in the execution of maneuvers, elements of strategy (or ‘grand tactics’ in the jargon of Jomini), military history, surveys of the armed forces of various Western European nations in both their geographical and statistical characteristics, and fortifications.²⁷ Courses delivered in the first year of coursework also exposed cadets to questions regarding military administration, logistics, the moral obligation of leadership, and the evils of false doctrine.²⁸ The second year of study

²³ John Paxton, *Leaders of Russia and the Soviet Union* (New York: Fitzroy Dearborn, 2004), 61.

²⁴ For details on the education of Tsar Nikolai I, see also Constantin de Grunwald, “Chapter II: The Education of a Prince” in *Tsar Nicholas I* (New York: Macmillan, 1955), 19.

²⁵ Carl Van Dyke, *Russian Imperial Doctrine and Education, 1832-1914*, (New York: Greenwood Press, 1990), 3.

²⁶ M. Maksimovskii, *Istoricheskii ocherk: Razvitiia Glavnago inzhenernago uchilishcha 1819-1869*, 31-32.

²⁷ Carl Van Dyke, *Russian Imperial Doctrine and Education, 1832-1914*, 3.

²⁸ *Ibid.* 3-4

immersed aspiring military engineers in applied studies, through which cadets would become more familiar with topics from the first year of classes by enrolling in small seminars, and conducting individual research assignments.²⁹ A student could progress into the officer core by specializing in a particular subject, and engaging further individualized study.

Before classes commenced in the fall of 1819, Grand Duke Nikolai allocated use of an imperial residency, the *Mikhailovskii zamok* [*Mikhailovsky Castle*] to the Main Engineering School. The first classes held in the *Mikhailovsky zamok* included 48 ensigns and 96 military guards, who received monthly stipends for their service.³⁰ Captains and lieutenants oversaw drills and military preparations, and a full support staff of teachers, librarians, nurses, porters, cooks, and clerical workers assisted in the coordination of living arrangements and instruction.³¹ As the palace became a central location for engineering classes, military drills, and guest lectures by multinational scholars, the edifice colloquially became known as the *Inzhenernyi zamok* [*The Engineering Castle*].³² When the Main Engineering School moved into the Imperial residence of *Mikhailovsky Castle*, the School of Conductor Guards and Cavalry Junkers opened nearby in the former barracks of the St. Petersburg Cavalry Regiment in 1823³³. This school later became known as the Nikolaevsky Cavalry School, and the two educational institutions often held drills and classes together, along with other military units of the Russian armed forces.³⁴

²⁹ Ibid. 3-4

³⁰ M. Maksimovskii, *Istoricheskii ocherk: Razvitiia Glavnago inzhenernago uchilishcha 1819-1869*, 31-32.

³¹ Ibid.

³² E. Ia. Kal'nitskaia, *Mikhailovskii zamok*, Vol. 1 (St. Petersburg: *Beloe i chernoe*, 1999), 173.

³³ P. P. Shkot, *Istoricheskii ocherk Nikolaevskogo kavaleriiskogo uchilishcha, byvshei shkoly gvardeiskikh podpraporshchikov i kavaleriiskikh iunkerov, 1823-1898* (St. Petersburg: 1898), 111.

³⁴ Ibid. 111. Other famous alumni of the Nikolaevsky Cavalry School include M.Iu. Lermontov (1814-1841), who studied there in 1834, and Modest Musorgskii (1839-1881), who completed his studies at the school in 1856. David Powelstock, *Becoming Mikhail Lermontov: The Ironies of Romantic Individualism in Nicholas I's Russia* (Evanston, IL: Northwestern UP, 2005), 106; Caryl Emerson, *The Life of Musorgsky* (Cambridge: Cambridge UP, 1999), 17.

The conception and expansion of the Main Engineering School, in several key considerations, reflected initiatives of the Russian state to keep up with advances made in the West. More particularly, the school served as the institutional model intended to replicate the accomplishments of the *École Polytechnique* in Paris.³⁵ The esteemed mathematician Gaspard Monge (1746-1818) founded the *École Polytechnique* during the French Revolution in 1794, and some of the most preeminent mathematical minds of Europe served as faculty members, including Joseph-Louis Lagrange (1736-1813), Simon LaPlace (1749-1827), and Joseph Fourier (1768-1830).³⁶ Monge was the pioneering founder of descriptive geometry, which was later incorporated into the educational curriculum of the Main Engineering School in Petersburg.

As one of the most intellectually rigorous academic centers of Europe, the *École Polytechnique* produced prominent astronomers, chemists, physicists, doctors, and innovators. In 1804, the *École Polytechnique* became a military academy under Napoleon I, who then served as the President of the French Academy of Sciences.³⁷ The efficacy of the school in meeting the demands of military objectives established its lasting relationships with different branches of the French armed services. This legacy continues into the contemporary era, as the institution still operates under the supervision of the French Ministry of Defense.³⁸

Throughout the nineteenth century, the Russian Academy of Sciences in St. Petersburg and the French Academy of Sciences in Paris served as the primary state institutions promoting scientific research, the standardization of language, and scholarly debate.³⁹ The rise of

³⁵ Stephen Timoshenko, *Engineering Education in Russia* (New York: McGraw-Hill, 1959), 3.

³⁶ Dirk J. Struik, *A Concise History of Mathematics*, Fourth Revised Edition (Mineola, NY: Dover, 1987), 147; Sooyoung Chang, *Academic Genealogy of Mathematicians* (London: World Scientific Publishing, 2011), 92.

³⁷ Ezra N. Suleiman, *Elites in French Society: The Politics of Survival* (Princeton: Princeton UP, 1978), 40-41.

³⁸ David S. Yost, "France" in *The Defense Policies of Nations: A Comparative Study* (Baltimore: JHU Press, 1994), 257.

³⁹ James Cracraft, *The Petrine Revolution in Russian Culture* (Cambridge, MA: Harvard UP, 2009), 240.

professional engineering, the increased capabilities of European military powers, and the expanded economic dimensions of the Industrial Revolution, more broadly, contributed to a shift in educational values. Faced with foreign competition and expanding globalized economies, state leaders decided to fund educational efforts in technical engineering and the sciences often at the expense of traditional institutions and programs stressing humanistic discourses. The scale of scientific research conducted at the École Polytechnique and the Main Engineering School required the cooperative support of centralized governments, and the founding of these institutions served as the realization of state directives to modernize.

By the time Dostoevsky enrolled in 1838, the school had expanded drastically from its modest beginning in the barracks of the St. Petersburg Calvary Regiment. Officials of the school incorporated new courses of study in applied sciences, including chemistry [*khimiia*], mechanics [*mekhanika*], solid geometry [*stereometriia*], analytic and descriptive geometry [*analiticheskaia i nachertatel'naia geometriia*], differential and integral calculus [*differentsial'noe i integral'noe ischislenie*], practical trigonometry [*prakticheskaia trigonometriia*], construction [*stroitel'noe iskusstvo*], hydraulics [*givradlika*], civil engineering [*grazhdanskaia arkhitektura*], and mining [*minnoe iskusstvo*].⁴⁰ The 1869 historical sketch written by M. Maksimovskii in the commemorative album published in honor of the fiftieth anniversary of the school situates the credo of Ostrogradskii as a kind of an institutional motto: “all sciences are essential for the education of an engineer.”⁴¹ As one of its primary missions, the school functioned to prepare

⁴⁰ M. Maksimovskii, *Istoricheskii ocherk: Razvitiia Glavnago inzhenernago uchilishcha 1819-1869*, 42-45.

⁴¹ Baron El'sner, «[В]се науки необходимые для образования инженера» in *Ibid.* 38; see also Orest Miller, «При всем том, само собою разумеется, так высоко уважаемая в заведении наука оставалась наукою главным образом прикладною» in Orest Miller, *Biografiia, pis'ma i zametki iz zapisnoi knizhki Dostoevskogo*, 31; P.A. Ivanov, “Po povodu stat'i na jubilee Nikolaevskoi akademii i uchilishcha,” No. 325, *Sankt-Peterburgskie Vedomosti*, 1869, 2-3.

students for official military service, and to develop effective new methods and technologies in the art of war, science, and industry.

Of the classmates of Dostoevsky who pursued careers in the military, Fyodor Radetsky (1820-1890) was arguably the most well-known representative of the school. Radetsky attained the rank of General, and became a Russian national hero after leading successful campaigns throughout the Balkans in the Russo-Turkish War.⁴² Many graduates of the Main Engineering School ended up serving in the Crimean War. Russia lost the war against an alliance of Ottoman, French, British, and Sardinians forces, after suffering some 400,000 casualties, including numerous alumni from the Main Engineering School.⁴³

Before Dostoevsky could enroll in the Main Engineering School, he was required to pass entrance examinations and medical tests intended to evaluate mental and physical preparedness for the rigors of academic life and military exercises.⁴⁴ Exerting great pressure on his sons to perform admirably on the examinations to gain admission to the prestigious school, Dr. Dostoevsky entrusted Fyodor and Mikhail to Captain K. F. Kostomarov, who directed a boarding school in the Imperial capital.⁴⁵ Kostomarov was himself a military engineer, who possessed firsthand knowledge of the curriculum, requirements, and expectations at the Main Engineering School for incoming students.⁴⁶ Dr. Dostoevsky even paid Kostomarov 300 rubles in excess of the regular fee of the preparatory school, so that his sons could receive supplementary instruction in artillery and fortifications.⁴⁷ In addition, Dr. Dostoevsky contacted a distant relative, General-Lieutenant Krivoshein, who served in the department of the military engineering inspector, to

⁴² Ibid. 46; see also Peter Sekirin, *The Dostoevsky Archive: Firsthand Accounts of the Novelist from Contemporaries' Memoirs and Rare Periodicals*, 51.

⁴³ As cited by A. Gouttman, *La Guerre de Crimée, 1853-1856* (Paris: Editions SPM, 1995), 479.

⁴⁴ Konstantin Mochulsky, *Dostoevsky: His Life and Work*, 11.

⁴⁵ Ibid. 11

⁴⁶ Joseph Frank, *Dostoevsky: A Writer in His Time*, 41.

⁴⁷ Ibid. 41

improve the likelihood that his sons would receive offers of admission.⁴⁸ Dr. Dostoevsky, in short, placed great hope in the school that he thought would bring his sons bright futures and stable careers in engineering.

In preparing the boys for examination questions in artillery and fortifications, Kostomarov presented to the Dostoevsky brothers key lessons in algebra and geometry. They learned to calculate the trajectories of artillery shells, and to plan hypothetical military positions in both defensive and offensive scenarios. The admission committee of the Main Engineering School considered these skills indispensable to successful cadets. While the committee approved of the academic performance of both Dostoevsky brothers, only Fyodor was admitted, after Mikhail was diagnosed early symptoms of consumption.⁴⁹

Already during his preparation for entrance examinations, Dostoevsky encountered the principles of Newtonian mechanics, vector diagrams, and graphical analysis. This particular point expresses some degree of extrapolation at the outset of my efforts to reconstruct mathematical subjects that Dostoevsky encountered in his studies. The problems that he was asked to solve in his studies at the Main Engineering School could only be completed with requisite knowledge of mathematical formulae and methods.

To prepare for the entrance examinations, Dostoevsky studied the 1806 *Tables of logarithms, prime numbers, and trigonometric lines* [*Tablitsy logarifmov, prostykh chisel i trigonometricheskikh linii*], and the *Manual Mathematical Encyclopedia, book III, Algebra, 2nd edition, revised* [*Ruchnaia matematicheskaiia entsiklopediia, knizhka III: algebra, izdanie vtoroe,*

⁴⁸ Orest Miller, *Biografiia, pis'ma i zametki iz zapisnoi knizhki Dostoevskogo*, 46. As cited in Peter Sekirin, *The Dostoevsky Archive: Firsthand Accounts of the Novelist from Contemporaries' Memoirs and Rare Periodicals*, 51.

⁴⁹ Mikhail received treatment, and assumed a military post in Revel, modern-day Talinin. See Joseph Frank, *Dostoevsky: A Writer in His Time*, 41.

ispravlennoe] by Dmitrii Matveevich Perevoshchikov (1788-1880).⁵⁰ His coursework with Kostomarov, moreover, likely also entailed textual exercises from the 1819 translation of Euclid's *Elements* by F. Petrushevskii.⁵¹ The lessons from Kostomarov reinforced Dostoevsky's comprehension of mathematical problems, and acquainted him with the principles stressed in the curriculum of the Main Engineering School.

According to Orest Miller, however, the school “was not a very attractive place for those young men who dreamt about poetry. It was a school of mathematics, blue-printing and military drills- inspections, parades, and other exercises.”⁵² While Dostoevsky admits enjoying his academic coursework in his personal correspondence with friends and family, he disliked the general social atmosphere of the school, and he often found himself at odds with others.

⁵⁰ Dostoevsky's original copies remain at the Memorial Apartment-Museum of F.M. Dostoevskogo in Moscow. The museum opened in 1928, following the foundational efforts led by A.G. Dostoevskaia. Select texts and artifacts from the Dostoevsky Room in the Moscow Historical Museum were transferred to the apartment collection throughout the 1920s. Perhaps because of their detachment from the primary archival holdings of Dostoevsky materials, these items do not appear in the 2002 N.D. Budanova et al. *Biblioteka F.M. Dostoevskogo: opyt rekonstruktsii nauchnoe opisaniie* or Sergei Belov's 2011 *Ukazatel' proizvedenii F.M. Dostoevskogo i literatury o nem na russkom iazyke*. These surviving study materials are not included in subsequent inventories of his reading materials and belongings. See Galina Borisovna Ponomareva, *Muzei-kvartira F.M. Dostoevskogo v Mosvke* (Moscow: Palomnik, 2002), 95.

⁵¹ Before the research of Petrushevsky, Farquharson, the Scottish mathematician invited by Peter, helped translate the first fragments of the Latin version of *Elements* into Russian. Other translations followed, such as the 1769 Kurganov version from the French, and the 1784 edition from the Greek by Suvorov and Nikitin. These texts, however, were not circulated widely. The eight-book series of *Evklidovykh Nachal: osnovaniia geometrii [Euclid's Elements: The Foundations of Geometry]* by F.I. Petrushevsky (1785-1848) represented the first printing rendering of the systematic exposition of geometric sciences intended for mass distribution to Russian students. The translation was incorporated into Russian institutions of higher learning as a required mathematical text as early as the late 1820s. Lobachevsky encountered the work in his studies at Kazan University, and shortly later, lithographic extracts were assigned in geometry courses at the Main Engineering School starting in the early 1830s. Petrushevsky was even awarded with half of a Demidov prize in 1835 for his his translations of Euclid and Archimedes. The 1880 translation by Mikhail E. Vaschenko-Zakharchenko (1825-1912) largely replaced the work by Petrushevsky for the subsequent generation of mathematics and engineering students. See D.D. Mordukhai-Boltovskii, “Predislovie perevodchikia,” in *Nachala Evklida*, ed. M.Ia. Vygodskogo and I.N. Veselovskogo (Moscow: Gosudarstvennoe izdatel'stvo tekhniko-teoreticheskoi literatury, 1948), 6; V.F. Kagan, *Lobachevsky and His Contribution to Science* (Moscow: Foreign Languages Publishing House, 1957), 12; Sergei S. Demidov, “Chapter 8: Russia and the U.S.S.R.” in *Writing the History of Mathematics: Its Historical Development*, ed. Joseph W. Dauben and Christoph J. Scriba (Boston: Birkhauser Verlag, 2002), 179-180.

⁵² *Ibid.* 479; «Само по себе это заведение—с математикой, черчением и выправкой- не могло представляться для того, кто бредил поэзией».

Although Dostoevsky enjoyed moderate academic success in the diverse subject concentrations of the Main Engineering School, he was neither a model classmate, nor aspiring officer. In the apt summation of his classmate and friend, Konstantin Trutovsky, “Fyodor Mikhailovich was the least suitable person for a military life in the entire school. . . .His behavior was different from that of his- more or less light-minded- friends. Always concentrated within himself, he spent his spare time walking back and forth somewhere apart to the side, oblivious to what was going on around him.”⁵³ While readers formulate an impression of what the author looked like during his studies, there is an unfortunate lack of pictures depicting the author during these formative years of his artistic development. Based on the accounts of the author and his contemporaries, he was shy, soft-spoken, serious, somewhat distracted, but still studious, loyal, and hard-working.



⁵³ К.А. Трутовский, «Во всем училище не было воспитанника, который бы так мало подходил к военной выправке, как Ф.М. Достоевский. . . . Нравственно он также резко отличался от всех своих—более или менее легкомысленных—товарищей. Всегда сосредоточенный в себе, он в свободное время постоянно задумчиво ходил взад и вперед где-нибудь в стороне, не видя и не слыша, что происходило вокруг него» in “*Vospominaniia o Dostoevskom*,” in *Russkoe obozreniie* [*The Russian Review*] 1 (1893): 213.

Previous page: The Daguerreotype first came to Russia in 1839, and appeared exhibitions and published booklets by Nikolai Stepanov (1807-1877). Photography was largely only available to the wealthy, and professional daguerreotype work only started to proliferate throughout Russia in the late 1840s.⁵⁴ Consequently, there are no known pictures of Dostoevsky during the time of his education. The picture on the left is an 1847 portrait of the Dostoevsky by Konstantin Trutovsky.⁵⁵ The image on the right depicts the author in the Seventh Line Battalion stationed in Semipalatinsk during his compulsory military service in 1858. His uniform very closely reflects the formal garb worn by cadets of the Main Engineering School, complete with shiny epaulettes and buttons.⁵⁶

Hazing and bullying were integral features of student culture. Dmitrii Grigorovich recalls, for example, that “from the first day, new recruits received the nickname ‘grouses’ [*riabtsov*], a word produced, probably from a particular kind of bird, by which soldiers at that time used to refer to civilians. It was customary to look upon the grouses as pariahs, and it was considered a special skill to expose them to all kinds of trials and humiliations.”⁵⁷ Tormenting members of the younger classes became something of a sport for older students, and instructors often turned a blind eye to such infractions, provided external order and discipline were maintained.⁵⁸ Any resistance could bring on mass beatings that often sent bullied pupils to the hospital.⁵⁹ It was not easy for a young, shy boy such as Fyodor Mikhailovich Dostoevsky to acclimate to the rigid culture of the school.

⁵⁴ Roberto Ferrari, “Russian Empire” in *Encyclopedia of Nineteenth-Century Photography*, ed. John Hannavy (New York: Routledge, 2008), 1228.

⁵⁵ Portrait of Dostoevsky by Konstantin Trutovsky produced on New Year’s Eve of 1846-1847 in charcoal. Preserved at the State Literature Museum in Moscow. Fair-use reproduction of 1847 portrait. Accessed online at: < http://literatura5.narod.ru/dostoevsky_1847.jpg >.

⁵⁶ Photograph of Dostoevsky as an unter-officer in 1858. Preserved at the Literary Memorial Museum of Dostoevsky in St. Petersburg. Fair-use reproduction of 1858 photograph Accessed online at: < http://www.md.spb.ru/files/view.php?image=32&article_id=148 >.

⁵⁷ «С первого дня поступления новички получали прозвище рябцов,- слово производимое, вероятно от рябчика, которым тогда военные называли штатских. Смотреть на рябцов как на парий было в обычае. Считалось особенною доблестью подвергать их всевозможным испытаниям и унижениям». Dmitrii Grigorovich, *F.M. Dostoevskii v vospominaniakh sovremnikov*, 106.

⁵⁸ Joseph Frank, *Dostoevsky: A Writer in His Time*, 42.

⁵⁹ *Ibid.* 42. The boys shared sleeping quarters, where beatings and hazing activities presumably transpired at night. See also Joseph Frank, *The Seeds of Revolt, 1821-1849*, 76-77.

While Dostoevsky does not impart these impressions directly in his correspondences with friends and family members, a letter to his brother dated August 9, 1838 expresses his state of depression, resulting conceivably from unfortunate interactions at the Main Engineering School. He writes, “It seems to me that the world has taken on a negative meaning, and that from a high, refined spirituality there has emerged a satire.”⁶⁰ A.I. Savel’ev, furthermore, describes that classmates derisively referred to Dostoevsky as “the monk Photius”, since he frequently carried a copy of the Bible, and held lengthy conversations with Father Poluektov following lectures on religion.⁶¹ The angst that Dostoevsky endured during the years of his school from distasteful exchanges with his classmates contributed to his decisions to leave the profession of engineering, and to sever ties with many of his schoolmates.

Coincidentally, in the first year that Dostoevsky enrolled in the Main Engineering School, construction began on the Russian railroad system.⁶² The first two lines connected Tsarskoe selo and St. Petersburg, as well as St. Petersburg and Petergof.⁶³ In 1842, work on the railroad between St. Petersburg and Moscow had begun, and progressed under very unfavorable physical and climactic conditions.⁶⁴ Little is known of the particular drafting work that Dostoevsky completed during his education and eventual employment in the blueprint section of the Russian

⁶⁰ «Мне кажется, мир принял значенье отрицательное и из высокой, изящной духовности вышла сатира» in (*PSS* 28, bk. 1, 46).

⁶¹ A.I. Savel'ev remarks that Dostoevsky “was very religious, and zealously performed all the obligations of the Orthodox Christian Faith. He could be seen with the Bible, Zschokke's *Die Studenen der Andacht* [a famous collection of devotional essays with a strong emphasis on the necessity of giving Christian love a social application, etc.]” «Федор Михайлович вел себя скромно, строевые обязанности и учебные занятия исполнял безукоризненно, но был очень религозен, исполняя усердно обязанности православного христианина. У него можно было видеть и Евангелие, и «Die Stunden der Andacht» Цшокке, и др. После лекций из закона Божия о Полуэктова Федор Михайлович еще долго беседовал со своим законоучителем. Все это настолько бросалось в глаза товарищам, что они его прозвали мохахом Фотием.» A.I. Savel’ev, *F.M. Dostoevskii v vospominaniakh sovremenikov*, 97; see also Joseph Frank, *Dostoevsky: A Writer in His Time*, 48.

⁶² Stephen P. Timoshenko, “The Development of Engineering Education in Russia,” *Russian Review*, No. 15 (1956): 173-174.

⁶³ *Ibid.* 173-174

⁶⁴ *Ibid.* 173-174

Engineering Department, but it seems likely, given the scope of railroad expansion, that his efforts were devoted at least in part to the realization of rail lines and bridges.⁶⁵

In addition to course requirements in mathematics and engineering, the Main Engineering School also provided officers with exposure to educational endeavors in the humanities.⁶⁶ These courses included lectures on religion, history, Russian and French language and literature, as well as lessons in German.⁶⁷ While the Russian literature chair at the Main Engineering School focused predominantly on Romanticism, lecturing on Pushkin, Lermontov, and the Russian folk poet Koltsov, Dostoevsky's professor of French literature, Joseph Cournant, presented a range of artistic schools, and encouraged students to familiarize themselves with philosophical and scientific developments in Western thought.⁶⁸ From Cournant, Dostoevsky presumably became acquainted with the writings of Pascal and Descartes.⁶⁹ Dostoevsky derived such great insight from this course that he even asked his father for additional funds to join a French circulation library, where he could keep up with latest productions in French artistic and scientific output.⁷⁰ His passion for French literature, and his familiarity with the tropes, narrative methods, and devices of Romanticism frame the orientation of his earliest literary productions. In the final year of study at the Main Engineering School, Dostoevsky attended the public readings of Balzac, who spent three months in St. Petersburg in 1843.⁷¹

⁶⁵ The consideration that Kirillov from *Besy* worked as an engineer hired to build a railroad bridge suggests an autobiographical reference to Dostoevsky's own professional experiences.

⁶⁶ Joseph Frank, *Dostoevsky: A Writer in His Time*, 51.

⁶⁷ *Ibid.* 51; see also M. Maksimovskii, *Istoricheskii ocherk: Razvitiia Glavnago inzhenernago uchilishcha 1819-1869*, 42-45.

⁶⁸ *Ibid.* 51-52

⁶⁹ Dostoevsky refers to Pascal in a letter to his father dated 5 May 1838. (*PSS*: 28, book 1, 59-60).

⁷⁰ "I find it *absolutely necessary* to subscribe here to the French library for reading. There are so many great works of geniuses, mathematicians and military geniuses in French. I see a necessity to read them." «я нахожу совершенно необходимым абонироваться здесь на французскую библиотеку для чтения. Сколько есть великих произведений гениев- математики и военных гениев на французском языке. Вижу необходимость читать это...» (*PSS* 28, bk. 1, 59). See also Konstantin Mochulsky, *Dostoevsky: His Life and Work*, 23; Joseph Frank, *Dostoevsky: A Writer in His Time*, 51.

⁷¹ Konstantin Mochulsky, *Dostoevsky: His Life and Work*, 22-23.

As a general tendency, Russian students and scholars often looked to the West for the latest artistic fashions and scientific findings. The success of the Russian Academy of Sciences, however, soon transformed the Northern capital of St. Petersburg into a veritable center of cutting-edge research and analysis. While Newton and Leibniz discovered calculus, Leonhard Euler, who conducted some of his memorable research at the Academy of Sciences, systematized the uses of calculus, and pioneered his findings and methods to developing scientific arenas.

The significance of Euler's research was not immediately grasped by Russian academics, owing largely to the fact that the visiting Swiss scholar wrote primarily in French and Latin. Several decades needed to pass before his works were translated widely into the common vernacular. His prolific contributions to mathematics and the sciences established the reputation of the Academy of Sciences, and perhaps of Russia, more generally, as a productive environment for visiting scholars. Whereas Newton and Leibniz developed the theoretical underpinnings of calculus, Euler established manifold applications for the associated methods in just about every mathematical discipline known at that time, in addition to producing his independent treatises

While Dostoevsky did not enroll in engineering studies until 1838, V.E. Adodurov (1709-1785), S.K. Kotel'nikov (1723-1806), S.I. Rumovskii (1734-1812), M.E. Golovin (1756-1790), and M.V. Ostrogradsky (1801-1861) quickly adapted Eulerian methods into Russian scientific investigations.⁷² Of these Eulerian disciples, Dostoevsky studied under Mikhail Vasil'evich Ostrogradsky.⁷³ Receiving roughly six times the pay of the average faculty member at the school, Ostrogradsky primarily served as a celebrity figurehead of the school, who simultaneously held a post as an elected member of the Russian Academy of Sciences.⁷⁴ Although he served in an administrative capacity at the school starting in 1828, Ostrogradsky began teaching his own

⁷² Alexander Vucinich, *Science in Russian Culture: A History to 1860*, 104, 147, 205.

⁷³ A.S. Dolinin, *F.M. Dostoevskii v vospominaniakh sovremennikov: sbornik* (Moscow: Khudozhestvennaia literature, 1964), 94.

⁷⁴ M. Maksimovskii, *Istoricheskii ocherk: Razvitiia Glavnago inzhenernago uchilishcha 1819-1869*, 108.

classes at the Main Engineering School in 1836, when student performances failed to meet the expectations of state inspectors.⁷⁵ He was arguably the most esteemed professor on the faculty of the school, if not in all of Russia, and he enjoyed academic celebrity in the West.

The French mathematician Augustin-Louis Cauchy (1789-1857), for example, referred to Ostrogradsky as, “*donné de beaucoup de sagacité, et très versé dans l’analyse infinitésimale*” [possessing great sagacity, and well versed in infinitesimal analysis]. Ostrogradsky impressed Cauchy when he delivered demonstrations of independently conceived formulae in integral calculus. Cauchy made great use of the formulae in his 1825 text *Mémoire sur les intégrals définies prises entre des limites imaginaires* [A Memoir on Definite Integrals Between Imaginary Limits].⁷⁶ Another successful monograph on the theory of heat transference, containing the formulae for the transformation of a volume-integral into a surface-integral, catapulted Ostrogradsky into the highest circles of mathematical research. He soon found himself in the eminent company of Lagrange, Gauss, Poisson, Legendre, and Cauchy, and he came to know several of these scholars personally when he studied at the Sorbonne and the Collège de France in 1826. In light of his accomplishments, Ostrogradsky was elected to the membership of several learned societies outside of Russia, including the American Academy of Arts and Sciences.⁷⁷

Although the celebrity of Ostrogradsky brought welcome praise to Russian scientific initiatives from the West, his research and writings were largely not widely known to the

⁷⁵ Galina Kichingina, *The Imperial Laboratory: Experimental Physiology and Clinical Medicine in Post-Crimean Russia* (New York: Rodopi, 2009), 79; see also A.I. Maron, “Obshchie pedagogicheskie vzgliady M.V. Ostrogradskogo,” in *Mikhail Vasil’evich Ostrogradskii (k 200-letiiu so dnia rozhdeniia) in Istoriko-matematicheskie issledovaniia*, Vol. 4 (Moscow: OGIZ, Gos. Izd.-vo tekhniko-teoreticheskoi literatury, 1951), 124-125.

⁷⁶ Augustin-Louis Cauchy, *Mémoire sur les intégrals définies prises entre des limites imaginaires* (Paris: 1825), 2. As cited in Alexander Vucinich, *Science in Russian Culture: A History to 1860*, 240.

⁷⁷ Alexander Vucinich, “Nikolai Ivanovich Lobachevskii: The Man behind the First Non-Euclidean Geometry”, *ISIS*, Vol. 53, No. 4 (Dec., 1962), 467; see also B.V. Gnedenko, *Ocherki po istorii matematiki v Rossii* (Moscow-Leningrad, 1946), 109; B.V. Gnedenko, *Mikhail Vasil’evich Ostrogradskii: Ocherki zhizni, nauchnogo tvortchestva i pedagogicheskoi deiatel’nosti* (Moscow, 1952), 120.

domestic literate public. In 1841, N.D. Brashman lamented, “If Ostrogradsky had written in the Russian language, our mathematical literature would have occupied an honored place among those of other European countries.”⁷⁸ Despite the fact that Brashman was an admirer of Ostrogradsky’s contributions to calculus, the two mathematicians often disagreed on the coordination of national mathematics initiatives in state educational institutions.

By the time Dostoevsky enrolled in the Main Engineering School, Ostrogradsky had assumed. While he possessed an immense reputation, Ostrogradsky was not a very effective teacher and motivator of young minds. His lectures often veered from the subject of mathematics into the military arts, a subject also close to his own sympathies.⁷⁹ During lectures by Ostrogradsky at the Main Engineering School, Grigorovich and Dostoevsky would often pass the time by drawing portraits of the esteemed lecturer.⁸⁰ Upon receiving admonishment for his lack of attention, Grigorovich joked, “it’s better to be a good artist than a bad engineer.”⁸¹ According to the recollections of teaching colleagues, Ostrogradsky intimidated his students by bombastically declaring, “the essence of the differential is known only to two people, Euler and I. It is impossible to explain it. You can only feel it, or grasp it by means of inspiration. If Archimedes had lived in our time, then he would have been the third one who knew the meaning

⁷⁸ Ibid. 479.

⁷⁹ «Often Mikhail Vasil'evich did not want to read lectures. Then he began to tell lively stories of great generals, skillfully drawing on the board the plans of military battles- he knew all about military history.” «Зачастую Михаил Васильевич совсем не хотел читать лекцию. Тогда он начинал живо рассказывать о великих полководцах, умело чертить на доске планы военных сражений- о военной истории он знал все» Aleksandr Fomin, “Mikhail Vasilievich Ostrogradskii” in *100 znamenitykh uchennykh*, (Moscow: Folio, 2008), 47; see also Boris Vladimirovich Gnedenko, *Mikhail Vasil'evich Ostrogradskii: 1801-1862*, (Leningrad: Izdatel'stvo Akademii Nauk, SSSR, 1963), 253; Alexander Vucinich, *Science in Russian Culture: A History to 1860*, 240.

⁸⁰ D.V. Grigorovich, *F.M. Dostoevskii v vospomaniakh sovremennikov: sbornik*, ed. A.S. Dolinin, 94.

⁸¹ D.V. Grigorovich: «Лучше быть хорошим художником, нежели плохим инженером». As cited in Ibid. 94.

of the differential.”⁸² While Ostrogradsky possessed great credentials, his ego and reputation may have made it difficult for students to connect with him and the content of his courses.

In a letter sent to his father on 5-10 May 1839, Dostoevsky alludes to the impressive reputation of his teacher, while describing his frustration with the overarching emphasis on theoretical frameworks, “But why should I become a Pascal or an Ostrogradsky. Mathematics without application is a pure 0, and there’s just as much usefulness in it as in a soap bubble.”⁸³ Although Dostoevsky wrote this letter after failing his examinations in algebra, the note demonstrates his recognition of the social esteem that Ostrogradsky commanded, and the instructional direction of the school toward the pragmatic function of mathematics.

The subjective ascription of success to mathematical application, however, represents a theme that would later become central to his literary works. While military activities promote the development of technologies to increase the functionality and creative potential of civilizational existence, they also investigate models and mechanisms of destruction. The progression of mathematics and technological innovation fluctuates between two ideological extremes: the desire to save and serve humanity, and the other to kill, control, and subjugate. Gary Saul Morson argues that Dostoevsky and other critics of his time “foresaw that the twentieth century would not be a time of increasing enlightenment and liberalism, but the century giving rise to what we have come to call totalitarianism.”⁸⁴ The ascribed benefit of technology thus deserves careful skepticism, and its applications should not supersede individual morality and humanity.

⁸² «Сущность дифференциала знают во всем мире только двое: Эйлер да я. Объяснить его нельзя. Это можно или почувствовать, или постигнуть вдохновением. Если бы Архимед в наше время был жив, так он был бы третий, который знал бы, что такое дифференциал.» M. Ostrogradskii, as cited by A.V. Eval’d in “Vospominaniia A.V. Eval’d” in *Istoricheskii vestnik*, (Sankt-Peterburg, Tipografiia A.S. Suvorina, 1895), Vol. LXI, 578. A.V. Eval’d, coincidentally, was Dostoevsky’s instructor of Physics; see also Orest Miller, *Biografiia, pis’ma i zametki iz zapisnoi knizhki Dostoevskogo*, 31.

⁸³ «Но к чему мне сделаться Паскалем или Остроградским. Математика без приложенья чистый 0, и пользы в ней столько же, как в мыльном пузыре» (*PSS*: 28, bk. 1, 59-60).

⁸⁴ Gary Saul Morson, “Editor’s Introduction: The Process and Composition of *A Writer’s Diary*” in *A Writer’s Diary* by F.M. Dostoevsky, trans. Kenneth Lantz, (Evanston, IL: Northwestern UP, 2009), xxiii.

The letter dated 5-10 May of 1839, describing his frustration with mathematics, however, represents the last correspondence that Dostoevsky sent to his father.⁸⁵ Considering the rather mysterious circumstances of the death of Dr. Dostoevsky, Peter Sekirin offers the none-too-serious anecdotal explanation that his father suffered a stroke upon learning that Fyodor had potentially lost his interest in mathematics after failing to resolve problems in his algebra coursework from the previous year of study.⁸⁶ The premise would attach Freudian significance to his holistic regard for mathematics, in the sense that Dostoevsky may have internalized feelings of guilt for the death of his father after failing to live up to high academic and professional expectations. This psychoanalytical interpretation provides only an anecdotal interpretation of the range of feelings that Dostoevsky experienced following the loss of his last remaining parent. Scholars remain divided on the cause of death of his father, and the orphaned Dostoevsky subscribed to varying interpretations of what actually transpired on the outskirts of the village of Cheremoshnia near the family summer estate in Darovoe.⁸⁷

⁸⁵ “I am a passionate lover of military sciences, although I cannot tolerate mathematics. What is it with this strange science! And what stupidity to study it. It demands sufficiently enough from me to be an engineer, but still there is more.” «[Я] страстный охотник до наук военных, хотя не терплю математики. Что за странная наука! и что за глупость заниматься ею. С меня довольно столько, сколько требуется инженеру или еще и побольше» (*PSS* 28, bk. 1, 59).

⁸⁶ Peter Sekirin, *The Dostoevsky Archive: Firsthand Accounts of the Novelist from Contemporaries' Memoirs and Rare Periodicals* (Jefferson, NC: McFarland, 1997), 58.

⁸⁷ Andrei Dostoevsky subscribes to the theory that Dr. Dostoevsky was murdered, whereas Joseph Frank maintains that “death came by suffocation, and no marks of foul play were visible on the body. [He] was reported to have died of an apoplectic stroke, and though murder was rumored throughout the district, the family decided to let the matter rest.” The nurse of Andrei, Alyona Frolovna, allegedly described to him the psychological state of his father leading up to his death: “Dr. Dostoevsky used to talk loudly to himself. He imagined that he was speaking to his deceased wife, and he would reply to himself in her usual phrases. . . . He was in a state bordering on madness, especially when one considers that he was completely alone. Furthermore, he started to drink alcohol. He became intimate with a servant woman,

Although he struggled with algebra in a course taught by Sub-Lieutenant Lomnovsky, and lectures on differential calculus by Ostrogradsky, Dostoevsky consistently excelled at geometry.⁸⁸ In his geometric coursework, Dostoevsky often received perfect marks.⁸⁹ His geometric understandings, and skills in diagramming and graphing different mathematical relationships readily lent themselves to his proficiencies in drafting. The sketches of buildings, faces, and ornate calligraphy in his notebooks, moreover, demonstrate his artistic talents.⁹⁰

Catherine, who worked at our house in Moscow.” His conduct in the village inspired the contempt of local serfs. Despite reports of public confrontations between Dr. Dostoevsky and local peasants, the decision was made not to pursue a police investigation, and the family resolved to accept the natural cause of death. There is no official mention of foul play in the death of Dr. Dostoevsky that occurred on June 6, 1839. The five younger orphaned Dostoevsky children came to be raised by the Kumanin family. See Joseph Frank, *Dostoevsky: A Writer in His Time*, 6; A.M. Dostoevskii, *Vospominaniia*, (Leningrad: Izdatel'stvo pisatelei v Leningrade, 1930); Orest Miller, *Biografiia, pis'ma i zametki iz zapisnoi knizhki Dostoevskogo*, (Sankt-Peterburg: Tipografiia A.S. Suvorina, 1883), 43; K.A. Lantz, *The Dostoevsky Encyclopedia*, 223.

⁸⁸ Dostoevsky was actually required to repeat coursework for receiving a mark of 11 out of 15 in algebra. He reported the news to his father in a letter dated 30 October 1838: “I was proud of my exam, I scored with the distinction of *excellent*, but what of it? They've placed me for another year in the class. My goodness!....Out of 10 possible points (and 15 for algebra and fortifications), I received 11 for algebra (the teacher determinedly wanted to keep me back, he is mad at me more than the rest of the students). Fortifications- 12, Artillery- 8, Geometry- 10, History- 10, Geography- 10, Russian- 10, French- 10, German- 10, Catechism- 10.” «я гордился своим экзаменом, я экзаменовался *отлично*, и что же? Меня оставили на другой год в классе. Боже мой!...При 10-ти полных баллах (из алгебры и фортификации 15 полных) я получил: Из алгебры- 11 (преподающий хотел непременно, чтоб я остался, он зол на меня более всех)- фортификации- 12. Артиллерия- 8, Геометрия- 10, История- 10, География- 10, Русский язык- 10, Французский- 10, Немецкий- 10, Закон божий- 10» (*PSS* 28, bk. 1, 52). The marks that Dostoevsky communicated to his father accurately reflect the grades recorded in the chancellery documents of the Main Engineering School. See *Glavnoe inzhenernoe uchilishche*, RGVIA, fund 321, op. 1, d. 522, 25.

⁸⁹ *Glavnoe inzhenernoe uchilishche*, RGVIA, fund 321, op. 1, d. 522, 25. His perfect scores in geometry contributed to his standing as third in his class after the first full year of study at the Main Engineering School. After completing basic geometry, Dostoevsky later moved on Analytic Geometry using the 1837 textbook by Nikolai Brashman. Dostoevsky stresses the importance of his geometric learning to Brashman in a letter to his brother dated 1 January 1840 (*PSS* 28, bk. 1, 67); see also *Glavnoe inzhenernoe uchilishche*, RGVIA fund 351, op.1, d.522, 7.

⁹⁰ In 2008- 2009, the Harriman Institute of Russian, Eurasian, and East European Studies at Columbia University hosted the exhibition, “Dostoevsky’s Doodles,” with materials provided by Konstantin Barsht, a researcher at the Russian Academy’s Institute for Russian Literature (Pushkin House) in St. Petersburg. In 2005, Basht compiled the collected sketches by Dostoevsky for the Voskressnye edition of his works. A variety of translations, biographies, and collections of original manuscripts by Dostoevsky also

The architectural detail rendered in *Winter Notes on Summer Impressions* [*Zimnie zapiski o letnykh vpechatleniakh*, 1863] echoes his attention to questions of design and material science. At the outset to the text in the section, for example, Dostoevsky emphasizes these sensitivities throughout his travels, affirming “bird’s eye view is an architectural term, you know,” and also alluding to his appreciation for the Cathedral of Cologne, a structure that “he would sketch often in [his] youth when [he] studied architecture.”⁹¹ When he graduated from the Engineering School in 1843, these skills and intuitions helped him to find work in the blueprint office of the St. Petersburg Engineering Department.⁹² Although he left this position after a period of about a year to pursue his literary passions, his education afforded him unique insights into various disciplines of both the arts and sciences.

Dostoevsky’s conflicted attitudes toward the Main Engineering School, his difficulties in algebra, as well as his exchanges with Ostrogradsky left a deep impression on his psyche. Dostoevsky even vocalized aspects of his mathematical debates from his studies in subsequent polemics with his radical peers. When the Third Section of the secret police carried out its investigation of the Petrashevsky Circle, in addition to arresting to Fyodor Mikhailovich, they

feature selections of these sketches. These drawings often feature calculations in the margins, primarily related to his finances, but on select occasions, such as an entry from Holy Thursday of 1864, deliberations expressing pictorially ramifications of the hypothetical intersection of parallel lines. F.M. Dostoevsky, *Crime and Punishment*, trans. Edward Wasiolek. Chicago: University of Chicago Press, 1967; see also “Pictorial Souvenirs of Russian Writers: F.M. Dostoevsky”, compiled from scans of the Central State Archives of Literature and Art (now RGALI) in Moscow, on CultureRU in the series, *Culture: Art, Literature, Folk, Architecture*, 2011. Accessed online at: <http://cultururu.com/category/visual-arts/pictorial-souvenirs-of-russian-writers/f-dostoyevsky-1821-1881/>>. See also Colin Marshall, “Fyodor Dostoevsky Draws Elaborate Doodles in His Manuscripts” in *Open Culture*, 17 January 2014. Accessed online at: <http://www.openculture.com/2014/01/fyodor-dostoevsky-draws-elaborate-doodles-in-his-manuscripts.html>>.

⁹¹ «с птичьего полета не значит *свысока*. Это архитектурный термин, вы знаете» (*PSS* 5, 50); «Признаюсь, я много ожидал от собора; я с благоговением чертил его еще в юности, когда учился архитектуре» (*PSS* 5, 48). His mathematical background arguably informed his appreciations and understandings of architecture. An entire satellite project related to this dissertation could be undertaken to explore elements of his prose reflecting his background in architecture and civil engineering.

⁹² Orest Miller, *Biografiia, pis'ma, i zametki iz zapisnoi knizhki Dostoevskogo*, translated and reprinted in *The Dostoevsky Archive: Firsthand Accounts of the Novelist from Contemporaries' Memoirs and Rare Periodicals*, ed. Peter Sekirin (Jefferson, NC: McFarland & CO., 1997), 51-52.

also arrested Mikhail Dostoevsky. Mikhail had attended one or two meetings, but ultimately distanced himself from the group, and did not take part in their controversial activities.⁹³

While Mikhail was eventually cleared of all charges, he provided testimony to General I.A. Nabokov regarding the proceedings of a meeting of the Petrashevsky Circle on 22 April 1849, as related to him by his brother.⁹⁴ Mikhail recalled the agitated state of Fyodor, who reported that a discussion had come up involving Ostrogradsky, touching upon the possibility of understanding different levels of the equation, $2x^2=4$.⁹⁵ At the core of this debate, Dostoevsky seems to have been contrasting an ordinary person's understanding of such a basic equation with

⁹³ Although Mikhail was released, Fyodor was charged for his involvement in the manufacture of a "home-made" printing press and activities deemed destructive to the state. The most scathing evidence against him was his public recitation of the 1847 "Letter to N.V. Gogol" by Vissarion Belinsky. In the letter, Belinsky sharply criticizes the author's promotion of serfdom in *Vybrannye mesta iz perezpiski z druziami* (*Selected Passages from Correspondence with Friends*). The letter asserted that believers in material progress and reason, the socialists, were much closer to the Christian ideal of human dignity than was the Russian Church. Dostoevsky read the letter twice, at the Palm-Durov Circle, and again at the gathering of the Petrashevsky Circle. K. A. Lantz, *The Dostoevsky Encyclopedia* (Westport, CT: Greenwood Publishing Group, 2004), 35.

⁹⁴ Aleksandr Miliukov, "About Dostoevsky's Involvement in the Petrashevsky Secret Socialist Circle" in *The Dostoevsky Archive: Firsthand Accounts of the Novelist from Contemporaries' Memoirs and Rare Periodicals*, trans. Peter Sekirin (Jefferson, NC: McFarland, 1997), 83.

⁹⁵ "Presently, I only remember that after this explanation of how one should publish a journal, and of the advantage, which such means of a publication would present, Mr. Petrashevsky expressed regret that our contemporary literature does not present any kind of substance, and in it, moreover, there are no ideas. Durov or I, I don't remember well which one of us asked him, what he meant by substance, and what kind of ideas our literature ought to convey? He answered, that our authors don't have enough erudition, that they need to study, and that then, they would be able to understand themselves what kind of substance is necessary for literature, that George Sand and Eugene Sue are people who are first of all scholars, and they know history like none of us knows history, that he knows, and we know that $2x^2=4$, and Ostrogradsky knows $2x^2=4$, but between his knowledge of mathematics and ours there is a tremendous difference. I did not begin to fight with him, but asked him to hasten toward his point" «Теперь только вспоминаю, что после изложения того, как бы следовало издавать журнал, и выгод, какие представляет такой способ издания, г-н Петрашевский изъявил сожаление, что современная литература наша не представляет никакого содержания и что в ней нет никакой идеи. Дуров или я, не помню хорошенько, кто из нас, спросили его, что он разумеет под содержанием и какие идеи должна проводить наша литература? На это он отвечал, что литераторам нашим не достает эрудиции, что они должны учиться, что тогда они сами будут знать, какое содержание необходимо для литературы; что Ж. Санд и Е. Сю люди прежде всего ученые, что историю они знают, как никто из нас не знает; что и он, и мы знаем, что $2 \times 2 = 4$ и Остроградский знает, что $2 \times 2 = 4$, но между его знанием математики и нашим большая разница. Я не стал с ним спорить и просил его прийти скорее к заключению». M.M. Dostoevskii, "Sledstvennoe delo M.M. Dostoevskogo-petrashevtsa" in *Dostoevskii: materialy i issledovaniia*, ed. G.M. Fridlender, (Leningrad: Nauka, 1974), vol. 1, 263.

the conceptualization of the problem by a professional mathematician, artist, or philosopher with special insights into the subtlest nuances of being.

Even though Mikhail does not impart an exact transcription of his brother's commentary in the associated discussion, it seems likely that the young author would have participated rather enthusiastically in the conversation, having himself been a pupil of the esteemed mathematician. It is unlikely that Ostrogradsky challenged his students to conceptualize the existential basis of such seemingly straight-forward mathematical equations at the Main Engineering School. The premise of $2 \times 2 = 5$ presupposes a world where the defining basis of physical reality can be bent by divine miracle, force of will, or even clever arithmetic. The input volunteered by F.M. Dostoevsky at the Petrashevsky meeting may have been the earliest vocalization of his philosophical interrogation of $2 \times 2 = 4$, and his associated metaphysical doubts stemming from this debate. Although the topic first appeared in a meeting of the Petrashevsky Circle before appearing subsequently in *Notes from Underground*, Elizabeth Blake suggests that Dostoevsky may have encountered the premise in his readings of Diderot.⁹⁶

Since it is difficult to assess the explicit knowledge that Dostoevsky derived from his mathematical studies at the Main Engineering School, a brief examination of texts assigned to officers and cadets provides insight into the discourses and methods that he encountered in his scholarship. Since books were considerably more expensive, students of the school often

⁹⁶ Elizabeth Blake suggested this interpretation in discussion following the panel, "Texts and Contexts: Tolstoy and Dostoevsky" at the 2016 conference of AATSEEL in Austin, TX, and this argument will likely appear in her upcoming book on Dostoevsky and reason. Denis Diderot (1713-1784) provides seemingly obvious explanations of why $2 \times 2 = 4$ under the heading "Extraction" in *Encyclopédie* (1751-1772), explicating how to calculate exponents and multiples of two using shorthand notation "So then I square them, saying 2×2 makes four," [*puis je les quarré en disant, 2×2 font 4*]. In this entry, Diderot suggests that from the a rational perspective, 2×2 could not equal any other value. Denis Diderot and Fortuné Barthélemy de Félice, *Encyclopédie ou dictionnaire universel raisonne des Connoissances Humaines*, Volume 18, (Paris: 1772), 152. Accessed online through HathiTrust at <<http://catalog.hathitrust.org/Record/000761675>>.

received course materials in the form of lithographed notebooks (*litografirovannye tetradki*).⁹⁷ At the beginning of 1840, Mikhail Dostoevsky, having recuperated from the symptoms of the illness that prevented from enrolling at the Main Engineering School, considered re-applying to be reunited with his brother, and resume the career that his father had so desired for his sons. A letter dated 1 January 1840 sent by Fyodor to his Mikhail brings intriguing details of course readings and instructional methods to light. Since Fyodor ostensibly wanted to give Mikhail every advantage in the admission process, moreover, the letter conveys inside information regarding courses of instruction and the evaluative criteria of school officials.⁹⁸

In these primary passages, Fyodor intends to prepare Mikhail for his studies, and offers recommendations of how to rehearse before convening with the admissions committee: “I’ll definitely send [you] artillery, the petty officer course (which seems to be precisely what you need), the notes from the course taught by Major-General Diadin, who will conduct your examination in person.”⁹⁹ By describing Diadin as an “eccentric person” who expected rote memorization as if straight from the book in a parenthetical aside, Fyodor perhaps implies his dissatisfaction of instructional methods at the school, in which students would regurgitate material without challenging or debating the value of the associated ideas.¹⁰⁰

Fyodor describes other courses, including mathematics, in additionally colorful detail: “Field fortifications is such nonsense that you can cram it in 3 days. But in May, I’ll send it to

⁹⁷ (PSS 28, bk 1, 67).

⁹⁸ In a letter to his father dated 5-10 May of 1839, Fyodor asked his father to encourage Mikhail to re-apply to the Main Engineering School, stressing that he knew enough mathematics to be accepted. «Ему бы можно было экзаменоваться к нам в училище в нижний офицер<ский> класс. Посоветуйте ему это. Из крепост<ных> кондукторов очень много это делают. Примеры тому ежегодные. Он уже и так теперь знает довольно из математики.» (PSS 28, bk 1, 67).

⁹⁹ «Артиллерию, впрочем, курс кондукторских классов (что именно, кажется, вам и надобно) пришлю непременно, записки генерал-майора Дядина, который сам, собственною особою, будет экзаменовывать тебя». (PSS 28, bk. 1, 67).

¹⁰⁰ «Дядин человек с причудами, ему надо вызубрить или говорить своими словами как по книге.» (PSS 28, bk. 1, 67).

you, too. Long-term [fortifications] are another thing I'll try to take care of it. We have lithographed notebooks for differentials, too; but they're taken word for word from Brashman, and you can cram from it."¹⁰¹ The text by Brashman, none other than the 1836 *Kurs analitecheskoi geometrii* (*Course on Analytic Geometry*), is of such significance that Fyodor advises his brother to buy it for himself.¹⁰² As the brothers regularly struggled with money, this emphasis demonstrates the imperative of learning mathematics, and perhaps insinuates that the text represented something worthy of ownership.

The textbook by Nikolai Brashman that Dostoevsky encountered in his analytic geometry course deserves special consideration. Brashman accepted a post in the Department of Physics and Mathematics at the University of Kazan in 1825. Although he was a younger colleague of Nikolai Lobachevsky, he represents one of the first scholars in Russia to promote the tenets of Non-Euclidean Geometry. Both Brashman and Lobachevsky produced their best work in the Russian vernacular, and they represented respectable Russian scholarship that was beginning to develop outside the protectorate of the St. Petersburg Academy of Sciences.¹⁰³ Brashman believed that “the time was fast approaching when the outside world would read not only Russian poets, but also Russian geometers.”¹⁰⁴ This stance opposed the controlling posture of Mikhail Ostrogradsky, who, for one, refused to acknowledge the merit of the research by Lobachevsky, and for another, wrote almost exclusively in Latin and French.

Whereas Lobachevsky took a definitive stance against the institutional position of Ostrogradsky and the Academy of Sciences regarding the reliability of Euclid's *Elements*,

¹⁰¹ «Полевая фортификация такая глупость, которую можно вы зубрить в 3 дня. Впрочем, в мае пришлю и ее тебе. Другое дело долговременная; постараюсь об ней. Есть у нас и из аналитики литографированные тетрадки; но это взято слово в слово из Брашмана, и ты его зубри» Ibid. 67.

¹⁰² «Купи себе.» Ibid. 67.

¹⁰³ Alexander Vucinich, “Nikolai Ivanovich Lobachevskii: The Man Behind the First Non-Euclidean Geometry” in *ISIS*, Vol. 53, No. 4 (Dec., 1962), 479. See also B.V. Gnedenko, *Mikhail Vasil'evich Ostrogradskii: 1801-1862* (Leningrad: Izd. Akademii nauk, 1963), 98.

¹⁰⁴ Ibid. 479

Brashman was more diplomatic. In his mathematical texts, Brashman accepted Euclidean frameworks, while simultaneously offering the hypothetical supposition that Non-Euclidean principles could also embody mathematically viable alternatives. Reading between the lines, Brashman implicitly promotes of Non-Euclidean notions.

At the outset of his textbook, Brashman laments that more Russians were not familiar with “the classical work of Euler, *Introduction to Analysis of the Infinite* [*Vvedenie v analizis beskonechnykh*].¹⁰⁵ Brashman correspondingly defines “Geometry as the science about space.”¹⁰⁶ Without directly accepting the arguments of Lobachevsky, Brashman outlines suppositions of Non-Euclidean Geometry, in a mode infused with subliminal challenges to existing Euclidean models. For example, Brashman encourages his readers to consider that space exists as a relative construct.¹⁰⁷ Brashman alludes to hypothetical, rhetorical arguments to elaborate this claim, arguing, “this science [Geometry] would change its form if space were, for example, to acquire another dimension, that is, if it were possible to imagine four dimensions that were not mutually

¹⁰⁵ «И даже весьма немногие знают классическое сочинение Эйлера: *Введение в анализисъ безконечныхъ*» in N.D. Brashman, *Kurs analiticheskoi geometrii* (Moscow: Universitetskaia tipografiia, 1836), iii.

¹⁰⁶ «Мы занимаемся этим предметом для Геометрии, которая есть наука о пространстве». Ibid. 1.

¹⁰⁷ To readers of the text infused with skeptical curiosity, as a well as a healthy dose of adventure and daring, both space and time in these terms would have inferred constructs with relativistic properties. Brashman describes the dimensional unities that embody space, “*prostranstvo*”, and argues that the sum unity of width, length, and height, depends on their relative proportions. Time, too, as a dimensional construct, would be subject to the same relativity. By the nineteenth century, scientists began not simply to *measure* time in terms of motion through space, but also to *define* in these terms, thus abandoning the concept of absolute time. Lobachevsky, for one, defined time in terms of the movement of material bodies: “The continuation of the motion of one body, taken as being known for comparison with another, is called time” Newton, on the other hand, conceived of time as an absolute construct that exists independently of motion of bodies in space. The suppositions of Brashman and Lobachevsky contributed to Einstein’s formulation of the Theory of Relativity. Because of the theory of relativity, “time is robbed of its independence.” In the more readily comprehensible description of Hermann Minkowski, because of relativity, “space in itself and time in itself sink into mere shadows and only a kind of union of the two retains independent existence,” i.e. space-time. N.I. Lobachevskii, “Dve leksii po mekhanike” in *Filosofskoe i nauchnoe znachenie idei N.I. Lobachevskogo*, ed. N.A. Litsis (Riga: Zinatne, 1976), 319; see also Albert Einstein, *Relativity: The Special and the General Theory*, trans. Robert W. Laws (New York: Crown, 1961), 56. As cited in Liza Knapp, *The Annihilation of Inertia: Dostoevsky and Metaphysics*, 283.

dependent.”¹⁰⁸ Furthermore, Brashman encourages students to consider other relativistic geometric constructs: “Insofar as space is the subject of geometry, then it is natural that geometry should depend on the qualities of space, and in addition, on our own structure—that is, how in accordance with our structure space appears to us.”¹⁰⁹ The ability to define, and construe space, accordingly, depends entirely upon human perception.

To make these abstract principles more approachable to the average reader, Brashman offers a useful analogy from sensory experience: “Perhaps we would express ourselves more clearly if we would say that Geometry would have to take on a different form if we were to imagine our structure to be different. For example, if human beings were to lack the sense of touch, then our Geometry would take on a different form.”¹¹⁰ Sensory perception affects human ability to discern and define space, and the resultant perception comes to reflect features of our psyche. From these lines by Brashman, Dostoevsky could have sensed the gravity of the revolutionary approaches that served as the foundational basis of Non-Euclidean Geometry.

Throughout his scholarship at the Main Engineering School, Dostoevsky encountered other texts that were incorporated into the mathematical curriculum, including selections of the 13-volume *Manual Mathematical Encyclopedia (Ruchnaia matematicheskaiia entsiklopediia, 1826-1837)* by D.M. Perevoshchikov (1788-1880), and materials from the 12-book translation of

¹⁰⁸ “Let us add that the science would change in its own appearance if it gained additional spaces. Still one more dimension, if you could imagine four independent dimensions and another extension. By the same token, space would also change if it were to lose a dimension.” «Прибавим, что эта наука изменилась-бы в своем виде, если бы пространства приобрело на пр. Еще одно протяжение, ш.е. если-бы можно было вообразить четыре независимые между собою протяжения. Напротив, если-бы он потеряло одно протяжение на пр» in N.D. Brashman, *Kurs analiticheskoi geometrii* (Moscow: Universitetskaia tipografiia, 1836), 3.

¹⁰⁹ «Поелику предмет Геометрии, как мы уже сказали, есть пространство, то естественно, что она должна зависит от его свойства, и вместе с тем, от собственного нашего устройства, т.е. как нам по устройству нашем представляешь пространство. Может быть мы выразимся яснее, если скажем, что Геометрия должна принять другой вид, если вообразим устройство наше иначе... Если-бы человек лишился чувства осязания, то Геометрия наша переменила-бы свой вид» in *Ibid.* 3.

¹¹⁰ *Ibid.* 3-4

Euclid's Elements (*Nachala Evklida*, 1819-1835) by F.I. Petrushevsky. In his geometry courses, Dostoevsky would have been required to produce proofs, diagram geometric constructions, and calculate unknown values.¹¹¹

Geometric and algebraic approaches were often intertwined. Standardized Eulerian notation to express relationships of generalizable abstraction may not have been communicated to students prior to their enrollment at the Main Engineering School.¹¹² As such, the processes by which students solved for unknown variables in algebra and calculus could have been geometric in nature. For example, to calculate 5^3 , a student could solve the value through arithmetic means, that is, $5 \times 5 \times 5$, or by drawing a cube with a side of length 5, and determining its volume. As young noblemen often received instruction in mathematics from private tutors, there was little standardization in the methods and texts that the students encountered before enrolling at the Main Engineering School. Most incoming conductors would have likely studied from mathematical *sborniki*, or survey texts intended for general use, but not always.¹¹³ Acclimating to new notation may have contributed to the difficulties faced by prospective engineers.

Higher-level seminars would have primarily been devoted to investigations in calculus, where the methods and findings of Leonhard Euler would have featured prominently. Ostrogradsky stressed Eulerian methods in his lectures, and asked his advanced students to consider the 1831 Russian translation by V. Buniakovskii of an original French calculus text by

¹¹¹ PSS 28, bk. 1, 52.

¹¹² Instructors at the Main Engineering School reinforced Eulerian methods; however, incoming students may not have all been familiar with the associated notational standards. It's unclear if these notational standards were seen as mandatory pre-requisites on entrance examinations.

¹¹³ See the 1804 *Rukovodstvo k arifmetike dlia upotrebleniia v narodnykh uchilishchakh Rossiiskoi Imperii*, (Instruction for Arithmetic for Use in Public Schools of the Russian Empire." Accessed online at: <<http://math.ru/lib/book/djvu/klassik/1804.djvu>>.

Cauchy, *Differentsial'noe i integral'noe ischislenie* [*Differential and Integral Calculus*].¹¹⁴ As instructors of the school assigned works by N.D. Brashman for geometry courses, his popularly-received general calculus research also featured in the curriculum of the school, including *Primechanie k teorii naibol'shikh velichin funktsii mnogikh peremennykh* (“Note to the theory of the maximum and minimum values of functions of several variables”).¹¹⁵ Like Petrushevsky before him, Brashman was awarded the Demidov Prize for his 1837 work, *Teoriia ravnovesiia tel tverdykh i zhidkikh, ili statika i gidrostatika* [*The Theory of Equilibrium of Solid and Liquid Bodies, or Statics and Hydrostatics*], which included applied calculus models for determining related rates, and considered the interrelationship of different mechanical functions.¹¹⁶

As a general initiative of the Academy of Sciences, instructors at state schools received encouragement to offer specialized courses, as opposed to general surveys familiarizing students with the generalizable tenets of applied engineering and mathematics.¹¹⁷ Officer seminars, for instance, were implemented to advance student preparedness for particular specializations contributing to military affairs. These courses often honed mathematical abilities relative to a particular concentration, such as chemistry, mechanics, hydraulics, or civil engineering.¹¹⁸ Successful completion of these officer programs almost assuredly translated to a confirmed post in the armed services, providing increased comfort and income relative to other positions and trades in private society. Dostoevsky, however, was more interested in the composition of his

¹¹⁴ Under the direction of Ostrogradsky, the Academy of Sciences made this text mandatory in Russian calculus classes. See O. L. Koshi (Cauchy), *Differentsial'noe i integral'noe ischislenie*, trans. V. Buniakovskii (St. Petersburg: Akademiia Nauk, 1831), 2. Accessed on math.ru. <<http://www.math.ru/lib/book/djvu/klassik/analysis/koshi.djvu>>.

¹¹⁵ N.D. Brashman, *Primechanie k teorii naibol'shikh velichin funktsii mnogikh peremennykh* (Kazan: Uchennye zapiski kazanskogo universiteta, 1835), Part 8, 131.

¹¹⁶ Sooyoung Chang, *Academic Genealogy of Mathematics* (Hackensack, NJ: World Scientific, 2011), 140; see also : N.D. Brashman, *Ravnovesiia tel tverdykh i zhidkikh ili statika i gidrostatika* (Moscow: Universitetskaiia tipografiia, 1837), 5-6.

¹¹⁷ Stephen Timoshenko, *Engineering Education in Russia* (New York: McGraw-Hill, 1959), 17.

¹¹⁸ M. Maksimovskii, *Istoricheskii ocherk: Razvitiia Glavnago inzhenernago uchilishcha 1819-1869*, 42-45.

literary works, than in these prospective posts and careers. Literary historians seem to agree that he had begun to work on *Poor Folk* [*Bednye liudi*] while was still in attendance at the school, and his perceived poverty as a student likely made him more attentive to the sociological experience of the sociologically downtrodden and disenfranchised demographics in the sprawling urban cityscape of Petersburg.

Dostoevsky, who possessed unique acumen in geometry and drafting, participated in courses stressing architecture, material science, and design. In addition to these concentrations, the young novelist augmented his abilities as a draughtsman by taking an officer seminar in mechanics, where he learned about dynamic loads, vector graphs, and the reactions of different materials when subjected to forces and displacements. These skills contributed to his short-lived professional performance in the blueprint section of the State Engineering Department in Petersburg. Although Liza Knapp explores his knowledge of Newtonian physics, his understanding of mechanical systems fits into a larger mathematical framework owing to the curriculum that Dostoevsky encountered throughout his entire course of study at the Main Engineering School and subsequent independent readings in the sciences.¹¹⁹

¹¹⁹ Liza Knapp, *The Annihilation of Inertia: Dostoevsky and Metaphysics*, 5-6.

Chapter Two
***The Certainty of Uncertainty: $2 \times 2 = 5$, the Underground Man, and
 The Ontological Unity of the Real and the Imaginary***

“Give me a place to stand on, and I will move the earth.”¹

~Archimedes, Quoted by Pappus of Alexandria, *Synagogue*, Book VIII, 340 B.C.E.

“You see, gentlemen, reason is an excellent thing. There is no doubt about it. But reason is only reason, and it can only satisfy the reasoning ability of man, whereas volition is a manifestation of the whole of life, I mean, of the whole of human life, including reason with all its concomitant head-scratchings. And although our life, thus manifested, very often turns out to be a sorry business, it is life none the less and not merely extractions of square roots. For my part, I quite naturally want to live in order to satisfy all my faculties and not my reasoning faculty alone, that is to say, only some twentieth part of my capacity for living.”²

~The Underground Man, in “Underground,” Chapter VIII, 1864

At the end of his first full year of studies at the Main Engineering School, Dostoevsky described in a letter to his brother dated 16 August 1839, a series of ideas that would later become prominent themes in the expression of his artistic credo: “I am confident in myself. Man is a mystery. And this mystery should be solved. If you spend your entire life solving it, then you can’t say it’s been a waste of time. I have been studying this secret, because I want to be a person.”³ Already in this early period, Dostoevsky communicated his anxiety of not living up to his human potential. In his desire to become a “person,” Dostoevsky implies an aspect of his

¹ «ΔΟΣ ΜΟΙ ΠΟΥ ΣΤΩ ΚΑΙ ΚΙΝΩ ΤΗΝ ΓΗΝ» a popular saying of Archimedes, quoted by Pappus of Alexandria, *Synagoge*, Book VIII. Cited in *The Genius of Archimedes—23 Centuries of Influence on Mathematics, Science, and Engineering*, Ed. Stephanos A. Paipetis and Marco Ceccarelli (New York: Springer, 2010), 472.

² «Видите ли-с: рассудок, господа, есть вещь хорошая, это бесспорно, но рассудок есть только рассудок и удовлетворяет только рассудочной способности человека, а хотенье есть проявление всей жизни, то есть всей человеческой жизни, и с рассудком, и со всеми почесываниями. И хоть жизнь наша в этом проявлении выходит зачастую дрянцо, но все-таки жизни, а не одно только извлечение квадратного корня. Ведь я, например, совершенно естественно хочу жить для того, чтоб удовлетворить всей моей способности жить, а не для того, чтоб удовлетворить одной только моей рассудочной способности, то есть какой-нибудь одной двадцатой доли всей моей способности жить» (PSS: 5, 115); Fyodor Dostoevsky, *Notes from Underground in Great Short Works of Fyodor Dostoevsky*, trans. Constance Garnett (New York: Perennial Classics, 2004), 285-286.

³ «Я в себе уверен. Человек есть тайна, Ее надо разгадать, и ежели будешь ее разгадывать всю жизнь, то не говори, что потерял время; я занимаюсь этой тайной, ибо хочу быть человеком» (PSS: 28, bk 1, 63).

creative mission not to be forgotten, not to embody a null set, and not to waste the gift of precious life. Within every human being, there is a spark, an energy, a living idea, whose defining feature somehow eludes immediate recognition on the surface of things. This essential vitality cannot fully be understood in “real” terms. It is the combined realization of ideational and material proportions. This complex nature defines human experience based simultaneously on the realms of individual consciousness and physicality.

The Underground Man, for instance, expresses his anxiety about the null set using emphatic mathematical imagery. Asserting his unwillingness to settle for the common fate of most temporary living things, the Underground Man affirms, “I know all the same that I won’t calm down in a compromise, in an infinitely recurring zero, just because it exists according to the laws of nature, and it *really* does exist.”⁴ This quotation exemplifies Dostoevsky’s propensity to use mathematical vocabulary in discussing human psychology. Moreover, the mathematical concepts that he introduces become important metaphors for reason, which Dostoevsky then inverts as a rebellion against rationality per se as the presiding feature of the human condition.

By extending arguments set forth in Boris Engelhardt’s 1925 essay, “Ideologicheskii roman Dostoevskogo,” concerning the aesthetics of characters perceived as “ideas incarnate,” this chapter offers the interpretative supposition that the Underground Man can be understood as the aesthetic embodiment of various mathematical constructs, namely the imaginary unit i , the concept of *regula falsi*, and *reduction ad absurdum*. In the assessment of Engelhardt, many

⁴ «все-таки знаю, что я не успокоюсь на компромиссе, на непрерывном периодическом нуле, потому только, что он существует по законам природы и существует *действительно*» (PSS 5, 122).

characters in works by Dostoevsky represent ideas that have acquired the vitality of flesh.⁵ The personalities of his heroes, accordingly, become living symbols of diverse outlooks and argumentative positions. Literary scholars more readily sense the personification of themes emanating from humanistic discourses, but often tend to overlook the anthropomorphization of concepts derived from mathematics.

First, the Underground Man's personality reflects the imaginary unit i . He possesses basic human agency only in his thoughts, and not in his physical, material existence. In his social interactions with others, moreover, he is paralyzed by unbearable indecision, and racked by an unrelenting inferiority complex. He neither achieves self-realization, nor forges meaningful relationships with others. Despite his inability to experience fully the phenomenon of "living life," the solipsistic consciousness of the Underground Man serves as the overriding ontological medium of his being. If life is represented by the sum of two existential modes, one real and the other imaginary, the Underground Man evaluates whether one affords his persona greater freedom than the other. The varying degrees of freedom ascribed to thought and action by the protagonist contribute to his examination of viable operations, limits, and infinity, which he formulates dually in mathematical and artistic terms.

Next, he represents the mathematical method of *regula falsi*. His thoughts accommodate different ideological positions, but especially those of an opposing, or mutually exclusive nature. Through polemics expressed predominantly in the internal monologic narrative of the mind, and

⁵ Dostoevsky recognized the propensity of his own physical body to embody associated ideas. In a letter to his brother Mikhail dated 22 December 1849 following his mock execution, Dostoevsky affirms, "Life is life everywhere, life is within us, not in externals. There will be people around me, and to be a *man* among people, and to remain that person forever, not to lose courage and not to falter, come what may—that is what life is about, that is its purpose. I realize it. That ideas has entered my flesh and blood." «Жизнь везде жизнь, жизнь в нас самих, а не во внешнем. Подле меня будут люди, и быть человеком между людьми и остаться им навсегда, в каких бы то ни было несчастьях, не уныть и не пасть— вот в чем жизнь в чем задача ее. Я сознал это. Эта идея вошла в плоть и кровь мою. Да правда!» (*PSS* 28, bk. 1, 162); see also Nancy Rutenburg, *Dostoevsky's Democracy* (Princeton, NJ: Princeton UP, 2008), 33.

to a lesser extent, in external dialogic interactions with others, the Underground Man weighs the validity of different philosophical questions, such as the hypothetical existence of free will, the nature of power, competing moral codes, and the place for man in a world tending toward increased scientific uniformity and systemization.

Third, the Underground Man embodies an anthropomorphized *reductio ad absurdum*, or proof by contradiction. Representing the personality of a new anti-hero in Russian literature, the Underground Man embodies a model of how *not to live*.⁶ When his consciousness senses fallibility in a given argument, the Underground Man readily admits the flaw in his thoughts and conduct, carrying out the associated logic to absurd or untenable extremes. His status as the personification of a proof by contradiction functions in conjunction with mathematical process of *regula falsi*. The implied author of the work, be it Dostoevsky himself, or perhaps the narrative persona of the implied editor of the text, who intervenes at both the outset and close of the story with footnotes serving to frame the work from the point of view of an ostensible “other,” selects different premises to be tested by the protagonist.⁷ Proof by contradiction is one of the most reliable techniques that mathematicians employ to establish the validity of a given proposition. It assumes the logical basis of many proofs, but it is especially common in geometry.

⁶ On the whole, the Underground Man himself reflects a holistic absurdity. His contemptuous brooding, isolation, and spite serves as a cautionary tale to readers to interact with others and live life to the fullest..

⁷ The associated relationship between Dostoevsky the author and the characters of his literary creation alludes to a source of tension for accepting fully the tenets of *polyphony*, as identified by Mikhail Bakhtin. Although his characters represent free, indeterminate, and independent personalities interacting unpredictably in the unfolding action of a given story, they nevertheless unknowingly enact experiences and ideas intended for them by their author-creator. Gary Saul Morson, explores this source of conflict, which Dostoevsky first expressed tacitly in *Notes from Underground*: “We learn...that everything the hero does to make himself unpredictable is itself subject to an iron logic, albeit of a peculiar and spiteful kind. Moreover, his actions are subject to a second of predetermination, that of artistic form; in a series of metaliterary reminders, Dostoevsky stresses that all the actions of this philosopher of freedom have already been written and planned by the author. It is as if Dostoevsky the ideologist was at war with Dostoevsky the artist, with the latter thaking shrewd advantage of formal opportunities to cast an ironic, deterministic shadow on the former. Dostoevsky apparently discovered how artistic structure lends itself to such irony. The question for him now was, could he create a work whose design conveyed an opposite and open temporality, more in accord with his indeterministic beliefs?” Gary Saul Morson, *Narrative and Freedom: The Shadows of Time* (New Haven, CT: Yale UP, 1994), 9.

The natural philosophers of Classical Antiquity, including Archimedes, Plato, Pythagoras, and Euclid used *regula falsi* and proof by contradiction extensively to establish geometric properties and relationships. The chancellery records of the Main Engineering School indicate that mathematical proofs comprised a fundamental requirement of the geometry courses, in which Dostoevsky excelled.⁸ In these classes, he gained firsthand knowledge of how classical thinkers conceptualized different problems, and organized their arguments either to solve or refute the ramifications of their respective hypotheses.⁹

By interrogating the mathematical imagination of Dostoevsky, this chapter investigates how the author came to connect the seemingly disparate realms of realia and irrealia in a unified ontological model. The concept of the *complex plane*, which contains both real and imaginary numbers, and comprises a topic that Dostoevsky could have encountered in his schooling, corresponds neatly to his understanding of the human experience, where “irrealia” (thoughts, dreams, visions) comes together with the “real”- physical and material experience. In this vein, the associated analysis addresses the primary status of the idea in *Notes from Underground*. For instance, if thought transforms action, and vice-versa, what prospect does this ascribed interrelationship hold for the individual striving to establish more meaningful, benevolent, sustainable connections to others? Finally, if Dostoevsky selects the given ideological arguments to infuse into the minds of his protagonists, moreover, how do his characters, readers, and even the author himself participate in the evaluation of variable ideological positions? This chapter

⁸ See the remarks of General-Lieutenant B.L. Sharnogostrom regarding mathematics education at the Main Engineering School. One of the primary objectives of the geometry course taught by Captain Cherniavskii is to acquaint students with the principles of argumentative logic of proof, ‘*dokazatel'stvo*.’ During examination periods of the school, students would be asked to replicate proofs on chalk boards in front of evaluating committess of faculty members, senior officers, and classmates. *Glavnoe inzhenernoe uchilishche*, RGVIA fund 351, op.1, d.522, 3, 11; see also *Istoriko-matematicheskie issledovaniia*, ed. G.F. Rybkin and A.P. Iushkevich, Vol. 3 (Moscow: Gosudarstvennoe izdatel'stvo tekhniko-teoreticheskoi literatury, 1950), 286, 288.

⁹ Ibid. 11

presents evidence from *Notes from Underground* demonstrating how Dostoevsky formulates his responses to these questions in a mathematical way.

In her 2009 book, *Dostoevsky's Secrets: Reading Against the Grain*, Carol Apollonio borrows a distinction from the grammatical category of mood to establish two levels of criticism for engaging Dostoevsky's multilayered narrative style. On one hand, concern for explicit meaning in his narrative works entails an "indicative" approach, "addressing what is written, rather than what is written about."¹⁰ Plot-driven elements would be of key concern for this indicative perspective. Indicative elements reflect aspects of the presented stimuli, the surface physicality of object, agent, and place, and the gradual unfolding of the story.

The "'indicative' approach, on the other hand, addresses only facts, and Dostoevsky's art is about a greater, symbolic truth, one that cannot be stated directly. We access this truth through the 'subjunctive,' the language of dreams, desires, and nonmaterial reality."¹¹ The presentation of themes, genres, and philosophical positions participate in the broader signification of the subjunctive approach. Modality in language allows speakers to convey additional attitudes about what they are saying, i.e. whether it is intended as a statement of fact, command, desire, or conditionality.¹² Whereas linguistic convention infers fundamental semantic separation between the modal categories of "indicative" and "subjunctive," theoretical mathematics supports the union of *realia* and *irrealia* in the conceptual basis of the *complex plane*.

¹⁰ Carol Apollonio, *Dostoevsky's Secrets: Reading Against the Grain* (Evanston, IL: Northwestern University Press, 2009), 3.

¹¹ *Ibid.* 3-4

¹² The array of modal categories available to the speaker depends on the grammatical and semantic categories provided by the particular language of parlance. Per Durst-Anderson, *Linguistic Supertypes: A Cognitive-Semiotic Theory of Human Communication* (New York: Mouton de Gruyter, 2011), 201; see also Yaron Matras, "The Borrowability of Structural Categories," in *Grammatical Borrowing in Cross-linguistic Perspective*, ed. Yaron Matras and Jeanette Sakel, (New York: Mouton de Gruyter, 2007), 45.

In mathematics, the formulation of the *complex plane* allows for the common evaluative presentation of “indicative” plot-driven ‘facts,’ and “subjunctive” thematic ideologies that emanate from the realm of imaginalia. The nature of the *idea*, in its variety of forms, e.g. thoughts, opinions, impressions, fantasia, dreams, serves as an extended metaphor signifying all mathematical notions of *irrealia*. While this broad formulation would imply that all ideological texts, regardless of content, express the imaginary unit and its corresponding role in complex equations, specific features of *Notes from Underground* demonstrate the particular propensity of Dostoevsky to think mathematically, and reflect his awareness of Leonhard Euler, who popularized acceptance of the complex plane in a proof first published in 1747.¹³

The Underground Man conveys ontological principles formulated in mathematical terms, elucidating not only metaphysical deliberations relevant for engaging artistic works by Dostoevsky, but also for understanding existential properties of the universe writ large.¹⁴ From the perspective of graph theory, one could track the appearance and movement of an imaginary element in the same contextual frameworks as any real stimulus. The incorporated lexicon of mathematics promotes the ontological unification of the *real* and the *imaginary*.

The imaginary unit i is defined by the property $i^2 = -1$, and the term "imaginary" is used because there is no real number having a negative square. The complex plane, moreover,

¹³ Leonhard Euler, “De la contraversion entre Messrs. Leibnitz et Bernoulli sur les logarithms des nombres negatifs et imaginaires” (1747) in *Memoires de l’academie des sciences de Berlin* 5 (1751), 139-179; see also Leonhard Euler, *Opera Omnia*: Series 1, Volume 17, 195-232; Florian Cajori, *A History of Mathematics* (Macmillan & Company, 1893), 317.

¹⁴ Protagonists in other works by Dostoevsky express ontological principles formulated in mathematical terms. While Goliadkin in *Dvoynik* likely expresses the first manifestation of these mathematical tendencies, *Zapiski iz podpol’ia* provided the crux of his existential philosophy that penetrates all of his subsequent major works. The intonation and circumstantial details may differ, but the thought is the same. As Grigorii Pomerants points out, “before *Notes from Underground*, Dostoevsky produced works that, though interesting, were primarily relevant only in the Russian cultural context. . . . Almost every novel that Dostoevsky produced after 1864 is a masterpiece.” Grigorii Pomerants, “Euclidean and Non-Euclidean Reason” in *The New Russian Dostoevsky*, 65; see also Robert Louis Jackson, *Dostoevsky’s Underground Man in Russian Literature* (Westport, CT: Greenwood Publishing, 1981 reprint), 7.

represents the set of all complex numbers, or entities expressed by the form $a+bi$, where a and b are real numbers, and i is the imaginary unit. The multiplicative product of a real number and the imaginary unit is called an imaginary number. Compositionally, the complex plane expresses the union of all real and imaginary numbers. The structural designation of the *complex plane*, resulting from the union of *real* and *imaginary numbers*, comprises a superset of all that is *real*. In other words, the set of all real numbers, denoted by R , exists as a subset of all complex numbers, represented by C . Mechanically speaking, it follows that the invisible, but altogether present realm of all that is *imaginary* predominates over all that is *real*.

Mathematicians struggle to propagate broad understandings of the imaginary unit initially proven algebraically by Leonhard Euler, and later geometrically by Nikolai Lobachevsky.¹⁵ The enigmatic appellation “imaginary” often leads people to believe incorrectly that such notions refer to superficial objects of abstraction invented merely for the sake of explaining uncertain or unknowable principles.¹⁶ Quite the contrary, imaginary numbers are as legitimate as integers, rational numbers, and real numbers.¹⁷ Mathematical proof, or the process by which thinkers confirm or deny assumptions through deductive heuristics, upholds the existential verisimilitude of the imaginary unit, and its role in the associated designation of the complex plane.

Although the entity represented by the imaginary unit is invisible and incorporeal, its being has been sufficiently established in terms that coincide with, and exert influence on all that

¹⁵ Euler presented his proof to colleagues in 1747. Lobachevsky submitted his own original findings supporting the validity of the complex plane in *Imaginary Geometry* [*Voobrazhaemaia geometriia*] (1835), as well as his 1856 monograph, *Pangeometry* [*Pangeometriia*]. Leonhard Euler, “De la contraversion entre Messrs. Leibnitz et Bernoulli sur les logarithmes des nombres negatifs et imaginaires” (1747) in *Memoires de l’academie des sciences de Berlin* 5 (1751), 139-179; see also Leonhard Euler, *Opera Omnia*: Series 1, Volume 17, 195-232; Florian Cajori, *A History of Mathematics* (Macmillan & Company, 1893), 317; Athanase Papadopoulos, “Introduction” to *Pangeometry* by N. I. Lobachevskii, ed. and trans. Athanase Papadopoulos (Zurich: European Mathematical Society, 2010), 229.

¹⁶ Jeffrey Bergen, *A Concrete Approach to Abstract Algebra: From the Integers to the Insolvability of the Quintic* (San Diego, CA: Academic Press, 2009), 139.

¹⁷ *Ibid.* 140

is real. Following the epigraph by Archimedes at the outset of this chapter, accordingly, “moving the earth” does not require a *real* “place”.¹⁸ Rather, this place may be imaginary, ideological, or spiritual. It may exist entirely beyond the confines of material existence. While the concept of an imaginary number had not yet been considered in scientific discourses that flourished during the age of Archimedes, his philosophical axiom helped later generations of mathematicians to conceptualize the dynamic interrelationships of existence. Ideas, too, can move the world.

As a perfect theoretical construct, space is defined, largely, by what you make of it. Space, consequently, is subjective and relativistic.¹⁹ The perception and conception of space, consequently, comes to reflect human consciousness. From the related perspective of psychoanalysis, the manifestation of an idea is never just an idea.²⁰ As Freud would suggest, the phenomenon of thought is shaped by underlying motives and desires emanating from subconsciousness, or unconsciousness, depending on the state of the given thinker. In this regard, there is always more to space than meets the eye. There are invisible forces acting upon it at all times. Human observers project their aims, ideas, intentions, and unconscious desires onto space, which possesses also its own intrinsic reflexive properties. As such, there exists immense *imaginary* potential for space that cannot be expressed solely in *real* terms.

The medium of fiction serves as an example of an especially powerful complex entity. On one hand, a text comprises a real, physical component. In the context of a book, for instance,

¹⁸ «ΔΟΣ ΜΟΙ ΠΟΥ ΣΤΩ ΚΑΙ ΚΙΝΩ ΤΗΝ ΓΗΝ» a popular saying of Archimedes, quoted by Pappus of Alexandria, *Synagoge*, Book VIII. Cited in *The Genius of Archimedes—23 Centuries of Influence on Mathematics, Science, and Engineering*, Ed. Stephanos A. Paipetis and Marco Ceccarelli (New York: Springer, 2010), 472.

¹⁹ Nikolai Brashman describes a similar principle at the outset to Dostoevsky’s geometry textbook described in the previous chapter. N.D. Brashman, *Kurs analiticheskoi geometrii* (Moscow: Universitetskaia tipografiia, 1836), 3.

²⁰ The anecdotal quip by Sigmund Freud “sometimes a cigar is just a cigar,” has largely been debunked as an apocryphal saying. Alan C. Elms, “Apocryphal Freud: Sigmund Freud’s Most Famous ‘Quotations’ and their Actual Sources,” in *The Annual of Psychoanalysis, V. 29: Sigmund Freud and His Impact on the Modern World*, by Jerome A. Winer, James W. Anderson et al., (New York: Routledge, 2013), 83.

ink congeals to form letters, words, sentences that are printed upon the pages and bounded together in deliberate order. Audiences encounter the text as a finished physical object. On the other hand, however, the meaning communicated by words in the book conveys the complex experience of entire universes, both related to the physical world of the reader, but also set apart from it in the realm of imagination. The associated action of the text unfolds at a sufficiently safe distance from the reader in the subjunctive realm of the mind, and not in the indicative flesh and blood world of the body.²¹

Creative narrative and the medium of literature, nevertheless, exert such great influence on real events that the individual cannot ignore their significance. The “place” that the Underground Man stands on, despite being of an imaginary or fictional nature, possesses the potential to change minds, influence behavior, and move the world. This influence extends not only to the story and events that unfold in the narrative, but also to the real world of the author and his readers, defined by a common physical existence. When different readers experience the same text, for example, the wellspring of consciousness connects dissimilar participants in unified ontological constructs. Human subjects are intrinsically connected to their thoughts, and the diverse thoughts or imagined environments influence the conduct of individuals in the shared experience of life. If an idea can move the world, just as much as a stone, sword, or human body, how does one quantify or categorize the “place” that it necessarily inhabits? In other words, where does an idea exist, what does it consist of, and how does it function in relation to conceptions of space, motion, and matter?

For the most part, life is short, confusing, and full of changes. Beyond the general tendency to accept things at face value, i.e. *seeing is believing*, how do people hypothesize and verify the ontological frameworks of entities encountered in the existential experience of the

²¹ Reading would become a rather perilous activity if the pains and torments of selected characters would be experienced physically by corresponding audiences of such works.

inconstant material world? The world that human individuals construe is inherently incomplete. Rather, human subjects lack the perceptive and descriptive abilities to grasp the manifold, interconnected mysteries comprising its essence *in toto*. The fabric of existence subsumes the basis of all life in its sprawling, shifting spatial substance. Dostoevsky's characters, like all human subjects, assess subjectively how they themselves and their perceived state of events came to be throughout the transformative progression of time.

Uncertainty is a pervasive feature of human existence. Responding to such bewildering incertitude, individuals will turn, typically, to scientific and mathematical methods to improve their understanding of the universe. By doing so, however, the dilemma arises whether to give preference to theory or practice.²² Although great strides have been made in the ways of observing, measuring, and analyzing the dynamic features of existence, theoretical frameworks and empirical findings align imperfectly, and perhaps this disconnect will always be so.²³ While abstract constructs and experiential reality manifest intrinsic interconnectedness, human consciousness tends to assign preference to physical concerns in the face of more immediate

²² This dilemma first appeared, arguably, in the natural philosophy of classical antiquity. Consider the discrepancy between Plato's universal forms, and Aristotle's empiricisms based on a quadripartite categorization of all reality in terms of formal causes, material causes, motive causes, and final causes. See Christopher Shields, *The Oxford Handbook of Aristotle* (Oxford University Press, 2012), 429.

²³ Theory entails the supposition of constructs, which are problematic, if not outright impossible, to apprehend empirically. Abstract models tend to diverge from applied material mechanisms in the observation of stimuli entailing, generally, the infinitesimal approaching zero, and entities of seemingly interminable immensity. Certain mathematical operations concerning zero and infinity, for example, such as division by zero, and zero raised to the power of zero, do not compute according to accepted procedures of calculation, warranting the befuddling scholarly designation, "undefined." Basic terms of geometry, such as, "point", "line", and "plane," likewise refuse formal explication. Theoretical mathematics, as a discipline proceeds from indefinite assumptions, which in turn, reflect the inherent uncertainty of humankind regarding the dynamics of the physical world. Rendering such principles as "undefined", however, does not prevent mathematicians from intuitively conceiving of and applying such abstractly formulated notions in the broader presentation of the universe and its holistic composition. Related stipulations concerning mathematical paradoxes, impossible objects, and unsolvable systems present similar problems for uniting theory and practice. Bryan Bunch, *Mathematical Fallacies and Paradoxes* (New York: Van Nostrand Reinhold Co., 1982), v; see also Eric Gossett, *Discrete Mathematics with Proof* (Hoboken, NJ: John Wiley & Sons, Inc., 2009), 87; John C. Stillwell, *Yearning for the Impossible: The Surprising Truths of Mathematics* (Wellesley, MA: Taylor & Francis, 2006), 1-5.

materialistic imperatives for survival, the pursuit of pleasure, and the applied fulfillment of matter-of-fact objectives, but does so without fully forfeiting conjecture and fancy.

Related to these concerns, the theoretical frameworks of argumentative logic uphold the existential validity of the imaginary unit, *i*. The imaginary unit comprises a numerical entity that cannot exist in *real* terms, but all the same *must* exist. Already this formulation bears striking resemblance to Dostoevsky's introduction of the Underground Man as the ascribed author of *Notes* in the opening footnote to the text: "Both the author of the *Notes* and the *Notes* themselves, are of course imaginary [*vymysheleny*]. Nevertheless, such persons as the author of such memoirs not only may, but must, exist in our society, if we take into consideration the circumstances which led to the formation of our society."²⁴ Although the remark would seem to comprise an inscrutable riddle, it expresses Dostoevsky's understanding of the relationship between theoretical constructs and physical reality that he may have derived from discourses in mathematics and natural philosophy.

While a literal translation of '*vymyshleny*' in contemporary parlance would infer the meaning of "fictitious" or "invented," the morphological composition of the word expresses the semantic connotation of "imaginary". The short form past-passive participle is formed by the unity of the directional derivational prefix *vy-*, inferring movement 'out of' or 'away from,' and the root lexical morpheme *mysh*, from *mysl'*, designates 'thought.' This would infer the semantic conception of something "imaginary," or something emanating from the depths of human consciousness. All the same, the word possesses the potential to function as fact. Something "fictitious," on the other hand, more plainly conveys something 'unreal' or 'untrue.'

²⁴ «И автор записок и самые "Записки", разумеется, вымышлены. Тем не менее такие лица, как сочинитель таких записок, не только могут, но даже должны существовать в нашем обществе, взяв в соображение те обстоятельства, при которых вообще складывалось наше общество» (*PSS*: 5, 99). Fyodor Dostoevsky, *Notes From Underground in Great Short Works of Fyodor Dostoevsky*, trans. Constance Garnett (New York: Perennial Classics, 2004), 263.

In Russian, the nomenclature to refer to imaginary numbers has never been fully consistent. Contemporary sources refer to the imaginary unit as ‘*mnimaia edinitsa*,’ or the ‘virtual root’, owing to the fact that the value of the imaginary number is found by taking the square root of -1 .²⁵ Works published by the Imperial Academy of Sciences in the 19th century generally used the French, ‘*les nombres imaginaires*’.²⁶ When the Russian vernacular returned to academic and intellectual circles, the French was usually replaced with ‘*voobrazhaemyi*’, meaning ‘imaginary’, such as Lobachevsky’s 1835 *Imaginary Geometry* [*Voobrazhaemaia geometriia*].²⁷ With no codified norm, however, members of the Russian educated elite likely used a variety of synonyms to convey the underlying premise of the imaginary unit.²⁸ Dostoevsky’s use of ‘*vymyshleny*’ in the opening footnote, consequently, expresses his own substitution to present the conceptual model of imaginary numbers to a lay literate audience.

The appearance of this footnote on the first page of *Notes* establishes the primacy of a problem and ostensible paradox to be addressed throughout the remainder of the text. That is, how could something “imaginary” or “fictional” possess physical realization?²⁹ In citing that the answer appears “when we consider the circumstances in the midst of which society is formed,” the implied author of the story encourages readers to consider more thoughtfully the ontological principles underlying the fabric of life. The *Underground Man* is not only a sum of unique ideas,

²⁵ A.J. Lohwater and S.H. Gould, *Russian English Dictionary of the Mathematical Sciences* (Providence, RI: American Mathematical Society, 1961), 129.

²⁶ *Correspondance mathématique et physique de quelques célèbres géomètres du XVIIIème siècle*, ed. P.H. Fuss (St. Petersburg: Imperial Academy of Sciences, 1843), 130.

²⁷ N.I. Lobachevskii, *Voobrazhaemaia geometriia* (Kazan: Tipografiia U of Kazan, 1835), 1; see also Athanase Papadopoulos, "Introduction" to *Pangeometry* by N. I. Lobachevskii, 229.

²⁸ *Ibid.* 70

²⁹ Although a literal translation of *vymyshlenny* would perhaps be more akin to “fictitious” or “invented” the morphological composition of the word express the semantic connotation of “imaginary”. The short form past-passive participle is formed by the unity of the directional derivational prefix *vy-*, inferring movement ‘out of’ or ‘away from,’ and the root lexical morpheme *mysh* or *mysl*, designates ‘thought.’ This would infer the semantic conception of something “imaginary,” or something emanating from the depths of human consciousness. All the same, the word possesses the potential to function as fact. Something “fictitious,” on the other hand, more plainly conveys something ‘unreal’ or ‘untrue.’

but the central intermediary or arbitrator of opposing arguments. The implied author situates his protagonist to reflect the materialization or projection of imaginary forces into the external, experiential, and interpersonal world of society, where readers themselves ground the basis of their own shared existence. Just as the Underground Man derives his essence from his ability to weigh different ideas, so too do readers formulate their own identities relative to attitudes, values, and principles in the narrative of thought, which guide their conduct in physical environs.

The paradox of the “Underground,” consequently, entails the quandary of how to express, visualize, and realize things that, in the physical sense of being, are not, or at the very least, are not as we generally know things to be.³⁰ They escape perception and observation, and neither assume a body of their own, nor function according to typical material mechanisms. The Underground is a defining feature of the human condition. It is the illogical, self-aggrandizing and self-loathing realization of the psyche that people rarely reveal to others, let alone to themselves. Metaphorically depicted as a locale, the Underground is the series of mental processes by which individuals assess how their ‘actual’ lives correspond to their imagined expectations and estimations of themselves, as well as the principles by which they define themselves in isolated consciousness.

The structure of *Zapiski iz podpol'ia*, in several key respects, reflects Dostoevsky’s holistic regard for the conception of the human existential condition, understood as the indeterminate reciprocity of individual consciousness and the collective physical world. While both thoughts and physical experience usually entail social interaction, the former can function without exerting influence on the material world. Individuals, for instance, can possess thoughts without necessarily acting on them. The imaginary unit, similarly, conjoins with the real number

³⁰ The end of the story ends with a note identifying the Underground Man as a “paradoxical fellow,” however, the original Russian *paradoksalist* more appropriately conveys the notion that the paradox subsumes his entire existence.

line at the origin, but also exists apart on its separate graphical axis. Although it is generally difficult for people to conceptualize the importance of the imaginary unit in mathematical terms, a general readership can certainly relate to the inherent incompatibility of implementing the abstraction of thought in the empirical dimensions of reality. If one can deduce a calculation theoretically, it does not necessarily mean the same results will be derived from applied experiments conducted in the material world.

The two parts of the novella, titled “Underground” [*Podpol’e*] and “Apropos of Wet Snow” [*Po povodu mokrogo snega*], convey the psychology and physicality of the Underground Man, respectively. “Underground” presents the rambling, paradoxical, and spiteful internal monologue of the story’s protagonist. Despite references to external figures, locations, texts, etc., the narrative unfolds exclusively in his mind. The second part conveys the Underground Man from an external vantage point, and demonstrates the succession of self-inflicted humiliations and social misgivings that gave rise to the spiteful voice in “Underground.”³¹ The inescapable constructs of his intellect prevent the Underground Man from realizing a “normal” existence.

Whereas the array of physical action in “Apropos of Wet Snow” conforms to the restraining limitations of scientific natural law, and the severe curtailment of autonomy brought about as a consequence of the Underground Man’s unfortunate interactions with others, the freedom of the mind seems “infinite” [*v beskonechnost’*].³² Recognizing the juxtaposition of these limitations of freedom, the Underground Man expresses a predilection for the realm of theory by affirming, “I am constantly exercising my powers of thought and, consequently, every primary cause with me at once draws another one after itself, one still more primary, and so *ad*

³¹ Although “Underground” precedes “Apropos of Wet Snow”, its narrative content unfolds some twenty years after the final meeting between the protagonist and Lisa depicted presented in part two at the close of the novella. “Apropos of Wet Snow,” consequently, could be construed as a vivid flashback. Less careful readers sometimes miss the jump in time. Dostoevsky, inverts the chronological progression of the story to show how the vindictive psychology of the Underground Man developed from early adulthood.

³² “...and so forth in infinity”; «и так далее в бесконечность» (*PSS* 5, 108).

infinitum.”³³ The prominence of the first-person singular pronoun “I” [*Ia*] at the beginning of this passage demonstrates the ego of the Underground Man, and narcissistically re-asserts the conception of his character as the most fundamental “primary cause” in the seemingly interminable sequence of questions and reflections conjured up in his solipsistic consciousness.

The realms of the idea and the body fundamentally differ, however, in the varying degrees of freedom they afford to the individual. In thought, it is very easy to imagine the sensation of flying without the assistance of technological apparatuses, or to fantasize about a particular goal or desire. The physical world, however, is less flexible and forgiving. If consciousness entails the limitless potential to process information and render questions without end, then from the perspective of pure reason, the sensation of physical experience remains confined to the axiomatic properties of natural science and mathematics.

Herein lies, however, a contradiction of regarding the composition of *Notes from Underground*. If the Underground Man subscribes to the notion that thought overshadows the action, why does the first part of *Notes from Underground* consist of 10,973 words, when the presented external life of the Underground Man in “Apropos of Wet Snow” unfolds over 24,734 words?³⁴ If we accept the ideological model designating “Underground” as the emblematic representation of thought, and “Apropos of Wet Snow” as the symbolic portrayal of action (or at least action insofar as a character trapped inside the tautologies of consciousness can imagine), then Dostoevsky assigns formalistic preference to the experience of *realia*, as opposed to the internal conception of *irrealia*.

³³ Fyodor Dostoevsky, *Notes From Underground in Great Short Works of Fyodor Dostoevsky*, trans. Constance Garnett (New York: Perennial Classics, 2004), 276; «Я упражняюсь в мышлении, а следственно, у меня всякая первоначальная причина тотчас же тащит за собою другую, еще первоначальнее, и так далее в бесконечность» (*PSS*: 5, 108).

³⁴ “Underground” appears on pages 99 to 123 in volume 5 of *PSS*, whereas “Apropos of Wet Snow” takes up pages 124 to 179.

Dostoevsky devotes more than twice, or ~ 2.25 times, of the story to the presentation of the Underground Man's physical experience than to the circuitous ramblings of his mind. Although the depiction of thought precedes the conveyance of action, the central sources of conflict in the novella unfold almost exclusively in the second chapter. The arranged textual presentation of the different parts also contributes to this theme. Reading vertically, for example, the narrative in part one appears in large block paragraphs with dense verbosity, while the narrative in part two is more fragmented with dialogue and shorter scene descriptions. While the content of both sections in the story are disturbing, "Apropos of Wet Snow" is easier to read, and perhaps more memorable. The philosophical arguments expressed in "Underground", though at times compelling, conveys the abstruse language of his long-winded ideological wavering.

While Dostoevsky may allocate more of his authorial focus to the presentation of experience in the broader context of "real" events, he does so while simultaneously demonstrating the uncanny talents of consciousness to surpass the limitations of the physical world. By embracing the possibility that $2 \times 2 = 5$, the Underground Man defies, flaunts, and escapes the rigid mathematical laws of the physical world. Thought alone, however, is not life. Despite the notion that his thoughts occupy a space entirely of their own, he has no company, no friends, no family. His body, moreover, is reduced to a heartless, empty vessel.

Although most readers refute the existentialist challenge of the Underground Man, the product of 2×2 does not necessarily need to equal 4. This is hard for most readers to believe, especially those without backgrounds in mathematics. The associated argument runs counter to the presentation of arithmetic at its most elementary level, but indeed occurs in discourses concerning deeper studies of numerical systems. Expanding upon this mathematical subtext provides a new interpretative framework for engaging the curious equation proposed by the Underground Man, i.e. $2 \times 2 = 5$, as well as the existential consequences of his arguments.

The product depends on the base of the number system in which the given operation is completed. In mathematics, the base of a given number system, sometimes called the radix, refers to the number of unique, distinct digits, including zero.³⁵ Base 10, or decimal, is the most common number system in use today, likely stemming from the fact that humans count most often on their ten fingers.³⁶ In base 2, or binary, that is, a system comprised only of 1 and 0, $2 \times 2 = 100$. In base 3, or ternary, $2 \times 2 = 11$, and then in base 4, or quaternary, $2 \times 2 = 10$. For all positional numeral systems of an integer base greater than 4, 2×2 will equal 4, because the range of the associated system will have a higher order of magnitude than that of the given operation.

During the 1830s and 1840s, when Dostoevsky was studying, the base of a given number system was generally conceptualized only as some integer greater than 1. Developments in 20th-century mathematics, however, consider positional systems with negative, irrational, and imaginary numbers as bases. George Bergman and Donald Knuth published papers on this subject in the late 1950s.³⁷ Consequently, a positional numeral system could very well exist, where 2×2 would equal 5, but it would likely require special computation to unearth it.³⁸ While it is interesting to conjecture whether or not Dostoevsky had these principles in mind, it seems more likely to suggest that he simply wanted the *Underground Man* to express a body of ideas antithetical to all existing mathematical assumptions and rules.

³⁵ Richard Helberger, *Computation for the Analysis of Designed Experiments* (New York: Wiley, 1989), 370.

³⁶ While most civilizations today use decimal number systems, the ancient Babylonians used a base-60 number system to calculate time and angles, which they likely developed to calculate the observed revolutions of celestial bodies. The Babylonian civilization, which flourished in Mesopotamia from about 2000 B.C.E until 300 B.C.E recorded their base-60 numbers on clay cuneiform tablets. The late Babylonian period (c. 300 B.C.E.) includes work on astronomy. Samuel L. Macey, *The Dynamics of Progress: Time, Method, and Measure* (Athens, GA: University of Georgia Press, 2010), 92; see also Gerard O'Regan, *A Brief History of Computing* (New York: Springer, 2008), 4-5.

³⁷ George Bergman, "A Number System with an Irrational Base," in *Mathematics Magazine*, Vol. 31, No. 2 (Nov-Dec., 1957), 98-99; see also Donald Knuth, "Positional Number Systems" in *The Art of Computer Programming* (Reading: MA: Addison-Wesley, 1973), 179.

³⁸ Wolfram Mathematics provides code for a variety of different number bases, including negabinary and negadecimal numbers, however, I have not encountered one where 2×2 would equal 5.

The extended metaphor of the “stone wall,” comes to embody the impassivity of scientific axioms stringently dictating the human condition. The Underground Man considers the “stone wall” interrogatively, asking in Part I, Chapter III, “Impossibility- meaning a stone wall?”³⁹ By addressing “impossibility” as a question, the Underground Man perhaps admits his own uncertainty regarding not only his own strength and potential, but also the capability of all humanity in the face of restrictive physical laws governing all “real” experience. In his explanation of how others generally conceptualize the “stone wall,” however, the Underground Man sarcastically undermines the complacency of people who so willingly accept such constraining facts at face value.

He asserts that this feeling is typical among people who know “how to avenge themselves, and generally, how to stand up for themselves.”⁴⁰ Like a mad bull, such people are goal-oriented, and they will charge with “horns lowered at their aim,” perhaps yielding only to the buttressing limitations of an immovable wall.⁴¹ This bull man, who embodies the most ordinary “people of action” in the estimations of the Underground Man, “capitulates sincerely before the wall.”⁴² On such “real and normal people, the wall exerts a kind of calming influence,

³⁹ «Невозможность - значит каменная стена?» (PSS: 5, 105); Fyodor Dostoevsky, *Notes From Underground in Great Short Works of Fyodor Dostoevsky*, 272

⁴⁰ «Ведь у людей, умеющих за себя отомстить и вообще за себя постоять» (PSS: 5, 103).

⁴¹ «Такой господин так и прет прямо к цели, как взбесившийся бык, наклонив вниз рога, и только разве стена его останавливает» (PSS: 5, 103).

⁴² «Кстати: перед стеной такие господа, то есть непосредственные люди и деятели искренно пасуют...» (PSS: 5, 103). This division of men into “ordinary” and “extraordinary” is a prominent theme in works by Dostoevsky. While it appears most memorably in Raskolnikov's article «O prestuplenii», it is also echoed in Ivan's rendering of “The Grand Inquisitor” in *The Brothers Karamazov*. The Grand Inquisitor serves the masses seeking bread and certainty, whereas the model of Christ in the story is charged with representing “the elect few,” who choose his model freely, out of faith, and not coercion. Whereas Raskolnikov accepts the bloody movers of history as examples of “great men,” Ivan conceptualizes this greatness in terms of morality, virtue, and faith. The “elect” [izbranniki] are monks and saints, and not generals. For the commentary of Raskolnikov see (PSS 6, 200); for Ivan's remarks in “The Grand Inquisitor” see (PSS 14, 234-235); Fyodor Dostoevsky, *The Brothers Karamazov*, trans. Constance Garnett (New York: Barnes and Noble Classics, 2004), 238-239.

a sort of final and morally decisive influence, and perhaps even a mystic one.”⁴³ Humanity is subjected to such flux and volatility that the premise of certain, verifiable facts provides human subjects with a basis for investigations to make life more comfortable. Average people do not even think to express skepticism about $2 \times 2 = 4$. It is upon such principles that their whole lives and societies are built. The incontrovertible proof of this knowledge, this pillar of inevitability forms the most basic core of their material existence.

For “thinking individuals who do nothing,” however, like the Underground Man, and his readership, this wall serves a very different purpose.⁴⁴ In the realm of thought, this wall is circumvented easily enough. Whereas ordinary people possess “a mental horizon [that] is even a little bit circumscribed”, the unsatisfied desires of thinking individuals turn inward, and the most illogical wishes, such as wanting to turn the veracity of the equation $2 \times 2 = 4$ on its head, suddenly become possible in the domain of solipsistic consciousness.⁴⁵ The Underground Man laments that “never does nature ask you for your opinion, it does not care a damn for your wishes, or whether you like its laws or not. You are obliged to accept it as it is, and consequently, all its results. A wall, that is, is a wall.”⁴⁶ Although the narrative of the mind possesses the capability to distort the laws of nature, the essence of consciousness deprived of a body, faith, and the completeness of life equates to thought in a vacuum.

Whereas ordinary men of action take comfort in the “stone wall” of scientific fact, it reminds the “thinking man,” such as the Underground Man, of his inability to act as he would

⁴³ «Вот непосредственного человека я и считаю настоящим, нормальным человеком... Стена имеет для них что-то успокоительное, нравственно-разрешающее и окончательное, пожалуй, даже что-то мистическое...» (PSS: 5, 103-104).

⁴⁴ «Как например для нас, людей думающих, а следственно, ничего не делающих...» (PSS: 5, 103).

⁴⁵ «[Н]е поддающееся сознанию, что чуть-чуть ограниченные люди...неудовлетворенных жаланий, вошедших внутрь, во лихорадке колебаний» (PSS: 5, 105).

⁴⁶ «Природа васне спрашивается; ей дела нет до ваших желаний и до того, нравятся ль вам ее законы или не нравятся. Вы обязаны принимать ее так, как она есть, а следственно, и все ее результаты. Стена, значит, и есть стена...и.т.д., и.т.д.» (PSS: 5, 105).

wish to, and his inability to relate to others from a position that is not one of complete authority or dominance. While ordinary, real men of action take existential solace in the reliability of the wall, the Underground Man endures repulsion, nausea, and dissatisfaction at the conception that his conduct is limited or circumscribed. To make matters worse, seemingly no one is to blame. While it is fruitless to direct his angst at his world and his society, the Underground Man levies insults and derisions at himself.⁴⁷ It is this reason that he derives perverse pleasure from his toothache, and revels in his misfortune, harm, and humiliation. The man of thought will proceed, figuratively, to thrash his thoughts against the wall in defiance of the restrictive laws of nature, but will not do so literally, because his rational intellect convinces him from acting in the first place. The end of Part I, Chapter III ends with a diatribe voiced by the Underground Man, rising to crescendo in an exhausting run-on sentence, detailing how the “stone wall” serves as a constant reminder of his perpetual ineffectiveness.⁴⁸

⁴⁷ Solipsistic consciousness taken to the extreme will attempt to escape its dire isolation by inventing characters that are merely projections or permutations of the given interlocutor. A post-modernist reading of *Notes from Underground* would likely advocate the supposition that there is no real action or authentic interpersonal dialogue in the story. All of the characters in the story are simply manifestations of the Underground Man’s own imagination. All uttered insults and attacks would serve as expressions of his own self-denigration.

⁴⁸ “As though such a stone wall were really the same thing as peace of mind, and as though it really contained some word of comfort simply because a stone wall is merely the equivalent of twice-two-makes-four. Oh what stuff and nonsense this is! Is it not much better to understand everything, to be aware of everything, to be conscious of all the impossibilities and stone walls? Not to be reconciled to any of those impossibilities or stone walls if you hate being reconciled to them? To reach by way of the most irrefutable logical combinations the most heinous conclusions on the eternal theme that it is somehow your own fault if there is a stone wall, though again it is abundantly clear that it is not your fault at all, and therefore to abandon yourself sensuously to doing nothing, silently, and gnashing your teeth impotently, hugging the illusion that there isn’t really anyone you can be angry with; that there is really no object for your anger and that perhaps there never will be an object for it; that the whole thing is nothing but some imposition, some hocus-pocus, some card-sharping trick, or simply some frightful mess--no one knows what and no one knows who. But in spite of these uncertainties and this hocus-pocus, you have still got a headache, the less you know the more splitting the headache!” Fyodor Dostoevsky, *Notes From Underground in Great Short Works of Fyodor Dostoevsky*, 273. «Как будто такая каменная стена и

In other scenes, the repeated metaphor of the wall serves to reiterate the distress that the Underground Man experiences in moments where he feels trapped by both his logic and his social circumstance. In the excruciatingly awkward dinner scene, for instance, the Underground Man gets up from the company of Zverkov and his cronies. After insulting his host, challenging the lackey Ferfichkin to a duel, and enduring the humiliation of not having received a formal invitation to the event, he proceeds to pace from the table to the *wall* and to the stove, pretending not to notice his so-called acquaintances.⁴⁹ Prior to this scene, moreover, the Underground Man anxiously prepares himself for reconciling the humiliation that surely awaits him. Trapped in miserable isolation, watching the thick wet snow obliterate the view of the city from the ventilation pane in his abode, the Underground Man is summoned to action by his “cheap *wall* clock that wheezed five o’clock.”⁵⁰ Toward the end of the story, moreover, when Liza arrives at his apartment in Part II, Chapter VIII, Apollon finds the Underground Man “clutching at his hair

вправду есть успокоение и вправду заключает в себе хоть какое-нибудь слово на мир, единственно только потому, что она дважды два четыре. О нелепость нелепостей! То ли дело всё понимать, всё сознавать, все невозможности и каменные стены; не примиряться ни с одной из этих невозможностей и каменных стен, если вам мерзит примиряться; дойти путем самых неизбежных логических комбинаций до самых отвратительных заключений на вечную тему о том, что даже и в каменной-то стене как будто чем-то сам виноват, хотя опять-таки до ясности очевидно, что вовсе не виноват, и вследствие этого, молча и бессильно скрежеща зубами, сладострастно замереть в инерции, мечтая о том, что даже и злиться, выходит, тебе не на кого; что предмета не находится, а может быть, и никогда не найдется, что тут подмен, подтасовка, шулерство, что тут просто будра, - неизвестно что и неизвестно кто, но, несмотря на все эти неизвестности и подтасовки, у вас все-таки болит, и чем больше вам неизвестно, тем больше болит!» (PSS 5, 106).

⁴⁹ «Я так выделанно и гадко фыркнул, что они все разом прервали разговор и молча наблюдали минуты две, серьезно, не смеясь, как я хожу по стенке, от стола до печки, и как я не обращаю на них никакого внимания» (PSS: 5, 147).

⁵⁰ The adjective used to describe the wall clock, *driannyi*, imparts the related connotation of foolish, trashy, or worthless: «Наконец на моих дрянных стенных часишках прошипело пять» (PSS: 5, 141). The reference to “5 o’clock” is also significant. Time expresses another construct that constrains the actions of the Underground Man. The protagonist is very punctual in describing the duration of associated actions and contemplations, usually in calculations pertaining to the unit of the “minute.” There are 77 instances in the text of the etymological root, *minut-*, expressing a kind of obsession with relative chronological progression, and emphasizing what Gary Saul Morson refers to as the “highly-intensified present.” Gary Saul Morson, *Narrative and Freedom: The Shadows of Time* (New Haven: Yale UP, 1994), 11.

with both hands and leaning his head against the wall.”⁵¹ This posture communicates that the Underground Man anxiously contemplates beating his head against the wall. On one hand, he so desperately wants to accept the wall and all the positive implications that come with submission to it, e.g. communion with others, surety, and interpersonal happiness, but on the other hand, his consciousness is too proud to yield to the crushing force of certain, immutable ‘truth’, and the its associated restrictions on his freedom.

The image of the “wall,” accordingly, undergoes a kind of transformation in the story. Its presentation differs as it appears in the thoughts of the Underground Man, and in his physical experience depicted from an external vantage point. It symbolizes the extreme thresholds of ontological constructs designating all that is real, on one hand, and all that is imaginary, on the other. In Part I, Chapter II, the Underground Man expounds upon his assessment of having reached the “final wall” of humiliation, after so thoroughly degrading the “beautiful and sublime” [*vsego prekrasnogo i vysokogo*].⁵² The expression of this barrier as a “blank wall” in the translation by Constance Garnett captures an exhaustion of creativity, which resonates sufficiently among English speakers in a general semantic sense, but this rendering perhaps omits the “finality” of the precipice indicating the Underground Man’s unfortunate arrival at the extremes of his own consciousness, and the capacity of his vanity to endure additional insult and hardship. This extreme is perhaps even more horrifying to the Underground Man. If he has reached the outer limits of his thoughts, then he has exhausted all of his options and freedoms in the realm of his mind, metonymically signifying the realm of all that is imaginary.

⁵¹ «Там, схатив себя обеими руками за волосы, я прислонился головой к стене и замере в этом положении» (PSS: 5, 105).

⁵²Fyodor Dostoevsky, *Notes From Underground in Great Short Works of Fyodor Dostoevsky*, 268. “I will explain it to you: enjoyment was just from the too vivid consciousness of my own humiliation, because I felt myself that I had reached the final wall.” «Я вам объясню: наслаждение было тут именно от слишком яркого сознания своего унижения; оттого, что уж сам чувствуешь, что до последней стены дошел» (PSS: 5, 102).

Counter to this finality, elsewhere in the story, the Underground Man considers the potential of his own intellect in abstract terms to be infinite: “I am constantly exercising my powers of thought and, consequently, every primary cause with me at once draws another one after itself, one still more primary, and so *ad infinitum*.”⁵³ If the Underground Man, as a representative of all that is imaginary, encounters a “blank” or “final wall” in his mind, it follows necessarily that the “normal” man, or a representative of all real and material concerns, confronts a “stone wall,” emblematic of his own earthly, empirical existence.⁵⁴

Although the “final wall” expresses an extremity of a higher order than that of the “stone wall”, Dostoevsky upholds the argument that the ideological composition of individuals should not supersede the well-being of their physical bodies. The vast imaginative potential of the Underground Man as demonstrated in “Underground,” sharply contrasts with his sickly, indecisive, and self-denigrating stature in his social interactions with others, presented in “Apropos of Wet Snow.” The dreadful act of murdering the Pawnbroker and her half-sister Lizaveta by Raskolnikov, similarly, indicates the latter’s prioritization of incomplete philosophies over the concerns of other living beings.⁵⁵ In another situational rhyme of a character who gives preference to ideas at the expense of the social dynamics of life, Dmitrii

⁵³ «Я упражняюсь в мышлении, а следственно, у меня всякая первоначальная причина тотчас же тащит за собою другую, еще первоначальнее, и так далее *бесконечность*». (PSS 5: 108)

⁵⁴ In the broader consideration of the “wall”, even oblique, coincidental appearances of the lexical morpheme '*sten-*' communicate the thematic distinction between the thresholds of physical experience and imagination. For example, the negation of the short-form adjective *ne vlasten*, meaning ‘not in control,’ appears when the Underground Man describes how he would get carried away in his own mind games. Although ‘*ne vlasten*’ ostensibly differs from the root in the word meaning ‘wall,’ the correlation imparts similar semantic meaning. Moreover, the diminutive adjective *chisten'kaia*, meaning ‘clean,’ occurs in his descriptions of the young woman, who would ultimately become the diseased prostitute being carried in a coffin out of a basement, in his exchanges with Liza in the brothel. This dissertation acknowledges the possibility that such etymological connections participate in the thematic separation of the *real* and the *imaginary* in *Notes from Underground*.

⁵⁵ A.D. Nuttall, *Crime and Punishment: Murder as Philosophic Experiment* (Sussex, UK: Sussex University Press), 1978, 3.

Karamazov describes, “Ivan knows everything....He is a tomb.”⁵⁶ By assigning priority to rationality, Ivan cannot experience the earthy, dynamic essence of life beyond the confines of intellect. The Underground Man, and other characters of the same fold, largely cannot make sense of the physical world. They do not feel themselves a part of that world, because on the surface others perhaps do not accept them as such, but on a deeper level, they are unable to escape consciousness as the predominant ontological construct of being.

The dichotomy of thought and action of the Underground Man corresponds to the author’s metaphysical outlook, which unites the mathematical treatment of *irrealia* with real life. The parting monologue of the Underground Man that he stammers lost and alone after his hopeless pursuit of Liza, stresses the imperative for self-realization, and the experience of “real life”:

[W]e are cripples, every one of us—more or less. We have lost touch so much that occasionally we cannot help feeling a sort of disgust with “real life,” and that is why we are so angry when people remind us of it. Why, we have gone so far that we look upon “real life” almost as a sort of burden, and we are all agreed that “life” as we find it in books is much better. And why do we make such a fuss sometimes? Why do we make fools of ourselves? What do we want? We don’t know ourselves....Why, we do not even know where we are to find real life, or what it is, or what it is called. Leave us alone without any books, and we shall at once get confused, lose ourselves in a maze, we shall not what to cling to, what to hold onto, what to love and what to hate, what to respect, and what to despise. We even find it hard to be men, men of *real* flesh and blood, *our own* flesh and blood. We are ashamed of it. We think it a disgrace. And we do our best to be some theoretical “average” men. We are stillborn, and for a long time we have been begotten not by living fathers, and that’s just what we seem to like more and more....

⁵⁶ “Ivan knows everything. He knew about it long before you [Alyosha]. But Ivan is a tomb.”
«Иван всё знает. Раньше тебя давно знает. Но Иван- могила» (PSS 14, 101).

Soon we shall invent some way of being somehow or other begotten by an idea. But enough—I don't want to write anymore from Underground...⁵⁷

It is clear from the Underground Man's experience that while imaginary entities fundamentally exist, even to the degree that they overshadow the physical experience of real life, it is disastrous for the individual to assign extreme preference to one over the other. Life is inherently complex, and individuals can only really "live" when they share their vulnerabilities with others, express compassion, and relate to each another without the impulse to dominate or exploit. Ideas are incredibly important, but they should not function as the sole medium in which individuals choose to lead their lives.

In the consideration that the "wall" expresses different kinds of impenetrable extremes, the Underground Man feels a certain gravity towards various liminal thresholds.⁵⁸ Doors, windows, and even the ventilation pane of his apartment function as portals capable of bringing about transcendence, or at the very least, self-reflective clarity.⁵⁹ Such spaces indicate the transference from one existential phase to the next, like the idea that swells up in the mind and propels forward into real life as action. Although the imaginary unit exists statically on the imaginary axis, it possesses transformative potential to become a real number through countless mathematical operations. Several key scenes introduce such liminal spaces. After the dinner

⁵⁷ «[В]се хромаем, всякий более или менее. Даже до того отвыкли, что чувствуем подчас к настоящей "живой жизни" какое-то омерзение, а потому и терпеть не можем, когда нам напоминают про нее. Ведь мы до того дошли, что настоящую "живую жизнь" чуть не считаем за труд, почти что за службу, и все мы про себя согласны, что по книжке лучше. И чего комошимся мы иногда, чего блажим, чего просим? Сами не знаем чего... Ведь мы даже не знаем, где и живое-то живет теперь и что оно такое, как называется? Оставьте нас одних без книжки, и мы тотчас запутаемся, потеряемся, -- не будем знать, куда примкнуть, чего придерживаться; что любить и что ненавидеть, что уважать и что презирать? Мы даже и человеками-то быть тяготимся, -- человеками с настоящим, собственным телом и кровью; стыдимся этого, за позор считаем и норючим быть каким-то небывальными общечеловеками. Мы мертворожденные, да и рождаемся-то давно уж не от живых отцов, и это нам все более и более нравится. Скоро выдумаем родиться как-нибудь от идеи. Но довольно; не хочу я больше писать "из Подполья"» (*PSS* 5: 178-179).

⁵⁸ M.M. Bakhtin, *The Problems of Dostoevsky's Poetics*, 171-172.

⁵⁹ The fact that the Underground Man looks out onto the city of St. Petersburg through a ventilation pane, and not a window, communicates, his destitution. His apartment also represents the bleakness, spitefulness, and pitiful isolation of his consciousness.

party, for example, the Underground Man arrives at the brothel in a separate sleigh from those that carried Zverkov and his obsequious comrades. The Underground Man gains admission to the establishment by banging on the closed door with his fists and feet, an action that seems uncharacteristic of a personage defined by pure, paralyzing thought.⁶⁰

The reader encounters at the brothel an image of the Underground Man in a position that his solipsistic consciousness finds fitting. As a paying male customer interacting with a disenfranchised female, the protagonist construes an experiential circumstance that corresponds to the dominating pretensions of his thoughts -- control. Upon entering the brothel, moreover, the setting assumes supernatural proportions. Audiences join the protagonist as he crosses the mystical threshold that transforms him, at least temporarily, from an imaginary entity into a “real” person. He walks into a “familiar large room where there was only one candle burning, looking utterly bewildered: there was no one there.”⁶¹ After he is led into a private room, he surveys his state of affairs enthusiastically, recollecting, “I had been saved from death, and I felt it joyfully with every fiber of my being... They were not there and everything—everything had vanished, everything had changed!”⁶² The array of key settings in the novel, such as the brothel, the restaurant, and the apartment, assume charged meanings and associations that echo the mindset of the protagonist.

⁶⁰ «начал стучать в дверь руками и ногами. Особенно ноги, в коленках, у меня ужасно слабели» (PSS 5, 151). It is interesting that the Underground Man describes his legs in terms that seem reminiscent of the kicking of the horse carrying the sleigh that brought him to the brothel. «стегая, однако ж, клячу, так что то начала лягаться задними ногами» (PSS 5, 151). The connection between the horse and the Underground Man relates to a similar scene in *Crime and Punishment*, where Raskolnikov falls asleep in a park after calling a police officer to look after a young drunk girl seen walking the streets by herself, followed by a lecherous older man. During his slumber, Raskolnikov has a nightmare, in which a group of peasants whip and beat a poor mare to death.

⁶¹ «Я прошел скорыми шагами через темную лавку в знакомый мне зал, где горела всего одна свечка, и остановился в недоумении: никого не было» (PSS 5, 151).

⁶² «Я был точно от смерти спасен и всем существом своим радостно это предчувствовал: ведь я быдал пощечину, я бы непременно, непременно дал пощечину! Но теперь их нет и... всё исчезло, всё переменилось!» (PSS 5, 151).

An absurd recollection by the protagonist in the first chapter of “Apropos of Wet Snow,” similarly, highlights also the importance of liminal spaces. The Underground Man recalls witnessing a brawl at a billiards pub, and in the course of the fracas, one of the men was thrown through the window and into the street. While an ordinary person would likely head the other direction to avoid getting involved in the conflict, the protagonist describes that he felt “envious” of the fellow, who had been thrown through the glass.⁶³ So much so, that the Underground Man even walks into the billiards room, attempting to pick a quarrel, so that he, too, could experience such an exhilarating encounter.⁶⁴ By professing that he was not drunk, the Underground Man communicates his sincere, albeit eccentric desire to be thrown through the window pane. It conveys, as it were, his wish to be reinvigorated with the kinesthetic sensation of life that his paralyzing intellect prevents him from experiencing. The window, unlike the wall, exists as a kind of container that human subjects can look through, or even shatter. The ability to transcend makes these liminal spaces infinitely more appealing than the “stone” wall of physicality, and the “final” wall of consciousness or his humiliation.

While references in the story to “square roots”, “tables of logarithms”, “inertia”, “the laws of nature” and the illogical equation “ $2 \times 2 = 5$ ” reflect Dostoevsky’s mathematical proclivities on the surface-level plot of the text, deeper elements, such as its overall structure, the conveyance of dialogue, and even the particular syntax of the given narrative also reflect mathematical correspondences and themes. The Underground Man perhaps alerts readers of this hidden complexity when he shouts at Liza in one of the final scenes of the story: “What have you come here for, tell me, please?” I began gasping for breath and paying no attention to the *logical*

⁶³ “I was envious of this gentleman who had been hurled out. I envied him so much that I even walked into the bar, into the billard room: ‘Perhaps, I too will get into a scuffle and get thrown out the window.’» «Что я этому спущенному господину позавидовал, и до того позавидовал, что даже в трактир вошел, бильиардную: “Авось, дескать, и я подерусь, и меня тоже из окна спустят”» (PSS 5, 173).

⁶⁴ Ibid. 173.

order in my words. I wanted to blurt it all out at once, and I didn't care a damn what I started with. What have you come here for? Answer! Answer!" I yelled suddenly remembering myself."⁶⁵ In light of the all-consuming nature of his consciousness, it follows then that the Underground Man can only speak directly in moments when he *forgets himself*. When he is self-aware, on the other hand, which is the case for most of the story, the "order of his words" reflects aesthetic artifice for the reader to interpret. His speech communicates not only the ostensible denotative meaning of individual words, but also connotative themes, unities, and juxtapositions.

Although some mathematical patterns discerned in literary works by Dostoevsky may not have been intentional, the dictum of Marshall McLuhan that "the medium is the message," upholds their inclusion in evaluations of devices and interdisciplinary discourses contributing to the trajectory of central themes.⁶⁶ That is, in light of his artful *weaving of words*, [*pletienie sloves*], a tradition dating back in medieval Slavic liturgical texts attributed to the 15th-century hagiographer Epiphanius the Wise, and the principle of *poetic grammar* devised by Roman Jakobson, the manifestations of numerical patterns in his prose, whether intended or coincidental, remain relevant for assessing his primary metaphysical arguments.⁶⁷ Dissecting the lexical, syntactic, and metrical presentation of his philosophical claims illuminates the mathematical processes by which Dostoevsky composed and organized his literary works.⁶⁸

⁶⁵ «Для чего ты ко мне пришла, скажи ты мне пожалуйста?— начал я, задыхаясь и даже не соображаясь с логическим порядком в моих словах. Мне хотелось всё разом высказать, залпом; я даже не заботился, с чего начинать. Зачем ты пришла? Отвечай! Отвечай!—вскрикивал я едва помня себя» (*PSS* 5, 173).

⁶⁶ Marshall McLuhan, *Understanding Media: The Extensions of Man* (New York: McGraw-Hill, 1964), 7.

⁶⁷ Alexis Klimoff, "Russian Literature and Orthodoxy: Outline of Main Trends to 1917" in *The Orthodox Christian World*, ed. Augustine Casiday, (New York: Routledge, 2012), 518. See also Alexandar Mihailovic, "Mikhail Bakhtin and Russian Orthodoxy," in *Corporeal Words: Mikhail Bakhtin's Theology of Discourse* (Evanston, IL: Northwestern University Press, 1997), 9-10; Roman Iakobson, "Poeziia grammatiki i grammatika poezii" in *Semiotika*, 462.

⁶⁸ *Ibid.* 518; see also Marshall McLuhan, *Understanding Media: The Extensions of Man*, 7.

In establishing a correspondence between formal features of his prose and extended mathematical discourses, this chapter acknowledges the inherent risk of analytical anachronism.⁶⁹ This tendency is aptly summarized by Ian Richmond, who writes, “there is always the danger of seeing ourselves in the past, of becoming victims of the fallacy whereby ideas are imported from present-day experience, and [historic] man is anachronistically saddled with views he would have found at best strangely unfamiliar.”⁷⁰ These frameworks do by no means provide an absolute assessment of Dostoevsky’s insights. Rather, the associated readings provide an original interpretative lens through which readers may gain new understanding of the perplexing features and personalities in works by Dostoevsky. The consideration that Dostoevsky may have encountered these mathematical ideas in his schooling gives the ideas in this dissertation additional credence, but does not exclude the possibility of other motivations.

In his 2001 translation of *Notes From Underground*, Michael Katz conveys a mathematical presentation of the uncanny patterns that appear in Dostoevsky’s syntax.⁷¹ The opening lines of the text read, “I am a sick man....I am a spiteful man. I am an unattractive man,” «Я человек больной... Я злой человек. Непривлекательный я человек».⁷² Most noticeably, the adjective used in each sentence represents the only word in these introductory remarks that actually changes.

⁶⁹ Valerie Rohy, *Anachronism and Its Others: Sexuality, Race, Temporality* (Albany: SUNY Albany Press, 2009), xv; see also Joseph P. Natoli, *Literary Theory’s Future(s)* (Champaign, IL: University of Illinois Press, 1989), 210; Jonathan Hart, *Literature, Theory, History* (Palgrave Macmillan, 2011), 151.

⁷⁰ The original quotation refers to “ancient” man, as opposed to “historic” man, since the initial claims concern anthropological evaluations of the origins of mathematics. The same principle, however, also applies to historical analysis of developments in the more recent past. Ian Richmond as cited in John Fauvel and Jeremy Gray, eds., *The History of Mathematics: A Reader* (London: Palgrave Macmillan, 1996), 11.

⁷¹ Michael Katz, “A Brief Note on the Translation” in *Notes From Underground* by F.M. Dostoevsky, trans. Michael Katz, (New York: W.W. Norton, 2001), xii.

⁷² F.M. Dostoevsky, *Notes From Underground*, trans. Michael Katz, (New York: W.W. Norton, 2001), 1; see also (*PSS* 5, 99).

Katz illustrates that these first three lines correspond to a 3x3 linear matrix, once we assign Dostoevsky's usage of pronouns the value of «1», nouns the value of «2», and adjectives the value of «3»:

1	2	3 _a
1	3 _b	2
3 _c	1	2

Katz argues that the progression of these adjectives in each sentence reveals a kind of intensification, i.e. (3_a) “sickly” to (3_b) “spiteful/evil” to (3_c) “unattractive/uninviting.”⁷³ While native speakers would sense subtle semantic differences between the word order, if Dostoevsky had decided to use the same adjective in each of these three lines, each sentence would impart roughly the same meaning.⁷⁴ Although each adjective denotes its own unique nuance of being, the structural presentation of the three sentences taken collectively also contributes to the rendered description of the protagonist’s personality.

Although Katz astutely points out the matrix-like organization of these three lines, he stops just short of relating the associated syntax to the education and mathematical genius of Dostoevsky. He refrains from discussing the opening of the text in relation to broader mathematical references and themes in works. An important mathematical subtext appears by tentatively accepting the presentation of these three lines as a selection of related differential equations. A differential equation expresses the degree of change in one variable as it relates to

⁷³ Ibid. 1.

⁷⁴ Moving the adjective creates a subtle change. Placing the adjective forward, or closer to the start of the sentence increases its emphasis.

the change in another.⁷⁵ In mathematics, the degree of change is typically identified by the notation of the Greek letter, Delta: Δ . To understand relative change, mathematicians look for the fluctuation of one variable, let's say y , divided by the change in another, x . In a given equation, if y increases by 4 as x increases by 2, the relative degree of change, or differential equals 2, calculated by simple arithmetic that 4 divided by 2 equals 2. The notation for a basic differential equation would typically appear as follows:

$$\Delta f(x) / \Delta x$$

If one considers the degree of change portrayed by the nominal and pronominal parts of speech in the opening lines of *Notes From Underground*, «человек» and «я», one realizes that no transformation occurs whatsoever. The words «человек» and «я» represent constants in Dostoevsky's system and thus demonstrate a change of zero. Thematically, this might illustrate the notion that the Underground Man is inescapably human, «человек» and, and irrevocably himself, «я». The adjective, on the other hand, does, in fact, change both semantically and syntactically. Since this is the only element in these introductory lines that actually transforms, the adjective used in each sentence should be interpreted as some unidentified value of the unknown variable, x . Since x represents an undetermined variable raised to the first power, the laws of mathematical derivation, i.e. the process of finding the degree of change in one variable compared to another, confirm that as x increases by 1, so too does $f(x)$ or y .⁷⁶

Now that one has found the degree of change in each element of Dostoevsky's introductory statements, one can comprehend the underlying structure of the associated differential equations:

⁷⁵ Morris Tenenbaum and Harry Pollard, *Ordinary Differential Equations*, (Dover: New York, 1963), 1.

⁷⁶ *Ibid.* 2-3.

0	0	1
0	1	0
1	0	0

By studying the degree of change in the Underground Man's given state of "being" in terms of adjectival proportions, Dostoevsky essentially tries to get at the root of "being" in terms of change, or rather the notion that the same individual can embody different and even contradictory emotional and physical states at any given moment. The individual, or the existentialist notion of "being" thus occurs as a constant process of change. The nuance of "being" ascribed to the Underground Man, for example, likewise at one moment reflects his state of "sickness," at another, "spitefulness," and at yet a third, "unattractiveness," but these changes occur at the most minute, momentary states of personality, and he is always still the same man.

The matrix that Dostoevsky imparts by providing these differential equations reveals exciting mathematical properties. In linear algebraic terms, this kind of system is commonly referred to as an anti-diagonal matrix, the exchange matrix, or the anti-identity matrix.⁷⁷ This terminology features prominently in almost every linear algebra course, and though Dostoevsky struggled in the subject, he encountered these concepts and methods in his algebra courses taught by the dreaded Sub-Lieutenant Lomnovsky.

⁷⁷ Iyad T. Abu-Jeib, "On the Counter-Identity Matrix," Department of Mathematics and Computer Science, SUNY College at Fredonia, article published online at: <http://cs.ucmo.edu/~mjms/2005.1/abujeib.ps>.

To understand the mathematical import of the anti-identity matrix, it is helpful compare it to the more widely-known identity matrix:⁷⁸

1	0	0
0	1	0
0	0	1

Identity Matrix
(*Edinichnaia matritsa*)

0	0	1
0	1	0
1	0	0

Anti-Identity Matrix
(*Antiedinichnaia matritsa* or
antidiagonal'naia matritsa)

As a mathematical concept, the identity matrix is useful in the sense that any matrix multiplied by the identity matrix yields the original matrix itself.⁷⁹ Essentially, the algebraic computation is similar to the arithmetic operation of multiplying any number by 1, which produces the original number. The identity matrix is among the most useful constructs in linear algebra, because it allows mathematicians to confirm whether or not they have correctly calculated the inverse of a given equation.⁸⁰

The inverse of a given function is found when the independent variable (x) is exchanged with the dependent variable (y). If one were to consider the function $f(x)=y$, for instance, then one would write the associated inverse, $f^{-1}(y)=x$.⁸¹ This process is more complicated when the original function involves multiple terms and algebraic operations. As its central property, the anti-identity matrix, oddly enough, is its own inverse. When one multiplies the given anti-

⁷⁸ Ibid.

⁷⁹ Ibid. For a review of Matrix multiplication to confirm that the anti-identity matrix is its own inverse, see Rod Pierce, "How to Multiply Matrices" on *Math is Fun*. 6 October 2014.

Accessed online: <<http://www.mathsisfun.com/algebra/matrix-multiplying.html>>.

⁸⁰ Joe D. Hoffman, *Numerical Methods for Engineers and Scientists* (New York: Marcel Dekker, 2001), 42.

⁸¹ Serge Lang, *Short Calculus: The Original Edition of "A First Course in Calculus"* (New York: Springer, 2002), 108.

identity matrix presented in the first three-lines of *Notes from Underground* by itself, or when one squares it, in other words, the product yields the result of the identity matrix.⁸² This process perhaps reflects the thought process of the Underground Man. Just as he considers one idea, he undercuts it with its countervailing opposite, taken figuratively to mean the inverse of the original argument. The defining feature, or ‘identity’, of both the Underground Man, and the anti-identity matrix, is an overriding propensity to reflect both the value of an idea and its inverse in one unified body.⁸³ It amounts to the process of self-cancellation.

The speech of Liza also conveys these mathematical patterns, albeit to a less noticeable extent, since the text sparsely presents samples of her spoken voice. When the Underground Man asks if she has a mother and father, to which she responds curiously, “Yes...no, I have.”⁸⁴ In the respect that “yes” [*da*] and “no” [*net*] convey definite meaning, they could be interpreted as constants, where as “I have” expresses a more dynamic state of “being” in [*est*’], this response could be read as the first row of yet another anti-identity matrix:

0	0	1
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⁸² For a review of Matrix multiplication to confirm that the anti-identity matrix is its own inverse, see Rod Pierce, “How to Multiply Matrices” on *Math is Fun*. 6 October 2014.

Accessed online: <<http://www.mathsisfun.com/algebra/matrix-multiplying.html>>.

⁸³ The process results, generally, in self-cancellation. Aesthetically, the concept of the anti-identity matrix as a mathematical entity that is also its own inverse mirrors the self-destructive psychological tendencies of characters in works by Dostoevsky. Goliadkin, for example, declares, “I am my own executioner.” The figure of Raskolnikov, similarly, engages the binary decision of confessing his crime and reinstating his communion with humanity through the model represented by Sonia, or alternatively, committing suicide, following the paradigm of Svidrigailov. A great many characters in works by Dostoevsky contemplate suicide as the ultimate expression of self-cancellation. By situating the consciousness of the Underground Man as its own inverse, Dostoevsky seems to suggest that that the internal thoughts of his protagonist equate to the square root of the whole of his unified personality, albeit one of a self-cancelling nature.

“And why did I write all those letters? My own executioner, I’m some kind of suicide, that’s what I am!” «И зачем все эти письма писал, я-то, душегубец; я-то самоубийца я этакой!» (*PSS* 1, 180).

It is interesting that Dostoevsky uses the word *dushgub* to infer the role of his own executioner, as the word derives etymologically from the root *dusha-*, as in ‘soul’, and *gubit*’, meaning ‘destroy,’ ‘ruin’, or ‘spoil.’ The word increases the severity of his status as an executioner. It entails the destruction of both the physical and spiritual dimensions of a human life.

⁸⁴ «Отец и мать есть?»

«Да...нет...есть» (*PSS* 5, 153).

The affinity of their outlooks and personalities is confirmed, furthermore, when Liza offers resolute confirmation of the Underground Man scoffing at the prospect of people loving each other.⁸⁵ While his consciousness does admit this feeling, the “appearance of a little idea” toward her, allowed his solipsistic consciousness, if only for a moment, to yield to her.⁸⁶ Like any notion conjured up in the mind of the Underground Man, however, this “*ideika*” is fleeting, and subjected to constant reevaluation.

The “little idea” in question is love. He even lowers himself in the scene to alleviate and elevate her downtrodden status as a prostitute: “I’m probably much worse than you.”⁸⁷ They are two spiteful souls, submitted involuntarily to the sociological limitations of insufficient wealth, repressed status, and physical freedom in the cityscape of St. Petersburg. The Underground Man even contemplates the likeness of their situations: “So she, too, was capable of the same thoughts. ‘Damn it, this is interesting – this means that are *akin* to one another.’ I thought almost rubbing my hands with glee.”⁸⁸ Consequently, Liza and the Underground Man both embody the

⁸⁵ “Now, tell me what is there so good about all this? Here you and I ...came together...recently, and we never said a word to each other the whole time, and it was only afterwards that you began staring at me like a wild thing. And I at you. Is that how people love one another? Is that how one human being should make love to another? It’s disgusting, that’s what it is!” “Yes!” she agreed with me sharply and promptly. The implied sexual encounter with Liza is one of the few periods when the Underground Man takes a break from his seemingly constant chatter, and shuts up for a nondescript period of time. The interpersonal connection between them, despite being of a commercial nature, is still a form of human intimacy. Its depth transcends the power of verbal communication, but its significance is communicated in the “wild” looks they give each other. The Underground Man uses the aphorism of ‘going together’ [*soshlis’*], moreover, to avoid describing the romantic connection in more explicit, earthy detail. «Ну скажи, ну что тут хорошего: вот мы с тобой...сошлись...давеча, и слова мы во всё время друг с дружкой не молвили, и ты меня, как дикая, уж потом рассматривать стала; и я тебя также. Разве эдак любят? Разве эдак человек с человеком сходиться должны? Это безобразие одно, вот что!» «-Да! - резко и поспешно она мне поддакнула» (PSS 5, 155).

⁸⁶ “I was already longing to expound my own favorite *little ideas*, which I had nursed so lovingly in my corner. Suddenly, something flared up within my, a sort of aim had *appeared*.” «Я уже свои заветные *идейки*, в углу выжитые, жаждал изложить. Что-то вдруг во мне загорелось, какая-то цель ‘явилась’» (PSS 15, 155).

⁸⁷ «Я, может, еще тебя хуже» (PSS 5, 155).

⁸⁸ «Черт возьми, это любопытно, это – *сродни* – думал я, чуть не потирая себе руки» (PSS 5, 156).

elements of the anti-identity matrix, and the potential for their meaningful union to come to fruition metaphorically reflects the product of a function and its inverse. If Liza and the Underground Man were to have fallen in love, their relationship would have been unified, recognizable, and whole, just as the square of the anti-identity matrix yields the identity matrix.

The type of love that nearly brought the Underground Man and Liza together would have been the embodiment of exceptional, infinite freedom. Love, in this vein, entails the independence of individuals to be themselves in any state or mood, and still be accepted unconditionally by their partners. It involves unwavering trust, communion, compassion, and a willingness to admit vulnerability. This bond reflects the union of spiritual, emotional, and bodily forces, which stand in opposition to the egoistic ambitions and spitefulness of excessive consciousness. When the Underground Man rejects Liza, he forfeits the infinite freedom represented by manifold connections to her, other people, and God, all for the ceaseless production of isolated thought. While thought and *living life* [*zhivaia zhizn'*] both afford human subjects the potential for infinite freedom, the pitfalls of the Underground Man suggest that the latter contributes more to the sustained happiness, health, and wisdom of individuals.

By surmising the illogical premise that $2 \times 2 = 5$, the Underground Man rebels against the laws of the physical world. Invisible to the untrained eye, calculations of physical mechanisms could explain, if not govern, every movement in the universe. Those possessing the awareness of these uncountable dynamics could, in theory, predict the outcome of every interaction and event. The Underground Man recognizes the import of such laws, and realizes that they could also

predicate the processes that allow human beings to think and feel.⁸⁹ Bodily organs, such as the brain, heart, spleen, and aching tooth abide by the same physical laws that govern all of nature.

In his defiance of such laws, the Underground Man refutes the extended philosophical discourse of Determinism to affirm his own personal freedom, autonomy, and responsibility. The ideological promotion of Determinism hinges upon a central question: if the mathematical and scientific laws of nature delineate the composition and fluctuation of everything in the physical universe, do individuals really possess the ability to choose for themselves what to do or not to do? The Underground Man laments the consequential cancellation of human free will:

there are the laws of nature in the world; so that whatever he does is not done of his own will at all, but of itself, according to the laws of nature. Consequently, as soon as these laws of nature are discovered, man will no longer have to answer for his actions and will find life exceedingly easy. All human actions will then, no doubt, be computed according to these laws, mathematically, something like the tables of logarithms, up to 108,000, and indexed accordingly. Or, better still, certain well-intentioned words will be published, something like our present encyclopedic dictionaries, in which everything will be calculated and specified with such an exactness that there will be no more independent actions or adventures in the world.⁹⁰

⁸⁹ The Underground Man considers the vascillation of his feelings in the same way as he would attempt to explain the changing of states in a chemical reaction, comprising a process that can be calculated and predicted by scientific methods. While reconciling his indeterminate moods, the protagonist rebels against the notion that his subjective feelings might stem from the same deterministic laws of nature, i.e. chemistry, physics, mathematics. He surveys these ideas, proposing, another head-thrashing to resolve the dilemma: “My anger, in the consequence of the damned laws of consciousness, is subject to chemical decomposition. As you look, its object vanishes into thin air, its reasons evaporate, the offender is nowhere to be found, the affront ceases to be an offense and becomes destiny, something like a toothache, for which nobody is to blame, and consequently there remains only the same outcome, which is to bang one’s head against the stone wall. Well, you shrug it off, because you haven’t found a primary cause.” «Злоба у меня опять-таки вследствие этих проклятых законов сознания химическому разложению подвергается. Смотришь- предмет улетучивается, резоны испаряются, виновник не отыскивается, обида становится не обидой, а фатумом, чем-то вроде зубной боли, в которой никто не виноват, а следовательно, остается опять-таки тот же самый выход- то есть стену побольнее прибить. Ну и рукой махнешь, потому что не нашел первоначальной причины» (*PSS 5*, 108-109).

⁹⁰ «на свете есть еще законы природы; так что всё, что он ни делает, делается вовсе не по его хотению, а само собою, по законам природы. Следственно, эти законы природы стоит только открыть, и уж за поступки свои человек отвечать не будет и жить ему будет чрезвычайно легко. Все поступки человеческие, само собою, будут расчислены тогда по этим законам, математически, вроде таблицы логарифмов, до 108 000, и занесены в календарь; или еще лучше того, появятся некоторые благонамеренные издания, вроде теперешних энциклопедических лексикон, в которых всё будет так точно исчислено и обозначено, что на свете уже более ни поступков, ни приключений» (*PSS 5*, 112-113).

Although the Underground Man argues that thought provides a greater degree of freedom than physical reality, the acknowledgement that scientific laws dictate all things, perhaps including the phenomenon of consciousness, reduces the human being to a mere “organ stop.”⁹¹

Following this rhetoric, scientific methods deprive humankind of independence, but also all culpability of all wrongdoing. The underlying mathematical dynamics of the universe dictate every action. Responding to these arguments causes an existential crisis on the part of the protagonist to prove his freedom and autonomy. The Underground Man, accordingly, will go to extreme and illogical lengths, even to the point of self-harm or self-destruction to prove that he possesses his own free will. Dostoevsky demonstrates that choice, or at the very least, the illusion of choice, instantiates an imperative feature of the human condition. Without choice, man is reduced to a machine, or brutish beast. He will go without sustenance, and forgo limitless material treasures to prove his own autonomy, and to establish his own self-determination. A person without choice, in these terms, is no person at all.

The Utopian vision of the Crystal Palace, in these terms, undergoes a discernible transformation.⁹² The Underground Man initially conceives of the Crystal Palace as an “indestructible” edifice, capable of providing him “a big house with model flats for the poor on a lease of a thousand years.”⁹³ There is no privacy in the building, however, since all the walls are made of transparent crystal. The Underground Man laments, “I shan’t be able to poke my tongue

⁹¹ Ibid. 284. «органный штифтик». (*PSS*: 5, 114).

⁹² The Crystal Palace was built for the Great Exhibition of 1851 in London’s Hyde Park. It was among the first of a series of World’s Fair exhibitions of culture and industry. Joseph Paxton (1803-1865) developed an intricate geometric design, and laid innovative plans for the structure to be built out of glass. See J.R. Piggot, *Palace of the People: The Crystal Palace at Sydenham, 1854-1936* (Madison, WI: University of Wisconsin Press, 2004), 1.

⁹³ «Вы верите в хрустальное здание, навеки нерушимое» (*PSS* 5, 120); «капитальный дом, с квартирами для бедных жильцов по контракту на тысячу лет» (*PSS* 5, 120).

out at it even by stealth.”⁹⁴ It metaphorically represents the ascribed potential of scientific investigation to make all mysteries of humanity and the universe known. No secret will go unturned. In these terms, however, the structure of the Crystal Palace comes to represent a false paradise, predicated on material aims alone, and not the deeper psychological or spiritual dimensions of the human condition.⁹⁵ What at first is a colossal edifice capable of bringing about material salvation, transforms into “a kind of ghost of the heavenly kingdom that is inside us, in the wholeness [*tseĭ nost*] of our inner life.” The true paradise envisioned by Dostoevsky is one that satiates the material, psychological, and spiritual striving of all humanity, while still maintaining the freedom and independence of individuals.⁹⁶

Returning to the premise of the “organ stop,” the ontological conceptions of realia and irrealia provide varying degrees of freedom to the reader and protagonist alike. Just like the Underground Man, individuals are entirely free to think whatever they like, even if the associated mental construct opposes the “truth” of scientific law. In the realm of thought, all rules can be broken.⁹⁷ From an ontological standpoint, although human experience may be limited in its physical form, it enjoys unparalleled freedom through intellect and imagination. While humanity acquires enhanced freedom in consciousness relative to the physical world, the conception of an idea also possesses its own controlling features.

⁹⁴ «Ну, а я, может быть, потому-то и боюсь этого здания, что оно хрустальная и навеки нерушимое и что нельзя будет даже и украдкой языка ему выставить» (*PSS* 5, 120).

⁹⁵ The presentation of the Crystal Palace appears in similar terms and proportions to the Tower of Babel referenced by the Grand Inquisitor in *The Brothers Karamazov*. The situational rhyme establishes a relationship between the two edifices, but also between the Underground Man and Ivan.

⁹⁶ The understanding of a true paradise, in these terms, coincides with the understanding of divine heaven promoted by the tenets of Eastern Orthodoxy.

⁹⁷ While all rules *can* be broken in thought, it doesn't mean that they *should* be broken. One of the primary themes of *The Brothers Karamazov* is that the quality of thought is not excused from the prescriptive codes of morality. See this discussion in Chapter Five concerning the quotation, “If there is no God, everything is permitted.”

Returning to the “ideological” reading of Dostoevsky by Boris Engelhardt, Dostoevsky’s protagonists are not merely physical personages endowed with specific characteristics.⁹⁸ Rather, they are anthropomorphized ideas, fluid values that Dostoevsky tests in the applied relative context of larger systems or functions governing entire societies, civilizations, and even all of humanity. The presentation of his characters as imbued with ideational value, consequently, reflects the mathematical process of *regula falsi*, by which a problem is evaluated by using test (“false”) values for unknown variables, and adjusting as necessary to approximate or determine the solution to a given equation.⁹⁹

When confronted with a basic algebraic equation, such as, $7y+3=52$, for example, one could substitute values for the unknown value to approach the conditions establishing equilibrium, without solving through algebraic means. By guessing that a value of 6 could fulfill the conditions of the equation, one would find that $7 \times 6 + 3 = 45$. Substituting a value of 8 for the variable would yield, 59, that is $7 \times 8 + 3$. Accordingly, the solution to the problem must be between 6 and 8. More specifically, the value of 7 completes the solution, that is $7 \times 7 + 3 = 52$. This process of picking values that can be inserted and tested in a mathematical system comprises the overarching method of *regula falsi*.

⁹⁸ Engelhardt conceives of Dostoevsky’s novels as texts instilled with cultural and sociological ideological positions. Sensing the appearance of ideas not limited to sociocultural discourses, Mikhail Bakhtin defines Dostoevsky’s primary genre more broadly as *ideinyi roman*, that is, a novel infused with ideas, in *Problemy poetiki Dostoevskogo*: «Б.М. Энгельгардт исходит из социологического и культурно-исторического определения героя Достоевского. Герой Достоевского—оторвавшийся от культурной традиции, от почвы и от земли интеллигент-разночинец, представитель ‘случайного племени.’ Такой человек вступает в особые отношения к идее: он беззащитен перед нею и перед ее властью, ибо не укоренен в бытии и лишен культурной традиции. Он становится ‘человек идеи,’ одержимым от идеи....Отсюда вытекает жанровое определение романа Достоевского как ‘романа идеологического.’ Но это, однако, не обыкновенный идейный роман, роман с идеей» in Mikhail M. Bakhtin, *Problemy poetiki Dostoevskogo* in *Sobranie sochinenii v semi tomakh*, Vol. 6, 30-31; see also B.M. Engel’gardt, “Ideologicheskii roman Dostoevskogo” in *F.M. Dostoevskii. Stat’i i materialy*, sbornik 11, ed. A.S. Dolinina (Moscow: Mysl’, 1924), 71-109; Victor Terras, *Reading Dostoevsky*, 6.

⁹⁹ Jean-Luc Chabert et al., *A History of Algorithms: From the Pebble to the Microchip* (Heidelberg: Springer, 1994), 85.

Testing is a primary theme in works by Dostoevsky. His protagonists try out different ideological positions, and hold experiments to gauge their ascribed importance, stature, and status. They develop hypotheses about themselves, which require the reactions and opinions of others in larger societal systems to confirm. The Underground Man, for example, develops the following supposition: “I could not even imagine any place of secondary importance for myself and for that very reason I quite contentedly occupied the most insignificant one in real life. Either a hero or dirt—there was no middle ground.”¹⁰⁰ When he does step out from his isolated ‘mouse hole’, and attempts to live life as a person, his interactions comprise a series of experiments to see if his mental calculations and expectations coincide with what happens in physical life.

These experiments begin on the small scale: he decides not to yield to an officer walking down Nevsky Prospect. After observing people on the pavement, “continuously making way for generals, officers of the guards and hussars, and way of for generals,” the Underground Man conceives of an experiment to test his own status by not moving out of the way on the sidewalk.¹⁰¹ His reactions while observing the busy street, however, foreshadow the fateful result: “At these moments, I used to have sharp shooting pains in my heart, and I used to feel all hot down my back at the mere thought of the miserable appearance of my clothes and the wretchedness of my darting little figure.”¹⁰² In spite of his own perceived inferiority, he goes through with the experiment in an attempt to realize himself in the action of life.

¹⁰⁰ «Второстепенной роли я и понять не мог и вот именно потому-то в действительности очень спокойно занимал последнюю. Либо герой, либо грязь, середины не было» (*PSS 5*, 133).

¹⁰¹ “I darted like an eel among the passers-by in a most uncomely fashion, ceaselessly giving way to generals, cavalry officers, and hussars, and to ladies.” «Я шмыгал, как вьюн самым некрасивым образом, между прохожими, уступая беспрерывно дорогу то генералам, то кавалергардским и гусарским офицерам, то барыням» (*PSS 5*, 130).

¹⁰² «[Я] чувствовал в эти минуты конвульсивные боли в сердце и жар в спине при одном представлении о мизере моего костюма, о мизере и пошлости моей шмыгающей фигурки» (*PSS 5*, 130).

He obsesses over the experiment, and the scene plays out repeatedly in his mind. After observing Nevsky for an extended period, he makes careful preparations for his plan, and even buys a coat with a German beaver collar to convey the façade of his wealth and status.¹⁰³ At the first trial of this experiment, the Underground Man loses the spirit to proceed with the plan. Before making contact, “he fell down in front of [the officer], who very calmly strode past him, and [the Underground Man] was hurled to one side like a ball.”¹⁰⁴ In the final trial of the test, they “knocked violently against each other, shoulder to shoulder, and [the Underground Man] did not budge an inch, and passed him on equal footing.”¹⁰⁵ Although the officer did not notice that they had bumped into each other, the Underground Man convinces himself that the officer was “only pretending not to notice.”¹⁰⁶ The experiment, which satirizes the rigid assignment of rank, also serves to demonstrate that the Underground Man is not the “hero” he envisions to be in the world of his internal consciousness. In the physical universe of the story, he is a pitiful non-entity, a null-set.

Other protagonists in Dostoevsky’s artistic works conduct similar tests. Raskolnikov, for example, tests the validity of the philosophies that would allow him to commit murder. He even rehearses the act of killing the pawnbroker before actually doing so, by counting the number of steps it takes to reach her shop from his apartment. In *Vechnyi muzh*, furthermore, Trusotsky invites the lover of his deceased wife, Velchaninov, to attend a party at the estate of his new fiancée. Even though Trusotsky hates Velchaninov after his extramarital affair with Natalia, the

¹⁰³ «Надо было переменить воротник во что бы ни стало и завести бобрик, вроде как у офицеров» (PSS 5, 131).

¹⁰⁴ «Один раз я было и совсем уже решился, но кончилось тем, что только попал ему под ноги, потому что в самое последнее мгновение, на двухвершковом каком-нибудь расстоянии, не хватило духу. Он преспокойно прошел по мне, и я, как мячик, отлетел в сторону» (PSS 5, 132).

¹⁰⁵ «Мы плотно стукнулись плечо о плечо! Я не уступил ни вершка и прошел мимо совершенно на равной ноге!» (PSS 5, 132).

¹⁰⁶ «Он даже и не оглянулся и сделал вид, что не заметил; но он только вид сделал, я уверен в этом» (PSS 5, 132).

invitation functions as a perverse scientific test. Trusotsky needs to confirm the conviction that he is the better man, the more enviable suitor, the superior individual compared to Velchaninov. The reactions of guests at the Zakhlebinin estate provide him with the answer that opposes the egoistic premise devised by his solipsistic consciousness.

The kind of testing that takes place in a work by Dostoevsky perhaps also informs the ascription of genre for the associated literary medium. Shorter fictional works by Dostoevsky, such as *Zapiski iz podpol'ia* and *Son smeshnogo cheloveka* conform generally to singular *regula falsi*, or the testing of one unknown variable, corresponding to the ideological value personified in one primary character. Longer texts, however, involving the weighing of values conveyed by multiple characters express higher degrees of *regula falsi*. In mathematics, for example, *double regular falsi*, or even *triple* or *quadruple regula falsi* methods can be used to test systems with corresponding unknown entities. This mathematical distinction perhaps elucidates boundaries of genre designated in works by Dostoevsky.

Literary productions involving higher degrees of *regula falsi*, that is, the testing of ideological cores expressed by multiple characters, such as the dynamic interactions of Myshkin, Nastasia Fillipovna, and Rogozhin in *The Idiot*, Raskolnikov, Dunia, Sonia, Razumikhin, and Svidrigailov in *Crime and Punishment*, as well as Alyosha, Ivan, and Dmitrii in *Brat'ia Karamazovy*, comprise novels, or *romany*. His *povesti*, such as *Dvoinik*, *Belye nochi*, and *Zapiski iz podpol'ia*, in contrast, largely reflect the discord of *individual* characters striving for acceptance and resolutions to doubts. Scholars usually situate the distinction between *romany* and *povesti*, translated as ‘novel’ and ‘[longer] story, tale’, respectively, in terms of length and style.¹⁰⁷ Dostoevsky, however, may have used other evaluative criteria to assign his works a particular genre based on the types of mathematical testing that his characters express or

¹⁰⁷ Victor Terras, *Handbook of Russian Literature* (New Haven: Yale UP, 1990), for *roman*, see 309; for *povest'*, see 410.

embody. While certain texts may serve as counter-examples to this designation, the overall system of classification nevertheless elucidates the values and characters that Dostoevsky emphasizes as dynamic entities undergoing the process of testing in the context of his prose.

As yet another mathematical method of confirming the fluid ideological values represented by his protagonists, Dostoevsky situates his characters to function as personified *reductiones ad absurdum*, or proofs by contradiction. The form of deductive argumentation demonstrates that a statement is true by showing that a false, untenable, or absurd result follows from its denial.¹⁰⁸ To arrive at the conclusive *quod erat demonstrandum* (*Q.E.D.*, or “that which had to be proven”), mathematicians employ the argumentative tenets of proof by contradiction to establish relationships between numerical, geometric, and algebraic entities.¹⁰⁹ Dostoevsky, in conjunction with the method of *regula falsi*, uses proof by contradiction to establish the veracity of their ideologies. A selection of his characters, villains and anti-heroes, most notably, are meant to fail, or to demonstrate the illogicality of their ascribed ideological positions.

The pitiful, lonely existence of the Underground Man, for example, serves to illustrate that a person should never dwell exclusively in the realm of solitary, solipsistic contemplation. Life is a social phenomenon, and to enjoy it fully, a human subject needs to interact with others. In relationships, moreover, individuals should construe themselves neither as total dictators, nor as total slaves, and their conduct should not vacillate wildly between these two poles. Individuals need to yield, to share vulnerabilities openly, and to demonstrate basic compassion for one another. Although he possesses immense capacity for intellect, the Underground Man functions as a model that Dostoevsky uses to convince readers of how not to act or think in their everyday lives. He is an anthropomorphized proof by contradiction. His humiliating physical experience,

¹⁰⁸ John J. Watkins, *Number Theory: A Historical Approach* (Princeton, NJ: Princeton UP, 2013), 37.

¹⁰⁹ Ibid. 37. In Russian, mathematicians use the abbreviation *ч.м.д* (*chto i trebovalos' dokazat'*) to indicate the presumed completion of a proof.

and his debilitating hyperconsciousness marginalize his status to the unenviable position of a character, who is almost subhuman. His position in the trajectory of the story refuses even the most basic joys of life, and shared social existence.

As a general argumentative or artistic technique, the assumptions and opinions of protagonists in works by Dostoevsky are generally intended to fail as they embark to prove or disprove theories and ideas about themselves and the world as a whole. Though a small selection of his characters achieve cathartic resolutions for their dilemmas, others like the Underground Man and Stavrogin find no closure. In evaluating problems and the merits of different ideological arguments, Dostoevsky and his characters undergo the methodical approach of *regula falsi* to achieve belonging in complex systems and to manage crises, expressed by angst, rage, and grief in the face of misguided ideas, incomplete aims, and flawed interactions.

Herein lies the outset of a puzzling compositional metanarrative expressing the relationship between author and character. Despite the consideration that characters possess their own voices, bodies, and thoughts following the tendencies of the polyphonic novel observed by Bakhtin, Dostoevsky as the author intervenes and deliberately orients the events and ideas of a given story in a particular direction of his choosing.¹¹⁰ Ultimately, it is the author who decides the associated ideological values that characters uphold. Main characters, consequently, personify characteristics that evolve, as the author attempts to draw out conclusions from the method of *regula falsi*, testing what may or may not happen in the plot by assigning their personas one set of ideas as opposed to another.¹¹¹

The Underground Man, for example, undergoes a transformation. In the beginning of the text, the protagonist seems to possess immense intellect, humor, and confidence exhibited by his

¹¹⁰ M. M. Bakhtin, *Problems of Dostoevsky's Poetics*, trans. Caryl Emerson (U of Minnesota Press, 1993), 6.

¹¹¹ This tendency of characters to evaluate the political ideas of the radical socialist followers of Chernyshevsky exemplifies this trend.

brash flaunting of the laws of nature, original philosophical commentary, and idiosyncratic narrative style. At the end of the novella, however, readers sense his vulnerability, regret, and longing for having yielded to his domineering ideas at the expense of opening his heart to Liza as a prospective friend, partner, and equal.

Other characters, often those playing minor roles in Dostoevsky's works, represent stock types who do not change, but rather represent stereotypical features of societies and civilizations as a whole. Semyon Marmeladov, for example, cannot surprise readers with new traits and ideas. He is a dishonorable drunk, who consistently ruins his family with his drinking addiction, and pitifully subjects his daughter Sonia to the demeaning occupation of prostitution. Likewise, Zverkov and his company at the dinner scene represent the "ordinary" trope of the materialistic bull men. There is nothing noticeably original or dynamic in these types. They represent static and eternal figures within the microcosm of St. Petersburg life.

Liza in *Zapiski iz podpol'ia*, in contrast, undergoes a kind of transformation from one of these stock types to a personality capable of change. At first, she seems to embody the standard trope of the fallen woman in need of saving.¹¹² Ultimately, however, she undergoes a kind of conversion that allows her to escape the mold of the unfortunate prostitute, and become a person with whom the Underground Man can truly connect. This transition elevates her status in the work, allowing her to sympathize with the Underground Man in his hyperconscious frenzy, and even take pity on him despite his insults, repelling behavior, and contradictory sentiments.

By visiting the apartment of the Underground Man, Liza approaches the precipice of becoming a character capable of so much more than her ascribed stock type. That is, she is the only character in the story capable of transforming into a dynamic personality, defined by

¹¹² The Nekrasov epigraph to work contributes to this expectation. Dostoevsky inverts the relationship of the egoistic male saving the downtrodden female prostitute. In re-orienting this device, *he*, not *she*, seems to be in more dire need of rescue from unfavorable sociological and psychological conditions.

compassion, understanding, and a capacity for love. Unlike the Underground Man who has pushed away all of his colleagues and “friends,” Liza has not lost the ability to connect with, and to trust in others. She embodies a complex entity, with invisible and unpredictable thoughts, feelings, and motivations. Her potential to free the Underground Man from his prison of isolated consciousness predicates her status as a *real* character in “the higher sense of the word.”¹¹³ Although Liza and the Underground Man presumably possess the power to save each other, her virtues and prospects for salvation are much greater than those of the egoistic protagonist.

The egocentricity of the Underground Man is all-encompassing. He even goes so far as to assert control over his readers. Thus he states: “Now, of course, I’ve made up all this speech of yours myself....I have invented them myself. It is the only thing I did invent. No wonder it has been committed to memory and conveyed in a literary form.”¹¹⁴ By writing the envisioned dialogue of his readers, addressing them--that is, us-- the Underground Man tries to exert his authorial influence beyond the confines of the text. Audience members become his characters, in whom he encourages the reflection of uncomfortable truths.

The projected relationship to an imagined audience indicates his desire to participate in a dialogue with his own externalized consciousness: “I, however, am writing for myself, and I should like to make it clear once and for all that if I address myself in my writings to a reader, I’m doing it simply as a matter of form, because I find it much easier to write like that. It is only a form, an empty show, for I know that I shall never have any readers.”¹¹⁵ He is obsessed with

¹¹³ Dostoevsky recorded in his notebook in 1880-1881, “I am simply a realist in the highest sense- that is, I depict all the depths of the human soul.” «[Я] лишь реалист в высшем смысле, то есть изображаю все глубины души человеческой» (*PSS* 27:65).

¹¹⁴ «Все эти ваши слова я сам теперь сочинил... Я их сам выдумал, ведь только это и выдумывалось. Не мудрено, что наизусть заучилось и литературную форму приняло....» (*PSS* 5, 122).

¹¹⁵ «Я же пишу для одного себя и раз навсегда объявляю, что если я и пишу, как бы обращаясь к читателям, то единственно только показу, потому что мне легче писать. Тут форма, одна пустая форма, читателей же у меня никогда не будет» (*PSS* 5, 122).

his self-image. However, although the Underground Man maintains his superiority relative to other people, his consciousness requires the presence of others to confirm its greatness.¹¹⁶ By creating and address an imaginary audience for the work, the ostensible dialogue of the Underground Man proves to be a monologue with the responses of different interlocutors provided by one and the same consciousness. Like the 1948 lithograph *Drawing Hands* by M.C. Escher, featuring one hand drawing the other, the Underground Man is both the agent and subject of his own creation.¹¹⁷



Left: M.C. Escher, *Drawing Hands*, 1948.¹¹⁸

Consequently, the paper and ink of the novel are like the flesh and blood of the Underground Man. He exists so long as the words conjured up from the wellspring of consciousness convey the basis of his life. When the words out, when all of his imagined readers have cleared out from the empty auditorium, he ceases to exist. He comes to life still, however,

¹¹⁶ The presentation of the various components comprising an individual relative to the unified whole of personality makes it difficult to assess whether the consciousness of the Underground Man views itself as an independent entity greater than the sum human protagonist. The thoughts of the protagonist, it seems, have wrestled free of the individual character, and strive to serve themselves, more so than they do the life and spirit of the actual thinker in whom they reside.

¹¹⁷ This picture appears aptly on the cover of the 2000 translation of *Notes from Underground* by Michael Katz.

¹¹⁸ Picture from the analysis homepage of the Department of Mathematics at SUNY Buffalo. Public domain reproduction permission granted via Wikimedia Commons. Accessed online at: <https://www.buffalo.edu/content/cas/math/research/analysis/jcr:content/par/image.img.688.auto.q80.jpg/1435093168213.jpg>.

when readers in the “real” world engage his ideas. The wet snow at the end of Part II obfuscates everything. After Liza vanishes from sight, the Underground Man remains forever alone.

When readers confront the protagonist in this pitiful state, they encounter the Underground Man as the holistic absurdity or illogical conclusion that Dostoevsky intended to illustrate at the outset to the novel. The Underground Man functions, accordingly, as the anthropomorphized *reductio ad absurdum* demonstrating the dangers of solipsism. Extreme egoistic consciousness leads to ruin. He exemplifies the cliché proverb, “the mind makes a good servant, but a terrible master.”¹¹⁹ In his failed relentless endeavors to assert control over other characters and even his readers, the Underground Man personifies the notion that the unwavering pursuit of domination results only in inescapable loneliness.

In conclusion, *Notes from Underground* contains manifold connections to mathematics. Dostoevsky uses both explicit and implicit mathematical imagery. These interdisciplinary elements contribute to the formulation of his existential philosophy promoting the unity of *realia* and *irrealia*, clarifies the structure of his argumentative logic via the methods of *regula falsi* and *reductio ad absurdum*, and conveys his rejection of Determinism through the evaluative weighing of rationality and the prerogative of human freedom. The illumination of these mathematical references, concepts, and motifs provides for new understandings of the themes, literary aesthetics, and central research questions presented in his canonical published works.

¹¹⁹ David A. Kessler, *Capture: Unraveling the Mystery of Mental Suffering* (New York: Harper Collins, 2016), 6.

Chapter Three
Null Sets, Pitfalls of Insolvability, and a Refutation of Utilitarian Calculus in
Crime and Punishment

“I did not kill a person, I killed a principle!”¹
 ~Raskolnikov, Part III, Chapter VI

“The greatest good for the greatest number.”²
 ~Jeremy Bentham

As Victor Terras has pointed out, Dostoevsky was a master of montage.³ His 1866 novel *Prestuplenie i nakazanie (Crime and Punishment)* represents a literary collage of elements derived from various aesthetic traditions and styles. Western readers are especially drawn to the work, because they likely recognize it as a relatively early manifestation of crime fiction that gained popularity through the productions of Edgar Allan Poe (1809-1849), Émile Gaboriau (1832-1873), and Sir Arthur Conan Doyle (1859-1930).⁴

Although the plot of *Crime and Punishment* would seem compatible with the generalizable arc of the murder mystery and detective novel, it diverts noticeably from such genres, encompassing a unique synergistic form comprised of various aesthetic tendencies connected with dissimilar artistic movements. Its psychological perspicacity, Dickensian focus on the hardships of the poor and social stratifications of Russian life, as well as its Gothic hues in presentations of both the murder and the urban capital of St. Petersburg, coalesce in the inimitable experience of the story. In its canonical standing as a masterpiece of world literature, its themes, questions, and approaches reflect elements reminiscent of Dostoevsky’s distinctive

¹ In Raskolnikov’s dream in Part III, Chapter VI, the protagonist thinks to himself, “I did not kill a person, I killed a principle!” «Я не человека убил, я принцип убил!» (PSS 6, 211).

² Jeremy Bentham, “Greatest Happiness for the Greatest Number” (1768) in *The Works of Jeremy Bentham*, ed. John Bowring (Edinburgh: 1838), Vol. 10, 54. As cited in J.H. Burns, “Happiness and Utility: Jeremy Bentham’s Equation,” in *Utilitas*, Vol. 17, No. 1 (Cambridge: Cambridge UP, 2005), 46.

³ Victor Terras, *Reading Dostoevsky* (Madison, WI: University of Wisconsin Press, 1998), 51.

⁴ Familiarity contributes to popularity, but Western readers are also drawn to the dynamic style of Dostoevsky.

authorial methods and philosophical outlooks. Polyphonic narrative, the dynamic weighing of interdisciplinary polemics, and the extension of sophisms framed in the context of meticulously constructed philosophical dialogues topically related to the political and ideological struggles of Russia instantiate telling markers of Dostoevsky's art.⁵

In a letter to M.N. Katkov, Editor of *The Russian Messenger* (*Russkii vestnik*) dated 12 September, 1865, Dostoevsky outlined his plans for the prospective story. The correspondence describes, "it is a psychological account of a crime. The action is topical, set in the current year. A young student of petty bourgeois [*meshchanin*] origins, who has been expelled from university, and enduring dire poverty..."⁶ The letter continues, "he succumbs through thoughtlessness and a lack of strong convictions to certain strange 'incomplete' ideas floating in the air, and decides to get out of his misery once and for all."⁷ The story highlights the array of ideological currents bearing down on the consciousness of Rodion Romanovich Raskolnikov.⁸

⁵ A number of literary scholars have likened the methodical process by Dostoevsky to evaluate different themes and philosophical positions to the process presented in Platonic dialogues. M. M. Bakhtin, trans. Caryl Emerson, *Problems of Dostoevsky's Poetics* (U of Minnesota Press, 1993), 279-280; see also Harriet Murav, "Crime and Punishment: Psychology on Trial" in *Bloom's Modern Critical Interpretations: Fyodor Dostoevsky's Crime and Punishment*, ed. Harold Bloom (New York: Chelsea House, 2004), 194; Victor Terras, *Reading Dostoevsky* (Madison, WI: University of Wisconsin Press, 1998), 52.

⁶ «Это- психологический отчет одного преступления. Действие современное в нынешнем году. Молодой человек, исключенный из студентов университета, мещанин по происхождению, и живущий в крайней бедности...» (PSS 28, bk. 2, 136).

⁷ «[П]о легкомыслию, по шатости в понятиях поддавшись некоторым странным "недоконченным" идеям, которые носятся в воздухе, решил разом выйти из скверного своего положения» (PSS 28, bk. 2, 136). The word '*legkomyslie*' appears often in works by Dostoevsky, and was likely one of his favorite lexical items. Although it refers literally, to 'light thinking', and is generally translated as 'foolishness' or 'flippancy,' it imparts a special kind of thinking that follows from a misdirected assumption or train of thought. Despite the morphological root, '*legko*', meaning 'light', '*legkomyslie*' in the context of Dostoevsky's works tends to occur with grave consequences for individuals involved. Ivan Matveich, for instance, is devoured by an Egyptian crocodile as a result his lightmindedness in Dostoevsky's 1865 satire, "The Crocodile."

⁸ The name Raskolnikov contains the Russian root, '*raskol*', meaning 'schism', or fragmentation'. This surname is significant, because while it reflects various fragmentation of his 'split personality,' it also alludes tacitly to key historical and cultural periods unique to the Russian experience. Russians refer to 'The Great Schism' that divided the Christian Church into the Eastern Orthodoxy and Roman Catholicism

Following the tenets of the “ideological novel” identified by Boris Engelhardt, the text functions as both the embodiment and resolution of a primary moral dilemma: what systemic conditions or rationalizations could possibly justify the act of homicide?⁹ The current chapter surveys the “incomplete ideas” that preoccupy the mind of the Raskolnikov, and communicates how the personality of the protagonist serves as the unfinalizable vessel into which Dostoevsky infuses the tenets of competing philosophical systems.¹⁰ As the novel unfolds, author and reader alike gauge the relative legitimacy of opposing arguments based on the ascribed successes and failures of Raskolnikov, who acts on such notions in the physical environs of the story. His character and conduct come to epitomize the ramifications of opposing ideologies.

Through the repeated method of *regula falsi*, or the testing of approximate values, Raskolnikov assesses the validity of different ideas and philosophical frameworks to explain how or why an individual would arrive at the conscious decision to commit murder. While the implied author of the story situates the violent conduct and moral panic of Raskolnikov in terms that undermine the criteria of such prescriptive systems, devised as they were to guide the moral decisions of individuals, readers encounter multiple explanations or rationalizations that would

in 1054 A.D. as *Velikii raskol*. In the story, Raskolnikov thinks like a Western intellectual by weighing the virtues of Utilitarianism, but his spiritual compass directs him internally to the tradition of Eastern mysticism. His patronymic, *Romanovich* is also significant. It reiterates Raskolnikov’s role as the central figure of the story, as the figurative ‘son of the novel,’ *roman*. This patronymic name is also connected tangentially with the patriarchal Romanov dynasty that ruled Russia from 1613-1917. Predrag Cicovacki, *Dostoevsky and the Affirmation of Life* (New Brunswick: Transaction Publishers, 2014), 79; see also Khalil M. Habib, “Between Compassion and Misanthropy: On Moral Reasoning in Fyodor Dostoevsky’s *Crime and Punishment*” in *Dostoevsky’s Political Thought*, ed. Richard Avramenko and Lee Trepanier (Lanham, MD: Lexington Books, 2013), 142.

⁹ B.M. Engel’gardt, “Ideologicheskii roman Dostoevskogo” in *F.M. Dostoevskii. Stat’i I materialy*, sbornik 11, ed. A.S. Dolinina (Moscow: Mysl’, 1924), 71-109;

¹⁰ Raskolnikov is not the only character who functions as the vessel for ideas. Through the tendency that Bakhtin identifies as “the double-voiced word,” or *dvugolosoe slovo*, Dostoevsky superimposes different perspectives in the mind of a single character. Razumikhin, for example, at times functions as an external manifestation for the ideas expressed by Raskolnikov, as well as the Underground Man. The characters in Dostoevsky’s artistic universe seem to function along a spectrum, in which their views are occasionally interchangeable. M. M. Bakhtin, *Problems of Dostoevsky’s Poetics*, trans. Caryl Emerson, 108; M.M. Bakhtin, *Problemy poetiki Dostoevskogo in Sobranie sochinenii v semi tomakh*, Vol.6, 123.

permit, justify, or even require the act of murder. Raskolnikov first internalizes their significance, and then projects their implications into the social experience of external life.¹¹ Dostoevsky, in this regard, meticulously situates the progression of arguments to be evaluated not only by the central characters of the novel, but also by readers, who participate in the associated weighing of different ethical systems and norms.¹² In this sense, readers are exposed to the anxious mental arbitration of Raskolnikov, and are invited, in turn, to consider the strengths and weaknesses of the associated ideological conclusions relative to the crime.

In relating the progression of the crime from its unfortunate inception in thought to its disquieting aftermath in physical existence, the omniscient narrator devotes special attention to the mindset of Raskolnikov. Dostoevsky relates the inner thoughts, impressions, and deliberations of Raskolnikov with such lucidity that readers and critics may have even suspected the author himself of having committed murder as research material for the psychological detail

¹¹ Presumably, murder could be committed in an unconscious state just as easily as it could in a conscious one. The latter, however, entails active calculations on the part of the agent that tend to ignore, subvert, or actively threaten the unique essence of another individual, i.e. the victim. In *Crime and Punishment*, Dostoevsky is most interested in these conscious decisions to commit murder, and the associated ideological systems that promote these motives.

¹² Different drafts of the text that would ultimately become the novel, *Crime and Punishment*, reflect different sequences of ideological weighing. Dostoevsky first conceived of the plot for the text in the medium of a *povest'*, or short story. Joseph Frank remarks that the “the main outlines of Dostoevsky’s conception of *Crime and Punishment* were set early, but it was only as the work developed and expanded under his hands that it took on its multifaceted richness. In the splendid complete edition of Dostoevsky’s writings published by the Academy of Sciences of the former Soviet Union, the editors have reassembled the disorderly confusion that Dostoevsky kept while working on *Crime and Punishment* and printed them in a sequence roughly corresponding to the various stages of composition. Dostoevsky, as we know, was in the habit of casually flipping open his notebooks and writing on the first blank space that presented itself to his pen, and since he also used the same pages to record all sorts of memorabilia, the extraction of this material was by no means a simple task.” Bibliographers have compiled a working draft of the novella as it was originally conceived, as well as the Wiesbaden version, the Petersburg version, and the final plan, which exemplifies the change from “a first-person narrator to the indigenous variety of third-person form.” Initially, Dostoevsky planned to have the story conveyed from a variety of different vantage points. Following the analysis of Gary Rosenshield, the Wiesbaden draft consisted of “a memoir written by Raskolnikov, his confession recorded eight days after the murder, his diary five days after the murder, and then a mixed narrative of memoir and diary. See Joseph Frank, *A Writer in His Time*, 472; see also Gary Rosenshield, “First-Versus Third-Person Narration in *Crime and Punishment*,” in *The Slavic and East European Journal*, No. 17.4 (1973): 399.

of the novel.¹³ Decisions and postures that Raskolnikov undertakes in the culmination of the crime are rendered with unforgettable vividness.

First, Raskolnikov considers the tenets of Utilitarianism, and the associated evaluative criteria of Utilitarian calculus to justify his killing the pawnbroker. Optimization principles are among the most important applications of calculus. During the Enlightenment, English and French thinkers posited that utility, or the total benefit to individuals derived from objects, dynamic arrangements, and even entire social systems, could be maximized to improve the overall efficiency of human subjects in relation to their respective communities. The doctrine of Utilitarianism relies on this kind of calculus as its primary means for optimizing the satisfaction and sustainability derived by individuals from centrally allocated resources, initiatives, and events. In the presiding model, happiness is reduced to an equation in the larger mathematical framework promoting the optimization social welfare.

By conceiving of the pawnbroker Alyona Semyonovna as a personage who willingly exploits others for profit, Raskolnikov reflects on the prospect that her death will contribute to the betterment of society. The associated calculative logic amounts to addition by subtraction. In addition to the focus on the pawnbroker, Raskolnikov surveys the lamentable passivity of his fellow citizens. The figures of Marmeladov, the corrupt police officer, and the gaping public St. Petersburg perpetuate social injustice and material inequality through inaction. They come to

¹³ Gary Saul Morson offers this descriptive suspicion in his course, HUM 395 *Russian Literature and Thought in the 1860s*. See also “Did Dostoevsky himself commit murder?” on *The Literature Network Forum*. July 2006. Accessed online at: < <http://www.online-literature.com/forums/showthread.php?18515-Did-Dostoevsky-himself-commit-murder>>. Aside from suspecting Dostoevsky of murder, the Russian journalist Aleksandr Glebovich Nevzorov advocates the tenuous conjecture that Dostoevsky may have himself been guilty of pedophilia and child abuse, following explicit descriptions of such acts in *Besy*, *Crime and Punishment*, etc. The promotion of these opinions more likely than not reflects the falsity of sensationalist journalism. All the same, the psychological vividness of the prose by Dostoevsky imparts the impression of a crime experienced or committed firsthand. See: A.G. Nevzorov, “Mertvye mal’chiki kak starinnaia dukhovaia ‘skrepa,’” in *Moskovskii komsomolets*, No. 26173, 26 February 2013.

embody self-serving opportunists, who avoid applying themselves to alleviate the hardships of others, let alone those closest to them.

Second, Raskolnikov continues logically to the formulation of his Great Man Theory. In this interpretative framework, atrocities committed in the annals of history are forgiven, provided they are committed by extraordinary individuals. In the 1850s, Russian publishers commissioned biographies of ‘great men’ for mass-market appeal.¹⁴ These great figures, such as Napoleon, Peter the Great, or Mohammed pull the entirety of human society according to their will. These personalities are so significant that they do not need to consider the consequences of their actions experienced by ordinary individuals, who, in contrast, come to represent null sets, or insects forgotten and trampled on in the name of progress. Whereas Liza Knapp situates the panic of never amounting to anything in the context of Newtonian mechanics, vis-à-vis the principle of inertia, or the property of matter by which a body retains its state of rest if not acted upon by an external force, the mathematical representation of the null set extends beyond the laws of physics. The nothingness represented by the null set concerns not only physical bodies and forces, but also different number fields and set theory as we shall see below.

Third, Raskolnikov weighs the prospect of amoralism. Svidrigailov comes to represent a vision of the world in which a person may follow his egoistic desires in a world devoid of a moral compass. The associated lack of an ethical code is connected with a kind of sickness. Those afflicted see ghosts, and commit senseless acts that curtail the well-being of others in the pursuit of perverse, egoistic vanity. Lastly, testing in its own right comprises a justification for murder. Raskolnikov, perhaps, is curious himself to see which of the explanations would allow him to deprive the life of another, and also to find out if he is truly capable of committing a deed that goes against his heart, faith, and conscience.

¹⁴ Ben Hellman, *Fairy Tales and True Stories: The History of Russian Literature for Children and Young People* (Leiden, Netherlands: Koninklijke Brill NV, 2013), 79.

Although his panicked, anxious state would appear to impart the impression that he considers the associated array of ideas all at once, and indeed his immense reason seems perfectly capable of this simultaneity, Raskolnikov encounters the tenets of these variable ideological currents according to a particular sequence. Since Raskolnikov reflects the personified influence of a variety of ideological systems, it is difficult to pinpoint which of the philosophical perspectives actually contributed to the realization of the irreversible act. Perhaps it is more fitting to present the dilemma in comparative terms. That is, which of his various motivations exerted the *most* or the *least* influence on his consciousness and conduct? Alternatively, perhaps the act could be construed in *toto*, implying that the sum dynamics of various ideological justifications prompted Raskolnikov to commit the double homicide.

Despite the deliberate nature of the associated ideological testing presented by Dostoevsky, there is no ultimate rational solution to address the question of why an individual would willingly commit murder. This underlying theme presupposes the insolvability of the sum inscrutable factors prompting individuals to act. The courses of action prescribed by calculating logic and reason should not supersede human morality and responsibility. As individuals weigh the consequences of competing ideological systems, no single rational framework completely explains why individuals choose to realize detrimental ideas in the physical world. Dostoevsky explores the inherent mystery of human foibles. The imperfections and inconsistencies of humanity comprise a mathematical problem for which there is no single, presiding answer.

Recognizing the potential of rationality to improve the quality of calculations developed under the frameworks of the scientific method, Raskolnikov turns to Utilitarianism as a viable system capable of improving social welfare and remedying the material shortcomings of human civilization at large. Utilitarianism is the ideological system devised by Jeremy Bentham (1748-1832) and John Stuart Mill (1806-1873) equating morality with the maximization of utility, and

the minimization of pain.¹⁵ Scientific progressivists (like those who supported the founding of the Crystal Palace) argued that economic problems and the phenomenon of crime stem from the notion that human subjects do not adequately understand their own advantage.

Mill, Bentham, and other practitioners of the same fold applied sociological methods to improve holistic understandings of this advantage, as it applied to individuals and collective societies. Consequently, they devised Utilitarian calculus, a type of mathematical calculation that takes into account numerous variables measured with varying degrees of scientific precision to maximize the utility derived by the greatest number. The collected data and centralized reforms would promote the formation of more efficient organizations and societies. Utilitarianism became the guiding ethical compass of revolutionary political groups in Russia throughout the nineteenth century to resolve material and social inequalities.

Prior to killing the pawnbroker, for example, Raskolnikov considers the altruistic, Utilitarian motives for committing the envisioned murder. While sitting in a miserable little tavern, Raskolnikov overhears a student and officer discussing how the old, miserly pawnbroker's death might actually serve a public good. As a form of addition by subtraction in Utilitarian terms, killing the pawnbroker would actually contribute to a collective social positive. Raskolnikov listens intently as the student proclaims:

[a] hundred thousand good deeds could be done and helped, on that old woman's money which will be buried in a monastery! Hundreds, thousands perhaps, might be set on the right path; dozens of families saved from destitution, from ruin, from vice, from the Lock hospitals- and all with her money. Kill her, take her money and with the help of it devote oneself to the service of humanity and the good of all. What do you think, would not one tiny crime be wiped out by thousands of good deeds? For one life thousands would be saved from corruption and decay. One death, and a hundred lives in exchange- it's simple arithmetic! Besides, what value has the life of that sickly, stupid, ill-natured old woman in the balance of existence! No more than the life of a louse, of a beetle, less in fact

¹⁵ John Troyer, "Introduction" to *The Classical Utilitarians: Bentham and Mill* (Indianapolis: Hackett, 2003), vii.

because the old woman is doing harm. She is wearing out the lives of others; the other day she bit Lizaveta's finger out of spite; it almost had to be amputated!¹⁶

When the time comes to perform the deed, Raskolnikov felt that his design was "not a crime."¹⁷

The Utilitarian framework exculpates his motives and responsibility for the crime.

While the "simple arithmetic" perhaps clarifies the course of action that Raskolnikov intends to take, the detail that the old pawnbroker had allegedly bitten the meek Lizaveta demonstrates the latter's persecution. Reflecting on the altruism of the action, Raskolnikov feels more compelled to act upon the thoughts he endured during his passivity. The Utilitarian arguments convince him to go forward with the deed. In the consideration of *regula falsi* on the part of Dostoevsky, the author infuses into the mind of his protagonist the ideological currents of utilitarianism. As he recalls later in defense of his utilitarian calculus, "I did not kill a person, I killed a principle!"¹⁸ The utilitarian value of the deed thus drives his act of murder, and he presumes her absence from society to bring about positive changes for other individuals in the story, comprising synecdochally St. Petersburg society, and perhaps all of humanity.

His plans go awry, however, when Lizaveta appears at the scene of the crime, despite the intelligence that Raskolnikov collected at Sennaia ploshchad' (The Haymarket) indicating that she would not be home during the time he plotted to commit the deed. As an eyewitness to the

¹⁶ «Сто, тысячу добрых дел и начинаний, которые можно устроить и поправить на старухины деньги, обреченные в монастырь! Сотни, тысячи, может быть, существований, направленных на дорогу; десятки семейств, спасенных от нищеты, от разложения, от гибели, от разврата, от венерических больниц, - и все это на ее деньги. Убей ее и возьми ее деньги, с тем чтобы с их помощью посвятить потом себя на служение всему человечеству и общему делу: как ты думаешь, не загладится ли одно, крошечное преступленье тысячи добрых дел? За одну жизнь - тысячи жизней, спасенных от гниения и разложения. Одна смерть и сто жизней взамен - да ведь тут арифметика! Да и что значит на общих весах жизнь этой чахоточной, глупой и злой старушонки? Не более как жизнь вши, таракана, да и того не стоит, потому что старушонка вредна. Она чужую жизнь заедает: она наемни Лизавете палец со зла укусила; чуть-чуть не отрезали!» (PSS 6, 54). See also F.M. Dostoevsky, *Crime and Punishment*, trans. Constance Garnett (New York: The Modern Library, 1994), 79-80.

¹⁷ «Во всё время исполнения задуманного, единственно по той причине, что задуманное им- "не преступление"» (PSS 6, 59).

¹⁸ In Raskolnikov's dream in Part III, Chapter VI, the protagonist thinks to himself, "I did not kill a person, I killed a principle!" «Я не человека убил, я принцип убил!» (PSS 6, 211).

murder, she complicates his position, and instead of saving her, Raskolnikov murders her, too. The omniscient narrator remarks that she did not scream, and that “her mouth twitched piteously, as one sees babies’ mouths, when they begin to be frightened, stare intently at what frightens them and are on the point of screaming.”¹⁹ Likened to the act of infanticide, the second murder contradicts all of his Utilitarian estimations. He has committed a morbid, almost unspeakable act, and all subsequent explanations fall exceedingly short of justifying his crime.

It is not exactly clear why Raskolnikov decides to kill Lizaveta. Most accounts suggest that he was possessed by the motion of the crime, and could not turn back from he had started. While he ostensibly sets out to save Lizaveta by killing her abusive half-sister, her witnessing the deed jeopardizes the success of his plot. The fact that he uses the blunt end of the axe for the pawnbroker, and the sharp edge of the axe for Lizaveta demonstrates his panic.²⁰ While the sharp edge of the axe presumably brings about a quicker death, it also creates more evidence in the splattering of the blood. The surprise that Lizaveta observed the murder causes Raskolnikov to act in a way that makes it harder for him to leave the scene of the crime unnoticed.

He acts even more irrationally and immorally, and he is “compelled by fear to commit a second, unexpected murder.”²¹ After killing the pawnbroker, Raskolnikov “remembered afterwards that he had been particularly collected and careful, trying all the time not to get smeared with blood.”²² As the horrific scene progresses however, Raskolnikov finds his hands covered with blood after removing the string with the keys from around the pawnbroker’s neck,

¹⁹ «губы ее перекосилились так жалобно, как у очень маленьких детей, когда они начинают чего-нибудь пугаться, пристально смотрят на пугающий их предмет и собираются закричать» (PSS 6, 65).

²⁰ Raskolnikov strikes Lizaveta with the “sharp edge” of the axe, ‘острием’ (PSS 6, 65) whereas he kills the pawnbroker with the “blunt edge,” ‘обухом’ (PSS 6, 63).

²¹ «Страх охватывал его всё больше и больше, особенно после этого второго, совсем неожиданного убийства» (PSS 6, 65).

²² «стараясь не замараться текущею кровию... Он вспомнил потом, что был даже внимателен, осторожен, старался всё не запачкаться...» (PSS 6, 63).

and striking Lizaveta with the sharp edge of the blade. Raskolnikov washes the blood off with a bucket of water in the kitchen. The selection of the axe as a heavy, unwieldy murder weapon expresses the blunt consequence of his misdirected actions and ideas. Murder by a knife or a gun is more precise. The selection of the axe, moreover, is reminiscent of Slavic folkloric tropes derived from the prevalence of deep forests and the reliance on wood as a vital natural resource.

By killing the pawnbroker and Lizaveta, Raskolnikov despotically reduces his victims to finished entities. He deprives them of the basic vitality to change themselves and their surroundings. As Raskolnikov points out in his article, “the vast mass of humankind is mere material, and only exists in order by some great effort, by some mysterious process, by means of some crossing of races and stocks, to bring into the world at last perhaps *one man out of a thousand* with a spark of independence.”²³ The quotation demonstrates mathematical calculation on the part of Raskolnikov that Dostoevsky derides in the broader systemic presentation of *regula falsi*. Such calculations deprive others of their basic human dignity.

In refuting the ideological basis of Utilitarian calculus, Dostoevsky echoes and satirizes the atheistic rhetoric of the radical socialist camp led by Nikolai Chernyshevsky (1828-1869) that came to the forefront of public attention in the 1860s.²⁴ After reading Feuerbach’s *The*

²³ «Огромная масса людей, материал, для того только и существует на свете, чтобы наконец, чрез какое-то усилие, каким-то таинственным до сих пор процессом, посредством какого-нибудь перекрещивания родов и пород, понатужиться и породить наконец на свет, ну хоть из тысячи одного, хотя сколько-нибудь самостоятельного человека» (PSS 6, 202).

²⁴ As a foil for Dostoevsky’s own views, and the ultimate subscriptions of Raskolnikov, Luzhin embraces the rational discourses of the Scientific Revolution. Though the narrative does not disclose his reading and ideological preferences, it seems likely that he would follow the likes of Adam Smith, Jeremy Bentham, Auguste Comte. Though he does not actively endorse the nihilism of Chernyshevsky, Luzhin visits Andrei Semyonovich Lebeziatnikov to gain information on the politics gaining popularity among “younger generations.” His appeal to the radical socialism of Chernyshevsky comes not from a sincere desire to reform society, but rather from the blind ambition to become part of an ideology that dominated daily life: “He, like every one, had heard that there were, especially in Petersburg, progressives of some sort, nihilists and so on...For this reason Pyotr Petrovich intended to go into the subject as soon as he reached Petersburg and, if necessary, to anticipate contingencies by seeking the favor of ‘our younger generation.’ He relied on Andrei Semyonovich for this....” «Слышал он, как и все, что существуют,

Essence of Christianity (*Das Wesen des Christentums*, 1841), Chernyshevsky subscribed to the opinion in the winter of 1850 “that human beings had projected their essence onto God...[and] that God did not exist independently of human imagination.”²⁵ In his 1853 master’s dissertation, “The Aesthetic Relation of Art to Reality” (*Esteticheskie otnosheniia iskusstva k deistvitel’nosti*), Chernyshevsky stressed material imperatives, human beauty, and if the censors had permitted it, the supposition that God represented a “human-like being,” invented out of a necessity to compensate for the world’s imperfections in pursuit of safety and comfort.²⁶

This ideology created a popular movement among the youth in the 1860s, who clashed with the more conservative age demographic that came of age in the 1840s. Ivan Turgenev explores this generational divide in *Fathers and Children* (*Ottsy i deti*, 1862]. The novel by Turgenev participated in a dialogue with Chernyshevsky and Dostoevsky in their subsequent publications, *What is to be done?* (*Chto delat’?*, 1863) and *Notes from Underground* (*Zapiski iz*

особенно в Петербурге, какие-то прогрессисты, нигилисты, обличители и проч., и проч.,.... Вот почему Петр Петрович положил, по приезде в Петербург, немедленно разузнать, в чем дело, и если надо, то на всякий случай забежать вперед и заискать у 'молодых поколений наших.' В этом случае надеялся он на Андрея Семеновича....» (*PSS* 6, 278-279). See also Liza Knapp, “The Resurrection from Inertia in *Crime and Punishment*” in *Modern Critical Interpretations: Fyodor Dostoevsky's Crime and Punishment*, ed. Harold Bloom, (New York: Chelsea House, 2004), 126; Robert Anchor, *The Enlightenment Tradition* (Berkeley: University of California Press, 1967), 9-10.

²⁵ The writings of Aleksandr Hertsen likely also contributed to his atheistic tendencies. Shortly before leaving Russia, Hertsen published articles espousing his indirect doubt in faith, divine Providence, and the immortality of the soul in 1846 and 1847 editions of *The Contemporary* (*Sovremennik*) and *Notes of the Fatherland* (*Otechestvennye zapiski*). Echoing the sentiments of the Scientific Revolution, and the Enlightenment, Hertsen professed that the individual possessed a moral obligation to doubt. See also A.I. Gertsen, “Kaprizy i razdum’e: Novye variatsii na starye temy,” *Sobranie sochinenii v tridsatii tomakh*, vol. 2, (Moscow: Izdatel’stvo Akademii Nauk SSSR, 1954), 89; A.I. Gertsen, “Realizm” in “Pis’ma ob izuchenii prirody,” vol. 3, 298, 303. As cited by Victoria Frede, *Doubt, Atheism, and the Nineteenth-Century Russian Intelligentsia*, (Madison, WI: University of Wisconsin Press, 2011), 126.

²⁶ Victoria Frede, *Doubt, Atheism, and the Nineteenth-Century Russian Intelligentsia*, 127. This tendency also reflects the imperative that Voltaire popularized in the Enlightenment: “If God did not exist, he would have to be invented.” As cited by Perry M. Rogers, *Aspects of Western Civilization: Problems and Sources in History* (New York: Prentice Hall, 2003), 66.

pod'polia, 1864).²⁷ The skepticism that Dostoevsky expressed toward nihilism just a few years earlier carries over into *Crime and Punishment*. As Chernyshevsky and his atheistic followers would affirm, in the absence of God, humanity would be free to make manifest its own destination. With or without egoistic pretense, human individuals in this model would consider the rational insights of materialistic science on a par with divine providence. The rise of Utilitarianism in Western Europe coincided with hierarchical prioritization of material and physical concerns.

While the frameworks of Utilitarianism could theoretically support the equitable distribution of resources among the participating members of a society, the authoritative party imposing the calculations would undoubtedly enact decisions sacrificing some for the preservation of the many. For example, if a municipal government of large city realized that it could provide free electricity to its entire populace by tearing down the houses owned by a minority, it would sacrifice the material well-being of the few, to serve the benefit of the majority. Under such stipulations, “the ends would justify the means,” and the immoral act of depriving people of shelter without recourse would be required under the associated calculus.

In more extreme situations, the eradication of individuals, or even entire demographics could be viewed in a positive light, so long as the fateful decision ensured the survival of the greatest possible number of all the rest.²⁸ The judgment of human subjects is often clouded by

²⁷ Russel Scott Valentino, *Vicissitudes of Genre in the Russian Novel: Turgenev's "Fathers and Sons", Chernyshevsky's "What is to Be Done", Dostoevsky's "Demons", Gorky's "Mother"* (New York: Peter Lang, 2001), 50.

²⁸ Bentham defended this overarching maxim, provided the associated activities met three justifications. “Firstly that the end be good. Secondly, that the means chosen be either purely good, or if evil, having less evil in them than on a balance there is of real good in the end. Third, that they have more of good in them, or less of evil, as the case may be, than any others, by the employment of which the end might have been attained.” The relative ascription of “good” or “evil” to a given activity requires the objective assessment of a centralized party cognizant of as much information as possible to produce accurate calculations in the algorithmic process of Utilitarian calculus. Jeremy Bentham, “Chapter XIII: The End Justifies the Means,” in *The Book of Fallacies from the Unfinished Papers of Jeremy Bentham* (London:

the subjective personalities of individuals. To be carried out effectively, Utilitarian calculus, or the algorithmic process that yields the greatest utility for the greatest number demands the presence of an ostensibly fair and impartial authority figure to decide what should be done, and how best to allocate resources.²⁹ Could those charged with making calculations to maximize social utility truly view themselves as unbiased figureheads, or would the drive for power and the assertion of their individual egos repudiate their rational stewardship of human civilization?

When individuals rebel against Utilitarian principles, they pose a threat to both the majority and the state. The idea of a society built on Utilitarian principles comes to embody a totalitarian state. It achieves optimization principles only by stamping out individual choice and independent personalities. By assuming that his actions conform to Utilitarian principles and taking justice into his own hands, Raskolnikov egoistically assumes the status of artificial authority, empowered to deprive fellow of life and material resources.

Surveying the social landscape of the story in moments when he feels compelled to leave his coffin-like apartment and to interact with others, Raskolnikov is overcome with frustration and disbelief at the passivity of his fellow citizens in confronting their social problems. Sensing the obligation to act to resolve the problems of immobility, indecision, and apathy, Raskolnikov encounters the prerogatives to act. But how should one act? The questions of when and why the

John and H.L. Hunt, 1824), 341.

²⁹ The success of this centralized authority presumes access to as much information possible. Ideally, this central power is omniscient. The relevance and availability of information improves the scope and precision of calculations designating the optimal courses of action to maximize utility for the greatest constituency of society. Charles Fourier was among the first Utilitarian philosophers to propose the utilization of vast logarithmic tables to facilitate the calculation of manifold exponential functions to systematize and optimize the organization and activity of populations in a sociological and economic approach. The Underground Man espouses ironic rhetoric lampooning this premise, and Dostoevsky identifies Fourier as one of the primary philosophers credited with this holistic method, along with his disciple Victor Considerant (1808-1893). Dostoevsky also alludes to Fourier and his followers in *Krokodil (The Crocodile)* and *Zimnie zametki o letnikh vpechatleniakh (Winter Notes on Summer Impressions)*. (PSS 5, 81, 194, 371, 380, 384); see also Charles Fourier, "Organization of the Township" in *A Popular View of the Doctrines of Charles Fourier*, ed. Parke Godwin (New York: J.S. Redfield and Clinton Hall, 1844), 60.

individual resorts to action are relevant to resist the presiding forces of unresponsive inertia. What metrics exist for individuals to model their conduct promoting the overall benefit of themselves and their communities?

At the beginning of the novel, Raskolnikov endures a nightmare revolving around the relentless beating of a mare to death by a crowd, and his controlling father, who ineffectively tells the boy “to look away” [*ne smotri!*] and to “leave the drunkards be” in their “carousal.”³⁰ Whereas his father turns away from the injustice, Raskolnikov looks directly at it, just as he does in the face of other hardships in the urban locale of St. Petersburg.³¹

Though he often changes his mind over decisions to volunteer to help those in need, he intervenes, for instance, when he finds a lecherous old man following an inebriated young woman, who very likely has been raped.³² Although the man does not seem to be Arkadii Ivanovich Svidrigailov, the primary villain of the novel, Raskolnikov calls him out by that

³⁰ ««Пойдем, пойдем!»- говорит отец, - «пьяные, шалят, дураки: пойдем, не смотри!»» (PSS 6, 48).

³¹ Whereas members of Petersburg society emblematic of his absent father ignore or look away from the problems of others, Raskolnikov is capable of devoting himself to helping others. His altruism sharply juxtaposes the ignominious nature of his crime. Characters in works by Dostoevsky are frequently wholly good, or bad. They are all complex personalities enacting a combination of respectable and shameful acts. Before sentencing deliberations, Razumikhin “discovered and proved that while Raskolnikov was at the university he had helped a poor consumptive fellow student and had spent his last penny on supporting him for six months, and when this student died, leaving a decrepit old father whom he had maintained almost from his thirteenth year, Raskolnikov had got the old man into a hospital and paid for his funeral when he died. Raskolnikov’s landlady Zarnitsyna bore witness, too, that when they had lived in another house at Five Corners, Raskolnikov had rescued two little children children from a building on fire and was burnt in doing so”; «Бывший студент Разумихин откопал откуда-то сведения и представил доказательства, что преступник Раскольников, в бытность свою в университете, из послдних средств своих помогал одному своему бедному и чахоточному университетскому товарищу и почти содержал его в продолжение полугода. Когда же тот умер, ходил за оставшимся в живых старым и расслабленным отцом умершего товарища (который содержал и кормил своего отца своими трудами чуть не с тринадцатилетнего возраста), поместил наконец этого старика в больницу, и когда тот тоже умер, похороил его. Все эти сведения имели некоторое благоприятное влияние на решение судьбы Раскольникова. Сама бывшая хозяйка его, мать умершей невесты Раскольникова, вдова Зарницына, засвидетельствовала тоже, что когда они еще жили в другом доме, у Пяти углов, Раскольников во время пожара, ночью, вытащил из одной квартиры, уже загоревшейся, двух маленьких детей, и был при этом обожжен» (PSS 6, 412).

³² While the text does not include explicit mention of rape, details of the scene infer undeniable plausibility of the dreadful act.

name.³³ The narrative never discloses his identity, but the apparent resemblance between the lecher and Svidrigailov foreshadows the apparent iniquity of the latter.

When the old lecher, police officer, and bewildered young woman depart, Raskolnikov soon finds himself alone on a city bench. After giving money to the officer to pay for the transportation of the girl to a safer place, he pessimistically thinks to himself, “And why did I want to interfere? Is it for me to help? Have I any right to help? Let them devour each other alive- what is it to me? How did I dare to give him twenty kopecks? Were they mine?”³⁴ Whereas the citizens of St. Petersburg seem to condone this activity, or ignore the frequent occurrence of such an obvious iniquity, Raskolnikov addresses the matter directly, and suffers material penalties for having involved himself in the affair.

Surrounded by grief in St. Petersburg, Raskolnikov witnesses the “revolting misery,” and heart-breaking poverty of the Imperial capital. He himself is “crushed by poverty.”³⁵ St. Petersburg is marked by a “special, insufferable stench.”³⁶ The “silver rouble” and the “copper kopeck” have enslaved Raskolnikov and everyone around him to live disgracefully and ignobly. Disparaging of the materialistic orientation of society, Dostoevsky vividly conveys the ease with which individuals neglect to make crucial considerations of morality in the act of pursuing financial or substantive gain. This tendency reflects metaphorically the usurping of human compassion by rational calculation. .

³³ ““Hey! You Svidrigailov! What do you want here?” he shouted clenching his fists and laughing, spluttering with rage. ‘What do you mean?’ the gentleman asked sternly, scowling in haughty astonishment.” «-Эй вы, Свидригайлов! Вам чего тут надо? – крикнул он, сжимая кулаки и смеясь своими запенившимися от злобы губами» «-Это что значит?- строго спорсил господин, нахмутив брови и свысока увидившись.» (PSS 6, 40).

³⁴ «И чего я ввязался тут помогать! Ну мне ль помогать? Имею ль я право помогать? Да пусть их переглодают друг друга живьем- мне-то чего?» (PSS 6, 42).

³⁵ Raskolnikov himself is “crushed by poverty.” «Он был задавлен бедностью» (PSS 6, 5).

³⁶ «та особенная летняя вонь...Нестерпимая же вонь» (PSS 6, 6).

Raskolnikov confronts the deplorable ramifications of the passivity and the cruelties of addiction in the character of Semyon Marmeladov. Marmeladov, who proclaims himself “a pig or beast by nature,” steals money from his starving children and consumptive wife to quench his thirst for alcohol.³⁷ By asking Raskolnikov the gut-wrenching question, “[d]o you suppose that a respectable poor girl can earn much by honest work,” Marmeladov insinuates that his own eldest daughter, Sonia has entered into the disgraceful profession of prostitution to support the family and his destructive addiction for drink.³⁸ Assessing his moral prerogative to ease the suffering of Sonia, as well as others in social circumstance and station, Raskolnikov endeavors to act, in the purity of his ideal, to speak a *new* word, to help those in need.³⁹

Departing from the models of Utilitarianism and passivity, Dostoevsky presents the Great-Man Theory as the next logical ideological permutation tested via *regula falsi* to resolve the question of murder. By crafting his analysis of individual ambition in the context of this Great-Man Theory, Dostoevsky directs his ironic criticism expressed in the novel not only at the tastes of the burgeoning general readership in Russia, but also at the personal proclivities and ambitions of N.G. Chernyshevsky and his loyal radical nihilist followers.

In his journalistic notes from 1860-1862, Dostoevsky drafted his impressions of the radical critic Chernyshevsky and his perceived self-aggrandizement. Although the commentary

³⁷ «Ну-с, я пусть свинья... Я звериный образ имею...» (PSS 6, 14).

³⁸ «Много ли может, по-вашему, бедная, но честная девица честным трудом заработать?» (PSS 6, 17).

³⁹ The ability to utter a *new* word embodies a defining feature of the great man. This personage is marked by originality, and the the force of will to sway the course of history without premeditated calculation: “As for my division of people into ordinary and extraordinary, I acknowledge that it’s somewhat arbitrary, but I don’t insist upon exact numbers. I only believe in my leading idea that men are in *general* divided by a law of nature into two categories, inferior (ordinary), that is, so to say, material that serves only to reproduce its kind, and men who have the gift or talent to utter a *new word*.” «Что же касается до моего деления людей на обыкновенных и необыкновенных, то я согласен, что оно несколько произвольно, но ведь я же на точных цифрах и не настаиваю. Я только в главную мысль мою верю. Она именно состоит в том, что люди, по закону природы, разделяются *вообще* на два разряда: на низший (обыкновенных), то есть так сказать, на материал, служащий единственно для зарождения себе подобных, и собственно на людей, то есть имеющих дар или талант сказать в среде своей *новое слово*.» (PSS 6, 200).

did not appear publicly, the vitriolic sentiments shed light on Dostoevsky's regard for Chernyshevsky and his political ideologues: "Mr. Chernyshevsky amuses himself by counting the great men of this world on his fingers: Kant, Hegel, Albertine, and Dudyschkina, and begins to teach them the ways of life Chernyshevsky, you want people not to listen to you, but to obey you."⁴⁰ Upon his return from exile in 1859, Dostoevsky enjoyed amicable relations with Chernyshevsky. Although Dostoevsky may have at first reserved his true feelings toward Chernyshevsky in his private notebooks, he eventually espoused public criticism of his ideological opponent in the article, "Mr. -bov and the Question of Art" ("G-n bov i vopros ob iskusstve"), implicitly referring to the latter's disciple, Nikolai Dobroliubov (1836-1861).⁴¹

Despite hints of tangible hyperbole in Dostoevsky's assessment, Chernyshevsky was indeed fond of summarizing the works of scientific and mathematical thinkers, and synthesizing them into his own philosophical worldview. In *What is to be Done?*, for example, Rakhmetov is

⁴⁰ «Г-н Чернышевский тешился тем, что подзывает к себе пальцем всех великих мира сего: Канта, Гегеля, Альбертини, Дудышкина, и начинает их учить по складам. . . . Чернышевскому- Вы хотите, чтоб вас не слушали, а слушались». (PSS 20, 154). See also K.A. Lantz, *The Dostoevsky Encyclopedia*, 57. [S.S. Dudyskin (1821-1866) was a prominent Russian journalist and literary critic]

⁴¹ Whereas Chernyshevsky upheld a utilitarian approach to art as the primary vehicle of social change, and others still saw art as an end in itself, Dostoevsky defends the transcendental nature of art and beauty. Rebuking the position of Chernyshevsky vis à vis his criticism of the Dobroliubov, Dostoevsky claims: "The important thing is that Mr.- bov is quite satisfied with the absence of artistic qualities so long as the right things are discussed. This last wish is of course praiseworthy, but it would be more agreeable if the right thing had been discussed well, and not just anyhow." «Главное дело, что г-н -бов доволен и без художественности; только чтоб говорили о деле. Последнее желание, конечно, похвальное, но приятнее было бы, если б и о деле говорили хорошо, а не как-нибудь». (PSS 18, 84). Dostoevsky asserts this authorial credo by emphasizing the variable and multisensory sensations of an impression derived from the transcendental experience of an artistic work: "Talent is given to a writer for the sole purpose of creating an impression. One can know a fact, one can see it a hundred times oneself and still fail to get the same impression as when someone else, a man with special gifts, stands besides you and points out that fact to you, explains it to you in his own words and makes you look at it through his

eyes. . . . Even today, *The Iliad* sends a thrill through a man's soul." «На то и талант у писателя, чтоб произвести впечатление. Можно знать факт, видеть его самолично сто раз и все-таки не получить такого впечатления, как если кто-нибудь другой человек особенный, станет подле васи укажет вам тот же самый факт, но только по-своему, объяснит вам его своими словами, заставит вас смотреть на него своим взглядом» (PSS 18, 89); «Ведь и теперь от «Илиады» проходит трепет по душе человека» (PSS 18, 95); Fyodor Dostoevsky, *Dostoevsky's Occasional Writings*, trans. and ed. David Magarshack (Evanston, IL: Northwestern University Press, 1964), 107, 118, 127.

presented reading Newton. As the discovery of calculus ushered forth a revolution in natural science, so too, would the revolution envisioned by the radical socialists of Chernyshevsky deliver a revolution in the social organization and economic direction of all civilization.⁴²

His correspondence with friends, family, and political followers likewise entailed references to “great men”, but especially those from the fields of mathematics and the sciences, whose findings contributed to material improvements and humanistic progress. In a letter to his sons dated 8 March 1878, Chernyshevsky stresses the importance of such men, reminding his children, “If we didn’t have Archimedes, Hipparchus, and Copernicus, etc., up to Laplace, then we would remain half-wild nomads. And only that.”⁴³ The same letter stresses the gravity of mathematical contributions made by Newton and Lobachevsky.⁴⁴ In their enduring polemics, both Chernyshevsky and Dostoevsky turned to the auspices of mathematics, sciences, and metaphysics to dispute their diverging points of view.

In his diary entries, Chernyshevsky affirmed his prophetic calling to do something extraordinary, and believed he possessed the potential to become a “remarkable man”.⁴⁵ Chernyshevsky fostered a cult of personality around himself in a manner perhaps reminiscent of the institution of Elders in Russian Orthodoxy, a sociological phenomenon that Dostoevsky would subsequently depict with great curiosity in *The Brothers Karamazov*. After the first

⁴² Irina Paperno, *Chernyshevsky and the Age of Realism: A Study in the Semiotics of Behavior* (Stanford: Stanford UP, 1988), 207.

⁴³ «Мы не имели б Архимеда, Гиппарха, Коперника и т.д. до Лапласа,--мы оставались бы полудикими номадами. Только». N.G. Chernyshevskii, “Pis’mo synov’iam A.N. i M.N. Chernyshevskim” 8 March 1878 in *Polnoe sobranie sochinenii v piatnadsatii tomakh*, vol 15 (Moscow: Khudozhestvennaia literature, 1950), 197.

⁴⁴ Throughout the 19th century, Chernyshevsky and his followers preferred the discourses of mathematics and sciences out of the pragmatic assumption that such fields possessed the best prospects for tangibly improving the status of life for Russia’s impoverished masses. Although Dostoevsky received his education in engineering and mathematics, it seems fitting that he returned to these arenas to espouse effective criticism of Chernyshevsky and his opinions in the same polemical arenas that the latter used to win over the great magnitudes of his supporters.

⁴⁵ Victoria Frede, *Doubt, Atheism, and the Nineteenth-Century Russian Intelligentsia*, 127.

installment of *What Is To Be Done?* (*Chto delat'?*) appeared in *The Contemporary* (*Sovremennik*) as a popular literary sensation, the radical socialist revolutionary, Nikolai Ishutin proclaimed that he “knew only of three great men in history: Jesus Christ, St. Paul, and Chernyshevsky.”⁴⁶ While Chernyshevsky, indeed, imparted a lasting legacy on Russia and the development of the world throughout the twentieth century, the ideological basis of his fame likely contributed to widespread violence and social upheaval.⁴⁷

Chernyshevsky and Dostoevsky met on several occasions, and both recorded accounts of their shared encounters. Whereas Dostoevsky recalled their friendly, but perhaps cold relationship focusing on their discussion revolving the dissemination of pamphlets calling for a “bloody and pitiless revolution,” Chernyshevsky recounted that the former arrived at his apartment “with nerves impaired to the state of disorder, near a mental condition, but I did not suppose that his illness had reached such [extreme] development.”⁴⁸ Although Dostoevsky was indeed subject to a feverish temperament at times, Chernyshevsky may have used the grounds of the former’s epilepsy to discredit his oppositional arguments, and to avoid debating the political questions at hand in a serious fashion.

⁴⁶ «Н. Ишутин заявлял, что он знает лишь трех великих людей: Иисуса Христа, апостола Павла и Николая Чернышевского». As cited by Iu. M. Steklov. *N.G. Chernyshevskii: Ego zhizn' i deiatel'nost', 1829-1889*, vol. II (Moscow-Leningrad, 1928), 216; see also Mark Lawrence Schrad, *Vodka Politics: Alcohol, Autocracy, and the Secret History of the Russian State*, (New York: Oxford University Press, 2014), 131.

⁴⁷ Chernyshevsky’s writings arguably served as foundational materials for the impending Socialist Revolution that swept Russia in the early twentieth century. Karl Marx and Lenin both admired *What is to be Done?*. They fashioned his arguments into the political agendas of the *Communist Manifesto* and *The Development of Capitalism in Russia*, respectively. In Russia, there are metro stations, universities, and streets named in his honor as remnants of the fallen Soviet Union. According to Joseph Frank, Chernyshevsky’s novel, *What is to be Done?*, far more than Marx’s *Capital*, supplied the emotional dynamic that eventually went to make the Russian Revolution. J. Frank, “N.G. Chernyshevsky: A Russian Utopian,” *Southern Review*, 3 (1967), 68. As cited by Michael R. Katz and William G. Wagner, “Introduction: Chernyshevsky, What Is To be Done and the Russian Intelligentsia”, in *What is to Be Done* by N.G. Chernyshevsky, trans. Michael R. Katz (Ithaca, NY: Cornell UP, 1989), 1.

⁴⁸ «Достоевский имеет нервы расстроенные до беспорядочности, близко к умственному расстройству но не полагал, что его болезнь достигла такого развития...». N.G. Chernyshevskii, in *F.M. Dostoevskii v vospominaniakh sovremennikov*, ed. M. Tiun'kina, Vol. 2 (Moscow: Khudozhestvennaia literatura, 1990), 5.

In *Crime and Punishment*, Raskolnikov serves to personify the grandiloquent ambitions of Chernyshevsky. Dostoevsky perhaps ironically situates this discourse in the context of the novel to demonstrate the fallibility of human subjects desiring for themselves pedestals to stand on in the annals of history. Vocalized in his editorial, entitled “On Crime” (“O prestuplenii”), published in the fictional journal *Periodical Review* (*Periodicheskaia rech'*), Raskolnikov contemplates that within society, “all men are divided into ‘ordinary’ and ‘extraordinary’ camps.”⁴⁹ These extraordinary types possess such awe-inspiring vision and agency, that they are effectively above the law, and “possess the perfect right to commit breaches of morality and crimes, properly because they are extraordinary.”⁵⁰ Their contributions to humanity are of such magnitude, that it matters not if others perish in the fulfillment of their momentous campaigns.

By developing the ideological premise of the Great-Man Theory, Raskolnikov cites “extraordinary” figures from history when he refers to renowned individuals such as “Kepler, Newton, Lycurgus, Solon, Mahomet, and Napoleon.”⁵¹ Radically arguing on behalf of perceived delusions of grandeur in his article, Raskolnikov declares that the great contributions made by these “extraordinary” individuals would have clearly justified any action or thought, “without asking questions,” as he would later explain it to Sonia.⁵² Porfirii Petrovich assumes correctly that Raskolnikov had written the article, estimating that its author likely considered himself to embody one of these great men beyond all reproach. This interrogation, however, does not take

⁴⁹ «Все люди как-то разделяются на «обыкновенных» и «необыкновенных» (PSS 6, 199). The narrative imparts satirical commentary in noting that Raskolnikov had intended for the article to come out in the *Weekly Review*, and not the *Periodical Review*, and all the same had not received payment for his submission.

⁵⁰ «А необыкновенные имеют право делать всякие преступления и всячески преступать закон, собственно потому, что они необыкновенные» (PSS 6, 199).

⁵¹ It is interesting that Raskolnikov refers to these ‘great’ individuals in the oblique case of the instrumental plural. The grammatical tendency reflects their repeated typology, as opposed to their individual, unique characteristics. «ну, например, хоть законодатели и установители человечества, начиная с древнейших, продолжая Ликургами, Солонками, Магометами, Наполеонами и так далее, все до единого были преступники, уже тем одним, что давая новый закон» (PSS 6, 199-200).

⁵² «кто прямо без вопросов идет...» (PSS 6, 321).

place until after the murder of the pawnbroker. Already wracked by his guilt stemming from other psychological features of his character, Raskolnikov seems confident in replying that he almost certainly does not fall into this category of such great men, but his writing the article implies an apparent inconsistency to both Porfirii Petrovich and Aleksandr Zametov.

Although Dostoevsky satirizes secular justice in the novel, both the omniscient narrator and Raskolnikov respect Porfirii's immense talent for piecing together the various fragments of the crime, and reconstructing the behavior of the primary suspect. The name 'Porfirii' denotes the color purple, and alludes implicitly to the color of the togas worn by Roman judges. His name and investigative tenacity comprise tacit connections the logic and deductive heuristics that developed in the natural philosophy of classical antiquity. Unlike his colleague Zametov, whose name suggests directness from the Russian root *-met* meaning 'aim, mark, label,' Porfirii engages the detail of the crime in a circuitous, exploratory manner.⁵³ Although he is a detective, he approaches the crime like a riddle, puzzle, or mathematical problem that can only be solved through indirect reasoning, probing questions, and astute observation. Were it not for Raskolnikov's confession, perhaps Porfirii would have eventually determined the validity of his initial suspicions.

Despite his replies to Porfirii Petrovich and Zametov, the figure of Raskolnikov is marked for his presumed 'otherness' [*inoi*] relative to the rest of the cast.⁵⁴ As a result of

⁵³ The name Zametov arguably comes from the perfective verb, *zametit'*, meaning to 'catch sight of, notice, observe, or mark.' Whereas Zametov possesses a talent for addressing evidence and suspects directly, Porfirii recreates facts in a circuitous, indirect fashion, which seemingly proves more effective for solving crimes.

⁵⁴ Porfirii senses this proclivity expressed tacitly in the article. He surmises prodigally, "What if some *other* kind of man or youth imagines that he is a Lycurgus or Mahomet – a future one of course- and suppose he begins to remove all obstacles...He has some great enterprise before him and needs money for it...and tries to get it. What do you think?" «Ну как *иной* какой-нибудь муж, али юноша, вообразит, что он Ликург али Магомет – будущий разумеется, - да и давай устранять к тому все препятствия...Предстоит, дескать, далекий поход, а в поход деньги нужны...ну и начет добывать себе для похода...знаете?» (*PSS* 6, 203).

separating the ranks of humanity, the ‘ordinary’ impoverished citizens, who inhabit the city of St. Petersburg become muted, louse-like [*vosh*’], ineffectual physical matter.⁵⁵ The use of the adjective ‘*inoi*’ in the inner monologue of the protagonist, likewise, asserts his egoistic prominence and unites Raskolnikov with other great men.⁵⁶ Other defining features, include his “tall, round Zimmerman hat,” indicate his unique perspective.⁵⁷ Raskolnikov is clearly marked in the context of the novel, and features of both his personality and appearance support his willingness and daring to take a *new* step, albeit a misguided one.

Whereas extraordinary men, according to Raskolnikov, act without giving a momentary pause to consider those affected by their positions of authority, ordinary men withstand the worst of such decisions. They come to embody non-entities of a peculiar sort, whose lasting legacy tends to vanish after a generation or two. Gogol was among the first Russian authors to encapsulate this motif in *The Government Inspector (Revizor)*, 1836). When the protagonist of the play bids farewell to the residents of town N., he hears the request of a minor character in the town, Bobchinsky: “When you return to St. Petersburg, I beg you just to say to all those high and

⁵⁵ The students in the tavern preaching the Utilitarian defense of murder of the pawnbroker describe that she has no bearing on the balance of existence than “a louse or a beetle” [He более как жизнь вши, таракана (*PSS* 6, 54).] When Raskolnikov considers himself as a louse in the novel, he senses that he does not embody a great man. In his feverish state, he asserts in thought, “‘Ech, I am an aesthetic louse and nothing more,’ he added suddenly laughing like a madman, ‘Yes, I am certainly a louse,’ he went on clutching at the idea gloating over it and playing with it with vindictive pleasure.” The appearance of the louse metaphor creates an intertextual synergy that aligns his personality with those of the Underground Man, who expresses the wish “to become an insect,” and Dmitrii Karamazov, who senses in himself “sensual insect lust.” For *Crime and Punishment*, see the passage «Эх, эстетическая я вошь, и больше ничего, - прибавил он вдруг рассмеявшись, как помешанный. – Да, я действительно вошь, - продолжал он с злорадством прицепившись к мысли, роясь в ней, играя и потешаясь ею» (*PSS* 6, 211); for *Notes and Underground* «я много раз хотел сделаться насекомым» (*PSS* 5, 101); similarly, Dmitrii Karamazov cites Schiller’s 1785 poem, “An die Freude” [“Ode to Joy”] as the source of this idea: «Насекомым – сладострастье!» (*PSS* 14, 99). This fixation with insects arguably influenced Franz Kafka’s *Die Verwandlung* [*The Metamorphosis*].

⁵⁶ After reading the letter from his mother, Raskolnikov surmises in solipsistic vanity: “It is clear that Rodion Romanovich Raskolnikov stands at the forefront in the central plan, and *no one else*.” «Ясно, что тут не кто иной как Родион Романович Раскольников в ходу и на первом плане стоит» (*PSS* 6, 38). The use of the third-person in the phrasing of this sentiment purposefully blurs the distinction between the inner monologue of the protagonist, his physical being, and the omniscient narrator.

⁵⁷ «Шляпа эта была высокая, круглая, циммермановская» (*PSS* 6, 7).

mighty people, those senators and admirals, say to them: Your Highness, or Your Excellency, ‘In such-and-such a town there lives a man called Pyotr Ivanovich Bobchinsky.’”⁵⁸ This request humble reflects the most pitiful desire to be known and remembered. As a consequence of the Great Man Theory, these ordinary people function as non-entities, or null sets.

One of the words for “number” in Russian, *tsifra*, reflects Arabic etymology, and is closely related to the Arabic word for zero, *sifir*. It is closely related to the English word, *cipher*, referring to zero. In *Crime and Punishment*, the only appearance of the word *tsifra* occurs in Raskolnikov’s imprecise explication of the Great-Man Theory, and how he could not provide “exact numbers” corresponding to the sets of ordinary and extraordinary individuals.⁵⁹ The Null Set features as a prominent theme in many works by Dostoevsky. Aside from Raskolnikov, other characters in works by Dostoevsky, including the Underground Man and the Ridiculous Man, express trepidation over their utter ineffectiveness. They are concerned with the impression they impart on others, and endure the feeling that they are largely ignored. They experience immense agitation over the supposition that their lives comprise the most insignificant non-entities.

For the Great Man theorists, an ordinary person has no value. From the perspective of Utilitarian materialism, ordinary people represent however much economic benefit they can produce for the state. For Dostoevsky, the ordinary individual possesses intrinsic worth and can

⁵⁸ «Я прошу вас покорнейше, как поедете в Петербург, скажите всем там вельможам разным: сенаторам и адмиралам, что вот, ваше сиятельство, или превосходительство, живет в таком-то городе Петр Иванович Бобчинский»; N.V. Gogol’, *Revizor*, (St. Petersburg: Azbuka-klassika, 2008), 70.

⁵⁹ “As for my division of people into ordinary and extraordinary, I acknowledge that it’s somewhat arbitrary, but I don’t insist upon exact numbers. I only believe in my leading idea that men are in *general* divided by a law of nature into two categories, inferior (ordinary), that is, so to say, material that serves only to reproduce its kind, and men who have the gift or talent to utter a *new word*.” «Что же касается до моего деления людей на обыкновенных и необыкновенных, то я согласен, что оно несколько произвольно, но ведь я же на точных цифрах и не настаиваю. Я только в главную мысль мою верю. Она именно состоит в том, что люди, по закону природы, разделяются *вообще* на два разряда: на низший (обыкновенных), то есть так сказать, на материал, служащий единственно для зарождения себе подобных, и собственно на людей, то есть имеющих дар или талант сказать в среде своей *новое слово*.» (*PSS* 6, 200).

make contribution to fellow human subjects. To a layperson, the concepts of zero and the null set indicated by $\{\}$ or \emptyset imply nothingness or insignificance. To a mathematician, however, it may suggest something of substance. It holds a place, gives values to other numbers, e.g. 10, 100, 1000, and serves as the underlying basis for all relative measurements.

Additionally, it should be pointed out that in mathematics, \emptyset or the null set is tacitly present in every set. Since there are no elements of \emptyset , the null set has no elements that are not also in any other set, therefore all of its elements are all (vacuously) in every set. In other words, the null set is tacitly present in any and every set, including itself. Axiomatically, it follows that \emptyset is a subset of every set. It is omnipresent. Metaphorically, perhaps this relationship alludes to universal inclusion of the largely unrecognized or even imperceptible contributions that ordinary men make in the campaigns of Great Men.

Set theory in mathematics was a topic of great speculation and debate during Dostoevsky's lifetime. Evariste Galois (1811-1832) produced the first modern approach to field theory, which only received critical attention following the posthumous publication of his paper in the 1866 textbook by Joseph Alfred Serret, *Cours d'algebre superieure*.⁶⁰ Other prominent mathematicians from roughly the same period, including Viete, Cauchy, Euler, and Gauss also produced compelling treatises on the subject of sets. Dostoevsky may have encountered the introductory frameworks of set theory at the Main Engineering School.

Physics and mathematics approach the concept of nothingness from different disciplinary perspectives. In physics, inertia occurs when there is no change or movement. Its definitive feature is stasis. In set theory, however, nothingness is defined by a given domain, range, or

⁶⁰ John Fauvel and Jeremy Gray, eds., *The History of Mathematics: A Reader* (London: Palgrave Macmillan, 1996), 507.

arbitrary group having no elements.⁶¹ Its definitive feature is absence. The potential exists for *nothingness* to become *somethingness* in both physics and mathematical set theory. An object at rest is acted upon by an external force, and motion resumes. Similarly, sets are said to be either closed or open. An open set can always gain new elements. If you extend the parameters of a given set, or redefine the associated metrics of calculation, then the null set invariably possesses the potential to gain elements of the same corresponding cardinality. Life is a unique set, comprised of complex elements, both real and imaginary, but it is one that remains open for the foreseeable future. Barring some apocalyptic event, life is always changing, moving, and evolving. As humans and other living beings die, they also multiply, and spread life anew.

As the final exposition of *regula falsi* by Dostoevsky to evaluate the ideologies that would justify murder, Raskolnikov considers amoralism. Of the moral codes that Raskolnikov considers, the concern for amoralism functions as the perspective to which both readers and characters in the novel most readily object. Defined as an interpersonal codex marked by an absence of moral standards, all modes of behavior are permitted. The associated principles of amoralism function in a markedly different manner than immoralism, that is a tendency toward activities that go against an established moral code. An amoralist, however, believes that no such code exists, and benevolent deeds in no way translate to redemption.

In the context of *Crime and Punishment*, the character of Arkadii Ivanovich Svidrigailov embodies the tenets of amoralism, the kinds of psychology and outlook that emanates from the absence of virtue. Unlike Raskolnikov, Svidrigailov commits crimes not for some grandiose theory or principle, but rather for the fulfillment of his egoistic vanity and perverse pleasure in corruption. The suicide of Svidrigailov embodies a kind of “spiritual bankruptcy,” that

⁶¹ Although the number 0 does not ordinarily reflect the presence of something, it can indeed reflect an element in a set from the perspectives of set and number theory. The absence of all elements would be construed as the null set, $\{\emptyset\}$. Anne Rooney, *The History of Mathematics* (New York: Rosen Publishing, 2013), 188.

juxtaposes the rejuvenation of Raskolnikov provided by the model of patient, forgiving Sonia.⁶² The two murderers in the story, Raskolnikov and Svidrigailov, perceive the world through the skewed lenses of their crimes.

Despite the fact that Raskolnikov commits a double homicide early in the novel, for most readers Svidrigailov assumes the role of the primary villain. The mere mention of his name seems to inspire something wicked and unclean. While Raskolnikov considers his life as a “louse” in the human ecosystem of St. Petersburg, Svidrigailov assumes the role of the spider. Spiders are arachnids, and though many people group them with insects, they comprise a different class of the biological phylum, Arthropoda. Arachnids, consequently, embody a group of organisms that are insect-like in nature, but that prey predominantly on actual insects.

Upon hearing Raskolnikov describe the categorization of humanity into louses and spiders, Sonia rejects the prospect of reducing human beings to the level of bugs. In describing one his underlying research questions for carrying out the heinous deed, Raskolnikov explains dejectedly, “And you don’t suppose that I went into it headlong like a fool? I went into it like an intelligent man, and that was just my destruction.”⁶³ The use of the phrase, “intelligent man” [*umnik*], which Garnett translates as “wise man” reiterates the skeptical stance of Dostoevsky towards systems of thought in the exclusion of feeling and spirituality. Raskolnikov continues, “And you mustn’t suppose that I didn’t know, for instance, that if I began to question myself whether I had the right to gain power- I certainly did not have the right- or that if I asked myself whether a human being is a louse it proved that it wasn’t so for me, though it might be for a man

⁶² A.D. Nuttall, “The Intellectual Problem II” in *Bloom’s Modern Critical Interpretations: Fyodor Dostoevsky’s Crime and Punishment*, Ed. Harold Bloom, (New York: Chelsea House, 2004), 10.

⁶³ «И неужели ты думаешь, что я как дурак пошел, очертя голову? Я пошел как умник, и это-то меня и сгубило!» (*PSS* 6, 321).

who would go straight for his goal without asking questions.”⁶⁴ The kind of person who “goes straight for his goal without asking questions” reflects the Great Men of history on one hand, but on the other, it also expresses an aspect of the personality of Svidrigailov, who ignores, or suppresses the question of morality in fashioning his conduct.⁶⁵

Svidrigailov imparts his hellish vision of a “just eternity” to Raskolnikov as retribution for their crimes against fellow humans. He frightens Raskolnikov, who still clings to the notion of Christian mercy, as well as potential for resurrection and redemption that he experiences through the model represented by forgiving, selfless, Sonia. Svidrigailov wonders aloud, “We always imagine eternity as something beyond our conception, something vast, vast! But why must it be vast? Instead of all that, what if it is one little room, like a bathhouse in the country, black and grimy and spiders in every corner, and that’s all eternity is! I sometimes fancy it like that.”⁶⁶ Raskolnikov appropriates the imagery of Svidrigailov in admitting his beastly deed.

At the outset to his confession, Raskolnikov asserts, that he “sat in [his] room like a spider. You’ve been in my den, you’ve seen it... And do you know, Sonia, that low ceilings and tiny rooms cramp the soul and the mind?”⁶⁷ This imagery becomes intensified as his commentary progresses, developing the binary model between the benevolence of Sonia and the iniquity of Svidrigailov: “I did the murder for myself, for myself alone, and whether I became a benefactor

⁶⁴ «И неужель ты думаешь, что я не знал, например, хоть того, что если уж начал я себя спрашивать и допрашивать: имею ль я право власть иметь? – то, стало быть, не имею права власть иметь. Или что если задаю вопрос: вошь ли человек? – то стало быть, уж не вошь человек для того, кому этого и в голову не заходит и кто прямо без вопросов идет...» (*PSS* 6, 321).

⁶⁵ His crimes and mistreatment in the story serve his vanity. He acts without giving proper credence to the question of morality and virtue. He derives perverse pleasure from oppressing others in the fulfillment of his own egoistic drives, desires, and motivations.

⁶⁶ «Нам вот всё представляется вечность как идея, которую понять нельзя, что-то огромное, огромное! Да почему же непременно огромное? И вдруг, вместо всего этого представьте себе будет там одна комнатка, эдак вроде деревенской бани, закоптелая, а по всем углам пауки, и вот и вся вечность. Мне знаете в этом роде иногда мерещится» (*PSS* 6, 221). The image of the bathhouse ascribes an imagerial parallel between Svidrigailov and Smerdiakov, just as the spider establishes a connection to Stavrogin.

⁶⁷ «Я тогда, как паук к себе в угол забился. Ты ведь была в моей конуре, видела... А знаешь ли, Соня что низкие потолки и тесные комнаты душу и ум теснят!» (*PSS* 6, 320).

to others, or spent my life like a spider catching all people in my web and sucking the life out of them, I couldn't have cared at that moment... And it was not the money I wanted, Sonia, when I did it... It was something else.”⁶⁸ Maintaining the freedom and dignity afforded to human beings in Christianity, Sonia objects to the premise of Raskolnikov's examination of human nature in relation to power, exclaiming “Human being- a louse!”⁶⁹ She senses the absurdity of the comparative imagery, while upholding the notion that no human possesses the right to kill.

Although not expressed directly, Sonia also emphasizes the opinion that no human has the right to judge. She hears Raskolnikov's confession, and instead of condemning him, she takes pity on him, and advises him urgently to “Arise! (She grabbed him by the shoulder, he got up, looking at her almost bewildered.) Go at once, this very minute, stand at the cross-roads, bow down, first kiss the earth which you have defiled, and then bow down to all the world and say to all men aloud, “I am a murderer!” Then God will send you life again. Will you go?” When Raskolnikov refuses at first, she questions, “But how will you go on living? What will you live for?”⁷⁰ Life without communion with others, and without belief in a just, merciful God does not end the material existence of the individual, but it does equate to spiritual emptiness and the extended psychological torment of consciousness.

Whereas Raskolnikov confesses and repents for his spiritual salvation, Svidrigailov does not care if he lives or dies. He construes that his actions, however iniquitous, as fitting within the overall milieu of living to satiate material appetites and partaking in depravity. Although

⁶⁸ «Я просто убил; для себя убил, для себя одного: а там стал ли бы я чьим-нибудь благодетелем или всю жизнь, как паук, ловил бы всех в паутину и из всех живые соки высасывал, мне, в ту минуту, всё равно должно было быть!... И не деньги, главное, нужны мне были, Сон, когда я убил; не столько деньги нужны были, как другое...»

⁶⁹ «Это человек-то вошь!» (PSS 6, 320).

«Встань! (Она схватила его за плечо; он приподнялся, смотря на нее почти в изумлении.) Поди сейчас, сию же минуту, стань на перекрестке, поклонись, поцелуй сначала землю, которую ты оскверник, а потом поклонись всему свету, на все четыре стороны, и скажи всем, вслух: «Я убил!» Тогда бог опять тебе жизни пошлет. Пойдешь? Пойдешь?» «А жить-то, жить-то как будешь? Жить-то с чем будешь?» (PSS 6, 323).

Svidrigailov does not definitively know of Raskolnikov's crime during their first meeting, he recognizes a strange bond between them. He teases Raskolnikov and their shared "natural propensity to vulgarity."⁷¹ Counter to the altruistic motives of Raskolnikov, however, Svidrigailov uses people as a means to fulfill his perverse appetites. Their suffering, furthermore, seems not to affect him adversely. It perhaps even brings him pleasure and excitement.

Prior to reaching St. Petersburg, Svidrigailov lived in the provinces with his wife. The couple hired Dunia to serve as their family governess. Dunia promptly left the family estate, after Svidrigailov impressed his authority upon her by requesting that she elope with him. Reporting the news that his wife "had passed," Svidrigailov follows Dunia to the capital with the ostensible intention of convincing Dunia to commence their affair in earnest. An unscrupulous, impulsive, manipulative brute, Svidrigailov denies his involvement in the death of this wife, but Raskolnikov, nevertheless, suspects the truth of rumors of the former's involvement in various murders and crimes. Raskolnikov seems almost certain of these elements in light of the communion they share with having both seen ghosts, and the psychological signs they recognize in each other as having both committed murder.⁷²

The vision of ghosts is attributed in the novel to a kind of sickness. Murder creates such an abrupt tear in the experiential fabric of human existence that it tends to remain etched in the minds of those who deign to break spiritual covenants with God and fellow man. After cutting short the finite physical form of a person, Svidrigailov and Raskolnikov still perceive the

⁷¹ «а потому отчего же и не побывать пошляком, когда это платье в нашем климате так удобно носить и...и особенно если к тому и натуральную склонность имеешь» (*PSS* 6, 277).

⁷² Both Raskolnikov and Svidrigailov exhibit the signs of an apparent malady "They say, 'You are ill, so what appears to you is only unreal fantasy.' But that's not strictly logical. I agree that ghosts only appear to the sick, but that only proves that they are unable to appear except to the sick, not that they don't exist." «Они говорят: 'Ты болен, стало быть, то, что тебе представляется, есть один только несуществующий бред.' А ведь тут нет строгой логики. Я согласен, что привидения являются только больным; но ведь это только доказывает, что приведения могут являться не иначе как больным, а не то, что их нет, самих по себе» (*PSS* 6, 220-221).

continuation of the deceased persons. They possess insight into ontological realms and forces that are presumably invisible to those who have not taken the life of another. Svidrigailov elaborates on this unnerving extra-sensory vision, which defies rational explanation, but coincides with their mystic or psychic awareness of reality on a spiritual or bodily level:

‘Ghosts are as it were shreds and fragments of other worlds, the beginning of them. A man in health has, of course, no reason to see them, because is above all a man of this earth and is bound for the sake of completeness and order to live only in this life. But as soon as one is ill, as soon as the normal earthly order of the organism is broken, one begins to realize the possibility of another world; and the more seriously ill one is, the closer becomes one’s contact with that other world, so that as soon as the man dies he steps straight into that world.’ I thought of that long ago. If you believe in a future life, you could believe in that, too.⁷³

Although Svidrigailov and Raskolnikov encounter ghosts in imaginative consciousness, they nevertheless sense the power of these apparitions to influence the progression of real events.

While ghosts are ostensibly invisible to ordinary people, they appear to the charged perception of murderers, who observe the ethereal continuation of ideas embodied by their victims even after their physical deaths. In works by Dostoevsky, ghosts exist in the same way imaginary numbers do in the broader ontological model of the *complex plane*. They operate hidden in plain sight, but nevertheless participate in the story that unfolds not exclusively in real terms.

While Raskolnikov has, indeed, committed a mortal sin, he embodies a character and personage superior to that of Svidrigailov. Raskolnikov confesses and repents. Svidrigailov continues to harass Dunia, who feels threatened to the extreme of pointing a gun at him. Uttering his final words to Raskolnikov, and to his beloved Dunia, Svidrigailov commits suicide with the

⁷³ «-Приведения- это, так сказать, клочки и отрывки других миров, их начало. Здоровому человеку, разумеется, их незачем видеть, потому что здоровый человек есть наиболее земной человек, а стало быть, должен жить одною здешнею жизнью, для полноты и для порядка. Ну а чуть заболел, чуть нарушился нормальный земной порядок в организме, точас и начинает сказываться возможность другого мира, а чем больше боле, тем и соприкосновений с другим миром больше, так что когда умрет совсем человек, то прямо и перейдет в другой мир- я об этом давно рассуждал. Если в будущую жизнь верите, то и этому рассуждению можно поверить» (PSS 6, 221).

parting directive to tell those who ask about him, that has left for America.⁷⁴ The suicide of Svidrigailov embodies a kind of “spiritual bankruptcy,” that juxtaposes the rejuvenation of Raskolnikov provided by the model of patient, forgiving Sonia.⁷⁵ As an amoralist, Svidrigailov brings about his own death, likely with no hope or promotion of the spiritual afterlife.

Murder, in these terms, is not a symptom of sickness, but the cause of an illness itself. Both Svidrigailov and Raskolnikov contemplate the existence of the world beyond, where their victims presumably reside. They possess knowledge of this world, and it exists as an invisible ontological extension of the ‘real’ material world of the story. Unlike Christian metaphysics, this other world seen by Raskolnikov and Svidrigailov is not a source of comfort, nor is it a place marked by inherent immortality. It is simply a place that seems to beckon to them as a projection of their guilt and severed connection to the rest of humanity. .

Weighing the legitimacy of the outcomes of Dostoevsky’s ideological experiment, readers come to terms with the authorial position that there is no acceptable justification for committing of murder.⁷⁶ In spite of all of the rationalizations for taking a life raised by Raskolnikov, the novel provides no “rational” answer to why the protagonist committed the murder. All of the ideological calculations conveyed through *regula falsi* demonstrate the inherent weaknesses of Utilitarianism, the Great Man Theory, Amoralism, and even testing itself.

⁷⁴ «Ну, брат, это всё равно. Место хорошее; коли тебя станут спрашивать, так и отвечай, что поехал, дескать, в Америку» (PSS 6, 277).

⁷⁵ A.D. Nuttall, “The Intellectual Problem II” in *Bloom’s Modern Critical Interpretations: Fyodor Dostoevsky’s Crime and Punishment*, Ed. Harold Bloom, (New York: Chelsea House, 2004), 10.

⁷⁶ Murder is intrinsically despicable. Before his suicide, Svidrigailov offers sarcastic commentary on the question of the “just war” as “the most innocent form of deception” used those pretending to be Great Men to convince different factions of people to kill one another. There is no justification for murder that coincides with the spiritual teachings of Christian morality. «Так что ж? Так что ж?- повторял Свидригайлов, смеясь нараспашку, - ведь это *bonne guerre*, что называется, и самая позволительная хитрость!» (PSS 6, 215). Dostoevsky translates *bonne guerre* with a footnote as «честная война» to ensure that the resonance of this idea reaches his Russian-speaking audiences.

It is impossible to delve fully and perfectly into the mindset of any individual, let alone one on the threshold of making the conscious decision to commit murder.

Similar to the tribulations that plague the Underground Man, the inner thoughts of Raskolnikov seem perceptibly dissociated from his social experiences and interactions. Whereas the Underground Man fails to act meaningfully in *Notes from Underground* due to the rampant indecision of his self-cancelling hyperconsciousness, Raskolnikov succeeds in acting, but does so in a mode reflecting volatile oscillation between the disparate opinions and poles of conflicting ideologies. This dualism, however, is not settled at the end of the novel.

Ernest J. Simmons argues, for instance, “Raskolnikov sees no hope in harmonizing this fundamental opposition....The act was a conscious fulfilment of an unconscious desire to resolve his ambivalence.”⁷⁷ Whereas Simmons grounds his analysis on the psychological ambivalence of Raskolnikov as an individual, it seems more appropriate to consider the universal features of all crimes. Human subjects are capable of assuming the role of both the victim and the culprit. Dostoevsky encourages readers to consider that individuals all possess intrinsic value that should not be reduced by abstract calculations or estimations resulting from the principles of ideological codes. Moreover, establishing the worth of a human life at the outset should not be left up to statisticians, sociologists, or officers of the state. “Rational” systems may condone the act of murder, but human beings are not null sets to be unjustly exploited, oppressed, and exterminated.

The transference of contemplation into the realm of physical experience, moreover, is a sudden and unpredictable process. People never really know if a thought will give rise to corresponding action until they are at the very precipice, or perhaps even in the midst of its associated motion. An action represents a certain, irreversible finality, whereas an idea still in the realm of the mind expresses indefinite potential.

⁷⁷ Ernest J. Simmons, “Introduction” to *Crime and Punishment* by F.M. Dostoevsky, trans. Constance Garnett (New York: Modern Library), xviii.

Dostoevsky's stance on premeditated acts is one of general incredulity. Individuals do not actually know they are going to do something, until they actually do it. In the May 1876 issue of *Diary of a Writer*, Dostoevsky reviewed the case of a woman named Anastasia Kairova.⁷⁸ She had been having an affair with a married man. When the relationship soured, the man left her, and returned to his wife. Kairova showed up one night at their dacha while the couple was in bed, brandishing a razor.⁷⁹ Awakened by the threatening figure, the wife struggled with Kairova, suffering several slashes, but avoiding any life threatening injuries.⁸⁰ While the court indicted Kairova with premeditated attempted murder, Dostoevsky countered that she herself likely did not know whether she was going to use the razor until she actually did so.⁸¹ Moreover, although the wife endured injuries, perhaps Kairova intended only to hurt her, but not to the point of actually killing her. Human courts lack the omniscience to confirm exactly the quality of Kairova's intentions. Dostoevsky recognizes in Kairova the same psychology of indecisiveness that he had sketched so compellingly in the character of Raskolnikov.⁸²

While Raskolnikov undertakes certain plans for the fateful act, such as counting the number of steps to the pawnbroker's apartment, fashioning a special sleeve for the axe, and calculating the ideal time to commit the deed, he could have chosen to abandon the plan up until the very last moment of raising the axe. Although Dostoevsky perfectly intends for Raskolnikov to commit the crime, as a representative of the human condition, the protagonist possesses the agency at every step of his plot to turn away from the vicious deed

⁷⁸ Joseph Frank, *Dostoevsky: The Mantle of the Prophet* (Princeton, NJ: Princeton UP, 2002), 293.

⁷⁹ *Ibid.* 293

⁸⁰ *Ibid.* 293

⁸¹ «я утверждаю, что и когда уже резала, то могла еще не знать: хочет ли она ее зарезать или нет, и с этою ли целью ее режет?...Напротив, наверно, в ту минуту, когда резала, знала, что режет, но хочет ли, сознательно поставив себе это целью...» (*PSS* 23, 9).

⁸² This same psychology is also reflected in Dmitrii Karamazov, who threatens to kill, but ultimately hesitates to take the life of his father, Fyodor Pavlovich. Similarly, Alexei Velchaninov in the *Eternal Husband*, attacks Pavel Trusotsky in his sleep with a razor without causing him to die.

The psyche of Raskolnikov at the scene of the murder is inconspicuously muddled. He closes his eyes when he kills the pawnbroker, and he swings the axe almost unknowingly. Readers are exposed to the sum of various ideological arguments that Raskolnikov considers before committing murder, but it is impossible to say which of his thoughts exerted the greatest influence on his psyche, prompting him to act. Like the whole of life, human consciousness is so dynamic, mercurial, and abstruse.

Instead emerging with a singular, overriding explanation for why he did it, readers encounter the complexity of human psychology, and experience for themselves the testing of different ideologies taken to their logical extremes. They sense the connection between thought and action, and acquire sensitivities that allow them to consider more thoughtfully the mutual reciprocity of ideas and behavior. There is no justification for human imperfection. It amounts to an insolvable riddle. The reader is left with a variety of possible justifications for the murder, but never one that explains the despicable deed once and for all.

Chapter Four

Probability, Spirituality, and Free Will Predicated on Unpredictability in *The Gambler* with Reference to the Personal Life and Other Writings of F.M. Dostoevsky

“The plot of the story is the following: a certain type of Russian living abroad. Note: there was a big question about Russians living abroad in the journals this summer. That will all be reflected in my story. And in general, the whole contemporary moment of our inner life (as far as possible, of course) will be reflected. I’m taking a straightforward nature, of a man, nonetheless, much developed, but in every regard still immature, who has lost faith and *does not dare not* believe, revolting against the authorities and fearing them. He reassures himself with the thought that there is nothing for him to do in Russia, and consequently there is bitter criticism of people in Russia summoning back our Russians living abroad... The main point is that all his life juices, energies, violence, boldness have gone *into roulette*. He is a gambler, and not an ordinary gambler, just as Pushkin’s miserly knight is not an ordinary miser. This is by no means to compare myself with Pushkin. I’m speaking only for clarity. He is a poet in his own way, but the point is that he himself is ashamed of this poetry, for he feels its baseness, although the necessity of risk also ennobles him in his own eyes. The whole story is the story of how for the third year he’s been playing roulette in gambling houses.”¹

~Excerpt from a letter sent by F.M. Dostoevsky to N.N. Strakhov, 18 September 1863.

“You cannot tolerate slave theory, but you demand slavery all the same. ‘Answer and don’t discuss the point!’ Well, so be it. Why do you need money, you ask? How can you ask why? Money is everything!”²

~Aleksi Ivanovich to Polina, Chapter Five, *The Gambler*, 1866.

“If there is a God, He is infinitely incomprehensible, since having neither parts nor limits, He has no affinity to us. We are then incapable of knowing either what He is or if He is. This being so, who will dare to undertake the decision of the question? Not we, who have no affinity to Him.”³

~ Blaise Pascal, *Les Pensées*, Paris, 1670.

¹ «Сюжет рассказа следующий: один тип заграничного русского. Заметьте: о заграничных русских был большой вопрос летом в журналах. Всё это отразится в моем рассказе. Да и вообще отразится вся современная минута (по возможности, разумеется) нашей внутренней жизни. Я беру натуру непосредственную, человека, однако же, многообразного, но во всем недоконченного, изверившегося и *не смеющего не верить*, восстающего на авторитеты и боящегося их. Он успокаивает себя тем, что ему *ничего делать* в России, и потому жестокая критика на людей, зовущих из России наших заграничных русских... Главная же штука в том, что все его жизненные соки, силы, буйство, смелость пошли *на рулетку*. Он – игрок, и не простой игрок, так же как скупой рыцарь Пушкина не простой скупец. Это вовсе на сравнение меня с Пушкиным. Говорю лишь для ясности. Он поэт в своем роде, но дело в том, что он сам стыдится этой поэзии, ибо глубоко чувствует ее низость, хотя потребность *риска* и облагораживает его в глазах самого себя. Весь рассказ – рассказ о том, как он третий год играет по игорным городам не рулетке» (*PSS* 28, bk. 2, 50-51).

² «Рабской теории не терпите, а рабства требуете: «Отвечать и не рассуждать!» Хорошо, пусть так. Зачем деньги, вы спрашиваете? Как зачем? Деньги—всё!» (*PSS* 5, 229).

³ “S’il y a un Dieu il est infiniment incompréhensible puisque n’ayant ni parties ni bornes, il n’a nul rapport à nous. Nous sommes donc incapables de connaître ni ce qu’il est, ni s’il est. Cela étant qui osera entreprendre de résoudre cette question? ce n’est pas nous qui n’avons aucun rapport à lui.”

Blaise Pascal, *Les Pensées* (London: J.M. Dent, 1913), 122.

In 1863, Dostoevsky made his first visit to the casinos of Wiesbaden.⁴ Throughout extended misadventures in the gaming halls of Western Europe, often accompanied by Apollinaria ‘Polina’ Suslova, Dostoevsky developed a fascination with games of chance and the psychology of the gambler. Whereas other Russian thinkers explored the dimensions of risk in faro, whist, horse racing, and dueling, Dostoevsky gravitated both in life and art to the thrill and panic of roulette.⁵ The hypnotic spinning of the roulette wheel possessed seemingly supernatural powers in its centripetal pull capable of inducing the author and his characters to bet compulsively and degenerately on the path to almost certain financial ruin.

Roulette, in its proper, unadulterated form, denies all systemization. It requires no special skill to play. The game is *random* in the sense that no gambler can predict the outcome of a single spin without advanced computational assistance.⁶ The disadvantageous odds of the roulette wheel decide the destinies of its players. As a mathematical system, the game of roulette, following Cardano’s Law of Large Numbers, is one that, over time, players will surely lose.

The assessment of any event being truly *random* is a pressing question of scientific controversy and debate.⁷ The tossing of a coin, for instance, is determined by the physical

⁴ He would proceed to play roulette throughout other cities in the German spa casinos located along the Rhine. See Richard J. Rosenthal, “Gambling” in *Dostoevsky in Context*, ed. Deborah Martinsen and Olga Maiorova (Cambridge: Cambridge UP, 2015), 148-149.

⁵ The most memorable presentation of faro occurs in *The Queen of Spades (Pikovaia dama)* by A.S. Pushkin. References to whist (*vist*), similarly, appear in Tolstoy’s *Death of Ivan Ilych* and Turgenev’s *Fathers and Children*. In *Anna Karenina*, furthermore, Count Vronsky unsuccessfully jockeys his horse Frou-Frou in a competitive race. While the narrative focus of the novel assigns priority to the dramatic tension of the contest and the breaking of the horse’s back, spectators clamor not only out of excitement, but also out of the likely consideration that they have financial interests in the outcome of the race. Duels are a common trope in Russian literature, and they embody the ultimate existential risk.

⁶ V. Szebehely, “From Newton’s Adjustable Clock to Poincaré’s Chaos” in *From Newton to Chaos: Modern Techniques for Understanding and Coping with Chaos in N-Body Dynamical Systems*, ed. Archie E. Roy and Bonnie A. Steves (Cortina D’Ampezzo, Italy: NATO ASI, 1993), 212.

⁷ Albert Einstein disputed claims of quantum mechanics, involving underlying mathematical equations expressing the variable speed and location of subatomic particles, with the famous adage, “The old man [God] doesn’t play dice.” (“[D]ass der Alte nicht würfelt.”).

mechanics of the associated spin, and not by any *random* behavior. In 2004, a team of statisticians and engineers from Harvard and Stanford built a machine that could flip a coin in a uniform fashion with correspondingly uniform results.⁸ Scientists could tell the machine, in other words, to flip all heads or all tails, and it would do so without fail.⁹ The ascribed randomness of the event, consequently, expresses the imperceptibility of mechanical variables, the lack of perfect control in non-mechanized movements, and the generalizable human inability to calculate the variables in such sudden events without technological assistance. These underlying dynamics reflect the scientific proverb that “chaos is order yet undeciphered.” Unlike machines, humans are not equipped to predict the outcome of a roulette spin.

The game of roulette permeates different layers of Dostoevsky’s 1866 novel, *The Gambler (Igrok)*. The central action of the novel unfolds, for example, in the imaginary setting of “Roulettenburg,” a central European town, whose name assuredly stems from roulette. The primary economic and cultural development of this town revolves around casinos and the influx of foreign tourists drawn to the thrill of the game.¹⁰ References to Roulettenburg appear in tandem with actual European cities, such as Paris, London, and Frankfurt, blurring the lines

Erwin Hiebert, “Einstein’s Image of Himself as a Philosopher of Science,” in *Transformation and Tradition in the Sciences: Essays in Honor of I. Bernard Cohen*, ed. Everett Mendelsohn (New York: Cambridge UP, 1984), 185.

⁸ David Kestenbaum, “The Not So Random Coin Toss: Mathematicians Say Slight but Real Bias Toward Heads,” National Public Radio, 24 February 2004. Accessed online at:

< <http://www.npr.org/templates/story/story.php?storyId=1697475>>.

⁹ It is important to note that the machine functioned in the controlled environment of a laboratory. The results of the experiment could have been skewed in the event of a natural disaster, such as a lightning strike, earthquake, meteor strike, etc. Actuaries assessing risks for insurance companies, often refer to such unforeseen circumstances as “Acts of God,” equating unforeseen events with the whimsical decisions of a divine creator. Humans assign *randomness* to events they cannot explain or predict.

¹⁰ The text alludes to the cosmopolitan status of Roulettenburg. For instance, after Aleksei Ivanovich accompanies Antonida Vasilievna to the roulette table, an omniscient third-person narrator interrupts his first-person presentation of the scene, recounting, “Her renown had gradually spread through the town. All visitors to these waters, from all nations, the ordinary and the most notable, flocked to look at ‘*une vieille comtesse ruse tombée en enfance*,’ who had already lost ‘several million.’”

«Мало-помалу известность ее распространялась по всему городу. Все посетители вод, всех наций, обыкновенные и самые знатные, стекались посмотреть на «*une vieille comtesse ruse, tombee en enfance*», которая уже проиграла «несколько миллионов»» (*PSS* 5, 283).

between the geography of fiction and real life. The interactions and perspectives of the characters themselves seem to reflect the sequential outcomes of “random” numbers in a game of roulette. Through the medium of polyphonic narrative, the text presents a complex symphony of voices, each with unique roles, social stations, emotions, and motivations, any one of which may turn up in the given spin of narrative focus. Although this narrative focus is deliberately selected by Dostoevsky, it is “random” in the sense that the first-time reader cannot readily predict what array of personas, languages, currencies, and relationships will turn up next.

Literary scholars generally recognize *The Gambler* to be one of Dostoevsky’s most autobiographical literary works.¹¹ They readily identify the protagonist of the novel, a Russian tutor turned roulette addict, Aleksei Ivanovich, for instance, with qualities of Dostoevsky himself, recounting his troubling experiences in the casinos of Western Europe during his stormy love-hate affair with Apollinaria Suslova.¹² As Konstantin Mochulsky points out, the heroine of the novel, Praskoviia ‘Polina’ Aleksandrovna, inherits the name, ambitions, and cruelty of Suslova.¹³ There is a tendency, however, in critical works on *The Gambler* for biographical events from Dostoevsky’s life to overshadow the aesthetic dimensions of the novel itself.

¹¹ Ronald Meyer, for instance, comments, “*The Gambler* has been traditionally viewed as Dostoevsky’s most autobiographical novel. To be sure, Dostoevsky had ample first-hand knowledge of risk-taking and the ‘poetry’ of gambling.” Geir Khetsaa, similarly, dwells on the biographical features of the novel. Ronald Meyer, “Introduction” to *The Gambler and Other Stories* by F.M. Dostoevsky, (New York: Penguin Classics, 2010), 6.

See also Geir Kjetsaa, *Fyodor Dostoevsky: A Writer’s Life* (New York: Fawcett Columbine, 1989), 154.

¹² Aside from readings stressing the biographical and psychological, other studies have interpreted the text as emblematic of Dostoevsky’s engagement with social issues of the 1860s, such as gender crisis, Russian rejections of Western secularization, and the emancipated woman question.

See Nina Pelikan Strauss, *Dostoevsky and the Woman Question: Rereadings at the End of a Century*, (New York: Palgrave MacMillan, 1994), 1-2.

As referenced by Julian W. Connolly, “A World in Flux: Pervasive Instability in Dostoevsky’s *The Gambler*,” in *Dostoevsky Studies, New Series*, Vol. XII, (2008), 68.

¹³ Konstantin Mochulsky, *Dostoevsky: His Life and Work*, 315.

While evidence in the text would seem to offer obvious parallels to Dostoevsky's own life, there is an inherent danger of taking autobiographical interpretations too far.¹⁴ Joseph Frank argues, "commentators have been so bemused by the biographical overlappings that they have simply identified Aleksei with Dostoevsky and taken Polina as the supposedly 'demonic' Suslova. In fact, however, Aleksei is an unreliable narrator, and the picture he gives of Polina is woefully distorted by his own frustrations and grievances."¹⁵ Although it is difficult to strike a sound balance between the biographical and the aesthetic, the two are intrinsically and irrevocably linked. Art reflects life, and vice-versa. The ensuing chapter explores not only features of the work itself, but also extra-textual events from Dostoevsky's personal experiences, education, and independent readings that contributed to the appearance of themes, plot details, and philosophical arguments in the holistic composition of the *The Gambler*.

The given chapter addresses four primary objectives. The first surveys Dostoevsky's own experiences with gambling. Why was he so drawn to the game of roulette, and what was it that prompted him to risk losing everything? Moreover, how did his propensity for betting affect his relationships with others, as well as his creative process? Secondly, this chapter inspects specific aesthetic features of the novel that contribute to Dostoevsky's commentary on the nature of risk, the allure of games of chance, and the broader significance of unpredictability in his polemics comprising the basis of his existential philosophy. This section also compares the depiction of gambling by Dostoevsky to that of A.S. Pushkin in *Queen of Spades* [*Pikovaia Dama*, 1834].

¹⁴ Naïve readings of *The Gambler* uphold the text as a direct representation of the thoughts and experiences that Dostoevsky encountered in the casinos of Western Europe. As Nikolai Trubetskoi points out, "The autobiographical foundation of the *The Gambler* is apparent, but it should not be made too much of: *The Gambler* is a piece of literature, not an autobiography." Carol Appolonio echoes this same sentiment, affirming, "Add the inevitable sensationalistic biographical information discovered (and invented) by zealous psychoanalytical critics, and it becomes too easy to overlook the important thing: the literary quality of the novel itself." N.S. Trubetskoi, *Writings on Literature*, ed. and trans. Anatoly Liberman (Minneapolis: University of Minnesota Press, 1990), 86; see also Carol Apollonio, *Dostoevsky's Secrets: Reading Against the Grain* (Evanston, IL: Northwestern UP, 2009), 44.

¹⁵ Joseph Frank, *Dostoevsky: A Writer in his Time*, 522.

Thirdly, this chapter examines the game of roulette in its historical and mathematical development. How did the popularity of roulette influence scientific discourses during Dostoevsky's lifetime? Topical investigations into probability and mechanical entropy are especially relevant for understanding the broader legacy of roulette in works by Dostoevsky.

Lastly, this chapter extends the arguments of Aleksandr Sekatskii concerning "the role of risk in its existential dimension" to the mathematical approach of Dostoevsky.¹⁶ A game generates chance, which in itself constitutes a mode of self-existence. What is the nature of *chance*, and how does it necessarily relate to *choice*? If humanity is predicated upon choice, does the individual devoid of choice cease to remain human? As games are a part of life, and life, in turn, transpires definitively with its own hazards, the appearance of chance in its variety of dynamics correlates to a mode of being.¹⁷ Following the logic of Pascal's wager, moreover, Christianity, and other forms of religiosity, represent modes of chance where one's soul is at stake. In a manner highlighting his mathematical sensitivities, Dostoevsky offers compelling philosophical commentary on the question of free will and human tendencies toward arbitrariness and chance in *The Gambler*.

Comprising a metanarrative that paralleled the relationship between the life and artistic productions of the author, the completion of *The Gambler* itself represented the successful outcome of a risky professional wager. In the summer of 1865, after returning to Russia in October of 1863 from a financially disastrous tour of Western Europe, Dostoevsky accepted a 3,000-ruble advance from the publisher F.T. Stellovsky as part of a dubious contract with blatantly one-sided terms.¹⁸ Under the associated terms of the agreement, Dostoevsky promised

¹⁶ Aleksandr Sekatskii, "Stikhiia azarta: pervoe pogruzhenie" in *Logos*, No. 5, (2013), 241.

¹⁷ *Ibid.* 241

¹⁸ (PSS 29, bk. 1, 210-11); see also K.A. Lantz, *The Dostoevsky Encyclopedia*, 411-412.

to furnish a new novel for publication by November 1, 1866.¹⁹ If Dostoevsky would have failed to deliver the novel on time, Stellovsky would have gained the right to publish all of Dostoevsky's future work without having to pay a single kopeck in royalties for nine years.²⁰ Unbeknownst to the author, however, Stellovsky had secretly purchased Dostoevsky's debt from other creditors, which allowed him to recoup the initial 3,000 ruble advance with interest.²¹ To meet this pressing deadline, Dostoevsky put the remaining installments of *Crime and Punishment* on hold, hired the young stenographer, Anna Grigorievna Snitkina, whom he later married. With Anna Grigorievna's assistance, Dostoevsky completed *The Gambler* in 26 days.²²

The appearance of Anna Grigorievna in the life of F.M. Dostoevsky marks a turning point in his creative output. Although he continued to gamble, even losing many of his wife's most precious possessions in Baden-Baden, he derived from her the strength and fortitude to cease his reckless betting, and more importantly, gained a partner with the intelligence and

¹⁹ (PSS 29, bk. 1, 210-11); see also Neil Heims, "Biography of Fyodor Dostoevsky" in *Fyodor Dostoevsky: Comprehensive Biography and Critical Analysis*, ed. Harold Bloom (Philadelphia: Chelsea House, 2005), 51.

²⁰ (PSS 29, bk. 1, 210-11);

²¹ Neil Heims, "Biography of Fyodor Dostoevsky" in *Fyodor Dostoevsky: Comprehensive Biography and Critical Analysis*, ed. Harold Bloom (Philadelphia: Chelsea House, 2005), 51.

²² Carol Apollonio cites that the novel took 28 days to compose, citing the detail that Dostoevsky had developed a plan for the novel, and had one and a half signatures before the arrival of Anna Grigorievna two days later. Dostoevsky published installments of *Crime and Punishment* every other month, which saved him from the near impossible task of writing two novels simultaneously. Anna Grigorievna first arrived at Dostoevsky's apartment on October 4, 1866. The dictation was finished on October 29. Dostoevsky made final corrections on October 30 and 31, and then delivered the document to Stellovsky's home. Stellovsky attempted by every possible means to prevent Dostoevsky from delivering the manuscript, including making himself unavailable on the date in question. The resourceful Anna, however, consulted with a lawyer, who advised registering the manuscript with a notary in the district where Stellovsky lived. After making the necessary precautions, Dostoevsky delivered the manuscript, and obtained the all-important receipt that upheld the conditions of the original contract. Dostoevsky planned a victory dinner for his friends in a restaurant and of course invited Anna, without whom, as he justly said his triumph would not have been possible. Although Anna turned down the invitation, she assumed a primary position in his life, and proved indispensable to his work. Carol Apollonio, *Dostoevsky's Secrets: Writing Against the Grain*, 46; see also Frank, *A Writer in His Time*, 516-517; K.A. Lantz, *The Dostoevsky Encyclopedia*, 97

warmth to facilitate the development of new ideas and premises in his literary works.²³ Her education and status as a member of a younger generation than that of the author facilitated her ability to communicate the progression of trends and debates in the contemporary social context to Dostoevsky from a new perspective.

Anna Grigorievna was educated at the newly founded Pedagogical Institute for Women in St. Petersburg, but she left her coursework prematurely to care for her ailing father.²⁴ Although her studies were curtailed by family obligations, she took classes across a variety of disciplines. She later recounted in her diary, “At that time, a passionate interest in the natural sciences had arisen in Russian society, and I too succumbed to the trend. Physics, chemistry, and sociology seemed a revelation to me, and I registered in the school’s department of mathematics and physics.”²⁵ Joseph Frank elaborates on Anna Grigorievna’s intellectual interests and academic curriculum relative to the cultural climate of the 1860s, by affirming, “while such enthusiasm for the natural sciences often led to a conversion to political radicalism and its accompanying obligatory atheism, there is no trace of any such tendency in her development.”²⁶ Anna Grigorievna stood apart from popular moods and movements, developed independent ideas, and throughout her studies, preserved her belief in God. In addition to her scientific coursework, Anna enthusiastically participated in courses on Russian literature taught by V.V. Nikolsky.²⁷ Her interests and opinions largely aligned with those held by Dostoevsky.

After observing Anna Grigorievna’s progress in shorthand, and knowing of Dostoevsky’s pressing need for a stenographer, Professor P.M. Olkhin of the Sixth Grammar School by Chernyshev Bridge recommended the prospect of the two working together. Inquiring about the

²³ A.G. Dostoevskaja, *Vospominaniia* (Moscow, Pravda, 1987), 165-66.

²⁴ Anna Dostoevsky, *Reminiscences*, trans. and ed. Beatrice Stillman (New York, 1975), 10. As cited by Joseph Frank, *Dostoevsky: A Writer in His Time*, 510.

²⁵ *Ibid.*, 4

²⁶ Joseph Frank, *Dostoevsky: The Miraculous Years, 1865-1871*, 154.

²⁷ *Ibid.* 154

details of the position, Anna Grigorievna would receive 50 rubles for transcribing about 7 folios of large size text.²⁸ Already familiar with Dostoevsky's work, having read *Unizhennye i oskorblennye* (*The Insulted and Injured*) at the age of 15 and the more recent installments of *Nakazanie i prestuplenie* (*Crime and Punishment*), Anna accepted the position, agreeing to appear at Dostoevsky's personal address the next morning.²⁹

In addition to verbal questions, Dostoevsky tested her with matters of gestures and etiquette. He chain-smoked throughout the interview, and offered her a cigarette, assuming her to be a newly emancipated female Nihilist. When she turned down the cigarette, and affirmed that she did not even like to see other women smoke, Dostoevsky perhaps thought to himself: "If she does not smoke, perhaps she believes in God?"³⁰ Dostoevsky liked her immediately, and only warmed up to her more as they continued to work together. During the interview, she commented humorously that his apartment reminded her of the domicile where she imagined Raskolnikov had lived. Both seemed to have enjoyed the conversation, and soon set to work.³¹

Despite the negative cultural connotations of a young woman going to an older gentleman's house in the evening, even for professional objectives, Anna Grigorievna showed up at his house for 26 successive evenings to help Fyodor Mikhailovich finish *The Gambler*. The consideration that Dostoevsky communicated personal details of his life and previous romances to Anna Grigorievna throughout the course of his dictation gives additional credence to

²⁸ Ibid. 3

²⁹ Joseph Frank, *Dostoevsky: A Writer in His Time*, 510.

³⁰ According to Gary Saul Morson, "Smoking was almost compulsory for a nihilistka." See Gary Saul Morson, "The Intelligentsia and Its Critics" in *A Companion to Russian History*, ed. Abbott Gleason (Malden, MA: John Wiley & Sons, 2009), 266.

³¹ A.G. Dostoevskaja, *Dostoevsky Portrayed by His Wife: The Diary and Reminiscences of Mme. Dostoevsky*, 15. As cited in Ibid. 511.

autobiographical interpretations of the text.³² Aside from composing the novel, he was also testing Anna Grigorievna to see if she would be receptive to his hopeful desire of courtship.

Anna Grigorievna was, indeed, taken by the idea, and she came to sense that conversations with her contemporaries were empty and trivial compared to her passionate talks with Dostoevsky.³³ Her family was less inclined to support the proposal. Her sister Masha warned, “It’s all for nothing Netochka your having such a crush on Dostoevsky. For your dreams can’t ever come about, and thank goodness they can’t—if he’s that ill and overloaded with family and debts!”³⁴ Despite these admonishments, the two were married on February 15, 1867. Parts of *The Gambler* can be read as Dostoevsky’s confession of vices, missteps, and previous romances to his future bride.

As readers encounter the story of *The Gambler* from the vantage point of the confused and bewildered Aleksei Ivanovich, the narrative admits sparse objective clarity. Readers almost unanimously recognize, however, the central conflict of the novel unfolds in the heart and mind of the protagonist: the contest between his love of Polina and his addiction for the game of roulette.³⁵ Characters in the novel at times seem to reflect independent, differentiated individuals, but they also reflect a kind of personality spectrum, along which their beings overlap, repeat in

³² Joseph Frank notes that Dostoevsky began to acquaint Anna Grigorievna with some of the details of his recent sentimental life, including his presumed engagement with Anna Korvin-Krukovskaia, and although he did not speak at length about Suslova, he seems to have showed Anna her portrait. Joseph Frank, *Dostoevsky: A Writer in His Time*, 514.

³³ Ibid. 515

³⁴ Anna Grigorievna, even in her family circles, had taken the nickname “Netochka,” the name of the heroine in Dostoevsky’s unfinished novel, *Netochka Nezvanova*. Linda Schierse Leonard, *Witness to the Fire: Creativity and The Veil of Addiction* (Boulder, CO: Shambhala, 1990), 272; see also Anna Dostoevsky, *Reminiscences*, trans. and ed. Beatrice Stillman (New York, 1975), 39. As cited by Joseph Frank, *Dostoevsky: The Miraculous Years, 1865-1871*, 164.

³⁵ Variations of this argument have been made by Carol Appolonio, Julian Connolly, Aleksei Pavelenko, and Gary Rosenshield.

different situational contexts, or nullify and exclude each other.³⁶ As an interesting subtext to the novel, the cast of characters never seem to perform their ascribed professions. The General, for example, only received his rank upon retirement from the military. Likewise, Aleksei Ivanovich is ostensibly a tutor of the General's children, but the first-person narrative focus of the story never shifts to scenes of his delivering actual academic lessons. Mlle. Blanche, furthermore, may not actually be related to the woman presented as her mother, though later the narrator says she did turn out to be her mother, or the "Marquis" De Grioux, for that matter, who "only became a marquis very recently."³⁷ Readers encounter the motley bunch, and skeptically regard not their reputations, but their enigmatic, cipher-like roles.

The first-person narrative focus of the protagonist, Aleksei Ivanovich, assesses different characters in the dizzying presentation of scandal and misfortune. Virginia Woolf characterizes this novel as a 'seething whirlpool.'³⁸ The first paragraph, for example, introduces seven different characters, some by name, and others by description, with no explanation of who they are, or where the story actually transpires.³⁹ The direction of the novel in its specific orientation

³⁶ Doubling is a common theme in the works of F.M. Dostoevsky. Goliadkin and Goliadkin Jr. [*mladshii*] in *Dvoinik (The Double)*, the Underground Man and Apollon in *Zapiski iz podpol'ia (Notes from Underground)*, as well as Trusotsky and Velchaninov in *Vechnyi Muzh (The Eternal Husband)* exemplify notable character doublings in Dostoevsky's artistic works. Aleksei Ivanovich likewise serves as the double of other characters in *The Gambler*. In his efforts to understand the motivations and dynamics of characters in the cast, he often finds himself in circumstances intended as defining experiential moments for others. For example, after winning a great fortune in roulette, he takes up with Mlle. Blanche in Paris, a fate desired by General Zagoriansky. Similarly, when he brings 50,000 francs to Polina to fling in the face of Monsieur De Grioux, she detests the implied notion that her love can be bought, and instead throws the money in the face of Aleksei Ivanovich. As the narrative of his internal consciousness does not actively express a yearning to become like other members of the cast, his tendency to replace other characters in the cast occurs as the result of unconscious mimetic desire and the overarching motivation to understand the perspectives of others in the dizzying trajectory of the story.

³⁷ Julian W. Connolly, "A World in Flux: Pervasive Instability in Dostoevsky's *The Gambler*", *Dostoevsky Studies, New Series*, Vol. XII, (2008), 71.

³⁸ Virginia Woolf, "The Russian Point of View," in the *The Common Reader: First Series*, ed. Andrew McNeillie (New York: Harcourt, Brace, 1984), 178. As cited by Ronald Meyer, "Introduction" to *The Gambler and Other Stories* by F.M. Dostoevsky (New York: Penguin Classics, 2010), 6.

³⁹ Ronald Meyer, "Introduction" to *The Gambler and Other Stories* by F.M. Dostoevsky, 6.

toward one character or the next seems to bounce from person to person like the haphazard motion of a roulette ball.

Their personalities and relationships are equally confusing. The reactions of characters to each other and their emotional responses to events in the story do not seem typical of human interactions. Perhaps they, too, are selected at random determined by a process akin to the arbitrary landing place of the ball along a spinning wheel. As a Russian in a strange European locale, Aleksei Ivanovich struggles to make sense of the town of Roulettenburg, its customs, social hierarchy, and the interpersonal dynamics comprising the general plot lines of the presented story.⁴⁰ He is new to the town, employed as a tutor in the entourage of General Zagoriansky and his family, who have likewise left their native Russia for opportunities abroad. While Aleksei Ivanovich is thrust into the intrigue and drama of the cosmopolitan cast of French, British, German, Polish, Jewish, and Russian company at the outset of the novel, he is often the last to uncover the ‘true’ underlying motives of other characters.⁴¹ Almost everyone in this locale is a foreigner, suffering from some kind of decay, deterioration, and loss, expressed in both financially and morally. The town of Roulettenburg is presented as a kind of hell on earth.

Despite having just two central plot lines, the story comprises a complex web of scandal presented in the medium of the polyphonic novel, replete with linguistic and fiscal hybridity, and

⁴⁰ After insulting the Baron and Baronnes Wurmerhelf, performed as an act of self-debasement requested by Polina on a whim, Aleksei Ivanovich is asked by the General to resign. In another example of his inability to acclimate to foreign environment of the West, Aleksei Ivanovich is imprisoned in another German casino town for a debt of 200 gulden.

⁴¹ There have been numerous studies exploring the national character of the work. Joseph Frank, for example, suggests that *The Gambler* represents Dostoevsky’s foray into depicting what would come to be known as the ‘international’ theme in the work of such writers as Henry James, where a character’s psychology and actions are evaluated not only in terms of personal traits or individual temperament, but also as they reflect national values. Joseph Frank, *Dostoevsky: The Miraculous Years, 1865-1871* (Princeton: Princeton UP, 1995), 172; see also Julian W. Connolly, “A World in Flux: Pervasive Instability in Dostoevsky’s *The Gambler*”, 68.

misdirection resulting from the unreliable first-person vantage point of Aleksei Ivanovich.⁴² In its focus on the dichotomous passions of an obsession for a game of chance on one hand, and a woman on the other, *The Gambler* entails a strong degree of intertextuality with Pushkin's *The Queen of Spades*, albeit with noticeable differences and departures. The protagonists of the two works, Aleksei Ivanovich and Germann, are both foreigners mesmerized by the dynamics by a strange, addicting game that entices them to play for the highest stakes. While readers encounter stereotypical qualities of the German national character in the personality of Germann, that is, his "calculation, moderation, and diligence," on one hand, they also confront his ardent imagination and obsession on the other.⁴³ While Germann exemplifies Romantic tropes, Aleksei Ivanovich is drawn to the game at first to help Polina, but then subsequently for no clear, identifiable reason. He seems hypnotically drawn to the spinning of the wheel, and its mystic property to bring a great fortune to players placing even the smallest of bets. Both commence playing, however, to win the heart of a younger beauty related to an elderly rich woman.

⁴² Although the primary narrative of the novel appears in Russian, *The Gambler* also features dialogic fragments in French, German, English, and Polish. The diversity of currencies staked on various games also contributes to the confusing impression of the text. Readers are left to their own devices to convert the exchange rates between rubles, guildens, francs, florins, and bonds. According to R.L. Jackson, "The mixed French and German components of the name [Roulettenburg] suggest the illegitimate and rootless character of the place. This is the land of Babel, a place with a national language or culture." Robert Louis Jackson, *The Art of Dostoevsky: Deliriums and Nocturnes* (Princeton: Princeton UP, 1981), 211. As cited by Julian W. Connolly, "A World in Flux: Pervasive Instability in Dostoevsky's *The Gambler*," 71.

⁴³ «[P]асчет, умеренность, и трудолюбие» in A.S. Pushkin, *Sobranie sochinenii v 10 tomakh*, ed. D.D. Blagoi, S.M. Bondi, et al., Vol. 5 (Moscow: Gosudarstvennoe izdatel'stvo khudezhestvennoi literatury, 1960), 260. Despite this apparent contrast, it should also be noted that Germann also possesses an ardent imagination, and becomes obsessed with gaining the secret and winning a fortune.

These elderly women also feature centrally in the development of various themes that unite the two works. Antonida Vasilievna, for instance, serves as a metaphor for all of Russia.⁴⁴ This synecdoche is echoed, for instance in the consideration that she dismisses Polina's new Western name, preferring to call her granddaughter by her original Christian name with Slavic derivation, Praskoviia. The General along with his creditors and cronies keep betting on her death to reap the fortunes of her bountiful inheritance. Her appearance in the town of Roulettenburg serves as a comical inversion of the resurrection trope from the bible.⁴⁵ When she's drawn into the gambling hall, she consistently makes the riskiest bet of all, instructing Aleksei Ivanovich to wage on the zero. She gambles without thinking, driven by faith in the appearance of the zero that nullifies all other bets.

The Countess Anna Fedotovna, in Pushkin's *Queen of Spades*, in contrast, supposedly possesses supernatural insight into the game. She knows the order of the cards that will turn up in a game of Faro long before they actually appear. When Germann sneaks into her chambers after being let in by the servant girl of his desire, Lizaveta Ivanova, he appeals to her experience in love as a bond that brings them together. Although the Countess dies from shock before answering Germann's question about her predictive system, she later comes to him in a dream, like a succubus, and reveals to him the order of the cards. Whereas the witch-like seductress of

⁴⁴ Her passion for roulette, for example, rings true with Aleksei Ivanovich's earlier debate with De Grioux: "In my opinion," said I, roulette was made simply for Russians. And when at my challenge the Frenchman laughed contemptuously, I observed that I was, of course, right. For to speak of the Russians as gamblers was abusing them far more than praising them, and so I might be believed." Aleksei Ivanovich, in this regard, also frames roulette and gambling, more generally, in terms of an activity that bespeaks national lack of self-control. «А по-моему мнению, рулетка только и создана для русских-сказал я, и когда француз на мой отзыв презрительно усмехнулся, я заметил ему, что, уж, конечно, правда на моей стороне, потому что, говоря о русских как об игроках, я гораздо более ругаю их, чем хвалю, и что мне стало быть, можно верить.» (PSS 5, 225).

⁴⁵ Despite expectations of her ill health, she seems rather healthy when she appears in Roulettenburg. "In spite of her seventy-five years there was still a certain vigor in her face: and even her teeth were almost perfect. She was wearing a black silk dress and a white cap." «Несмотря на семьдесят пять лет, лицо ее было довольно свежо и даже зубы совсем пострадали. Одета она была в черном шелковом платье и в белом чепчике.» (PSS 5, 252).

the Countess always wins, the invalid, burdensome “la baboulinka” loses. Though she feels humiliated at first, she accepts her losses with a good nature.⁴⁶

When Germann loses, he goes mad, and spends his days in the mental ward of Obukhov Hospital. Although he loses financially and romantically, Germann wins in the sense that he becomes an accepted member of the community in Petersburg.⁴⁷ The other gamblers at the table cheer him on, proclaiming loudly, that he “gloriously punted.”⁴⁸ Whereas Western readers typically intuit sarcastic reproach in the commentary of the players, Nina Wieda views these remarks by the Russian players as genuine praise, following the tenets of kenosis in Russian Orthodoxy, or the process of ‘self-emptying’ one’s will to become completely receptive to God’s will.⁴⁹ Aleksei Ivanovich, however, does not admit subscription to the institution of secular kenosis. The stimulus that drives him to penury and the symptoms of madness in the gambling

⁴⁶ Instead of devoting her remaining funds to the inheritance of her spindthrift son, the General, Antonida Vasilievna takes what she has left to rebuild a wooden church in stone on her estate. “Did you think that I was joking, my dear girl? I said I was leaving and I am leaving. Today, I squandered 15,000 roubles on that damned roulette of yours. Five years ago, I made a promise to rebuild a wooden church in stone on my estate, and instead of that I threw it away here. Now, my dear girl, I’m going to go and build that church.” «Я сегодня пятнадцать тысяч целковых просадила на растреклятой вашей рулетке. В подмосковной я, пять лет назад, дала обещание церковь из деревянной в каменную перестроить, да вместо того здесь просвисталась. Теперь, матушка, церковь поеду строить» (*PSS* 5, 279).

⁴⁷ Although not explicitly described in the conclusion to the story, Germann’s ending up in a mental ward puts him in good company. If the famous saying by Lenin holds true for the social context of the 19th century, that, “All of Russia is Ward No. 6” («Вся Россия палата No. 6») referring to the success of Chekhov’s 1892 short story, then Germann has achieved the requisite sense of belonging in the country where he was previously a foreigner.

⁴⁸ «Славно спонтировал!» A.S. Pushkin, *Sobranie sochinenii v 10 tomakh*, ed. D.D. Blagoi, S.M. Bondi, et al., Vol. 5 (Moscow: Gosudarstvennoe izdatel’stvo khudezhestvennoi literatury, 1960), 260.

⁴⁹ Nina Wieda, *How the Russian Soul is Made: Secular Kenosis in Russian Literature*, (Northwestern University, PhD Dissertation, 2010), 12. Accessed online through Proquest: <http://search.proquest.com/docview/305210862>.

hall, is somewhat different.⁵⁰ Whereas Germann is driven mad by the game, Aleksei only begins his path to ruin after he leaves Polina to go gamble. As Carol Apollonio points out, “he loses in love by winning in roulette.”⁵¹ His failure in love leads to the hero’s debilitating addiction. His playing assumes the primary manifestation of his mental illness, whose root cause is not financial, but rather a certain pain of the heart, *un cri du cœur*, the trauma of unrequited love.

Instead of following Polina to Switzerland and beyond, Aleksei Ivanovich follows Mlle. Blanche to Paris. As Julian Connolly argues, readers “should note that her name itself is a color word, namely the feminine adjective “blanche” meaning “white.”⁵² The text highlights her diabolical mutability. She has gone by different names and reputations, but all the same, every man who has tried to court her has fallen into irreparable financial hardship. She is roulette

⁵⁰ The theme of depriving oneself of pleasures for the accumulation of wealth appears prominently in Dostoevsky’s literary works, and functions as an implicit reference to Pushkin’s Miserly Knight and Gogol’s Pliuskin. These characters cherish wealth as an end in itself, and not the goods and services themselves that money can purchase. They tend to live modestly, even avoiding the delivery of financial assistance to friends and family in need. Their wealth, in this regard, is afforded special mystic significance. They hoard wealth, and project project onto their holdings the holistic of life. As Susan Fusso remarks, for example, “in the first part of *A Raw Youth* [*Подросток*], Arkadii confides his cherished ‘ideas’: his plan to become a Rothschild. His inspiration is the typical newspaper story of the ragged beggar who upon his death is discovered to have amassed a fortune. Arkadii believes that self-deprivation and stubborn saving up of pennies is a ‘mathematically guaranteed’ route to wealth. Later this obsession is replaced by gambling: ‘I flew to the roulette table as if my whole salvation, my whole way out, were concentrated in it.’” In an obvious echo of comments by Aleksei Ivanovich in *The Gambler*, Arkadii yells in a fervor to Anna Andreevna, “‘This is what we are going to roulette for! It is everything!’ I yelled, ‘Money is everything!’” «[с]амая нехитрая форма наживания, но лишь непрерывная, обеспечена в успехе математически» (PSS 13, 67); «Я полетел на рулетку, как будто в ней сосредоточилось всё мое спасение, весь выход...» (PSS 13, 265); «Это что мы на рулетку-то! Да это всё!- вскричал я, - деньги всё!» (PSS 13, 265). See Susanne Fusso, “Dostoevsky’s Comely Boy: Homoerotic Desire and Aesthetic Strategies in *Raw Youth*,” in *The Russian Review*, Vol. 59, No. 4 (October 2009), 592.

⁵¹ Carol Apollonio, *Dostoevsky’s Secrets: Reading Against the Grain*, 51.

⁵² Julian W. Connolly, “A World in Flux: Pervasive Instability in Dostoevsky’s *The Gambler*”, 71-72.

personified, or more specifically, the little *white* ball that hypnotically induces all suitors to forfeit all of their money in pursuit of her.⁵³

The Queen of Spades, however, is not the only literary antecedent by Pushkin that provides depictions of risk and wealth as they pertain to *The Gambler*. In a letter dated 18 September 1863, an excerpt of which also appears in the first epigraph to this chapter, Dostoevsky outlined the basic premise of the literary work that would later become *The Gambler* to his friend and colleague, N. N. Strakhov. Writing from Rome, Dostoevsky affirms Aleksei Ivanovich's connection to the miserly knight (*skupoi rytsar'*) from Pushkin's *Little Tragedies*, (*Malen'kie tragedii*, 1830):

The main point is that all his life juices, energies, violence, boldness have gone *into roulette*. He is a gambler, and not an ordinary gambler, just as Pushkin's miserly knight is not an ordinary miser. This is by no means to compare myself with Pushkin. I'm speaking only for clarity. He is a poet in his own way, but the point is that he himself is

⁵³ There is perhaps satirical commentary in the allure of Antonida Vassilievna toward Mlle. Blanche on the occasion of their first meeting. Like the General, Barberini, Prince Nilski, and Albert, La Baboulinka, too, seems fascinated, even smitten with Mlle. Blanche. Her attraction to Blanche reiterates, metaphorically, Aleksei Ivanovich's comments that roulette was made for Russians. Blanche's outfit in the scene, riding garments with a whip, expressing the one-sided power-dynamics of her relationships. She is beholden to none, and she flagellates all who woo her. The sense of attraction that others feel toward her reflects a kind of self-laceration. The scene in which Antonida Vassilievna meets Mlle. Blanche assumes comically unfolds: "Who is this?" she asked, indicating Mlle. Blanche. The striking-looking Frenchwoman in a riding habit with a whip in her hand, evidently impressed her. 'Some one living here?' 'This is Mlle. Blanche de Cominges, and this is her mamma, Madame de Cominges; they are staying in this hotel, I explained. 'Is the daughter married?' Granny questioned me without ceremony. 'Mlle. de Cominges is an unmarried lady,' I answered, purposely speaking in a low voice and as respectfully as possible. 'Lively?' 'I do not understand the question.' ... 'Oh she casts down her eyes, she is giving herself airs and graces; you can see the sort she is at once; an actress of some kind. I'm stopping here below in the hotel... I shall be your neighbor. Are you glad or sorry?'" «Это кто такая? – обратилась она, указывая на mademoiselle Blanche. Эффективная француженка, в амазонке, с хлыстом в руке, видимо, ее поразила. – Здешняя, что ли? Это mademoiselle Blanche de Cominges, а вот и маменька ее madame de Cominges; они квартируют в здешнем отеле, - доложил я. - Замужем дочь-то? Не церемонясь, расспрашивала бабушку. - Mademoiselle de Cominges девица, отвечал я как можно почтительнее и нарочно вполголоса. – Веселая? Я было не понял вопроса. – О, глаза опустила, манерничает и церемонничает; сейчас видна птица; актриса какая-нибудь. Я здесь в отеле внизу остановилась... соседка тебе буду; рад или не рад?» (PSS 5, 253-254). See also Julian W. Connolly, "A World in Flux: Pervasive Instability in Dostoevsky's *The Gambler*", 71-72.

ashamed of this poetry, for he feels its baseness, although the necessity of risk also ennoble him in his own eyes.⁵⁴

In Pushkin's 1830, *The Miserly Knight*, an old Baron hoards money in his wealth in six large chests. He refuses to help his son, or to pay his debts. His son, the profligate knight Albert, appeals to a Jewish money lender for credit. The usurer rejects Albert's appeal for a loan, but offers him poison to murder his father and reap the fortune in his inheritance. Albert refuses this suggestion, and appeals to the Duke for help convince his father to share the familial wealth.

When Albert and the Duke approach the old Baron to discuss the question of money, the Baron challenges his own son to a duel, which the later angrily accepts.⁵⁵ To prevent bloodshed and preserve family ties, the Duke casts out the son, and chastises the Baron. The panic of the moment, however, excites the Baron to such a degree that he collapses. In his dying breaths, he asks not for his son, but for the keys to his treasure chests.⁵⁶ In such terms, the object of life becomes not the enjoyment of others, or the forging of lasting family bonds, but rather the accumulation of wealth.⁵⁷ Money becomes the primary existential aim for the Baron, just as roulette becomes the central concentration of Aleksei Ivanovich in *The Gambler*.

In the reorientation of desires and needs, individual characters sense mystic gravity in the new target of their striving. However base, or detrimental to their relationships, sanity, or health, these characters intuit poetry in the new objects of their isolated pursuits. The gambler's obsession with winning fortunes effortlessly in cards, roulette, and other games of chance

⁵⁴ «Он – игрок, и не простой игрок, так же как скупой рыцарь Пушкина не простой скупец. Это вовсе на сравнение меня с Пушкиным. Говорю лишь для ясности. Он поэт в своем роде, но дело в том, что он сам стыдится этой поэзии, ибо глубоко чувствует ее низость, хотя потребность *риска* и облагораживает его в глазах самого себя» (PSS 28, bk. 2, 50-51).

⁵⁵ This scene is later echoed in *The Brothers Karamazov* when Dmitrii Karamazov strikes Fyodor Pavlovich over the extended money disputes that prevent father and son from loving one another.

⁵⁶ «Простите, государь... Стоять не могу... мои колени слабеют... душно!... душно!... Где ключи? Ключи, ключи мои!...». A.S. Pushkin, *Sobranie sochinenii v 10 tomakh*, ed. D.D. Blagoi, S.M. Bondi, et al., Vol. 5 (Moscow: Gosudarstvennoe izdatel'stvo khuzhzhestvennoi literatury, 1960), 320.

⁵⁷ The trope of the miser also occurs memorably in Gogol's *Dead Souls* in the figure of Pliushkin.

expresses what Charles Dickens refers to as “the old distorted faith.”⁵⁸ John Carroll provides the apt interpretation that “for Dostoevsky, the gambler is Hyde to the mystic’s Jekyll. The novelist is fascinated by this travesty of his mystical idea. The gambler, like the mystic knows that reason does not govern life. He detests the permanent and the material so much that he has to squander all that he possessed: he exorcizes these demons that threaten to possess him.”⁵⁹ But in purging oneself of one’s money and material possession, the existential striving does not return immediately to ‘normal’ humanity in the company of family, friends, and interpersonal relationships. Instead, the gambler delves deeper into the game. After everything else is lost, the gambler will throw himself into its consuming, volatile hazards.

Before visiting the casinos of Saxon-le-Bain in the autumn of 1867, Dostoevsky wrote to his second wife, Anna Grigorievna, “Oh, my little dove, don’t let me near roulette! As soon as I touch it—my heart stops, my arms and legs shake and turn cold.”⁶⁰ In a letter to Apollon Maikov dated 16 August 1867, Dostoevsky attributed his losses to a “demon” (*bes*) that manipulated his ability to think and act with rational discretion.⁶¹ Recounting his reckless betting in Baden, Dostoevsky describes, “the demon immediately played a trick on me. In three days, I won 4000

⁵⁸ Charles Dickens, *The Old Curiosity Shop*, (New York: Alfred P. Knopf, 1995), 27. As cited by Susanne Fusso, “Dostoevsky’s Comely Boy: Homoerotic Desire and Aesthetic Strategies in *A Raw Youth*,” in *The Russian Review*, Vol. 59, No. 4 (October 2009), 592.

⁵⁹ John Carroll, *Break-Out From the Crystal Palace. The Anarcho-Psychological Critique: Stirner, Nietzsche, Dostoevsky* (New York: Routledge, 2010), 127.

⁶⁰ «Ах, голубчик, не надо меня и пускать к рулетке! Как только прикоснулся – сердце замирает, руки-ноги дрожат и холодеют» (*PSS*, 28, bk. 2, 234)

⁶¹ Apollon Maikov was a close friend of Dostoevsky, and a fellow Russian author. Maikov was godfather to Dostoevsky and Anna Grigorievna's children. It is interesting that Dostoevsky uses the word *bes* to describe this demon, as the word also appears in the title of his 1871-1872 text, *Demons (Besy)*. The text also became known as *The Possessed* following the 1916 translation by Constance Garnett, however, subsequent translators, such as Robert Maguire, Richard Pevear and Larissa Volokhonsky, have argued that the word *besy* refers not to those who are possessed, but rather to those who are doing the possessing, that is the *possessors*. In the 1871-1872 story, the *besy* refer dually to the misguided revolutionaries in their violent deeds, and the incomplete ideas that motivate their actions and relationships. See also Robert A. Maguire, Introduction to *The Demons* by Fyodor Dostoevsky (New York: Penguin Classics, 2008), xxxiii-xxxiv; Richard Pevear and Larissa Volokhonsky, “Introduction” to *The Demons* by Fyodor Dostoevsky (New York: Vintage Classics, 1995), xiii.

francs with unusual ease.... But in the end, everything was completely lost...I wasn't able to withstand winning. If at first I had lost 10 Louis d'or, as I assumed, then I would have given up everything immediately and left. But winning 4000 francs ruined me!"⁶² According to Susan McReynolds, this 'demon' embodied his desire for redemption through money, specifically a gambling windfall that would enable him to redeem his many debts.⁶³ Although Dostoevsky claimed in his letters that he bet according to a "system," implemented to improve his chances of winning, or at the very least, curtail his losses, he played impulsively, upheld eccentric superstitions, and underwent wild mood swings from elation to despair as his finances fluctuated wildly from one spin to the next.

Faced with the inscrutability of the dynamic mechanical properties involved in a roulette spin, gamblers invent hypothetical *systems* for themselves to rationalize their expectations and bets. These *systems*, consequently, often become the substance of pseudoscience and superstition. Dostoevsky himself often fell prey to such tendencies. According to Geir Kjetsaa, "Dostoevsky put his faith in dubious gambling handbooks that called casinos 'German California' and instructed players on how to 'ruin the banks' through 'fail-proof' systems."⁶⁴ In addition to gaming systems, Dostoevsky intuited a correlation between seemingly mystical outcomes in games of chance and his own temperament.

In descriptions of this system, he tended to emphasize its influence on his emotional demeanor, more so than his assessment of statistical calculations, probabilities, and betting variations. While he may have subscribed to several gambling strategies, Dostoevsky first

⁶² «Бес тотчас же сыграл со мной шутку: я, дня в три, выиграл 4000 франков, с необыкновенною легкостью....Наконец, довольно, всё было проиграно....Если б я первоначально проиграл 10 луидоров, как положил себе, я бы тотчас бросил всё и уехал. Но выигрыш 4000 франков погубил меня!» (*PSS* 28, bk. 2, 207, 212).

⁶³ Susan McReynolds, *Redemption and the Merchant God: Dostoevsky's Economy of Salvation and Antisemitism* (Evanston: Northwestern UP, 2011), 58-59.

⁶⁴ Geir Kjetsaa, *Fyodor Dostoevsky: A Writer's Life* (New York: Fawcett Columbine, 1989), 156.

alludes to a system in a letter dated 20 September 1863 to his brother Mikhail from Turin. He describes, “Let me tell you, my dear Misha, that in Wiesbaden I devised a method of play which I put to the test and won myself 10,000 francs. But the next morning in my excitement I failed to stick to my system, and lost right away. In the evening, I returned to the system, with all inflexibility, and without any effort soon again won 3000 francs.”⁶⁵ As opposed to admitting the shortcomings of his calculations of statistics and probabilities underlying the game of roulette where the odds are so clearly stacked against the player, Dostoevsky blames his excitement as the reason for his losses.

Anna Grigorievna provides additional insight into the betting system, affirming “All of Fyodor Mikhailovich’s rationalizations about the possibility of winning at roulette by using his gambling system were entirely correct. His success might have been complete - but only on condition that this system was applied by some cool-headed Englishman or German and not by such a nervous and impulsive person as my husband, who went to the outermost limits in everything.”⁶⁶ By upholding the successful viability of a betting system in its holistic amorphous abstraction, Dostoevsky intuited the notion that he possessed mystical insight into the dynamics of roulette. Despite his awareness of statistics, Dostoevsky, like his characters, expressed skepticism toward purely quantitative, rational calculation in games of chance.

⁶⁵ «Друг Миша: я в Висбадене создал систему игры, употребил ее в дело и выиграл тотчас же 10000 франк<ов>. Наутро изменил этой системе, разгорячившись, и тотчас же проиграл. Вечером возвратился к этой системе опять, со всею строгостью, и без труда и скоро выиграл опять 3000 франков» (*PSS* 28, bk. 2, 45).

⁶⁶ «Все рассуждения Федора Михайловича по поводу возможности выиграть на рулетке при его методе игры были совершенно правильны, и удача могла быть полная, но при условии если бы этот метод применял какой-нибудь хладнокровный англичанин или немец, а не такой нервный, увлекающийся и доходящий во всем до самых последних пределов человек, каким был мой муж». A.G. Dostoevskaiia, *Vospominaniia*, (Moscow: Khudozhestvennaia literature, 1981), 171; see also Anna Dostoevsky, *Dostoevsky: Reminiscences*, trans. and ed. Beatrice Stillman, (New York: Liveright, 1977), 130. As cited by Carol Apollonio, *Dostoevsky’s Secrets: Reading Against the Grain*, (Evanston, IL: Northwestern UP, 2009), 52.

Dostoevsky sensed that he lost only when he became emotionally invested in the game. In a series of letters written to Anna Grigorievna dated May 6, 1867, Dostoevsky affirmed, “Here is my definitive observation, Ania: if one is prudent, that is, if one is as though made of marble, cold, and *inhumanly* cautious, then definitely *without any doubt*, one can win *as much as one wishes*.”⁶⁷ Dostoevsky often cited this quality of *inhuman* composure in his assessment of Jewish gamblers.⁶⁸ His decision to quit gambling was prompted after a famous episode in 1871, when strolling through the dark streets of Wiesbaden, he mistook a synagogue for a Russian Orthodox church.⁶⁹ This episode equated to a crisis of faith, whereby he sensed that he had lost his connection with his own spirituality, by putting his faith in roulette. While he ostensibly envied this presiding calm and its perceived effect on gambling outcomes, he came to situate his

⁶⁷ «Вот мое наблюдение, Аня, окончательное: если быть благоразумным, то есть быть как из мрамора, холодным и нечеловечески осторожным, то непременно, *без всякого сомнения*, можно выиграть *сколько угодно*» (PSS 28, bk. 2, 186).

⁶⁸ In *The Gambler*, two Jewish characters give advice to Aleksei Ivanovich advising him to stop while he’s ahead, sensing that he’s reached the peak of his winnings. He ignores these admonishments, only to lose his fortune. The question of anti-Semitism, moreover, is a topic that seems to help him bond with Antonida Vasilievna Tarasevitcheva, otherwise referred to in the story as “la baboulinka.” When she asks if there are exchange bureaus in the casino, Aleksei Ivanovich responds glibly, “Oh as many as you like! But what you lose in the exchange is so much...that even a Jew would be horrified!” «-Есть здесь меняльные лавки? Мне сказали, что все наши бумаги разменять можно, - решительно спросила бабушка. -О сколько угодно! Но что вы потеряете за промен, так...сам жид ужаснется!» (PSS 5, 274). Later in the story, however, two Jewish visitors of the casino try to reason with the impassioned Aleksei Ivanovich, begging him to leave with his winnings, and not to place another stake. “Two Jews stopped me at the exit. ‘You are bold! You are very bold!’ They said to me, ‘but leave tomorrow at once, as early as possible, so you don’t lose everything, everything.’» «Два жида остановили меня у выхода. – Вы смелы! Вы очень смелы!- сказали они мне, - но уезжайте завтра утром непременно, как можно раньше, не то вы всё-всё проиграете...» (PSS 5, 295).

⁶⁹ “I lost everything before half past nine, and went out half-mad. I suffered so much that I at once ran to a priest (don’t worry, he was not there, was not, and I will not go!). I thought while on the way, and running to to him in the darkness through unknown streets: he is God’s pastor, I’ll speak to him not as with a private person, but as in confession. But I got lost in the city, and when I got to what I thought was the Russian church, they told me in the store that it was Jewish, not Russian. It was like cold water poured over me.” Dostoevsky uses the derogatory adjective, *zhidovskaia*, instead of the more neutral, *evreiskaia*. «Я проиграл всё к половине десятого и вышел как очумелый; я до того страдал, что тотчас побежал к священнику (не беспокойся, *не был, не был и не пойду!*). Я думал дорогою, бежа к нему, в темноте, по неизвестным улицам: ведь он пастырь божий, буду с ним говорить не как с частным лицом, а как на исповеди. Но я заблудился в городе, и когда дошел до церкви, которую принял за русскую, то мне сказали в лавочке, что это не русская, а жидовская. Меня как холодной водой облило. Прибежал домой; теперь полпочь, сижу и пишу тебе. (К священнику же не пойду, не пойду, клянусь, что не пойду!)» (PSS 29, bk. 1, 198).

impressions in blatantly anti-Semitic terms, aligning the drive for money and materialistic comfort with the kind of redemption he saw associated with the Jewish faith.⁷⁰ While he often reported brief periods of cold detachment in times that he observed to overlap with his winning streaks, he could never maintain his equanimity, and would turn toward the presumed “abyss” of emotional rashness and its associated toll on his holdings.

The “abyss” [*bezdna*] comprises a common trope in the literary works of Dostoevsky, and this tendency is perhaps reflective of all Russian literature, as it occurs in the writings of Tiutchev, Mandelshtam, etc., Aleksei Ivanovich, for instance, declares his willingness to jump into the abyss as a sign of his outmost devotion to Polina, declaring, “say the word, and I will jump into this abyss. If you would have said the word, I would have jumped. Do you really not believe that I would not jump?”⁷¹ In *Demons*, the corrupted Stavrogin is described as having before him “a nearly insurmountable abyss.”⁷² By and large, Dostoevsky’s most memorable characters are those who stand on the precipice between two opposing emotions, actions, decisions. They are also just on cusp of doing something incredible, before returning to their lethargic, finite states, like the roulette ball teetering between two numbers.

Dostoevsky himself at certain moments in his life seemed to reflect a character facing the dilemma abyss. Before his courtship with Anna Grigorievna, for example, he commented to her that “‘he was standing at a crossroad and three paths lay before him.’ He could go to the East-Constantinople and Jerusalem- and remain there, ‘perhaps forever’; he could ‘go abroad to play roulette,’ and immolate himself in the game he found so utterly engrossing, or he could ‘remarry

⁷⁰ Susan McReynolds, *Redemption and the Merchant God: Dostoevsky’s Economy of Salvation and Antisemitism* (Evanston: Northwestern UP, 2011), 58-59.

⁷¹ «скажите слово, и я соскочу в эту бездну. Если б вы сказали это слово, я бы тогда соскочил. Неужели вы не верите, что я бы соскочил?» (*PSS 5*, 231).

⁷² «перед вами почти непроходимая бездна» (*PSS 11*, 26).

and seek joy and happiness in family life.”⁷³ Despite the undoubtedly exaggerated dramatic tension of these comments, Dostoevsky found it necessary to hint to Anna Grigorievna how important she was to him and his broader expectations of their time together.

Especially during his gambling years, Dostoevsky’s financial situation conformed generally to a recurring turbulent cycle. Upon receiving money, he would lose it rather quickly, and resort to borrowing and publishing activities only to begin the process all over again. He was sometimes in the black, but more frequently in the red.⁷⁴ While he, indeed, incurred great losses with his gambling, Dostoevsky also dispersed his wealth to his dependents, including his spendthrift stepson Pasha from his first marriage with Maria Dmitrievna, his second wife Anna Grigorievna, and his sister-in-law Emily Fyodorovna von Ditmar along with her five sons and daughters after the death of his brother Mikhail in 1864. Like the self-cancelling tendencies of his protagonists, the fiscal decisions of Dostoevsky, both noble and ignoble in nature, embody a kind of stasis. As soon as credits appears on the ledger that was never distant from his thoughts,

⁷³ Anna Dostoevsky, *Dostoevsky: Reminiscences*, trans. and ed. Beatrice Stillman, (New York: Liveright, 1977), 130. As cited by Joseph Frank, *Dostoevsky: A Writer in His Time*, 515.

⁷⁴ This cyclical system is perhaps loosely reminiscent itself of roulette. The accounting idioms of being “in the black” or “in the red,” however, likely did not exist in nineteenth-century Russian parlance. Aside from being associated with accounting ledgers and the game of roulette, the colors red and black appeared in cultural discourses of the 19th century after the publication of the Stendhal’s 1830 historical psychological novel, *Le Rouge et le Noir (The Red and the Black)*, which influenced Russian literary productions of the same period, including Tolstoy’s *Voina i Mir (War and Peace)*. The colors of the roulette wheel entailed unique semantic associations that alluded to broader meanings. Aylmer Maude, *The Life of Tolstoy: First Fifty Years* (London: Archibald Constable and Co., 1908), 93.

he would nullify them with corresponding debits, creating a system that made it extremely difficult for him to enact lasting change in his social station and material wealth.⁷⁵

After his first trip to Wiesbaden, his brother Mikhail forwarded him funds to pay for his return travel to Russia, which he had lost at the roulette wheel. Mikhail implored his brother, “For God’s sake, don’t gamble any more...How can you gamble with our happiness?”⁷⁶ Whereas Fyodor Mikhailovich struggled to maintain a steady financial situation, Mikhail possessed greater stability, having invested in property, including a local cigarette factory.⁷⁷

Although the factory ceased to be profitable after several years of operation, the business served as collateral that he periodically mortgaged to cover expenses for forays into the world of journalism with his brother. While the brothers shared editorial duties in the organization of *Vremia* and *Epokha*, Mikhail seems to have been responsible for a greater share of the accounting burdens in running the two journals than Fyodor. Before his death in 1864, Mikhail owed more than 20,000 rubles to local creditors.⁷⁸ Although Dostoevsky’s gambling did not

⁷⁵ Despite his heavy losses, Anna Grigorievna would sometimes encourage her husband to gamble, because she sensed that it alleviated his nervous tension. According to Henri Troyat, “Confronted with this rising bad humor, Anna Grigorievna advised her husband to go to Saxon-les-Bains, a watering town forty miles from Geneva, with a world-famous gambling casino. She knew that her Fedya’s disastrous ventures at roulette always soothed him in a mysterious way, and that when he had suffered enormous losses he would regain confidence and be eager to redeem his failure by hard work.” At some point, she likely decided that she could cope with his moods, but not his debilitating gambling losses. His fortunes took a change for the better after swearing off gambling entirely to his wife in 1871. Henri Troyat, *Firebrand: The Life of Dostoevsky*, trans. Norbert Guterman (New York: Roy Publishers, 1946), 306.

⁷⁶ «Ради бога не играй больше. Где уж с нашим счастьем играть?» М.М. Dostoevskii in *F.M. Dostoevskii materialy i issledovaniia*, ed. A.S. Dolinin (Leningrad 1935), 536. As cited by Joseph Frank, *Diary of a Writer*, 352.

⁷⁷ K.A. Lantz, *The Dostoevsky Encyclopedia*, 111.

⁷⁸ *Ibid.*

directly bring about the closure of *Epokha* in 1865, it nevertheless deprived the journal of capital that could have been used to promote its longevity and viability as a business model.⁷⁹

The incessant need for money served as a crucial impetus for Dostoevsky's creative genius. To pay his mounting debts and to support his extended family, Dostoevsky turned to literature as a means for survival. Writing became akin to a life or death proposition. Responding to the hypothetical question, "What might Dostoevsky's life have been like without gambling?", Richard J. Rosenthal upholds the theory presented by cartoonist R.O. Blechman that without incurring gambling losses, "Dostoevsky would never have become Dostoevsky."⁸⁰ However stressful, the extent of his financial obligations infused the tumultuous paper chase of his writing career with the vitality of his entire being, and the same could also be said of his fanatical passion for roulette.

According to Aleksandr Sekatskii, games become a mode of self-existence. The human subject, like the player, sees "clear indication of the potential ability of sources of prolonged risks to regulate the interpersonal dynamics of society and the psychodynamics of the individual."⁸¹ Life, like a game of chance, produces some winners and some losers. It is a game where the wager has already been placed before the player. In order to live, one needs to play.

⁷⁹ The journal was struck by a series of unfortunate incidents that contributed to its closing in 1865, but if Dostoevsky had retained more capital from his tours of European casinos, the venture may have survived. In 1864, the journal's best-known contributor Apollon Grigoriev died from stroke. Lacking funds from subscribers, Mikhail borrowed 25,000 rubles to commence publishing activities. Dostoevsky received another 10,000 rubles from his godmother Aleksandra Kumanina as an advance of his inheritance. Throughout most of the journal's short life span, Dostoevsky toiled as the sole editor. The brothers were also technically deficient, with poor paper quality, and many typographical errors. Ivan Turgenev and Aleksandr Ostrovsky, promised submissions that never materialized, and the censors suppressed articles by Nikolai Strakhov. Issues were frequently delayed, which prompted refunds to the limited subscribers. The journal folded in January of 1865, less than a full year in operation. See K.A. Lantz, *The Dostoevsky Encyclopedia*, 127.

⁸⁰ Richard J. Rosenthal, "Gambling" in *Dostoevsky in Context*, ed. Deborah Martinsen and Olga Maiorova, (Cambridge: Cambridge UP, 2015), 148.

⁸¹ «И все же мы видим ясное указание на потенциальную способность источников длительного риск-излучения регулировать социодинамику общества и психодинамику индивида.» Aleksandr Sekatskii, "Stikhia azarta: pervoe pogruzhenie" in *Logos*, No. 5, (2013), 241.

Every action in life involves some kind of risk or peril. Extreme aversion to risk would reduce the human condition to complete immobility.

Stemming from Dostoevsky's knowledge of probability and his involvement in contemporary debates, the associated "dynamics" of risk and games of chance feature prominently in his philosophical treatments of determinism, the premise of free will, and the existence of God. Undercurrents in *The Gambler*, for example, seem conversant with the writings of Pascal. Following the model of "Pascal's Wager," faith takes the form of a gamble, whereby a human subject has everything to gain and nothing to lose by upholding the existence of a God. In the early stages of *The Gambler*, Dostoevsky seems to have been prepared to take the narrative in this general direction. His comments to Strakhov, for example, the text seems to mirror the basic premise of "Pascal's Wager": "I am taking a straightforward nature, of a man, nonetheless, much developed, but in every regard still immature, who has lost faith and *does not dare not* believe, revolting against the authorities and fearing them."⁸² It is interesting that the final version of the text seems generally devoid of arguments framed in the context theology or Christian metaphysics.

In Dostoevsky's lifetime, the subject of *entropy*, or the lack of order and predictability in a given system, became a central debate in mathematical and scientific discourses.⁸³ As a

⁸² «Я беру натуру непосредственную, человека, однако же, многоразвитого, но во всем недоконченного, изверившегося и не смеющего не верить, восстающего на авторитеты и боящегося их.» (PSS 28, bk. 2, 50).

⁸³ "Still in the 19th century, entropy was introduced as a measure of physical disorder. Unlimited growth of entropy means destruction, disintegration, chaos. While engineers studied entropy in relation to mechanical systems, specialists in the social sciences also applied the terminology to describe the proliferation of liberal ideas that contributed to the appearance of political factions that opposed the centralized power of the autocratic state." «Еще в XIX веке энтропия была введена как физическая мера беспорядка. Неограниченный рост энтропии означает разрушение, распад, полный хаос, а в перспективе – «тепловую смерть»». Vardan Torosian, *Istoriia obrazovaniia i pedagogicheskoi mysli: uchebnik dlia studentov vuzov* (Moscow: DirectMedia, 2015), 397; see also Aleksandr Dugin, *The Fourth Political Theory*, ed. John B. Morgan, trans. Mark Sleboda & Michael Miller (London: Arktos Media, 2012), 172; Elena Petrovna Kazban, *Liberalizm kak politicheskoe techenie i al'ternativa radikalizmu* (Moscow: GUU, 2008), 75.

property of thermodynamics, the entropy of one system, when connected to another, will never decrease. It will only stay the same, or increase. Although roulette would seem to function according to static, regulated entropy, in the sense that numbers are not arbitrarily added to the wheel, its overarching unpredictability comes to affect the external world of players participating in the game. The variability of roulette subsumes all players involved, resulting in the random ascription of winners or losers. Roulette, in these terms, comes to embody a kind of contagious chaos that infects the behavior of players, who often become addicted to the thrill of the game. The randomness of the spin, consequently, increases the entropy in the lives of their gamblers and their corresponding societies.

Roulette became popular in the aristocratic salons of 18th-century France. The invention of roulette is largely credited to the polymath Blaise Pascal (1623-1692), who developed the game as an unexpected result of his search for a perpetual-motion machine.⁸⁴ In addition to roulette, Pascal developed pioneering work on mechanical calculating machines, made exceptional breakthroughs on probability theory in collaborations with Pierre de Fermat, invented the syringe and hydraulic press, developed studies in geometry, fluid dynamics, and

⁸⁴ Gambling historians disagree over the origins of roulette. According to some, Pascal invented roulette in 1655, on a monastic retreat, when he performed early experiments of reducing spin friction with ball-bearings. Others claim that it was invented by a French monk to help relieve the monotony of monastery life. Earlier versions of the game likely occurred in ancient Greece with soldiers spinning shields on sword points, and the Roman emperor Augustus had a rotating chariot wheel installed in the gaming room of his palace. Another interpretation links the development of roulette with an old Chinese game involving a spinning wheel, and thirty-seven haphazardly placed miniature statues. Variations of the game occurred in many different historical periods and cultures. The modern form of roulette, similarly, expressed the fusion of English wheel games, including Roly-Poly, Reiner, and Ace of Hearts, with the Italian lottery board games of Hoca and Biribi. Jaroslaw Strzalko, Juliusz Grabski, et al., *Dynamics of Gambling: Origins of Randomness in Mechanical Systems* (New York: Springer, 2009), 4; see also Brian Everitt, *Chance Rules: An Informal Guide to Probability, Risk and Statistics* (New York: Springer, 2008), 56; David G. Taylor, *The Mathematics of Games: An Introduction to Probability* (Boca Raton, FL: Taylor & Francis, 2015), 25; M.B. Goldstein, *The Newest Testament: A Secular Bible* (Bloomington, IN: Archway, 2013), 506.

heat transfer, while notably clarifying the physical concepts of pressure and vacuum.⁸⁵ Aside from his mathematical and scientific work, Pascal produced a number of theological and philosophical treatises probing the hypothetical existence of God, the relationship of man to nature, and overarching ontological basis of life.

The game is played at a table with a wheel and a betting area.⁸⁶ The wheel rotates around a vertical axis, and is located in a shallow bowl with a concave groove, along which the ball can smoothly revolve around the wheel spinning in the opposite direction. The bowl retains the ball and prevents it from flying outside as it would via intrinsic centrifugal forces, after being set in motion by the croupier.⁸⁷

Every new spin corresponds to a new round of betting in roulette. The game is among the simplest of all casino games, and players can readily infer the meaning of their bets based on the color associations of the wheel pockets and the board. The fact that the game is understood almost without the communicative assistance of language contributes to its popularity. Unlike

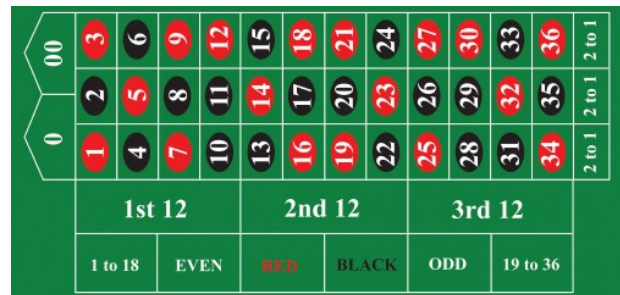
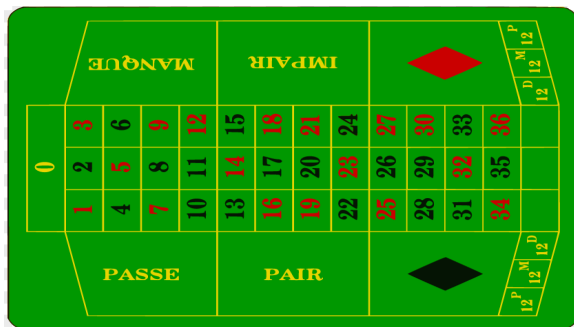
⁸⁵ Blaise Pascal, *Thoughts on Religion, and Other Subjects by Blaise Pascal*, trans. Rev. Edward Craig (Edinburgh: H.S. Baynes, 1825), 17-18.

⁸⁶ Every roulette wheel has two central pieces- an external housing, known as a bowl, and a central piece, which rotates, known as a wheel-head. The standard bowl for American roulette tables is 32" in diameter, and is usually made of solid wood, however, sometimes it is metal or plastic with wood paneling. The bowl mechanism includes a ball track, a lower ball track (apron) with ball deflectors and a vertical component, known as spindle, which supports the rotating wheel-head. The wheel-head is placed inside the bowl and has a diameter of 20" and it is fitted with upper and lower ball-bearing mechanisms to facilitate its spinning. The outer edge of the wheel-head features a circle of numbers, while inside these numbers is where the ball pockets are placed. The wheel head is shaped like a cone that directs the ball to the pockets. Christopher Pawlicki, *Get the Edge at Roulette: How to Predict Where the Ball Lands!* (Chicago: Bonus Books, 2001), 91.

⁸⁷ Irregularities can sometimes occur in the game of roulette. A "no spin" may be announced in the instance when something falls into the wheel that obstructs the path of the ball, or if the croupier makes an unexpected mistake when spinning the ball and wheel, causing the the ball to make less than three revolutions around the roulette cylinder. If the croupier spins the wheel at a high velocity, the ball may bounce off the table upon making contact with the pocket dividers. Also, many casinos have special house rules for the rare situation of a "floater" when the ball does not drop into a single slot. Gambling guidebooks often instruct roulette players to look for a croupier's spin signature, i.e. a consistent spin pattern. One dealer may spin 10 revolutions on average, and another 7. In principle, this kind of calculation could give a player some insight into where the ball would fall with questionable reliability. Frank Scoblete, *Spin Roulette Gold: Secrets of Beating the Wheel* (Chicago: Bonus Books, 1997), 99-100.

dice, card games, and sports book, tourists and foreign visitors can easily intuit the rules of roulette. As a general rule of the casino business, any and all with the money to play should be invited to do so.

There are several different varieties of roulette. The French and American versions of the game are the most popular, but there are key differences that influences the statistics of the game.



The French roulette wheel (bottom left) has 37 numbers on it, whereas the American wheel (bottom right) has 38. Aside from betting individual outcomes, players can bet *rouge* or *noir*, *pair* or *impair* (even or odd), *manque* (1-18) or *passee* (19-16), or *premiere douzaine* (1-12), *moyenne douzaine* (13-24), and *derniere douzain* (25-36). The French style of roulette is more advantageous for the player than its American counterpart. A given number has a 1 in 37 chance

of appearing in French roulette, as opposed to a 1 in 38 chance in the American system with both a single zero and a double zero.

The betting habits of Antonida Vasilievna express her fascination with the zero. This affinity assumes additional aesthetic importance as it relates to the personality of the protagonist. Just as she relies on Aleksei Ivanovich to introduce her to the games, so too, does she rely on the zero as her favorite wager. She becomes fascinated that this number pays 35 to 1, and questions humorously, if the “other players are fools for not betting it.”⁸⁸ Aleksei Ivanovich, as the result of these aesthetic parallels, comes to embody metaphorically the zero not only as it appears on the roulette wheel, but perhaps more broadly, as it occurs in nature.

In the arithmetic operations of multiplication, the product of 0 and any other number, including both positive and negative numbers, yields 0: $0 \times N = 0$. Although Aleksei Ivanovich may be up one day, and down in debtor’s jail the next, his obsession with the game assuredly reduces his financial holdings to zero following Cardano’s Law of Large Numbers. The zero in this vein, furthermore, could be viewed as the repetition of the null set.

The presentation of 0 in the novel comes to reflect elements of Russian Orthodoxy, namely *smirenie*, or abject self-negation, and kenosis, and the process of self-emptying to be more receptive to God’s will.⁸⁹ Her betting habits seemingly indicate a conflation of these two principles, and her resulting confusion and losses demonstrate ultimately the failures of her non-Orthodox path. At first, Antonida Vasilievna senses in the zero a mysterious, even mystical quality that guides her conduct and play at the table. During her first trip to the gaming halls, she

⁸⁸ “What! Thirty-five times?, and does it turn up often? Why don’t they stake on it, the fools.”

«Как, в тридцать раз, и часто выходит? Что ж они, дураки не ставят?» (*PSS* 5, 263).

⁸⁹ Edith Clowes, “Self-Laceration and Resentment: The Terms of Moral Psychology in Dostoevsky and Nietzsche” in *Freedom and Responsibility in Russian Literature: Essays in Honor of Robert Louis Jackson*, (Evanston, IL: Northwestern UP, 1995), 119; see also Nina Wieda, *How the Russian Soul is Made: Secular Kenosis in Russian Literature*, (Northwestern University, PhD Dissertation, 2010), 12. Accessed online through Proquest: <<http://search.proquest.com/docview/305210862>>.

successfully stakes zero three times in a row, bringing her immense fortune. Her winnings are not merely the results of blind, dumb luck. They symbolize the deep-rooted nature of her faith and spirituality, the miracle that nothing should become something.

Having won a fortune by staking the zero, Antonida Vasilievna changes her betting habits, making one last victorious bet on red, before retiring with twelve thousand florins and a bag of gold in her purse. This change of play paradoxically sets the stage for her financial downfall, but perhaps commences her spiritual windfall through kenosis, as she rousts Aleksei Ivanovich at 3:30 A.M. to return to the tables.⁹⁰ While her losses could be viewed in terms of kenosis, there is irony associated with her obsessive gambling habits, as she would have done better not playing at all, and building the church at the outset with her original sizable fortune.

When she starts losing, she appeals to two Polish swindlers, conceivably representing the influence of the Catholic Church in Russia in this metaphorical model, who steal from her scarce remaining holdings, and bicker with each other on the proper way to bet.⁹¹ Antonida Vassilievna

⁹⁰ The recurrence of the number three in this scene is suggestive of Christian motifs, e.g. the trinity, the three wise men. Even the time at which her servant Potapych knocks on her door suggests a parallel to biblical numerical imagery.

⁹¹ This scene in *The Gambler* reflects a situational parallel with the squabbling Poles at Marmeladov's funeral in *Crime and Punishment*. After Luzhin accuses Sonia of theft, and Raskolnikov wins over the gathered crowd with his ardent defense, three drunkards shout, “‘The pan is a laidak!’ muttering threats in Polish” [«‘пане лайдак,’ причем бормотали еще какие-то угрозы по-польски»] (*PSS* 6, 309). The Poles assume a more menacing status in *The Gambler*: “Several Poles in succession guided Granny’s operations in the course of the day. She began by dismissing the Pole whose hair she had pulled the day before and taking on another, but he turned out almost worse. After dismissing the second, and accepting again the first, who had never left her side, but had been squeezing himself in behind her chair and continually poking his head in during the whole period of his disgrace, she sank at last into complete despair. The second Pole also refused to move away; one stationed himself on her right and the other on her left. They were abusing one another the whole time and quarreling over the stakes of the game, calling

comes to represent Russia, and her deviation from both the zero and Aleksei Ivanovich expresses her loss of faith. Her interactions with the Poles express the detriment of her intrigue with foreign beliefs, as opposed to holding steadfast to the faith she knows in her heart.

Although zero is marked by a quality of absence, there is something very profound about it from both the perspective of spirituality and mathematics. In mathematics, dividing any number by 0 produces the befuddling result of “undefined.” However, if you position a very small number in the denominator, i.e. a number that approaches 0 without actually reaching it, the quotient of the associated operation, in turn, asymptotically approaches infinity. From a spiritual perspective, moreover, following the directive of Christ, “to love thy neighbor as thyself,” requires complete self-abnegation (*smirenje*), or reducing oneself as much as possible.⁹² The process that individuals undertake to reduce their value to zero serves to exponentially increase the value of fellow human subjects. The manifestation of pious submission is distorted in the novel, because none of the characters humbles themselves before God, let alone before each other. Instead, they infuse into the game of roulette, the material, psychological, and spiritual energy, which according to Dostoevsky, should be directed into life.

each other ‘laidak’ and other Polish civilities, making it up again, putting down money recklessly and playing at random....The luckless Potapych told me all this the same evening almost with tears, and complained that they stuffed their pockets with money, that he himself had seen them shamelessly steal and contually thrust the money in their pockets.” «Полячки руководившие бабушку, сменялись в этот день несколько раз. Она начала с того, что прогнала вчерашнего полячка, которого она драла за волосы, и взяла другого, но другой оказался почти что еще хуже. Прогнав этого и взяв опять первого, который не уходил и толкался во всё это время изгнания тут же, за ее креслами, поминутно просовывая к ней свою голову, - она впала наконец в решительное отчаяние. Прогнанный второй полячок тоже ни за что не хотел уйти; один поместился с правой стороны, а другой с левой. Всё время они спорили и ругались друг с другом за ставки и ходы, обзывали друг друга «лайдаками» и прочими польскими любезностями, потом опять мирились, кидали деньги без всякого порядка, распоряжались зря....Несчастный Потапыч рассказывал мне всё это со слезами в тот самый вечер, после проигрыша, и жаловался, что они набивали свои карманы деньгами, что он сам видел, как они бесовестно воровали и поминутно совали себе в карманы» (*PSS* 6, 282).

⁹² Gospel of Mark, Chapter 12, Verse 31. *The Holy Bible*, Revised Standard Version (New York: Oxford UP, 1973), 1231.

Whereas the model of Christianity in the Gospel encourages forgiveness, the presentation of roulette admits no mercy. It subjects all players to accept their fates unquestioningly, and without any say in the matter. In life, the players possess the freedom to choose and act in varying social contexts. Although not mentioned in *The Gambler*, some French roulette games offer special rules that work to the benefit of the player. Following *La Partage rule*, for example, the player loses only half his bet when he has bet red, black, high, low, even or odd and the zero appears.⁹³ Even more favorable, although virtually extinct in French casinos, *En prison rule* states the player's bet will remain intact when he has bet red, black, high, low, odd, or even and the zero has come.⁹⁴ The outcome of the next spin will decide if the player wins or loses the bet.⁹⁵ Second chances and improved odds for players, however, do not contribute to the successful business model of a gaming hall. Unfortunately, the casinos in Roulettenburg offer players neither of these additional protections. Perhaps if Aleksei Ivanovich had desired to lose even faster than he did in the novel, he should have traveled to an American casino, where the capitalistic inclusion of the double zero slot worsens the odds for individual numbers to hit.

In his own betting habits, sticking to a regimented "system" remained a primary component of the composure that Dostoevsky sought to keep up in the boisterous company of gamblers around the roulette wheel. There is no definitive identification of the playing style that Dostoevsky used to regulate either his betting and emotions. Gambling experts and aficionados developed and implemented many different strategies to improve their presumed chances, and it

⁹³ Richard A. Epstein, *The Theory of Gambling and Statistical Logic*, (Waltham, MA: Academic Press, 2013), 148.

⁹⁴ Victor H. Royer, *Powerful Profits from Casino Table Games* (New York: Kensington, 2004), 50.

⁹⁵ *Ibid.* 50

seems likely that Dostoevsky may have tried out several different methodologies, or used them in conjunction with one another.⁹⁶

The term “gambling expert” is something of an oxymoron when it comes to roulette. Following Gerolamo Cardano’s treatise, “Law of Large Numbers Theorem,” in his *Liber de Ludo Aleae*, although a single game may exhibit deviations in the probability of expected outcomes, a large number of games will demonstrate the asymptotic convergence of experimental results with corresponding theoretical calculations.⁹⁷ This is the central business model of the entire casino industry. Although players may win in the short term, their drive to keep playing realigns their empirical gains with the long-term advantage preserved by the house. Consequently, gamblers have the best odds of winning in games where they play against each other and not the statistical benefit of the casino itself.⁹⁸ Professional gamblers, accordingly, occupy themselves generally with games that reward skill, cunning, and insider insight, such as poker, bridge, backgammon, or sports book. Amateur casino gamblers, on the other hand, find that over time, as a principle of Cardano’s “Law of Large Numbers Theorem,” their money steadily transfers back to the casino, and they urgently sense the need for new employment.

⁹⁶ There are dozens, if not hundreds of betting strategies popularized in the genre of gambling guide books. One of the books that Dostoevsky purchased, *German California: Roulette and Trente-et-Quarante, a Sure Way to Make an Income of 100,000 Francs*, (Paris), 1862 provides “guarantees” that players will amass fortunes at the casino tables by following its associated guidelines. See also Geir Kjetsaa, *Fyodor Dostoevsky: A Writer’s Life*, 156.

⁹⁷ There is no exact date for *Liber de Ludo Aleae*, but it was written at some point in the mid-16th century. It was published posthumously in 1663. Samuel S. Wilks, Foreword to *The Book on Games of Chance: The 16th-Century Treatise on Probability* by Gerolamo Cardano, trans. Sydney Henry Gould (New York: Holt, Rinehart and Winston Inc., 1961), iii.

⁹⁸ Every casino game has percentages of defeat built into it for the player. Blackjack, depending on the number of decks, presents the house with 1.2-2% differential, when gamblers use perfect strategy. Players frequently make mistakes, or fail to understand the rules of the game. In these ‘normal’ circumstances, blackjack players find themselves at a 10-20% disadvantage. Even when players possess the ability to count cards, they are statistically less likely to win. Baccarat has a 1.17-14.1% differential. Craps favors the house 1.4%-16.7% with normal bets, .8% with single bets, and .6% with double odds bets. American roulette runs at a 5.26% advantage to the house when the player bets either red or black, and European roulette is slightly more favorable to players at 4.37%. James Walsh, *True Odds* (Santa Monica, CA: Merritt Publishing, 1996), 6

Although explicit details of the particular betting system that Dostoevsky used in casinos are not directly known, Richard J. Rosenthal examines the Martingale System and the Monte Carlo Method as the two most prominent approaches to roulette throughout the nineteenth century.⁹⁹ Of the wide variety of gambling systems in practice, the Martingale system is one of the oldest strategies in roulette. It calls for a double-up-after-you-lose progressive system.¹⁰⁰ The payout for betting red or black is 1 to 1. For example, if you bet \$5 on black, and the ball falls to red, you would double your next bet to \$10. If you lose the second bet, you would be down \$15 (\$5 + \$10). Double again with a bet of \$20 (\$10 + \$10), and a winning spin would bring you winnings in the amount \$20, enough to cover the \$15 that you lost in the two previous spins, and \$5 extra. Additionally, you could keep the \$20 from the original winning stake. At this juncture, you could decide to walk away with your winnings, or continue to bet them on new spins.

Over time, however, this method would prove perilous. Although individual spins may demonstrate statistical aberrations, the process considered over a great magnitude of spins would illustrate the advantage of the house. The Monte Carlo method, consequently, following Cardano's Law of Large Numbers is not statistically sound, but gamblers subscribe to it all the same. Before the days when electronic tickers or display boards would come to hover over the roulette wheel, players would bring notebooks to casinos to record the outcomes of successive spins, or perhaps commit them to memory. If you were to ask a gambler what the odds would be of the ball falling to black in seven successive spins, the answer would seem to be just under 1% (.00644% to be more exact). You could determine the probability exactly on a European wheel by raising $(18/37)$ to the seventh power. The number 18 is selected, because it is the number of black numbers on the total wheel, comprised of 37 possible outcomes.

⁹⁹ Richard J. Rosenthal, "Gambling" in *Dostoevsky in Context*, ed. Deborah Martinsen and Olga Maiorova, (Cambridge: Cambridge UP, 2015), 149-150.

¹⁰⁰ Victor H. Royer, *Powerful Profits from Casino Table Games* (New York: Kensington, 2004), 50.

The underlying premise of this strategy, referred to in popular terms as the Gambler's Fallacy, is the mistaken belief that if something happens more frequently than normal during some period, then it will happen less frequently in the future, and vice-versa.¹⁰¹ In roulette, for example, if a series of red outcomes occur in succession, gamblers will superstitiously expect that the ball has a greater than normal probability of falling to black.¹⁰² In situations where what is being observed is truly random, i.e. independent trials of a random process, the odds of each successive spin remain the same. The ball always has an (18/37) chance of falling to black regardless of the previous sequence of succession.

Aleksei Ivanovich even alludes implicitly to the Gambler's Fallacy in his most felicitous trip to the casino, when he won 100,000 florins, nearly quadruple the amount Polina reported she needed to repay a debt of 50,000 francs, which she wished to throw in the face of her presumed lover, and stepfather's creditor, Monsieur de Grioux.¹⁰³ Before deciding to place his own bets, Aleksei Ivanovich recalls in his thoughts, "Three days ago I had heard that during the previous week there had been a run of twenty-two coups on the red- an occurrence never before known at roulette- so that men spoke of it with astonishment. Naturally enough, many deserted the red

¹⁰¹ Barry H. Cohen, *Explaining Psychological Statistics* (Hoboken, NJ: John Wiley & Sons, 2008), 689-690.

¹⁰² Ibid. 690

¹⁰³ It is unclear if Aleksei Ivanovich converts his florins to francs in a currency exchange that is omitted in the narration of his good fortune, or if he calculates the exchange rates in presenting the funds to Polina. The omission of the currency exchange serves to obfuscate the nature of what is both won and lost. Individuals readily exchange money for goods and services, including other forms of money, but love and human intimacy follow different evaluative criteria. In the sense that Aleksei comes to embody a living preference for monetary gains, he loses out on a budding romance with Polina. True love cannot be redeemed for coin. If he calculates the exchange rate in his head, then perhaps he does so to appeal to the specific dilemma of Polina in need of francs. The hybridity of fiscal instruments staked on the games echoes the diversity of voices and languages interjected by degenerate gamblers in the scene. At the casino, he hears: "The Monsieur has already one hundred thousand florins," I heard a voice say near me. «Monsieur a gagné déjà cent mille florins», - раздался подле меня чей-то голос. Я вдруг очнулся. Как? Я выиграл в этот вечер сто тысяч флоринов! Да к чему же мне больше?» (*PSS 5*, 295). When he returns to Polina in his hotel room, however, he declares proudly, "I won two hundred thousand francs!" «Я выиграл двести тысяч франков,- вскричал я...» (*PSS 5*, 295).

after ten rounds, and practically no one could now be found to stake upon it.”¹⁰⁴ Aleksei

Ivanovich carried on in a similar vein in a similar scene:

Yet some whim or other led me, on remarking that the red had come up consecutively for seven times, to attach myself to that color. Probably this was mostly due to self-conceit, for I wanted to astonish the bystanders with the riskiness of my play. Also, I remember that- oh, strange sensation! I suddenly, and without any challenge from my own presumption, became obsessed with a *desire* to take risks....All of a sudden I heard exclamations arising that the whole thing was a marvel, since the red was turning up for the fourteenth time!¹⁰⁵

The consideration that Dostoevsky may have known about the Gambler’s Fallacy infuses the scene with irony. That is, the “risky” behavior that Aleksei Ivanovich is not truly risky, since on every spin of the wheel, the ball is an 18 in 37 chance of falling to red. The spins are all independent events. Instead of taking a meaningful risk, such as attempting to reconnect with Polina, or to move on, and find someone else to spend his life with, Aleksei Ivanovich descends into the abyss of a game where the odds will always be against him. At least in love, he’d stand a fighting chance of finding sustained happiness and fortune.

Mathematicians working at the Academy of Sciences in the 18th and 19th centuries, coincidentally, turned their attentions to the question of statistical analysis of games involving infinite gains. As one of their last projects in Russia, before returning to safer political climates in the West in 1737-1738, the Bernoullis and Leonhard Euler worked on a problem that came to

¹⁰⁴ «Я слышал еще третьего дня, что красная, на прошлой неделе, вышла двадцать два раза сряду; этого даже и не запомнят на рулетке и рассказывали с удивлением. Разумеется, все тотчас же оставляют красную и уже после десяти раз, например никто не решается на нее ставить». (*PSS 5*, 294).

¹⁰⁵ «Но я, по какому-то странному своенравию, заметив, что красная вышла семь раз сряду нарочно к ней привязался. Я убежден, что тут наполовину было самолюбия; мне хотелось удивить зрителей безумным риском, - о странное ощущение – я помню отчетливо, что мною вдруг действительно без всякого вызова самолюбия овладела ужасная жажда риску....Кругом кручали, что это безумно, что красная уже выходит четырнадцатый раз!» (*PSS 5*, 294-295).

be known as the “St. Petersburg Paradox.”¹⁰⁶ The problem entails a theoretical gambling scenario with an infinite potential return, and the associated risk-analysis of the game is still referred to often in the disciplines of statistics and economics. During the time of Dostoevsky’s education, treatments of the problem were presented in the 1843 compendium of commentaries by Leonhard Euler, published by the Imperial Academy of Sciences.¹⁰⁷

The analysis of the “St. Petersburg Paradox” hinges upon a theoretical lottery game that leads to a random variable with infinite payout, which counter-intuitively seems to be worth only a very small amount to the participants.¹⁰⁸ Dominic Klyve and Anna Lauren demonstrate the problem in the context of a hypothetical coin flip:

Imagine, for example, that a casino offered a game, whose outcome would be decided by the flip of a fair, 2-sided coin. If the player flips “heads” on the first flip, the house pays out \$2. If the first “heads” occurs on the second flip, the house pays \$4. In general, if heads first comes up on the n th flip, the house pays $\$2^n$. How much should the gambler pay to play this game? Or in modern terminology, *What is the expected value of this game?* The answer hinges on a paradox.¹⁰⁹

Although this type of game would be devastating for the business model of a casino, if such a lottery system were to be incorporated into a given gaming hall, what would be a fair price required of players to play?¹¹⁰

If the initial stake is set at \$1, following Cardano’s Law of Large Numbers, half the time, the player wins only \$1, and gamblers are 75% likely to end up with a payment of \$4 or less.¹¹¹

¹⁰⁶ Dominic Klyve and Anna Lauren, “An Empirical Approach to the St. Petersburg Paradox” in *The College Mathematics Journal*, Vol. 42, No. 4 (September 2011), 260-261; see also Karen Marta and Simon Castets, *The St. Petersburg Paradox* (New York: Swiss Institute Karma, 2015), 3-4.

¹⁰⁷ Leonhard Euler, *Correspondance mathématique et physique de quelques célèbres géomètres du XVIIIeme siècle*, ed. P.H. Fuss (St. Peterburg: Imperial Academy of Sciences, 1843), 243.

¹⁰⁸ Michael D. Weiss, *Conceptual Foundations of Risk Theory* (New York: U.S. Department of Agriculture Economic Research Service, 1987) Technical Bulletin Number No. 1731. 36

¹⁰⁹ Dominic Klyve and Anna Lauren, “An Empirical Approach to the St. Petersburg Paradox”, 260-261.

¹¹⁰ Most models situate the game as allowing gamblers in the lottery to play once and only once.

¹¹¹ Robert Martin, “The St. Petersburg Paradox” in *The Stanford Encyclopedia of Philosophy*, Ed. Edward N. Zalta. 21 June 2014.

Accessed online at: <<http://plato.stanford.edu/archives/sum2014/entries/paradox-stpetersburg/>>.

The chances of winning more than \$25 are less than one in 25.¹¹² Very low payments are highly likely, just as high ones are very rare.¹¹³ In the 1980 article, “Strange Expectation” in *Philosophy of Science*, mathematician Ian Hacking reflects, “for this gamble to be rational, the prize must be enormous...What is worth more than a million times your life-savings? You don’t know. Your intuitions boggle when considering this gamble...Few of us would pay even \$25 to enter such a game.” The expected payout of the game is infinite. The paradox entails the discrepancy between what people seem willing to pay to enter the game relative to its infinite expected value. Following the original 1738 assessment of Daniel Bernoulli, a player should pay any price to take part in a game with a potentially infinite return.

Love, like faith, comprises an entity capable of bringing about seemingly infinite happiness. Following the logic of Pascal’s Wager and the Petersburg Paradox, human subjects have everything to gain from love, just as they also do from belief in God.¹¹⁴ The abandoned relationship between Aleksei Ivanovich and Polina equates, in these terms, to an infinite loss, or rather, the missed opportunity to experience infinity in its combined material, ideological, and spiritual potential. Polina, feeling spurned by Aleksei, moves to Switzerland with Mr. Astley, where she enjoys his material comforts and stability. She strangely yearns for the image of De Grioux when they first commenced their affair, while also maintaining a lingering curiosity of Aleksei Ivanovich.¹¹⁵ The protagonist, accordingly, is not the only one who loses. Both he and

¹¹² Ibid.

¹¹³ Ibid.

¹¹⁴ Love could be viewed as an extension of God. It is like one of Zosima’s “other-worldly seeds” implanted in the hearts of men that allows humanity to sense mystically stimuli and motivations beyond the realm of physical, material experience.

¹¹⁵ Aleksei surmises the questions of Polina’s romantic desires to Mr. Astley: “Miss Polina- forgive me, the word is spoken and one can’t take it back- needs a long, long time to bring herself to prefer you to the scoundrel De Grioux. She thinks highly of you, becomes your friend, opens all her heart to you; but yet the hateful scoundrel, the base and petty money-grubber, De Grioux will still dominate her heart. Mere

his intended love interest, either by social circumstance, or the will of the implied author-creator of Dostoevsky, forfeit the romantic union that could have infinitely satiated their thoughts, bodies, and souls. They settle for the next best thing: the false projection of memory, the reliance on flawed systems, and the imaginative contemplation of what might have been.

obstinacy and vanity, so to say, will maintain his supremacy, because at one time this De Griex appeared to her with the halo of an elegant marquis, a disillusioned liberal, who is supposed to have ruined himself to help her family and her frivolous stepfather. All these shams have been discovered later on. But the fact that they have been discovered makes no difference: anyway, what she wants is the original De Griex- that's that's what she wants! And the more she hates the present De Griex, the more she pines for the original one, though he existed only her imagination. You're a sugar-boiler, Mr. Astley." «Мисс Полине же – простите, сказанного не воротишь- нужно очень, очень долгое время решаться, чтобы предпочесть вас мерзавцу Де-Грие. Она вас и оценет, станет вашим другом, откроет вам всё свое сердце; но в этом сердце все-таки будет царить ненавистный мерзавец, скверный и мелкий процентщик Де-Грие. Это даже останется, так сказать, из одново упрямства и самолюбия, потому что этот же самый Де-Грие явился ей когда-то в ореоле изящного маркиза, разочарованного либерала и разорившегося (будто бы?), помогая ее семейству и легкомысленному генералу. Все эти проделки открылись после. Но это ничего, что открылись: все-таки подавайте ей теперь прежнего Де-Грие – вот чего ей надо! И чем больше ненавидит она терперешнего Де-Грие, тем больше тоскует о прежнем, хоть прежний и существовал только в ее воображении. Вы сахаровар, мистер Астлей?» (PSS 5, 316).

Chapter Five

“There is no virtue, if there is no immortality”: Non-Euclidean Metaphysics and the Fallibility of Scientific Determinism in “Dream of a Ridiculous Man” and *The Brothers Karamazov*

“There is a concept that corrupts and upsets all others. I refer not to Evil, whose limited realm is that of ethics; I refer to the infinite.”¹

~Jorge Luis Borges, “Avatar of the Tortoise” [*Avatares de la Tortuga*”]

“I had expected complete non-existence and that was why I shot myself through the heart. And yet there I was in the hands of a being, not human of course, but which *was*, which existed. ‘So there is life beyond the grave!’ I thought with the curious irrelevance of a dream, but at heart I remained essentially unchanged. ‘If I must *be* again,’ I thought, ‘and live again at someone’s unalterable behest, I won’t be defeated and humiliated!’”²

~The Ridiculous Man, Chapter III “Dream of a Ridiculous Man”

“For what are we aiming at now? I am trying to explain as quickly as possible my essential nature, that is what manner of man I am, what I believe in, and for what I hope, that’s it, isn’t it? And therefore I tell you that I accept God simply. But you must note this: if God exists and if He really did create the world, then, as we all know, He created it according to the geometry of Euclid and the human mind with the conception of only three dimensions of space. Yet there have been and still are geometers and philosophers, and even some of the most distinguished, who doubt whether the whole universe, or so to speak more widely, the whole of being was only created in accordance with Euclid’s geometry; they even dare to dream that two parallel lines, which according to Euclid can never meet on earth, may meet somewhere in infinity. I have come to the conclusion that, since I can’t understand even that, I can’t expect to understand about God. I acknowledge humbly that I have no faculty for settling such questions, I have a Euclidean, earthly mind, and how could I solve problems that are not of this world.”³

~Ivan in Book V, *Pro and Contra*, Chapter III, “The Brothers Get Acquainted”

¹ Jorge Luis Borges, “Avatar of the Turtle” in *Labyrinths: Selected Stories and Other Writings*, ed. and trans. Donald A. Yates and James East Irby, (New York: New Directions, 2007), 202

² «Я ждал совершенного небытия и с тем выстрелил себе в сердце. И вот я в руках существа, конечно, не человеческого, но которое *есть*, существует: ‘А, стало быть, есть и за гробом жизнь!’—подумал я с странным легкомыслием сна, но сущность сердца моего оставалась со мною во всей глубине: ‘И если надо *быть* снова, -- подумал я, -- и жить опять по чьей-то неустрашимой воле, то не хочу, чтоб меня победили и унизили!’» (*PSS* 25, 110).

³ «Ведь у нас с тобой какая теперь задача? Задача в том, чтоб я как можно скорее мог объяснить тебе мою суть, то есть что я за человек, во что верую и на что надеюсь, ведь так, так? А потому и объявляю, что принимаю бога прямо и просто. Но вот, однако, что надо отметить: если бог есть и если он действительно создал землю, то, как нам совершенно известно, создал он ее по эвклидовой геометрии, а ум человеческий с понятием лишь о трех измерениях пространства. Между тем находились и находятся даже и теперь геометры и философы, и даже из замечательнейших, которые сомневаются в том, чтобы вся вселенная или, еще обширнее- всё бытие было создано лишь по эвклидовой геометрии, осмеливаются даже мечтать, что две параллельные линии, которые, по Эвклиду, ни за что не могут сойтись на земле, может быть, и сошлись бы где-нибудь в бесконечности. Я, голубчик, решил так, что если я даже этого не могу понять, то где ж мне про бога понять. Я смиренно признаюсь, что у меня нет никаких способностей разрешать такие вопросы, у меня ум эвклидовский, земной, а потому где нам решать о том, что не от мира сего.» (*PSS* 14, 241).

Unlike professional discourses that had existed throughout different historical periods in the West, philosophy did not develop as an independent discipline in Russian culture arguably until the late-nineteenth or early-twentieth century.⁴ During the rule of Nikolai I, philosophy was even banned as an academic discipline, and it was not reinstated at Russian schools and universities until 1863.⁵ Philosophy was rejected not only because it was deemed irrelevant for spiritual salvation, following prescribed teachings and metaphysical formulations of the Russian Orthodox Church, but also because it could lead men – in the words of the nineteenth-century Old Believer Pavel Liubopytny, “to contemplate the overthrow of kingdoms.”⁶ Fearing increased self-realization, leaders of state suppressed explicit manifestation of philosophy and studies of the human condition to preserve the status quo, which situated the autocracy in a favorable

⁴ Yuri Krizhanich (1618-1683), Pyotr Chaadaev (1794-1856), and Aleksandr Gertsen (1812-1870) would seem to embody ostensible outliers to this argument, however, none of these three was popularly accepted nor supported by Russian society. Chaadaev was deemed “clinically insane,” while Krizhanich and Gertsen were both exiled. After failing to introduce Western philosophical ideas into seventeenth-century Russian life, Krizhanich lamented, “The Russians are philosophers not in words, but in deeds.” Yuri Krizhanich: “Russi inquam non verbis sed rebus sunt filosofi,” in *Dialogus de Calumniis*, 1A, 1958, No. 1, 162. As cited by James Billington, *Icon and Axe: An Interpretive History of Russian Culture* (New York: Vintage Books, 1970), 310. For commentary on Chaadaev, see Edith W. Clowes, *Fiction's Overcoat: Russian Literary Culture and the Question of Philosophy* (Ithaca: Cornell UP, 2004), 37; G.M. Hamburg and Randall A. Poole, “Introduction: The Humanist Tradition in Russian Philosophy” in *A History of Russian Philosophy 1830-1900: Faith, Reason and the Defense of Human Dignity* (New York: Cambridge, UP, 2010), 10. For commentary on Gertsen, see Isaiah Berlin, “Introduction” to *My Past and Thoughts: The Memoirs of Alexander Herzen*, ed. Dwight Macdonald, trans. Constance Garnett (Berkeley, CA: UC Berkeley UP, 1973), xxxv.

⁵ Due to its connection with political upheaval and modernization, the Russian autocracy so distrusted philosophy that the discipline was banned between 1826 and 1863. Until 1889, moreover, philosophy could only be taught through commentaries on selected texts of Plato and Aristotle. Bernice Glatzer Rosenthal and Martha Bochachevsky-Chomiak, “Introduction” to *A Revolution of the Spirit: Crisis of Value in Russia, 1890-1924* (New York: Fordham UP, 1990), 7.

⁶ «Философия может созерцать в своем предмете буйство царей». Pavel Liubopytny as cited in A. Sinaisky, *Otnoshenie russkoi tserkovnoi vlasti k raskolu stroobriadstva v perye gody sinodal'nago upravleniia pri Petre velikom, 1721-1725* (Petersburg: Sinodal'naia tipografiia, 1895), 300; see also James Billington, *Icon and Axe: An Interpretive History of Russian Culture* (New York: Vintage Books, 1970), 310.

position. Taboos surrounding the discipline, however, only intensified social interest in philosophical questions, which manifested tacitly in artistic media.

In his 1979 book, *A History of Russian Thought: From the Enlightenment to Marxism*, Andrzej Walicki attributes the lack of professional philosophy in Russia to the anti-dialogic nature of religious institutions, and the ascribed cultural detachment of Eastern Slavs from the Greco-Roman traditions of dialectical and juristic thought.⁷ While Russian leaders suppressed philosophical discourses concerning politics, other arenas of inquiry and debate, though discouraged, appeared in print media. Although state censors squelched discussions regarding the prospective reorientation of political institutions, the nature of the social contract, and the relationship between the individual and the state, they did not sufficiently stifle the proliferation of metaphysical thought.

Russian “philosophers” formulated their own interpretations of metaphysical questions, espousing compelling skepticism toward existing explanations regarding the essence of *being*, assumptions of life after death, and argumentative logic to confirm *what is* and *what is not*. Despite limitations on free speech, a scarcity of a professional intellectual disciplines, and a prevailing perception of cultural backwardness, Russian thinkers sought out viable channels to voice questions about the universe, and to share ideas with like-minded individuals willing to challenge the status quo and to push the boundaries of human knowledge. Confronted by the discernible absence of a specialized public or academic platform, Russian philosophical polemics occurred most often in conjunction with other discourses, namely journalism, literary criticism, open and private letters, and literature.⁸

⁷ Andrzej Walicki, *A History of Russian Thought: From the Enlightenment to Marxism*, trans. Hilda Andrews-Rusiecka (Stanford: Stanford UP, 1979), 132

⁸ *Ibid.* xvi-xvii.

It is difficult, therefore, to conceptualize Russian thinkers as philosophers in the same vein as their Western counterparts, including Kant, Locke, Spinoza, Voltaire, etc., who operated in specialized scholarly traditions. In his assessment of Russian ‘philosophers,’ Walicki goes on to argue, for instance, that Herzen was as much a publicist and journalist, Belinsky a literary critic, and Bakunin a practical revolutionary.⁹ The rise of the Russian novel in the nineteenth century, in this regard, entailed extra-literary proportions.

This new artistic form comprised not merely a fictional text, but rather an interdisciplinary genre, in which characters internally and externally experience the ramifications of philosophical arguments following the evaluative investigations of their author-creators.¹⁰ In the assessment of Edith Clowes, “If there is a single figure in whom Russia’s original philosophical energy was distilled that radiated through the second half of the nineteenth century (in Russia) and the early and mid-twentieth centuries (first in Russia and then in Europe), it is certainly Fyodor Dostoevsky.”¹¹ In light of his tremendous influence on readers around the world and his status as one of the foremost authorial representatives of the Russian novel, Dostoevsky could be viewed as a philosopher, even if the traditional Western categorizations of “philosopher” and “philosophy” do not fully accommodate his diverse range of activities.¹²

Although these philosophical sensibilities unfolded primarily in the medium of the novel, they also developed in the context of the essay, short story, verse, and the other artistic media, including painting, sculpture, and music. In tracing the trajectory of philosophy as it developed

⁹ Ibid. 127

¹⁰ In the discipline of comparative literature, many scholars have highlighted the similarities between nineteenth-century Russian novels and the philosophical dialogues of classical antiquity. Frances Nethercott, *Russia’s Plato: Plato and the Platonic Tradition in Russian Education, Science, and Ideology, (1840-1930)* (Aldershot: Ashgate, 2000), 3; see also Barta, Peter I., David H. Lamour, and Paul A. Miller, *Russian Literature and the Classics* (New York: Routledge, 2013), 7.

¹¹ Edith W. Clowes, *Fiction’s Overcoat: Russian Literary Culture and the Question of Philosophy* (Ithaca: Cornell UP, 2004), 77.

¹² Ibid 77; Lev Nikolaevich Tolstoy (1828-1910) undeniably also falls into this camp of Russian novelists who functioned dually an artist and philosopher.

in non-specialized or synergistic creative discourses, Walicki broadly identifies four underlying characteristics of Russian thought: its relationship with church and state authority, its preoccupation with theories of history, its propensity to synthesize conflicting or opposing points of view, and its emphasis on the subjectivity of the individual.¹³ While the Russian novel centrally features the conveyance of plot, including setting, narrative focus, character interactions, and the general unfolding of events, the genre is also marked by its meticulous attention to psychological detail and unstated connections to broader philosophical inquiries.

Lev Loseff, author of *On the Beneficence of Censorship* (1984), argues that Russian authors were especially adept at embedding philosophical and political subtexts in their works to disseminate ideas that otherwise would be problematic for state censors if expressed directly.¹⁴ The novels and stories by Dostoevsky exemplify this tendency, and they entail interdisciplinary dialogues for audiences prepared to “read between the lines” in the assessment of beliefs put forth by the author. Such readings also highlight his engagement with ideas and movements emanating from diverse arenas of human development and ideological polemics.

This chapter unearths a selection of these interdisciplinary discourses, but especially those related to his education at the Main Engineering School and his independent readings in the sciences. Focusing on “Dream of a Ridiculous Man” (*Son smeshnogo cheloveka* 1877) and *The Brothers Karamazov* (*Brat'ia Karamazovy*, 1880-81), this chapter surveys Dostoevsky’s treatment of mathematical themes, including metaphysical ramifications of Non-Euclidean geometry, the fallibility of scientific determinism, as well as conceptions of infinity, relative measurement, and time. Critical commentaries formulated by Mikhail Bakhtin, Gary Saul

¹³ Andrzej Walicki, *A History of Russian Thought: From the Enlightenment to Marxism*, trans. Hilda Andrews-Rusiecka (Stanford: Stanford UP, 1979), xiii.

¹⁴ Lev Loseff, *On the Beneficence of Censorship: Aesopian Language in Modern Russian Literature*, (Munich: Verlag Otto Sagner in Kommission, 1984), 3.

Morson, and Robin Feuer Miller serve to align the narrative aesthetics of these two works with the overarching mathematical predilections of Dostoevsky.

The given chapter addresses three primary thematic objectives. First, this chapter surveys the presented distinction between materialism and spirituality. How do individuals in the two stories examine themselves and their complex surroundings? Moreover, how do they endeavor to confirm or deny assessments of fact vs. fiction, truth vs. lie, and science vs. pseudoscience in the face of countless doubts and unknowns? Both works feature extensive treatments of scientific determinism, and the incredulous stance of Dostoevsky toward technologies and methods optimistically announced in the progressive West to resolve all the problems and “uncertainties” of humanity. The dystopian society envisioned by the Grand Inquisitor, the limitations of medical doctors, and the denial of human culpability contribute to the formulation of Dostoevsky’s holistic critique of materialistic sciences.

Second, this chapter explores aesthetic elements of “Dream of a Ridiculous Man” that convey explicit references to terminology concerning number theory, astronomy, and physics. The presentation of light, for example, warrants close examination in the story. Relative to other authors of the same time period, Dostoevsky is uniquely informed about the speed of light. The text resonates with 20th-century findings in particle physics and quantum mechanics. In addition to surveying mathematical references, this section also devotes special attention to the broader intertextuality of the work. The text arguably represents the most memorable literary foray by Dostoevsky into the genre of science fiction, and as such, entails a variety of literary and rhetorical devices, which deviate from those employed in his other novels, short stories, and journalistic writings.¹⁵

¹⁵ *The Double* and *Bobok*, arguably, could be read as science fiction texts. However, it seems more appropriate to view these two works as Petersburg tales highlighting deranged psychology, and tinged with supernatural and Gothic elements associated more closely with Romanticism.

Thirdly, this chapter inspects implications of Non-Euclidean metaphysics, infinity, and immortality in both works. In the logic of the philosophical maxim formulated by Ivan Karamazov, “There is no virtue, if there is no immortality,” the existence of God, as the paradigmatic source of virtue and morality, coincides with the presupposition of the infinite.¹⁶ In response to the underlying premise of Non-Euclidean geometry that two parallel lines could meet somewhere off in infinity, Ivan reasons that this hypothetical intersection could occur only at such an unfathomable extremity of the universe, it is essentially impossible for the “earthly, Euclidean mind” of a human to calculate, let alone conceptualize.¹⁷

Throughout the corpus of his literary works, but perhaps most especially in “Dream of a Ridiculous Man” and *The Brothers Karamazov*, Dostoevsky develops a key distinction between the exceptionally great and the infinite, as well as the incredibly small and infinitesimal. This central differentiation exerts immense influence on Ivan, and generates a central debate in his overarching deliberations on faith, the human capacity for good and evil, and his general inclinations to accept or deny the existence of God. Both the Ridiculous Man and Ivan Karamazov explore contemplations that reflect the argumentative frameworks of the natural philosopher Zeno of Elea (490-430 B.C.E.) and his paradox of Achilles and the Tortoise.¹⁸ Commentary concerning number theory in the two works arguably foreshadows developments in

¹⁶ «Нет добродетели, если нет бессмертия» (PSS 14, 65). This formulation is often misquoted as, “Without God, all is permitted” While the exact wording of the latter phrase does not appear in *The Brothers Karamazov*, it likely expresses the underlying metaphysical assumption that Dostoevsky intended to impart.

¹⁷ «у меня ум эвклидовский, земной» (PSS 14, 241).

¹⁸ John P. Moran situates reflections on Zeno’s Paradox of Achilles and the Tortoise by Dostoevsky and Tolstoy in relation to theories of history, but not to the conception of the infinite. A holistic examination of this discourse by Dostoevsky illuminates mathematical features of his metaphysical regard for eternity and God. See: John P. Moran, *The Solution of the Fist: Dostoevsky and the Roots of Modern Terrorism*, (Lanham, MD: Lexington Books, 2009), 18-19.

twentieth-century mathematical research, including the calculus of convergent and divergent series, fractals, as well as David Hilbert's 1925 "Paradox of the Grand Hotel."¹⁹

As a central undercurrent in his writings, Dostoevsky examines the pros and cons of rationality per se. His positive characters, on the whole, seem to reject 'reason' [*razum*] out of an ascribed preference for 'living life' [*zhivaia zhizn'*] and the inexplicable phenomenon of faith [*vera*]. Although Dostoevsky was a practicing believer of Russian Orthodoxy, his designation of "faith" seems to transcend surface differences dividing the major world religions.²⁰ The rendering of Christian selflessness and abnegation in the Eastern Orthodox tradition of '*smirenie*' assumes obvious prominence in his writings, suggestively communicating that a particular Russian form of spirituality is needed to compensate for the dominant status of rationality in the

¹⁹ Clifford A. Pickover, *The Math Book: From Pythagoras to the 57th Dimension* (New York: Sterling, 2009), 354.

²⁰ Scholars have long criticized Dostoevsky for his intolerance toward other religions. His derogatory opinions seem to emanate from the prejudices and biases of his flawed, human character, and not the essence of his lofty, spiritual arguments. In the same way that Dostoevsky does not fully reject rationality, he likely does not completely oppose the entirety of other major world religions. His works most prominently feature disparaging treatments of Catholicism and Judaism, but they also tangentially explore the concerns of Islam and Buddhism. In formulating critiques of the seminal texts, institutions, and values at the core of other religions relative to his own native Russian Orthodoxy, his sensitivity engaging these topics often leaves much to be desired. While his commentary infrequently yields to discriminatory outlooks, his emphasis of faith and spirituality transcends religious differences. The Golden Rule at the core of '*smirenie*' and Dostoevsky's understanding of the principle most contributing to the salvation of humanity functions as a staple of nearly all world religions. According to rabbinical scholars, Marc Schneier and Tracy Rich, when Christ said "Love thy neighbor as thyself, he was quoting Torah," namely Leviticus 19:18, "love the stranger as thyself." Verse 24:22 of the Koran, moreover, stresses this same principle, "and you should forgive and overlook; Do you not wish for God to forgive? And Allah is Merciful Forgiving." While Dostoevsky would oppose religious frameworks that ignore or distort this principle, his endorsement of "spiritual" prerogatives would apply universally to people of all creeds. See Marc Schneier, "Love Thy Neighbor or Love the Stranger" in *Sons of Abraham: A Candid Conversation about the Issues that Divide Jews and Muslims* (Boston: Beacon, 2013), 132-133; Nicolas Starkovsky, *The Koran Handbook: An Annotated Translation*, (New York: Algora, 2005), 452; *The Holy Bible*, Revised Standard Version (New York: Oxford UP, 1973), 146; Elizabeth Blake, *Dostoevsky and the Catholic Underground*. Evanston, IL: Northwestern UP, 2014; Paul Contino, "The Prudential Alyosha Karamazov: The Russian Realist from a Catholic Perspective" in *Dostoevskii i khristianstvo. Dostoevsky Monographs* 6: St. Petersburg, 2014; David Goldstein, *Dostoevsky and the Jews* (Austin: University of Texas Press, 1981), 4; Val Vinokur, *The Trace of Judaism: Dostoevsky, Babel, Mandelstam, Levinas* (Evanston, IL: Northwestern UP, 2009; Joseph Frank, "His Jewish Problem" Review of *Dostoevsky and the Jews* by David Goldstein in *The New York Review of Books*, 4 December 1980.

development of human civilization.²¹ Reason and intellect, however, do not fall by the wayside. Despite the overriding association of the human capacity for thought with iniquity, vanity, and voluptuousness, intelligence and wisdom also contribute to the realization of both the physical survival and spiritual salvation of humanity.

In *The Brothers Karamazov*, Dostoevsky highlights the apparent danger of excessive reliance on intelligence and pure reason. The Grand Inquisitor, for instance, refers to the “wise spirit” [*umnyi dukh*], who offered to Christ the three temptations of the miracle, mystery, and authority.²² Whereas Christ rejects these temptations out of an implied understanding that such concepts possess the potential to suppress the intrinsic freedom and autonomous creativity of humanity, the Grand Inquisitor employs them as instruments to coerce unruly humankind into complete submission. Whereas the Grand Inquisitor compels humanity to follow his model, believers exemplifying true faith in God do so freely of their own accord.

Although the scheme of the Grand Inquisitor curtails the suffering of the masses, it also forces those supporting his tyrannical reign to sacrifice their eternal spiritual salvation. The Grand Inquisitor upholds that people seeks only “someone to worship, someone to keep his conscience, and some means of uniting all in one unanimous and harmonious anti-heap, for the craving for universal unity is the third and last anguish of men.”²³ Despite not hearing the poem by Ivan directly, Dmitrii in his sensual nature indicates a hypothetical willingness of his

²¹ Edith Clowes, “Self-Laceration and Resentment: The Terms of Moral Psychology in Dostoevsky and Nietzsche” in *Freedom and Responsibility in Russian Literature: Essays in Honor of Robert Louis Jackson*, (Evanston, IL: Northwestern UP, 1995), 119.

²² «чуда, тайна, и авторитет» (*PSS* 14, 234). The first mention of this “wise spirit” follows with other descriptive adjectives: “‘a terrible and wise spirit of self-destruction and non-existence’ continued the old man, ‘a great spirit spoke with you in the desert.’” «Страшный и умный дух, дух самоуничтожения и небытия – продолжает старик, - великий дух говорил с тобой в пустыне.» (*PSS* 14, 229). Additional qualifiers are added in subsequent references to the wise spirit, such as “powerful” «могучим и умным духом» (*PSS* 14, 230), as well as “sagacious” or “very wise” «премудрый дух» (*PSS* 14, 232).

²³ «чего ищет человек на земле, то есть: пред кем преколоться, кому вручить совесть и каким образом соединиться наконец всем в бесспорный общий и согласный муравейник, ибо потребность всемирного соединения есть третья и последнее мучение людей» (*PSS* 14, 234-235).

personality type to follow the Grand Inquisitor. Just as the Grand Inquisitor aims to quell the rebellious spirit of individuals, Dmitrii exclaims, “Man is created too broad. I’d have him narrower. The devil only knows what to make of it!”²⁴ Whereas the followers of the Grand Inquisitor endorse his false messianic mission blindly and without question, Dmitrii senses the metaphysical gravity of the decision to support him, as opposed to Him.

Dmitrii realizes that following the Grand Inquisitor equates to accepting certainty over freedom, the material at the expense of the spiritual, the devil instead of God. Recognizing that this question underscores a moral dilemma at the core of the human condition, Dmitrii exclaims, “God and the devil are fighting there and the battlefield is the heart of man.”²⁵ The commentary of Dmitrii foreshadows the premise that such a figure as the Grand Inquisitor could have good intentions to relieve human civilization of suffering, only to lead it into hellish, totalitarian bondage. He reflects, “It’s terrible how much mystery there is! Too many riddles weigh men down on earth...I can’t endure the thought that a man of a lofty mind and heart begins with the ideal of the Madonna and ends with the ideal of Sodom.”²⁶ The characteristic of a person with a “lofty mind” [*chelovek s umom vysokim*] alludes implicitly to Ivan as the representative of intellect, as well as the “wise” [*umnyi*] spirit that guides the motives of the Grand Inquisitor.

The title of Chapter VII in Book V, moreover, “It Is Interesting to Talk with an Intelligent Man” [*“S umnym chelovekom i pogovorit’ liubopytno*] explores the nefarious bond that develops between Ivan and Smerdiakov in their calculations of a plot to bring about the death of Fyodor Pavlovich at the hands of Dmitrii. The repetition of the word, ‘*umnyi*’, meaning ‘smart’ or ‘wise’ establishes this parallel. Returning to the theme of the ontological necessity of all that is

²⁴ «Нет, широк человек, слишком даже широк, я бы сузил. Черт знает что такое даже, вот что!» (PSS 14, 100).

²⁵ «Тут дьявол с богом борется, а поле битвы—сердца людей» (PSS 14, 100).

²⁶ «Страшно много тайн! Слишком много загадок угнетают на земле человека. Перенести я притом не могу, что иной, высший даже сердцем человек с умом высоким, начинает с идеала Мадонны, а кончает идеалом Содомским» (PSS 14, 100).

imaginary, the prospect of wishing death upon their father in thought is morally tantamount to actually killing him.

Life without any semblance of rational thought reduces humanity to the level of sensual beasts, or unconscious vegetables. In the absence of rationality, humanity would teeter perilously on the brink of chaos, mass lethargy, and extinction. The combination of rationality, sensuality, and spirituality taken as the realization of the “impossible” Christian virtue to “love thy neighbor as thy love thyself,” is needed to preserve the dignity and sustained survival of the human condition.²⁷ Ivan alludes to this impossibility at the outset of the rebellion described to Alyosha, “One can love one’s neighbors in the abstract, or even at a distance, but close quarters, it’s almost impossible.”²⁸ Rationality should enhance and augment the related concerns of spirituality and physicality, but not dominate them. Assigning exclusive preference to rationality, or any one component of the collective self, produces an imbalance that brings disastrous consequences to individuals and their corresponding societies.

The harmonious synchronization of the different parts of the collective self allows the individual to experience genuine compassion, tenderness, affection, or ‘*umilenie*,’ for others.

Torn between faith and doubt, Ivan even affirms the power of such tenderness that defies pure

²⁷ Dostoevsky addresses this point directly in an installment of *Dnevnik pisatelei* (*Diary of a Writer*) from November of 1877: “They rejected the single formula for their salvation that came from God and was proclaimed through revelation to humanity, ‘Thou shalt love thy neighbor as thyself,’ and replaced it with practical conclusions such as ‘*Chacun pour soi et Dieu pour tous*’ (‘Every man for himself and God for all’), or scientific slogans such as ‘the struggle for survival.’ Lacking the instincts by which animals live and flawlessly arrange their lives, people proudly placed their hopes in sciences, having forgotten that, in regard to matters such as constructing a society, science is still in its swaddling clothes.”

«Они отвергли происшедшую от бога и откровением возвещенную человеку единственную формулу спасения его: «Возлюби ближнего как самого себя»- и заменили ее практически выводами вроде: «*Chacun pour soi et Dieu pour tous*» («Каждый за себя, а бог за всех») – или научными аксиомами вроде «борьбы за существование». Не имея инстинкта животных, по которому не живут и устраивают жизнь свою безошибочно, люди гордо вознадеялись на науку забыв, что для такого дела, как создать общество, наука еще всё равно что в пеленках» (PSS 26, 90).

²⁸ «Отвлеченно еще можно любить ближнего и даже иногда издали, но вблизи почти никогда» (PSS 14, 216).

reason: “And I shall not weep from despair, but simply because I shall be happy in my tears, I shall steep my soul in *compassion*...It’s not a matter of intellect or logic, it’s loving with one’s inside, with one’s stomach. One loves the first strength of one’s youth. Do you understand anything of my tirade, Alyosha?”²⁹ In addition to expressing a human emotional state, *umilenie* also refers to the title of the icon depicting the Mother of God.³⁰ While Dostoevsky would have been drawn to this concept for religious reasons, he also perhaps sensed the morphophonemic significance of the word for instructive discourses presented in the novel on how to live.

Morphologically the word *umilenie* contains the prefix ‘*u-*’, the root, ‘*mil*’, meaning ‘dear’ or ‘kind’, and the suffix, *-enie*, its pronunciation in colloquial Russian speech, however, also produces the coincidental recurrence of the lexical unit, ‘*um*’, referring to ‘intellect’, ‘reason’, and ‘intelligence’.³¹ The utterance of the word brings to mind the sensation of “relaxed rationality,” out of the consideration that ‘*um*’ appears in tandem with the suffix, ‘*lenie*’, which sounds similar to the Russian word ‘*len*’, meaning ‘idle’, or ‘lazy’. Although this is a speculative point concerning Dostoevsky’s poetics, this interpretation of *umilenie* coincides with one of the central prescriptive philosophical themes of *The Brothers Karamazov* urging readers not to submit wholly to rationality at the expense of the body and spirit.

²⁹ «Собственным умилением упьюсь... Тут не ум, не логика, тут нутром, тут чревом любишь, первые свои молодые силы любишь... Понимаешь ты что-нибудь в моей ахинее» (*PSS* 14, 210).

³⁰ This representation of the Mother of God [*Bogoroditsa*] in the state of *umilenie* admits unusual variation compared to other icons. Depending on the various historical period and geographic origins of the *umilenie* icon, Mother Mary can be depicted both with and without the infant Jesus. David Coomler, *The Icon Handbook: A Guide to Understanding Icons and the Liturgy, Symbols, and Practices of the Russian Orthodox Church* (Springfield, IL: Templegate Pub, 1995), 215; see also V.N. Zakharov, ‘Umilenie kak kategoriia poetiki Dostoevskogo’ (Spiritual tenderness as a category in Dostoevskii’s poetics) in *Celebrating Creativity*, ed. Knut Andreas Grimstad and Ingunn Lunde (Bergen: University of Bergen, 1997), 237-238.

³¹ V.M. Dal’, *Tolkovy slovar’ zhivago velikoruskago iazyka* (Moscow: Tipografiia T. Ris’, 1866), 451. See also P. Ia. Chernykh, *Istoriko-etimologicheskii slovar’ sovremennogo russkogo iazyka*, Vol. 2 (Moscow: Russkii iazyk, 1993), 289.

In the ideological conveyance of existential frameworks, the three central characters in the *The Brothers Karamazov* are often seen as metaphorically reflecting different components comprising the whole of the individual human persona. Dmitrii, the sensualist, exemplifies the body; Ivan, the rationalist, embodies the mind; and Alyosha, the hero [*geroi*] of the novel, who possesses no explicit skills or talents, but who does exhibit an immense propensity for love, compassion, and forgiveness, assumes the amorphous status of the spirit.³² This ternary relationship expresses a trope of folk parables, and mirrors the conception of the holy trinity in Russian Orthodoxy. Smerdiakov, the illegitimate fourth brother, comes to represent the “‘shadow’ of the collective self, the part of the personality representing everything that one feels uncomfortable about and would wish to push away from oneself.”³³ In the associated model, the four brothers comprise the various components of human life.³⁴

³² The omniscient narrator introduces Alyosha in the beginning of the novel with the summation, “I will tell you in advance my full opinion: he was simply an early lover of humanity.” The narrator admits later, moreover, “They will say, perhaps, that Alyosha was dumb, uncultivated, and didn’t finish his studies, etc.” «Заранее скажу мое полное мнение: был он просто ранний человеколюбец.» (PSS 14, 17). «Скажут, может быть, что Алеша был туп, неразвит, не кончил курса и проч.» (PSS 14, 25). Moreover, Alyosha is identified as the hero of the novel at its very outset, without specific qualification: “Beginning with the life story of my hero, Aleksei Fyodorovich Karamazov, I find myself in somewhat of a quandary. Namely, although I call Aleksei Fyodorovich my hero, I myself know that he is by no means a great man, and hence I foresee such unavoidable questions as these: ‘What is so remarkable about your Aleksei Fyodorovich, that you have chosen him as your hero? What has he accomplished? What is he known for, and by whom? Why should I, the reader, spend time learning the facts of his life?’” «Начиная жизнеописание героя моего, Алексея Федоровича Карамазова, нахожусь в некотором недоумении. А именно: хотя я и называю Алексея Федоровича моим героем, но однако знаю, что человек он отнюдь не великий, а посему и предвижу неизбежные вопросы вроде таковых: чем же замечателен ваш Алексей Федорович, что вы выбрали его своим героем? Что сделал он такого? Кому и чем известен? Почему я, читатель, должен тратить время на изучение фактов его жизни?» (PSS 14, 5).

³³ Julian W. Connolly, *Dostoevsky’s The Brothers Karamazov*, (New York: Bloomsbury, 2013), 22.

³⁴ Comprising a more speculative reading of the underlying relationship between the four brothers, each could be seen to reflect a different dimension participating in the collective existential composition of human life. Smerdiakov perhaps reflects the first dimension. He is the most solitary of the four brothers, and predominately avoids interacting with others in a meaningful way. Dmitrii, in representing the body, could be construed as the embodiment of two dimensions, or area, following the presentation of bodily visages in the Eastern Orthodox tradition of iconicity. Ivan, accordingly, could be seen to express the

The failures and successes of each brother correlates to the hierarchical value of the particular capacity of the collective self that he represents. While Dmitrii endures a pivotal transformation in the action of the story, the primary metaphysical debates in the novel unfold in dialogue between Alyosha and Ivan, expressing figuratively the struggle between faith and doubt, respectively.³⁵ The consideration that they share the same mother, Sophia, signifies this unity, and suggests that both the intellect and the spirit of humankind emanate from one in the same place.³⁶ Although Dostoevsky distinguishes between matters of the “heart” and the “mind”, these physiological locales artificially function to separate the intrinsically linked conceptions of compassion and rationality, both of which originate in human consciousness.

Dostoevsky also presents the artificial separation between the components of the collective self and his overarching skepticism toward pure scientific rationality in “Dream of a Ridiculous Man”.³⁷ Shortly after arriving on the blue star, the Ridiculous Man remarks curiously that he “could not understand the knowledge” of the tranquil society existing seemingly in complete harmony with nature.³⁸ The pervasive love, selflessness, and communion underlying the basis of the civilization of the blue star does not compute in the consciousness of the

three-dimensional construct of volume, as his intellect gives him depth that the other brothers ostensibly lack. Alyosha, finally, would represent the dynamic whole of humanity with the added anthropomorphic realization of the spirit associated with his empathy towards others in the fluid movement of time. Alyosha, moreover, serves as a kind of ideological conduit in the novel, and he is constantly running off in search of people to relay messages and ameliorate their hardships. He literally and metaphorically embodies the force of life that brings people together.

³⁵ Ibid. 8.

³⁶ Dmitrii was born to Adelaida Ivanovna Miusova, Fyodor Pavlovich's first wife, who abandoned them to run off to Petersburg with a young seminarian before dying suddenly. The name of the mother of Ivan and Alyosha, Sofiia Ivanovna, on the other hand, reiterates her connection to the ideal of eternal feminine wisdom popularized by Vladimir Solovyov. Her origins as “the daughter of an obscure deacon, [who] was left from childhood an orphan without relations,” also presents an ostensible connection to Grushenka, who was also the orphaned provincial daughter “of a deacon or something of the sort.”

«Софья Ивановна была из «сироток», безродная с детства, дочь какого-то темного дьякона». (PSS 14, 12); «Грушенька... была дочь какого-то заштатного дьякона или что-то в этом роде» (PSS 14, 311).

³⁷ James Patrick Scanlan, *Dostoevsky the Thinker* (Ithaca, NY: Cornell UP, 2003), 6.

³⁸ «это я понял, но я не мог понять их знания» (PSS 25, 113).

Ridiculous Man. The capacity for reasoning in the persona and society of the protagonist has expanded in scope to suppress the complementary tendencies toward spirituality and physicality.

Counter to the egoistic vanity of “rational” beings on his native earth, the Ridiculous Man observes the inhabitants of the blue star, who “desired nothing and were at peace with themselves. They did not strive to gain knowledge of life as we strive to understand it, because their lives were full. But their knowledge was higher and deeper than the knowledge we derive from our science.”³⁹ The Ridiculous Man explores the notion that the people on this star instinctively experience the majesty of living life, whereas the rationality of his corrupted native home and consciousness falsely or incompletely “seeks to explain of what life is and strives to understand it in order to teach others how to live, while they knew how to live without science.”⁴⁰ The harmony of the blue star reflects what life was like before the Fall of man, descriptively corresponding to the Garden of Eden in the Book of Genesis. Whereas Adam and Eve acquire self-awareness and shame after tasting the fruit of the forbidden tree, the inhabitants of the paradise presented in the story already possess knowledge, ‘*znanie*.’ They are subsequently corrupted not by knowledge of good and evil, but almost innocently “by the beauty of a lie.”⁴¹ One lie leads to others, and the balance that once existed between the components of the collective self in terms of spiritual compassion, rationality, and sensuality leads eventually to disarray.

³⁹ «Они не желали ничего и были спокойны, они не стремились к познанию жизни так, как мы стремимся познать ее, потому что жизнь их была восполнена. Но знание их было глубже и высшее, чем у нашей науки» (*PSS* 25, 113).

⁴⁰ «наука наша ищет объяснить, что такое жизнь, сама стремится познать ее, чтоб научить других жить; они же и без науки знали, как им жить» (*PSS* 25, 113).

⁴¹ “They learned to lie, grew to love the lie, and discovered the charm of falsehood. It began innocently, with a joke, coquetry from an amorous game, perhaps indeed with an atom, but that atom of falsity made its way into their hearts and pleased them.” «Они научились лгать и полюбили ложь и познали красоты лжи. О, это, может быть началось *невинно*, с шутки, с кокетства, с любовной игры, в самом деле, может быть, с атома, но этот атом лжи проник в их сердца и понравился им...» (*PSS* 25, 115).

Although the Ridiculous Man does not readily comprehend the selfless spiritual virtue that he perceives in the civilization of the blue star, he himself unknowingly possesses a mystic orientation that seems strangely foreign to him compared to the other perceptual senses of his collective self. Anxiously confronting the empty finality of material nonexistence after committing suicide in his dream, the Ridiculous Man cries out “not with his voice, but with all of his being toward the power that was responsible for all that was happening to him.”⁴² Even though he is dead, the spiritual dimension of his existence persists.

In a mode of literary apostrophe, the Ridiculous Man indirectly appeals to God in calling out the “more rational” creator of his present ontological dilemma. Like the ghosts in *Bobok*, the protagonist is caught in limbo, between the earthly world of man and the infinite spiritual mercy and grace of God. Without abandoning his egoistic intellect, the Ridiculous Man affirms:

Whoever you may be, if you exist, and if anything more rational than what is happening here is possible, then permit it to be here now. But if you are revenging yourself upon me for my senseless suicide by the hideousness and absurdity of this subsequent existence, then let me tell you that no torture could ever equal the contempt which I shall go on dumbly feeling, though my martyrdom may last a million years.⁴³

Despite his professed willingness to endure “a million years of martyrdom,” the Ridiculous Man is shaken from his resting place after just a “full minute of silence.”⁴⁴ The dread that the Ridiculous Man senses from the finality of death intensifies the moment, and introduces the relativity of time. It is altogether possible that the crisis experienced in this singular “minute” of

⁴² «И я вдруг воззвал, не голосом, ибо был недвижим, но всем существом моим к властителю всего того, что совершалось со мною.» (PSS 25, 110).

⁴³ «Кто бы ты ни был, но если ты есть и если существует что-нибудь разумнее того, что теперь совершается, то дозвожь ему быть и здесь. Если же ты мстишь мне за неразумное самоубийство мое—безобразием и нелепостью дальнейшего бытия, то знай, что никогда и никакому мучению, какое бы не постигло меня, не сравниться с тем презрением, которое я буду молча ощущать, хотя бы в продолжение миллионов лет мученичества!» (PSS 25, 110).

⁴⁴ “Full silence continued for a full minute, and again another drop fell, but I knew, I with infinite [limitless] and unshakable certainty that everything would change immediately” «Целую почти минуту продолжалось глубокое молчание, и даже еще одна капля упала, но я знал, я беспредельно и нерушимо знал и верил, что непременно сейчас всё изменится.» (PSS 25, 110).

nonexistence actually equates to a million years in the progression of time as it transpires on earth. The ontological proportions of the afterlife in the infinite expanse of God and the immortality of the soul defy all measurements as they occur in the physical reality of humanity.

Though he alludes to a material solution to his predicament in the possibility that someone “opened his coffin” or “dug him up,” he comes to accept the presence of a supernatural entity as the source of his salvation.⁴⁵ He describes a “dark and unknown being” who miraculously whisks him into the incomparable darkness of space. This creature’ or ‘being,’ ‘*sushchestvo*,’ lifts him out of his static state, the two “were through space far away from the earth,” in the direction of the blue star that the Ridiculous Man saw in the sky the night the destitute child begged him for help.⁴⁶ Despite committing the irredeemable sin of suicide, and not believing in God as a consequence of his preference for rationality, the Ridiculous Man still experiences the infinite grandeur of the spirit.

Following the story’s metaphysical structure, even the worst sinners and disbelievers possess spiritual sensitivities, even if they fail to acknowledge them, or refuse to accept them following the arguments of their incomplete, earthly rationality. The inhabitants of the blue star intrinsically sense their connection to the infinite fabric of being. Life is just one form of their existence, and all living things ultimately return to the spiritual source from which they sprang.

Upholding this monistic ontological model counter to the complex sociological organization provided by rationally egoistic individualism in which people compete for authority and welfare on earth, the people observed by the Ridiculous Man “had no temples, but they had a

⁴⁵ “And suddenly my grave was suddenly thrown open. That is, I don’t know whether it was opened or dug up, but I was caught up by some dark and unknown creature.” «И вот вдруг разверзлась могила моя. То есть я не знаю, была ли она раскрыта и раскопана, но я был всят каким-то темным и неизвестным мне существом» (*PSS 25, 110*).

⁴⁶ «Мы неслись в пространстве уже далеко от земли» (*PSS 25, 110*).

real, living, and uninterrupted sense of oneness with the whole of the universe.”⁴⁷ Lacking permanent institutional foundations contributing to the veracity of their intuitions, the inhabitants of the blue star “had no creed, but they had a certain knowledge that when their earthly joy had reached the limits of earthly nature, then there would come for them, for the living and for the dead, a still greater fullness of contact with the whole of the universe.”⁴⁸ The unspoken surety of their presentiments concerning their belonging to the whole of existence, moreover, does not detract from the meaning of their physical, material lives. They patiently await death, and even “looked forward to that moment with joy, but without haste, not pining for it, but seeming to have a foretaste of it in their hearts.”⁴⁹ Although God transcends the rational sense of the earthly mind of man, all things are possible in the infinite realm of His virtue and mercy, which comprise an ontological realm of a higher order. To experience eternity and the immortality of the soul, humanity yields to the spirit. Rationality is good, but limited in its applicable scope. Pure reason is not enough to comprehend the vast miracle of God and existence beyond the tangible world.

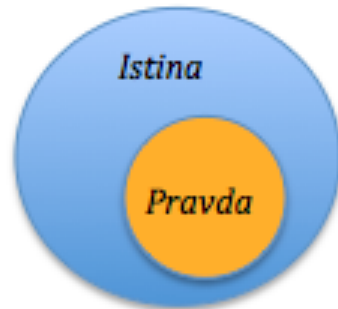
This associated division reiterates the lexical distinction in Russian between ‘*istina*,’ transcendent, eternal truth, and ‘*pravda*,’ matter-of-fact truth pertinent for reconciling and recording developments in the material world. The relationship between ‘*istina*’ and ‘*pravda*,’ or faith and rationality, consequently, comprises a Eulerian diagram. In the metaphysical model that unfolds in “Dream of a Ridiculous Man” and *The Brothers Karamazov*, the orientation of spirituality toward the infinite comprises a superset encompassing the finite physical perception

⁴⁷ «У них не было храмов, но у них было какое-то насущное, живое и непрерывное единение с Целым вселенной» (PSS 25, 114).

⁴⁸ «у них не был веры, зато было твердое знание, что когда восполнится их земная радость до пределов природы земной, тогда наступит для них, и для живущих и для умерших, еще большее расширение соприкосновения с Целым вселенной» (PSS 25, 114).

⁴⁹ «Они ждали этого мгновения с радостью, но не торопясь, не страдая по нем, а как бы уже имя его в предчувствиях сердца своего» (PSS 25, 114).

of human beings. Expressed another way, the insights of rationality pertaining to the physical world function as a subset of the eternity and immortality embodied by God.



Although human beings derive different metaphysical insights from their spiritual intuitions and sensory perceptions of physical existence, the categorizations of truth do not exist independently of one another. Instead, life entails their union as an intrinsic ontological whole.

Returning to the artificial separation of spirituality and rationality, Alyosha Karamazov argues that the heart of Fyodor Pavlovich is better than his head, demonstrating that he can still sense the human dignity in the old, decaying man, despite his offensive language and conduct.⁵⁰ This delights Fyodor Pavlovich, who turns to a different “mirthful” subject, namely his cruel treatment of Sophia Ivanovna, which causes Alyosha to fall into a “hysterical paroxysm of sudden violent, silent weeping. His extraordinary resemblance to his mother particularly impressed the old man.”⁵¹ Concerned by the extreme anxiety of Alyosha, Fyodor Pavlovich appeals to Ivan, “Water, quickly! It’s like her, exactly as she used to be then, his mother....He’s upset about his mother, his mother!”⁵² Though concerned about his brother, Ivan likewise senses the insult and neglect of Fyodor Pavlovich, responding with uncontrolled anger and contempt,

⁵⁰ “No, I’m not angry. I know your thoughts. Your heart is better than your head.” «Нет, не сержусь. Я ваши мысли знаю. Сердце у вас лучше головы» (PSS 14, 124).

⁵¹ «упал как подкошенный на стул и так и затрясся вдруг весь от истерического припадка внезапных сотрясающих и неслышных слез. Необычайное сходство с матерью особенно поразило старика» (PSS 14, 127).

⁵² «Иван, Иван! Скорей ему воды. Это как она, точь-в-точь как она, как тогда его мать! Вспрысни его из рта водой, я так с той делал. Это он за мать свою, за мать свою... - бормотал он Ивану» (PSS 14, 127).

“But she was my mother, too, I believe, his mother. Was she not?”⁵³ This confuses the old man, and after slowly realizing his mistake, Fyodor Pavlovich ultimately admits to forgetting which of his children came from which of his wives. As Ivan and Alyosha function as the metaphorical representations of rationality and spirituality, Fyodor also overlooks the notion that reason and faith spring from the same source.

Just as Ivan expresses a degree of sympathy for the utopian vision of the Grand Inquisitor, so too, does Dostoevsky sense the potential for rationality to improve the status of humankind, but only in conjunction with processes that do not deprive the individual of bodily health, compassion, and spiritual freedom. Whereas scientists and mathematicians look to rationality to refute the elusive existence of God as mere superstition, Dostoevsky inverts the argumentative medium upon itself, demonstrating the incompleteness of reason, and the uncertain extension of its applications to survey the entire universe.

Dostoevsky uses mathematics not to disprove the existence of God, but rather to defend his spiritual beliefs. If the mystic essence of Russian Orthodoxy defies all conventions of measurement and logic, why would Dostoevsky opt to formulate his philosophical arguments and defense of spirituality in mathematical terms, i.e. in the primary evaluative medium of rational calculation?⁵⁴ Moreover, if extended to the level of national character, would this hypothetical rebuttal of reason presume to speak for all of Russia? The associated approach

⁵³ «Да ведь и моя, я думаю, мать его мать была, как бы полагаете? – вдруг с неудержимым гневным презрением прорвался Иван» (*PSS* 14, 127).

⁵⁴ Instead of developing his critique of reason independently and foundationally, Dostoevsky participates in a broader Russian milieu of artists examining the inexplicable significance of their country and culture counter to rationalistic criteria in the West, e.g. economic production, sociological statistics, etc. Fyodor Tiutchev (1803-1873) arguably popularized this view with his 1866 verse, “You cannot understand Russia with your mind. You can’t measure it with a yardstick. Russia has something special. In Russia you must simply believe.” «Умом Россию не понять / Аршином общим не измерить / У ней особенная стать -- / В Россию можно только верить». F. Tiutchev, *Polnoe sobranie stikhotvorenii*, (Moscow: Direct-Media, 2015), 491. Judith Deutsch Kornblatt, *Divine Sophia: The Wisdom Writings of Vladimir Solovyov*, (Ithaca: Cornell UP, 2009), 4-5.

contributes to a certain mathematical irony, whereby Dostoevsky uses the instruments of argumentative logic to convey the paradoxes, enigmas, and uncertainties of reason itself.

This dissertation proffers a central clarification: Dostoevsky does not dismiss rationality *in toto*, but rather scientifically-based models and arguments that fail to account adequately for the human element in a given equation. He opposes philosophical premises that risk the forfeiture of humanity, as well as the cerebral preoccupation with calculations that prevent individuals from fully experiencing the splendor of life. By using the terminology and methods of mathematics and science, Dostoevsky undermines principles underlying material determinism using its own argumentative method and framing.⁵⁵

Mathematics, as both a theoretical and applied discipline, purports the descriptive potential to explain every entity in the universe.⁵⁶ Humans, however, are not computers, lacking sufficient time, energy, and technical insight to resolve the great ‘accursed’ questions of human existence. Quantitative methods underlying the basis of material dialectics can only reveal so much about the qualitative world of man, defined by competing ideologies, complex psychological motivations, and spiritual beliefs defying comprehensive linguistic explanation. Science, moreover, in its depiction by the Grand Inquisitor, comes to embody false, or incomplete knowledge that oppresses humankind, as opposed to restoring the full dignity and

⁵⁵ The expression, “You turn my own words my words against me!” attributed to Polonius in *Hamlet*, aptly reflects this argumentative approach. Ivan actually refers to this quotation directly in response to Alyosha’s objection of the premise that man created the devil, just as he did he did God. Curiously enough, this utterance by Polonius does not seem to appear in the original English of *Hamlet*, but it may have been included in Russian translations. Regardless of the status of the line in the original play, it reflects the premise of inverting the logic of rationality against itself. “I think if the devil doesn’t exist, but man has created him, he has created him in his own image and likeness.” “Just as he did God then?” observed Alyosha. “‘It’s wonderful how you can turn words,’ as Polonious says in *Hamlet*,” «А ты удивительно как умеешь оборачивать словечки, как говорит Полоний в «Гамлете», - засмеялся Иван. – Ты поймал меня на слове, пусть, я рад. Хорош же твой бог, коль его создал человек по образу своему и подобию.» (PSS 14, 218).

⁵⁶ This sentiment emanates from the adage of Pythagoras, “All is number.” As cited by Gabriele Cornelli, *In Search of Pythagoreanism: Pythagoreanism as an Historiographical Category*, (Boston, Walter de Gruyter, 2013), 145.

freedom of all humanity. Although he is a religious leader, the Grand Inquisitor promotes the extension of scientific means to feed and protect his subjugated followers.

The material sustenance and certainty of conscience delivered by the Grand Inquisitor falls far short of attaining the infinite spiritual virtue of Christ. His civilization reflects not the Kingdom of Heaven, but rather the doomed, vainglorious edifice of the Tower of the Babel.⁵⁷ The presented society of the Grand Inquisitor represents a dystopia in which humankind has forsaken the aims of spirituality to alleviate material suffering. The secret of the Grand Inquisitor, accordingly, is that he only feigns to serve God, when in essence, he serves on the behalf the Devil.⁵⁸ Evil exists in both the world of God and the Grand Inquisitor, but only in the former do individuals possess the freedom to choose for themselves how to act.

After lamenting suffering, first as a general condition of humanity, and then second in a more persuasive vein as it occurs to innocent children, Ivan sympathizes with the mission and method of the Grand Inquisitor. Citing the horrendous stories in the Russian press, Ivan again serves as the mouthpiece of Dostoevsky struggling to reconcile the horrendous abuse of children

⁵⁷ “Where thy temple stood will rise a new building; the terrible tower of Babel will be built again, and though like the one of old, it will not be finished, yet Thou mightest have prevented that new tower and have cut short the sufferings of men for a thousand years; for they will come back to us after a thousand years of agony with their tower. They will seek us again, hidden underground in the catacombs, for we shall be again persecuted and tortured. They will find and cry to us, ‘Feed us, for those who have promised us fire from heaven haven’t given it!’ And then we shall finish building their tower, for he, who finishes the building, feeds them. And we only shall feed them in Thy name, declaring falsely that it is in Thy name.” «На месте храма твоего воздвигнется новое здание, воздвигнется вновь страшная Вавилонская башня, и хотя и эта не достроится, как и прежняя, но всё же ты бы мог избежать этой новой башни и на тысячу лет сократить страдания людей, ибо к нам же ведь придут они, промучившись тысячу лет со своей башней! Они отыщут нас тогда опять под землей, в катакомбах, скрывающихся (ибо мы будем вновь гонимы и мучимы), найдут нас и возопиют к нам: “Накормите нас, ибо те, которые обещали нам огонь с небеси, его не дали. И тогда уже мы и достроим их башню, ибо достроит тот, кто накормит, а накормим лишь мы, во имя твое, и сождем, что имя твое.» (PSS 14, 230- 231).

⁵⁸ “They have no so great cleverness and no mysteries and secrets... Perhaps nothing but Atheism, that’s all their secret. Your Inquisitor does not believe in God, that’s his secret!” «Никакого у них нет такого ума и никаких таких тайн и секретов... Одно только разве безбожие, вот и весь их секрет. Инквизитор твой не верует в бога, вот и весь его секрет» (PSS 14, 238). “We have taken the sword of Caesar, and in taking it, of course, have rejected Thee and followed *him*” «Мы и взяли меч кесаря, а взяв его, конечно, отвергли тебя и пошли за *ним*». (PSS 14, 235).

in the corrupt world of man. He purposefully unnerves Alyosha and the reading audience of the novel by citing despicable scenes of human cruelty covered in the journalistic press.

Ivan begins with an episode from the Russo-Turkish war, where the “Turks took a pleasure in torturing children...cutting the unborn child from the womb of a mother, and tossing babies up in the air and catching them on the points of their bayonets before their mothers’ eyes.”⁵⁹ Ivan then moves in his eschatological analysis to scenes closer to home. He describes how an educated cultured gentleman and his wife beat their own daughter with a birch-rod, covered with branches to inflict greater pain. Another child of five was locked up by her parents in an outhouse in winter, where her mother smeared the girl’s face and filled her mouth with excrement. Lastly, Ivan describes that a retired general punished a small serf-boy for injuring the paw of his favorite hound by sicking his kennel of hounds on him, as if in a hunt, tearing apart the boy limb from limb. The unfortunate fate of these children even inspires doubt in the heart of pious Alyosha, who momentarily abandons the holy virtue of mercy, agreeing with Ivan that abusers of innocent, such as the General, deserve to be shot.⁶⁰

These horrendous scenes contribute to Ivan’s indictment of the human condition, and by extension, God. Ivan does not give up his acceptance of God, but he respectfully returns his ticket to His world, because the knowledge of god and evil is not worth the suffering experienced by young children. By inciting the underlying premise of theodicy, or “the answer to the question of why God permits evil,” Ivan surveys the dreadful imperfections of humanity, and explores the

⁵⁹ «Эти турки, между прочим, с сладострастием мучили и детей, начиная с вырезания их кинжалом из чрева матери, до бросания вверх грудных младенцев и подхватывания их на штык в глазах матерей» (*PSS* 14, 217). The transition from ‘mother’ ‘*materi*’ in the genitive singular to ‘mothers’ ‘*materei*’ in the genitive plural perhaps indicates the hyperbole in Ivan’s story, but it also demonstrates the shift from the particular to the general in presenting the terrible capacity of humanity for atrocity.

⁶⁰ Vetlovskaiia and Thompson have suggested that Ivan performs the work of the devil in this scene to tempt Alyosha to abandon his spiritual mission as a monk. See Valentina E. Vetlovskaiia, *Poetika romana “Brat’ia Karamazovy”* (Leningrad: Nauka, 1977), 98; see also Diane Oenning Thompson, *The Brothers Karamazov and the Poetics of Memory* (Cambridge: Cambridge UP, 1991), 197. As cited by Julian W. Connolly, *Dostoevsky’s The Brothers Karamazov*, 69.

apparent predisposition of humankind toward diabolical cruelty.⁶¹ In his analysis of theodicy, Dostoevsky refutes the premise of original sin, while also weighing the various arguments related to the central dilemma by Western philosophers.

The reading material that Dostoevsky engaged to formulate his treatment of theodicy, interestingly enough, likely deepened his engagement with prominent mathematical thinkers. Gottfried Leibniz (1646-1716), for instance, in addition to discovering calculus independently of Sir Isaac Newton (1643-1727), produced a seminal collection of philosophical writings under the title, *Essais de Théodicée sur la bonté de Dieu, la liberté de l'homme et l'origine du mal* (*Theodicy: Essays on the Goodness of God, the Freedom of Man and the Origin of Evil*, 1710).⁶² Reconciling his Christian faith with the rationality of the Enlightenment, Leibniz argues in complex and multifaceted philosophical analysis that God is intimately intertwined with all facets of the cosmos, participating in both creation and destruction.

Understanding the divine scheme requires a shifting of perspectives from the limited point of view of the subjective, finite individual to the theoretical continuous bird's-eye view that discloses the order of being as a whole, in the fullness of time and space.⁶³ Applying the notions of calculus to the associated model, Leibniz argues that a benevolent and omniscient God surveys the array of all possible worlds, and the one that actually exists embodies the best of all

⁶¹ Ivan examines the demonic presence that lurks beneath the surface of humankind: "In every man, of course, a beast lies hidden- the beast of rage, the beast of lustful heat at the screams of the victim...." «Во всяком человеке, конечно, таится зверь, зверь гневливости, зверь сладострастной распальемости от криков истязуемой жертвы, зверь без удержку, спущенного с цели....» (*PSS* 14, 220).

⁶² According to Michael Murray and Sean Greenburg, Leibniz was the first to coin the term 'theodicy,' and the treatise represented one of his only book-length manuscripts that was widely circulated. See Michael Murray and Sean Greenburg, "Leibniz on the Problem of Evil" in *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta. 27 February 2013. Accessed online at: <http://plato.stanford.edu/entries/leibniz-evil/>.

⁶³ Maria Banerjee, *Dostoevsky: The Scandal of Reason* (Great Barrington, MA: Lindisfarne, 2006), 100; see also Gottfried Wilhelm Leibniz, *Theodicy*, ed. Austin M. Farrer, trans. E.M. Huggard (New York: Cosimo Classics, 2009), 127.

available possibilities. These sentiments were challenged by other philosophers, perhaps most notably by Voltaire, whose 1756 “Poem on the Lisbon Disaster” (“Poème sur le désastre de Lisbonne”) following an earthquake that ravaged the capital city of Portugal defied the optimism of Leibniz.⁶⁴ The poem by Voltaire even included the subtitle, “Or an examination of the axiom: All is well” (“Ou examen de cet axiome: *Tout est bien*”).⁶⁵ Instead of passively accepting God’s benevolent will like Leibniz, Ivan Karamazov formulates his rebellion in terms that resonate with the angst of Voltaire in response to the senseless destruction and violence afflicting humanity.

Although Ivan rejects conceptions of the infinite vis-à-vis his denial of God’s world, Zosima and Alyosha in their spiritual insight ascribe validity to human striving toward eternity and the immortality of the soul. Dostoevsky, in this regard, upholds the ontological premise of infinity supported by Leibniz without the corresponding teleological supposition that all suffering happens for an explicit reason according to the will of God discerned only at an abstract, macro level. Dostoevsky seems to suggest that evil occurs as the byproduct of unsuccessful ideological experiments or tests of individuals deviating from the spiritual virtue of Christ and God. The underlying premise that one should “love thy neighbor as thyself” is not a model that readily admits comparison. The love of God is not competitive; all should feel drawn intrinsically to submit to it and to enjoy the compassion and communion of all humanity.⁶⁶

Regardless of the actual source of evil, Ivan condemns the world of God, who in His omniscience and omnipotence could have prevented such terrible events. In the sense that Ivan commiserates with the Grand Inquisitor on behalf of the Devil to curtail needless suffering in the world, Dostoevsky himself struggles to make sense of the crimes and brutality of humankind.

⁶⁴ Ibid. 100-101

⁶⁵ Ibid. 100-101

⁶⁶ Clergy and secular citizens alike exhibit egoistic vanity. Father Zosima somehow rises above the “holier than thou” rhetoric in his steadfast compassion, patience, humility, and empathy. Ferapont and his followers, however, pride themselves on the fall of Zosima, and take the stench of the elder's corpse as a false sign of his spiritual and material corruption.

Consequently, although the Grand Inquisitor embodies a dishonest tyrant, Dostoevsky acknowledges the contradictory status of his motives. In the words of Gary Saul Morson, “out of compassion, he becomes the most profound misanthrope in world literature.”⁶⁷ Just as Dostoevsky can appreciate the original intentions of the Grand Inquisitor, so too, does he acknowledge that the complexity of the “wise spirit” guiding his actions possesses both good and bad characteristics. Consequently, Dostoevsky upholds the notion that science and rationality are not categorically corrupt. Rather, he observes that the promotion of intellect to the exclusion of human empathy, the neglect of bodily preservation, and the denial of spiritual virtue leads human subjects astray from the path toward their genuine salvation.

Although Dostoevsky developed an interest in utopian ideals early on in his literary career, as exemplified by his participation in the Petrashevsky Circle, his literary works express overwhelming skepticism toward false messiahs and their professed ability to build paradise on earth. When the Ridiculous Man arrives on the blue star, he observes a human-like society in complete harmony with both itself and its surrounding environment. Despite his positive impression of the native inhabitants, his presence brings about their rapid deterioration. Reiterating the biblical presentation of the Fall of man, Dostoevsky positions his protagonist as a kind of anti-Christ in the context of the story. While the Ridiculous Man harbors no animosity or malice toward these people, his presence on the planet unintentionally germinates discontent, malfeasance, and their denigrating awareness of “the beauty in a lie.”⁶⁸ Notions of the beautiful and sublime in the hands of humans descend eventually into chaos and disorder. In similar terms,

⁶⁷ Gary Saul Morson, “The God of Onions: *The Brothers Karamazov* and the Mythic Prosaic” in *A New Word on The Brothers Karamazov*, Ed Robert Louis Jackson (Evanston: Northwestern UP, 2004), 110. As cited by Julian W. Connolly, *Dostoevsky’s The Brothers Karamazov*, 66.

⁶⁸ “They learned to lie and they loved lies and understood the beauty of a lie.” «Они научились лгать и полюбили лжи и познали красоту лжи.» (*PSS* 25, 115).

moreover, subscribing only to the scientific “progress” of humanity leads not to increased sustainability, happiness, or salvation, but rather facilitates impending civilizational doom.

In *The Brothers Karamazov*, Pyotr Aleksandrovich Miusov represents a caricature of Western progressivism. He parrots and accepts the hypotheses of Western rationalists without challenge or qualification. Although Miusov defends these sentiments in the company of the Karamazovs and clergymen in the quarters of Zosima, Dostoevsky satirizes the propensity of individuals to accept contemporary ideological positions as a kind of fashion to convey a false impression of modernity. Ivan Karamazov mocks this same tendency, when he affirms to Alyosha, “I won’t go through all the axioms laid down by Russian boys on that subject, all derived from European hypotheses; for what’s a hypothesis there, is an axiom with the Russian boys, and not only with the boys, but with their teachers too, for our Russian professors are often just the same boys themselves.”⁶⁹ The desire for the conformity of fashion leads to insincerity, incomplete contemplations, and a consequential misalignment between the ideological and material composition of human societies.

As an additional feature of his treatment of scientific determinism in *The Brothers Karamazov*, Dostoevsky interrogates the implications of material dialectics for individual culpability, divine justice, and the fallibility of courts. The murder trial of Dmitrii Karamazov functions as a central scene for the appearance of this commentary. Aside from commentary surrounding the courtroom drama, Dostoevsky examines the role of science in regard to the nature of human knowledge, the heuristic processes by which individuals confirm suppositional hypotheses, and the relationship between the physiological and psychological. Are human

⁶⁹ «Не стану я, разумеется, перебирать на этот счет все современные аксиомы русских мальчиков, все сплошь выведенные из европейских гипотез; потому что что там гипотеза, то у русского мальчика тотчас же аксиома, и не только у мальчиков, но, пожалуй, и у ихних профессоров, потому что и профессора русские весьма часто у нас теперь те же русские мальчики» (*PSS* 14, 241).

thoughts, in other words, merely the results of biological and chemical processes, or does the ideological creativity of consciousness exist independently of the brain and other bodily organs?⁷⁰ Chapter III of Book XII, “The Medical Experts and a Pound of Nuts,” moreover, clarifies the incredulous stance of Dostoevsky toward biological sciences.⁷¹

Although Dostoevsky highlights the generosity of Dr. Herzenstube, who examines poor patients free of charge, such as the children of Captain Snegiryov, the hunch-backed Nina and the frail, feverish Iliusha, the novel demonstrates noticeable shortcomings in his medical practices. In consultations with patients, Herzenstube tends to focus solely on the condition of the physical body. The inability of Herzenstube to consider the complexity of spiritual and psychological ailments, which do not always exhibit clear cause-and-effect correlations in the appearance of physiological symptoms, contributes to his ascribed lack of medical efficacy.⁷² The family members of afflicted patients, and the patients themselves, observe disappointedly that the prescribed “nostrums,” “lotions,” “mineral baths”, and “Goulard’s Water” never seem to

⁷⁰ Dmitrii describes his amazement at the physiological lessons he has gleaned from his conversations with Rakitin. He expresses his fascination with “little tails,” by which he most likely means synaptic connections that transmit electric or chemical signals in the human nervous system, which Rakitin and practitioners of science uphold as the source of all thought and feeling: “Imagine: inside, in the nerves, in the head—that is, these nerves are there in the brain... (damn them!) there are sort of little tails, the little tails of those nerves, and as soon as they begin quivering... that is, you see, I look at something with my eyes and then they begin quivering, those little tails... and when they quiver, then an image appears....” «Вообрази себе: это там в нервах, в голове, то есть там в мозгу эти нервы (ну черт их возьми!)... есть такие этакie хвостики, у нервов этих хвостики, ну, и как только они там задрожат... то есть видишь, я посмотрю на что-нибудь глазами, вот так, и они задрожат, хвостики-то... а как задрожат, то и является образ....» (*PSS* 15, 28).

⁷¹ «Медицинская экспертиза и один фунт орехов» (*PSS* 14, 103).

⁷² Dr. Herzenstube treats Lize Kholokhova, Katarina Ivanovna, Nina, Iliusha, the epileptic Smerdiakov, and examines the abnormal hysterics of Dmitrii Karamazov, all without successful prognoses for treatment. Madame Kholokhov describes the general process by which Herzenstube examines the sick: “I could hardly wait for the morning and for Herzenstube to come. He says that he can make nothing of it, that we must wait. Herzenstube always comes and says that he can make nothing of it.” «Я насилу дождалась утра и Герценштубе. Он говорит, что ничего не может понять и что надо обождать. Этот Герценштубе всегда придет и говорит, что ничего не может понять.» (*PSS* 14, 165).

produce desired improvements in health.⁷³ Herzenstube, as a doctor of foreign German origin, represents the Western rational mind attempting to diagnose the ailments of the Russian soul.⁷⁴

Dr. Eisenschmidt, the German medical practitioner, treating Markel, Zosima's consumptive older brother, appears in less flattering terms. Eisenschmidt lies to Markel, informing that he'll "live many days yet, and months and years, too," only to reveal his true diagnosis to his mother, "your son cannot live long."⁷⁵ In another respect, Eisenschmidt cannot sense the spiritual strength and vibrancy of Markel that seems readily apparent to the young Zosima. Eisenschmidt attributes the authentic revelations of Markel to his estimation that "the disease has begun to affect his brain."⁷⁶ The Western rationalism embodied by the character type of the German doctor reduces the renewed appreciation of beauty, spiritual insights, and short-lived *joi de vivre* of Markel to the mere by-product of a disease, or madness. Rational science denies the legitimate existential and metaphysical rejuvenation that follows from the belief in God. The perceived "ranting" of Markel from the perspective of Eisenschmidt provides the inspiration for Zosima regarding the premise of faith as the precursor for miracles and not vice-

⁷³ Goulard's Water, also known as subacetate of lead, was used as astringent in the 18th, 19th, and 20th centuries. While it effectively caused bodily tissues to contract, it could also bring about lead poisoning in patients. Lise praises the "lead lotion," which doctors in the West referred to as "Goulard's Water," in honor of its inventor, the French surgeon, Thomas Goulard (1697-1784). «Довольно, мама, довольно о Герценштубе, -- весело смеялась Лиза, - давайте же скорей корпию, мама, и воду. Это просто свинцовая примочка, Алексей Федорович, я теперь вспомнила имя, но это прекрасная примочка.» (PSS 14, 168).

⁷⁴ The figure of the German doctor represents a stock character type in works by Dostoevsky to embody the representative ideals of European scientific progressivism. In *The Double*, for example, Goliadkin visits Dr. Krestian Ivanovich Rutenspitz to cure the detrimental psychosomatic symptoms of his deranged state. The German doctor occurs not only in works by Dostoevsky, but in other works of Russian literature, as well. The figure of Dr. Werner in Lermontov's *Geroi nashego vremeni* [*Hero of Our Time*] also participate in the stereotypical depiction of the German as a calculating, moderate, and detached national character,

⁷⁵ «Не то что день, и много дней проживаете, и месяцы, и годы еще проживаете» (PSS 14, 262); «Не жилец он на свете, ваш сын» (PSS 14, 262).

⁷⁶ «он от болезни впадает в помешательство» (PSS 16, 262).

versa, and the ever-present possibility of resurrection through the infinite mercy and grace of transcendent spiritual truth.⁷⁷

The coverage of medical questions in journalistic endeavors presented in the novel also communicates the limitations of rational science. Articles by Mikhail Rakitin, for example, assert sociological and scientific reasons as the primary motivations for Dmitrii to murder his father. The fact that Dmitrii did not commit the murder only further undermines these rationales. Moreover, although he was wrongfully accused, such claims would deny the accountability of his own individual conscience for any and all of his sins. In his article, Rakitin affirms, “Dmitrii couldn’t help murdering his father, because he was corrupted by his environment.”⁷⁸ Echoing sentiments expressed in *Crime and Punishment* and *Notes from House of the Dead*, Dostoevsky reiterates that crimes are not merely the unfortunate products of people misunderstanding their material advantage. Crime is committed by both rich and poor, women and men; it is an affliction of humanity capable of being perpetrated by anyone. But if individuals are guided by scientific and material principles, then their actions are already predetermined, and the culpable onus of their crimes falls not on the individual, but on nature and the organization of society. As a consequence of this rhetoric, however, humans are not free to choose what they do or do not

⁷⁷ Aside from the resurrection of the young girl by Christ in Ivan’s story of the Grand Inquisitor, Alyosha encounters the visage of Zosima brought back to life in Book VII, Chapter IV, “Cana of Gaililee.”

⁷⁸ Dmitrii summarizes the gist of the article, “He wants to write an article about me, about my case, and so begin his literary career. That’s what he comes for; he said so himself. He wants to prove some theory. He wants to say ‘he couldn’t help murdering his father, he was corrupted by his environment,’ and so on. He explained it all to me. He is going to put in a tinge of Socialism, he says.” «Хочет он обо мне, об моем деле статью написать, и тем в литературе свою роль начать, с тем и ходит, сам объяснял. С направлением что-то хочет: «дескать, нельзя было ему не убить заеден средой» и проч., объяснял мне. С оттенком социализма, говорит, будет.» (PSS 15, 28). Defense attorneys frequently appeal to the ‘scientific’ and ‘sociological’ sensibilities of judges and juries to defray the guilt of their clients on their associated environments. Dostoevsky reiterates his rejection of this argument in *Crime and Punishment*. This trope appears in extended literary representations of courtroom dramas, but perhaps most memorably in *The Brothers Karamazov* and *Native Son* by Richard Wright. The argument is perhaps more convincing in *Native Son*, because the work touches on the psychological trauma of the individual persecuted by the systemic oppression of African American minorities before the Civil Rights Movement.

do. Dostoevsky, however, rejects this view, affirming that humans are not ‘organ stops,’ but rather autonomous beings with the conscious agency to decide for themselves how to act.

A major instrument that Dostoevsky uses to challenge the perceived over-reliance on reason by his society is the genre of fantastic. Interspersing the objective and subjective, Dostoevsky comments on his authorial process in terms of fantastic realism: “Realism is higher than everything else. It is true that we have a different conception of reality, a thousand thoughts, prophecy—a fantastic reality.”⁷⁹ Without providing explicit commentary on the “fantastic” vein in his literary works, Dostoevsky presents possibility and impossibility in tandem.

Tzvetan Todorovsky characterizes the fantastic by marking out its generic limits: if the reader “decides whether the laws of reality remain intact and permit an explanation of the phenomena described, we say that the work belongs to another genre: the uncanny. If, on the contrary, he decides that new laws of nature must be introduced to account for the phenomena, we enter the genre of the marvelous.”⁸⁰ Liza Knapp, alternatively, interprets the fantastic element in writings by Dostoevsky as a form for “dealing with ends and beginnings,” because it is impossible to describe what happens before birth or after death.⁸¹ The term “‘fantastic’ relates not only to the improbable mode of narration, but also to the nature of what is narrated: the

⁷⁹ «Действительность выше всего. Правда, может быть, у нас другой взгляд на действительность 1000 душ* пророчества—фантастич<еская> действит<ельность>» (PSS 9, 276). In the *Polnoe sobranie sochinenii*, a footnote appears next to the word *dush* clarifying that the hand-written note may have been *dum*. See also Robin Feuer Miller, *Dostoevsky's Unfinished Journey*, (New Haven: Yale UP, 2007), 222.

⁸⁰ Tzvetan Todorov, *The Fantastic: A Structural Approach to a Literary Genre*, trans. Richard Howard (Ithaca, NY: Cornell University Press, 1973), 3.

As cited by Robin Feuer Miller, *Dostoevsky's Unfinished Journey*, 132.

⁸¹ Liza Knapp, *The Annihilation of Inertia: Dostoevsky and Metaphysics*, (Evanston, IL: Northwestern UP, 1996), 66.

ultimate ‘end,’ death itself.”⁸² Relative to its appearance in various designations of genre, the “fantastic” in works by Dostoevsky entails a tangible breaking of deterministic expectations and scientific realities.⁸³ The literary style of Dostoevsky in select works, consequently, could be viewed as a precursor to Magical Realism.

There are numerous examples of characters in works by Dostoevsky who become preoccupied by hypothetical thoughts and actions that either cannot or should not come to fruition in the physical world. In the realm of subjunctive thought, the whims of fancy supersede the established limitations of verifiable fact. The unnamed dreamer [*mechtatel*'] in *White Nights*, the Underground Man, Raskolnikov, and the Ridiculous Man embody just several individuals in works by Dostoevsky who retreat into a special state of consciousness, where they enjoy as much

⁸² Ibid. 67. Dostoevsky narrates the moments leading up to, and following the finality of death. This occurs, for example, in *Bobok*, a short ghost story, conveying the interactions of dead souls in a cemetery. Also, in “The Meek One,” Dostoevsky presents the final living moments of a woman jumping out of a window, clutching an icon. Furthermore, this trope occurs in Myshkin’s recitation of a public execution by guillotine during his travels abroad. Dostoevsky was all too familiar with the impending panic of a death sentence following his mock execution by firing squad in 1849. See also A.L. Bem, “Pered litsom smerti,” in *O Dostojevskem. Sbornik stati a material*, ed. Julius Dolansky and Radegast Parolek, (Prague: Slovenska knihovna, 1972), 169.

⁸³ The fantastic realism of Dostoevsky appears in terms similar to magical realism, associated generally with Latin American literature. Although structurally and aesthetically different, the classification of fantastic realism and magical realism seem to permit common goals. According to Erika Haber, “both fantastic and magical realism provide alternative realities to the accepted or predominant one.” Noting the subtle similarities between the two, Seymour Menton argues, furthermore, “whereas magic realism injects a touch of magic in reality, it should not be confused with fantastic realism, which portrays the magic, the imaginary, the fantastic in a somewhat realistic manner.” Menton refers to the dissimilar artistic medium of painting, citing the clarifying statements of Pyke Koch, who equates fantastic realism with surrealism. According to Menton, Koch affirmed “Magical Realism is based on the representation of what is possible, but not probable; Surrealism, on the other hand is based on impossible situations.” Donald Fanger, additionally, explains that the coincidence of supernatural elements and sociological focus on the urban poor in Dostoevsky constitutes a hybrid genre, termed Romantic Realism. Gary Saul Morson, moreover, argues that Dostoevsky deliberately fashioned his works to bridge different movements, comprising its own specialized genre, termed threshold literature, creating a “hermeneutic perplexity” marked not “by generic ambiguity, but by generic incompatibility.” Dostoevsky situates the impossible, consequently, in terms that defy not only the physical laws of reality, but also the accepted departmentalization of genre. Erika Haber, *The Myth of the Non-Russian: Iskander and Aitmatov’s Magical Universe* (Lanham, MD: Lexington Books, 2003), 42; see also Seymour Menton, *Magic Realism Rediscovered, 1918-1981* (East Brunswick, NJ: Associated University Presses, 1983), 23; Gary Saul Morson, *The Boundaries of Genre: Dostoevsky’s Diary of a Writer and the Traditions of Literary Utopia* (Evanston, IL: Northwestern UP, 1981), 49-50; Donald Fanger, *Dostoevsky and Romantic Realism: A Study of Dostoevsky in Relation to Balzac, Dickens, and Gogol*, (Evanston, IL: Northwestern UP, 1965), xvii.

freedom as their intellects and imaginations allow, in contrast to the marginalization, humiliation, and material impoverishment they endure in ‘real’ life. Seemingly rigid scientific laws and the multisensory experience of space and time exhibit fluid, malleable, and even indeterminate characteristics in thought and the curious workings of the mind.⁸⁴

The conveyance of the fantastic appears not only in the presentation of inner psychological dynamics, such as Mitya’s dream of the shivering babe and Ivan’s nightmare of his encounter with the devil, but also in the presentation of parables. By situating the genre of the parable within the context of the novel, Dostoevsky and other Russian authors of same creative orientation co-opt the narrative structures and philosophical arguments of both the Old and New Testaments, replete with didactic lessons on morality, mythological imagery, and an insistent fascination with miracles.⁸⁵ Certain literary genres aside from the parable, including the folk story, fairy tale, and various manifestations of the supernatural in the artistic movement of

⁸⁴ Different characters possess different degrees of agency to bend the axiomatic laws of physical existence in thought. The Underground Man, for example, “stands several heads taller” than other characters in his intelligence. He may be lonely, but in the monological realm of his internal consciousness, he is the master of all things. In this spiteful, solipsistic world, he can conjure up falsehoods, such as $2 \times 2 = 5$, and make them true. For other characters, the ability to distort the experiential phenomena of “reality” as depicted in thought occurs unwillingly as a product of the subconscious or unconscious mind. The repression of guilt, in this regard, exhibited in the psychologies of Goliadkin, Raskolnikov, and the Ridiculous Man, for example, causes uncontrollable nightmares, hallucinations, and delusions that reverberate throughout the realm of contemplation that would otherwise remain tranquil and free. Grigorii Pomerants, “Euclidean and Non-Euclidean Reason” in *The New Russian Dostoevsky*, trans. and ed. Carol Apollonio, (Bloomington, IN: Slavica Publishing, 2010), 72.

⁸⁵ The omniscient narrator of *The Brothers Karamazov* explains that miracles did not give birth to faith. Rather, faith gave birth to miracles. Dostoevsky situates faith as a kind of multisensory experiential willingness to accept premises and events that would otherwise be impossible for the rational mind and physically limited body. “It is not miracles that incline a realist to faith. The true realist, if he is a believer will always find the strength and the ability not to believe a miracle, and if a miracle will stand before him as an incontrovertible fact, then he will sooner not believe his own sense, than admit the fact. And if he admits it, then he admits it as a natural fact, but until now only formerly unknown to him. In the realist faith is not born out of a miracle, rather a miracle is born of faith.” «Не чудеса склоняют реалиста к вере. Истинный реалист, если он верующий всегда найдет в себе силу и способность не поверить и чуду, а если чудо станет пред ним неотразимым фактом то он скорее не поверит своим чувствам, чем допустит факт. Если же и допустит его, то допустит как факт естественный, но доселе лишь бывший ему неизвестным. В реалисте вера не от чуда рождается, а чуда от веры» (PSS 14, 24).

Romanticism represent aesthetic modes where the fantastic remains not only possible, but entirely expected and necessary.

Grushenka's story of the miraculous onion, Ivan's creative rendering of the Grand Inquisitor and the temptation of Christ express interpretative renderings of the fantastic narrated by characters in the central medium of the story that serve to highlight their underlying motivations and values. Other characters, in contrast, unwittingly exemplify attitudes and outlooks derived from parables and other fantastic intertextual models. The relationship between Fyodor and Dmitrii Karamazov, for example, reflects a corrupted version of the parable of the return of the prodigal son.⁸⁶ Moreover, although Fyodor Pavlovich embodies the archetype of the miserable father, he, too, is a son. His status as a despicable old man marked by physical, spiritual, and moral decay, perhaps reflects the fate of the prodigal son, who did not appeal to his own father for forgiveness.

Similarly, the omniscient narrator ominously presents the relationship between Fyodor Karamazov and Smerdiakov in terms reflecting the interaction of Balaam and Balaam's Ass in the Book of Numbers.⁸⁷ Fyodor Pavlovich, for example, remembers the parable imperfectly,

⁸⁶ Jesus shares the Parable of the Prodigal Son with his disciples, the Pharisees, in the Gospel of Luke (Luke 15:11-32). In the story, the prodigal son wastes his fortune, becomes so destitute that he longs to eat the same food given to pigs. He returns home to beg his father to take him on again as a servant, expecting the latter to reject him. Instead, the father passionately embraces his son, and welcomes him back into his fold. *The Holy Bible*, Revised Standard Version (New York: Oxford UP, 1973), 1269.

⁸⁷ «Валаамовою ослицей оказался лакей Смердяков.» (PSS 14, 114). As Robert Louis Jackson points out, "Fyodor Karamazov repeatedly refers to Smerdiakov of 'Balaam's ass'- a playfully derisive reference to the donkey in the story from the Book of Numbers—implying that Fyodor, like Balaam is obliged constantly to scorn and bearate his servant in order to keep him in place and get him to serve his master properly. There is, of course, a great deal of irony here at the expense of Fyodor, who doesn't seem to remember or care about the rest of the biblical story. In the Bible, Balaam's path is blocked by a sword-bearing angel he does not see, and when the ass on which he rides turns from the road to avoid this angel, Balaam strikes it three times to get it to turn back and obey. Suddenly, the donkey speaks to Balaam, 'What have I done to you, that you have struck me these three times?' But when the animal's pleas inspire only further anger on its master's part, the angel intercedes, chastising Balaam, 'Your way is perverse

forgetting that the donkey saves the man in the story, whereas Smerdiakov ends up killing him in an apparent act of patricide. While readers readily sense the tangible lessons of parables, their meaning largely goes unheeded in the presented physical ‘reality’ of the story. The beauty of these stories seems impossible to imperfect individuals. The characters of Dostoevsky ostensibly glean the meaning of such parables, but find it difficult to realize the associated moral lessons in the context of their own subjective outlooks and interactions.⁸⁸

Dreams also convey elements of the fantastic, conveying realms of the mind where consciousness verges toward the impossible in the distortion of physical laws. The Ridiculous Man remarks to readers that “[d]reams, as we all know, are very curious things: certain incidents in them are presented with quite uncanny vividness, each detail executed with the finishing touch of a jeweler, while others you leap across as though entirely unaware of, for instance, space and time.”⁸⁹ This emphasis on the impossible goes hand in hand with the fantastic. The fantastic occurs not only in creative renderings of death and the afterlife. It appears, also, in the outlooks of characters estimating both possibilities and impossibilities relative to their unique contemplations and circumstances. His heroes sense the inherent disconnect between the varying degrees of freedom afforded to them by internal consciousness and material experience.

Dostoevsky even identifies “Dream of a Ridiculous Man” as a “fantastic story” [*fantasticheskii*

before me. The donkey saw me and turned away from me these three times. If it had not turned away from me, surely just now, I would have killed you!’ (Num 22:32-33). When one realizes that it is the donkey who holds the very life of Balaam at its mercy, the narrator’s seemingly humorous borrowing of Fyodor’s phrase takes on a more ominous tone.” Robert Louis Jackson, *A New Word on the Brothers Karamazov*, (Evanston, IL: Northwestern UP, 2004), 77.

⁸⁸ Fyodor Pavlovich does not recall the significance of the donkey in the original biblical text. Similarly, Alyosha does not sense the direct implication of murder when Ivan reminds him that the saying “Am I my brother’s keeper” originates in the story of Cain and Abel. Characters who willingly attempt to realize passages from the bible predominately gravitate toward malicious deeds. Alyosha, in contrast, out of an ascribed lack of book learning, embodies the teachings of Christ vis-à-vis Zosima that he intuits directly and not through his knowledge of a text.

⁸⁹ «Сны, как известно, чрезвычайно странная вещь: одно представляется с ужасающею ясностью, с ювелирски-мелочно отделкой подробностей, а через другое перескакиваешь, как бы не замечая вовсе, например, через пространство и время». (*PSS* 25, 108).

rasskaz] at the very outset of the text.⁹⁰ Confronting stark differences between thought and physicality, they nevertheless cling to the viability of all thoughts and deeds, but perhaps especially those in opposition to the patterns and laws governing the physical world. The recurrence of this trope infers a universal feature of human psychology developed by Dostoevsky: humanity is fascinated by the impossible.

The trope of the dreamer highlights the appraisal of impossibility, while also emphasizing the dichotomy between material existence and mental deliberation. Although characters in works by Dostoevsky experience the interconnectedness of space and time in depictions of physical reality, they remain capable of distorting the proportions of space and time in modes of internal consciousness. The imagination of the individual, as it were, exists beyond or apart from the unified material and ideological frameworks of “real life.” In dreams, fantasies, and other modes of solipsistic thought, the perception of space and time as a unified whole yields to subjective psychic preferences for emotion, the reconciliation of projected stimuli and the desired freedom to consider ideas and perform deed that would otherwise be impossible.

Reiterating the significance of the subconscious state of “dreams” [*сны*] relative to the distortion of rational constructs, the Ridiculous Man elaborates “[d]reams seem to be induced not by reason but by desire, not by the head, but by the heart, and yet what clever tricks my reason has sometimes played on me in dreams!”⁹¹ Humankind, consequently, faces the evaluative decision to assign preference either to materialistic reason, or to the spiritual yearning of the heart. The ramifications of these realms may overlap, but more often than not, Dostoevsky presents the ways in which individuals artificially situate the motivations and priorities of these two experiential realms of humankind as mutually exclusive.

⁹⁰ «Сон смешного человека- фантастический рассказ» (*PSS* 25, 104). Dostoevsky's “The Meek One” (“*Krotkaia*”) also bears the sub-heading of “fantastic story” (*PSS* 24, 5).

⁹¹ «Сны, кажется, стремится не рассудок, а желание, не голова а сердце, а между тем какие хитрейшие вещи проделывал иногда мой рассудок во сне!». (*PSS* 25, 108).

“Dream of a Ridiculous Man” entails broad intertextual engagement with works of various disciplines and genres. First, the text represents the sole manifestation of Dostoevsky’s direct engagement with science fiction. Liza Knapp explores the connection of the work to “Zhiteli planet” (“Inhabitants of Planets” 1861) by Nikolai Strakhov, “Gipoteza o budushchei sud’be mira” (“Hypothesis of the Future Fate of the World, 1864) by M. Lisovskii, and *Histoire du ciel* (*History of the Heavens*, 1872) by Camille Flammarion. Dostoevsky owned and seems to have read all three of these works.⁹² While Knapp creatively explores the contextual and ideological overlap between “Dream of a Ridiculous Man” and these three works, she does not fully examine the literary aesthetics and motifs of the work in and of themselves, nor does she establish the connection of the story to earlier works by Dostoevsky and the inspirational influence of Gogol. She refers to the story only in peripheral claims concerning her central treatment of Newtonian concepts presented in the novels of Dostoevsky.

Robin Feuer Miller, similarly, briefly explores the relationship of the story to “The Unparalleled Adventure of One Hans Pfaal” (1835) by Edgar Allen Poe.⁹³ One crucial detail of the publication not mentioned by Miller is that Poe originally intended the story to be a hoax. The story concerns the adventure of Hans Pfaal, a young Dutchman from Rotterdam, who has built a revolutionary hot air balloon, equipped with a special device that converts the vacuum of space into breathable air, from earth to the moon. Poe intended to trick his readers into thinking that the account of the story reflected the actual experiences of a nineteenth-century cosmonaut.

⁹² Dostoevsky himself edited Strakhov’s “Inhabitants of Planets.” It appeared in *Vremia* (1) 1861, 1-56. The same is also true of Lisovskii’s “Hypothesis of the Fate of the World.” Dostoevsky published the work of Lisovskii in *Epokha* 5, (1864): 295-312. The content of these works aligned with the intellectual interests and creative inspirations of Dostoevsky himself. His personal library collection also contains Flammarion’s *Histoire du Ciel*.

⁹³ The short story appeared the June 1835 issue of the monthly magazine, *Southern Literary Messenger*. Edgar Allen Poe, *Essential Tales & Poems of Edgar Allen Poe* (New York: Quayside Publishing, 2015), 493; see also Robin Feuer Miller, *Dostoevsky’s Unfinished Journey* (New Haven: Yale UP, 2007), 110.

The reception of the story, however, was upstaged by the 1835 “Great Moon Hoax”, a story attributed to astronomer Sir John Herschel at Lord Rosse’s Observatory, but actually written by Richard Adams Locke. The story achieved incredible fanfare in the New York newspaper, *The Sun*.⁹⁴ In the genre of science fiction, the verifiable and the specious appear in tandem. Science and pseudoscience, the fact and fantastic, the prosaic and the magical merge seamlessly in the production of the story. While Dostoevsky likely did not intend for his audiences to assume that he himself had endured the “dream” of suicide, and his travels to the other side of life, he gleaned from the writings of Poe a variety of compelling narrative insights that infused the story with the exhilaration of an actual journey of the soul to the blue star.

Miller, similarly, explicates compelling correlations between “Dream of a Ridiculous Man” and *A Christmas Carol* by Charles Dickens, *Gulliver’s Travels* by Jonathan Swift, and various philosophical polemics formulated by Jean Jacques Rousseau. The connection between Dickens and Dostoevsky in these two works seems to be most the most tangible of the intertextual discourses she discusses. Both works convey the experiences of a flawed protagonist traveling back in time via the accompaniment of implied supernatural forces to sense how the perceived shortcomings of the world came to be.

Although the two works present of kind of devolution, in the sense that the quality of life on earth gets worse, when one compares the earlier state with the present, the protagonists nevertheless emerge from their respective journeys aware of their agency to improve the lives of those around them. Ebenezer Scrooge, on one hand, senses his moral obligation to treat others with charity and generosity. He returns to the present a new man, with a renewed sense of duty toward his neighbors and colleagues, but especially his abused clerk, Bob Cratchit, and his crippled son, Tiny Tim. Whereas the *Ghost of Christmas Yet to Come* depicts the death of Tiny

⁹⁴ Richard Adams Locke, *The Moon Hoax; Or, A Discovery that the Moon has a Vast Population of Human Beings*, (New York: William Gowans, 1859), vi.

Tim, Dickens affirms explicitly to readers that Scrooge became a “second father” to the boy, who survives because of this new bond. The Ridiculous Man, similarly, reconnects with the shivering, impoverished girl, who so startled him at the outset of the story, leading readers to conjecture optimistically that he saves her.⁹⁵

Interactions with the inhabitants of the blue star in “Dream of a Ridiculous Man” reflect, in several key respects, Gulliver’s relationship with the Houyhnhnms, those “spiritually sensitive yet, rational horses whom the rapidly disintegrating Gulliver came to love so much on his fourth voyage.”⁹⁶ Miller points out that like the society observed by the Ridiculous Man, Gulliver is especially impressed by the consideration that the Houyhnhnms lack words in their language for lie, doubt, opinion, or evil.⁹⁷ The verb, *to die*, moreover, means “to retire to one’s first mother.”⁹⁸ Interestingly enough, Swift praises the “rationality” of the Houyhnhnms, affirming “Upon the whole, the behavior of these animals was so orderly and rational, so acute and judicious, that I at last concluded they they must be magicians.”⁹⁹ The inhabitants of the blue star possess their own

⁹⁵ «А ту маленькую девочку я отыскал...И пойду! И пойду!» (PSS 25, 119).

⁹⁶ Robin Feuer Miller, *Dostoevsky’s Unfinished Journey*, 108. The spiritual essence of Swift’s horses recurs perhaps in *The Brothers Karamazov*. Alyosha describes his conversation with Iliusha, to the boy’s father, Captain Snegiryov: “For of course a Russian boy is born among horses.” This notion also reiterates the importance of non-verbal communication. «А уж известно, что русский мальчик так и родится вместе с лошадкой». (PSS 14, 189).

⁹⁷ Robin Feuer Miller, *Dostoevsky’s Unfinished Journey*, 108.

⁹⁸ Johnathan Swift, *Gulliver’s Travels* (New York: New American Library, 1726), 288, 296. As cited in Robin Feuer Miller, *Dostoevsky’s Unfinished Journey*, 108.

⁹⁹ Johnathan Swift, *Gulliver Travels*, (London: Jones & Company, 1826), 104.

mysterious modes of communication.¹⁰⁰ Embedded in renderings of these utopian societies could be read subliminal commentaries on the tendencies of colonization. Both accounts take the form of a monologue, devoid of additional vantage points. The depictions of life on the blue star and amongst the Houyhnhnms seem to reflect visions of ideal, unfallen societies.

This image of “natural man” pertains not only to Swift, but to Rousseau, as well. In his *Discourse on the Origins of Inequality* (1755). Referred to elsewhere as the savage, these natural men “live by instinct; an instinct untroubled by passion and informed by the emotion of pity... that contributes to the ‘mutual preservation of the whole species... It is pity which in the state of nature takes the place of laws, morals, and virtues, with the added advantage that no one there is tempted to disobey its gentle voice.’”¹⁰¹ Following the assessment of Miller, “the difference between these two conceptions is vast, for Rousseau’s brand of pity can exist without God, whereas in Dostoevsky’s scheme it cannot.”¹⁰² This divide, consequently, also separates the metaphysical deliberations of the two philosophers. For Rousseau, the premise of life after death

¹⁰⁰ “They pointed out their trees to me, and I could not understand the intense love with which they looked on them; it was as though they were talking with beings like themselves. And, you know, I don’t think I am exaggerating in saying that they talked with them! Yes, they had discovered their language, and I am sure the trees understood them. They looked upon all nature like that – the animals which lived peaceably with them and did not attack them, but loved them, conquered by their love for them. They pointed out the stars to me and talked to me about them in a way that I could not understand, but I am certain that in some curious way they communed with the stars in the heavens, not only in thought, but in some actual, living way.” «Они указывали мне на деревья свои, и я не мог понять той степени любви, с которою они смотрели на них: точно они говорили с себе подобными существами. И знаете, может быть, я не ошибусь, если скажу, что они говорили с ними! Да, они нашли их язык, и убежден, что не понимали их. Так смотрели они и на всю природу- на животных, которые жили с ними мирно, не нападали на них и любили их, побежденные их же любовью. Они указывали мне на звезды и говорили о них со мною о чем-то, чего я не мог понять, но я убежден, они как бы чем-то соприкасались с небесными звездами, не мыслю только, а каким-то живым путем.» (*PSS* 25, 113).

¹⁰¹ Jean Jacques Rousseau, *A Discourse on Inequality*, trans. and ed. Maurice Cranston (Harmondsworth, UK: Penguin Books, 1984), 101. Rousseau attempts to show a link between “reason and passion: It is by the activity of the passions that our reason improves itself; we seek to know only because we desire to enjoy; and it is impossible to conceive a man who had neither desires nor fears giving himself the troubles of reasoning” (89). As cited in Robin Feuer Miller, *Dostoevsky’s Unfinished Journey*, 108, 114.

¹⁰² Robin Feuer Miller, *Dostoevsky’s Unfinished Journey*, 109.

concerns more the immateriality of the soul, than it does its immortality.¹⁰³ Dostoevsky, in contrast, grounds his expectations of life after death in formulations of the infinite.

With respect to narrative structure, authorial intentions, character psychology, and specific plot details, “Dream of a Ridiculous Man” instantiates key parallels with *Notes From Underground*. Both texts interrogate similar questions, including the relationship between internal consciousness and physical existence, the nature of good and evil, the underlying dynamics of love and hate, as well as the unavoidable experience of humiliation and suffering by individuals and societies. These characters, arguably, function as archetypes in modern literature.

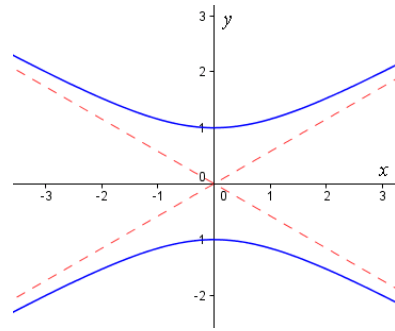
The relationship between the Underground Man and the Ridiculous Man, however, is marked by a noticeable inversion of the abyss that tends to devour the characters of Dostoevsky. Instead of being pulled downward into the underground, the Ridiculous Man is pulled upward into the pulled upward into the abyss of the “fathomless black sky.”¹⁰⁴ Although he endures the scene of his own funeral, and describes the unnerving sensation of being trapped in a cold, wet coffin, he summons a “creature” by calling out to him with the “whole of his being,” who transports him to the blue star that he saw on the night of the dream in question on the third of November.¹⁰⁵ The detail concerning “the whole of his being” alludes, additionally, not just to the

¹⁰³ John C. Neal, *The Progressive Poetics of Confusion in the French Enlightenment*, (Newark, DE: University of Delaware Press, 2011), 114.

¹⁰⁴ “The sky was awfully dark, but I could clearly distinguish the torn wisps of a cloud, and between them fathomless dark patches.” «небо было ужасно темное, но явно можно было различить разорванные облака, а между ними бездонные черные пятна.» (*PSS* 25, 105).

¹⁰⁵ Freud argues, “the motivation of all dream content is wish-fulfillment, and that the instigation of a dream is often to be found in the events of the day preceding the dream, which he called the “dream day.”

physical manifestation of the body, but to the complex ascription of ideas, spirit, and consciousness. Consequently, the Ridiculous Man and the Underground Man operate like the manifestations of a hyperbola. They exemplify one in the same mathematical expression, whose lengths extend towards opposite extremes of infinity.



Left: graphical representation of a hyperbola. Reproduction permission (July 2016).

Considering the array of tangible connections between the two texts, and the nameless anonymity of both protagonists, the Ridiculous Man could perhaps even be viewed as the logical, albeit inverted extension of the Underground Man. The unreliable first-person narrative of both texts put forth various paradoxes. Although they seemingly admit distinct perspectives comprising binary characteristics, they could be also construed as one and the same personality at different moments of their shared development and growth.

Laura Marcus, "Introduction" to *Sigmund Freud's the Interpretation of Dreams: New Interdisciplinary Essays*, (New York: Manchester University Press, 1999), 3. "And suddenly I called (not with my voice, for I was motionless, but with the whole of my being) upon Him who was responsible for all that was happening to me... The dead silence went on for almost a minute, and one more drop fell on my closed eyelid, but I knew, I knew and believed infinitely and unshakably that everything would without a doubt change immediately. And then my grave was opened. I don't know, that it is, whether it was opened or dug open, but I was seized by some dark and unknown being and we found ourselves in space. I suddenly regained my sight. It was a pitch-black night. Never, never had there been such darkness! We were flying through space at a terrific speed, and we had already left the earth behind us" «И я вдруг воззвал не голосом, ибо был недвижим, но всем существом моим к властителю всего того, что совершалось со мною... Целю почти минуту продолжалось глубокое молчание, и даже еще одна капля упала, но я знал, я беспредельно и нерушимо знал и верил, что непременно сейчас всё измениться. И вот вдруг разверзлась могила моя. То есть я не знаю, была ли она раскрыта и раскопана, но я был взят каким-то темным и неизвестным мне существом, и мы очутились в пространстве. Я вдруг прозрел: была глубокая ночь, и никогда, никогда еще не было такой темноты! Мы неслись в пространстве уже далеко от земли.» (PSS 25, 110).

Whereas the Underground Man contemplates “bashing his head against the wall,” he never gives serious consideration to ending his physical existence, despite his pursuits of humiliation, suffering, and self-cancellation.¹⁰⁶ As a representative of the “superfluous man” [*lishnii chelovek*], “the little man” [*malen'kii chelovek*], or the “conscious mouse,” [*soznaiushchaia mysh'*], the Underground Man seems all too cognizant of his inability to act.¹⁰⁷ He has been pushed to such a degraded extreme that his thoughts prevent him from taking any meaningful action. Paralyzed by self-consciousness, he cannot make permanent changes in his own physical existence, including the irreversible deed of ending a life, be it his own, or that of another. When he contemplates violence towards other characters, he oscillates between wanting to reconcile himself to them on the one hand, and punishing them viciously on the other.¹⁰⁸ Like Goliadkin in *Dvoynik*, he envisions initiating a duel, only to desire communion with his adversary. He broods contemptuously in his hovel of an apartment, opting to not to participate in the ‘ignorant’ certainty of ‘ordinary’ men, preferring instead the creative freedom of literature.

Like the Underground Man, the Ridiculous Man retreats into consciousness to avoid confronting the horrors of society.¹⁰⁹ Whereas the Underground Man launches into incessant

¹⁰⁶ “No doubt I shall never be able to break through such a stone wall with my forehead, if I really do not possess the strength to do it, but I shall not reconcile myself to it just because I have to deal with a stone wall and haven’t the strength to knock it down.” «Разумеется, я не пробью такой стены лбом, если и в самом деле сил не будет пробить, но я и не примирюсь с ней потому только, что у меня каменная стена и у меня сил не хватило». (*PSS* 5, 105).

¹⁰⁷ «лишний человек» (*PSS* 5, 376); «сознающая мышь» (*PSS* 5, 104).

¹⁰⁸ “At last I made up my mind to challenge my enemy to a duel. I wrote him a most beautiful, most charming letter, demanding an apology from him and, if he refused to apologize, hinting rather plainly at a duel. The letter was written in such a way that if the officer had had the least notion of ‘the sublime and the beautiful,’ he would certainly have come running to me, fallen on my neck, and offered me his friendship. And how good that would have been!....But, thank God (to this day I thank the Almighty with tears in my eyes!), I did not send my letter.” «Наконец я решил вызвать противника моего на дуэль. Я сочинил к нему прекрасное, привлекательное письмо, умоляя его передо мной извиниться; в случае же отказа довольно твердо намекал на дуэль. Письмо было так сочинено, что если б офицер чуть-чуть понимал ‘прекрасное и высокое,’ то непременно бы прибежал ко мне, чтоб броситься мне на шею и предложить свою дружбу. И как бы это было хорошо!....Но, слава богу (до сих пор благодарю всевышнего со слезами, я письма моего не послал.» (*PSS* 5, 129).

¹⁰⁹ The coughing, shivering orphan girl who follows him in pursuit of her parents.

mental tirades, simultaneously undercutting every manifestation of the “beautiful and sublime” [*prekrasnoe i vysokoe*], the Ridiculous Man seeks sincerity, and looks for a way out of the endless falsehood and cruelty. This escape, however, comes in the form of suicide. Before the dream, the Ridiculous Man endures offense at the mocking jeers of others. But having emerged from the tribulations of the whole of human history on the blue star, he wishes renewed communion with humanity, whom he loves all the same, despite their having mocked him, or considered him ridiculous.¹¹⁰

Other elements of “Dream of a Ridiculous Man” seem to establish meaningful connections to *Notes from Underground*. The opening line of the story, for instance, “I am a ridiculous man,” infers a tacit connection to the introduction of the monologue by the Underground Man: “I am a sick man...I am an evil man. I am an unattractive man.”¹¹¹ These initial utterances by the two protagonists establishes similarities of their matrix-like syntax and styles, separated of course, by their interpersonal psychological reactions towards others. The Ridiculous Man pities the rest of humankind, and lowers himself voluntarily, whereas the Underground Man feels spite and malice. The Underground Man perhaps recognizes his own lowness, but instead of elevating the rest of humanity from this vantage point, he wishes the power to bring them all down to his level.

The torrential downpour of rain in “Dream of a Ridiculous Man” seems to reflect this characteristic, as the protagonist describes the weather on that fateful third of November: “the

¹¹⁰ The Ridiculous Man expresses similarities with Zosima. Following his duel with a higher-ranking gentleman over the affections of a woman he loved, Zosima comes to embody a puzzling personality for the local personality. His regiment scoffs at home for having offended their honor, and others cannot grasp the intention to become a monk. The wife of the spared gentleman, however, immediately senses the importance of his virtuous decision, stepping forward one even to affirm: “I am the first not to laugh at you, but on the contrary, I thank you with tears and express my respect for you for action then.” «Позвольте мне, говорит, изъяснить вам, что я первая не смеюсь над вами, а, напротив, со слезами благодарю вас и уважение мое к вам заявляю за тогдашний поступок ваш» (*PSS* 14, 273).

¹¹¹ «Я смешной человек» (*PSS* 25, 104). «Я больной человек...я злой человек. Непривлекательный я человек.» (*PSS* 5, 99).

rain, I remember had a distinct animosity toward people.”¹¹² Immediately following this climactic precipitation, however, the Ridiculous Man describes the steam and condensation from the rainfall in terms reminiscent of the resurrection motif: “and a sort of steam was rising from everything, from every cobble in the street, and from every side-street if you peered closely into it from the street as far the eye could reach.”¹¹³ The Ridiculous Man and the Underground Man, consequently, come to represent binary representations of the progression of man, one positive, and one negative, pulling the whole of humanity with them in their corresponding direction.

The curious detail of the gas light in the street invokes a memorable scene from “Nevskii Prospekt” by Gogol. In the final line of the original text by Gogol, the narrator remarks, “the demon fuels street lights, only to show everything in a false light.”¹¹⁴ The Ridiculous Man, in similar terms, narrates the intrusion of the artificial gas lights lining the streets of Petersburg: “I could not help feeling that if the gaslight had been extinguished everywhere, everything would have seemed much more cheerful, and that the gaslight oppressed the heart so much just because it shed a light upon it all.” Although slightly different in their word selections, both Gogol and Dostoevsky present the artificial lights in terms that express the hubris of man to light up the darkness, to convene with diabolical forces in the absence of His light. The gas light is not the

¹¹² «дождь, я это помню с явной враждебностью к людям.» (*PSS 25*, 105). This is also a Romantic trope in the personification of cruel, merciless nature.

¹¹³ «ото всего шел какой-то пар, от каждого камня на улице и из каждого переуллка, если заглянуть в него в самую глубь, подальше, с улицы.» (*PSS 25*, 105).

¹¹⁴ «Когда сам демон зажигает лампы для того только, чтобы показать все не в настоящем виде.» N. Gogol, *Sochineniia*, (Moscow: OLMA Media Group, 2002), 301.

divine, life-giving radiance of God or the sun, but rather luminance derived through the dirty, smelling burning of organic product.¹¹⁵

Light, in both “Dream of The Ridiculous Man” and *The Brothers Karamazov*, assumes special significance as an element of biblical, mythological, and scientific intrigue. Relating the miracle of its source to the myth of Prometheus, Ivan alludes to the notion that man illicitly obtained fire, to make use of its light and warmth, from the heavens on high.¹¹⁶ Ivan, Alyosha, and Father Zosima seem to agree on the nature of light in the universe, however, it is a light that does not necessarily emanates from the sun.¹¹⁷ In Russian, the word meaning ‘light’, ‘*svet*,’ is often used interchangeably with the word for ‘world’, or ‘*mir*’, to denote not just the physical planetary body of earth and its inhabitants, but rather the fuller grandeur of God and His domain.

¹¹⁵ Gogol remarks that the “malodorous oil” of these lamps often splashes on the “fashionable frock-coats” of those, who come to close to them. Stressing the toxicity of the diabolical falsity of Petersburg, Gogol warns his readers, “Keep your distance from the street-lamps, I implore you, and hurry past them quickly, as quickly as possible. Count yourself lucky if they only spill the malodorous odor odor on your elegant frock coat. Besides the street-lamp, everything breathes deceit.” «Далее, ради Бога, далее от фонаря! и скорее, сколько можно скорее, проходите мимо. Это счастье еще, если отделаетесь тем, что он зальет шегольской сютрук ваш вонючим своим маслом. Но и кроме фонаря, все дышит обманом.» N. Gogol, *Sochineniia*, (Moscow: OLMA Media Group, 2002), 301.

¹¹⁶ “Men are themselves to blame, I suppose; they were given paradise, they wanted freedom, and stole fire from heaven, though they knew they would become unhappy, so there is no need to pity them. With my pitiful, earthly, Euclidean understanding, all I know is that there is suffering and that there are non guilty; that cause follows effect, simply and directly; that everything flows and finds its level—but that’s only Euclidean nonsense, I know that, and I can’t consent to live by it.” «Люди сами, значит, виноваты: им дан был рай, они захотели свободы и похитили огонь с небесе, сами зная, что станут несчастны, значит, нечего их жалеть. О, по моему, по жалкому, земному эвклидовскому уму моему, я знаю лишь то, что страдание есть, что виновных нет, что всё одно из другого выходит прямо и просто, что всё течет и правновешивается, но ведь это лишь эвклидовская дичь, ведь я знаю же это, ведь жить по ней я не могу же согласиться!» (*PSS* 14, 222).

¹¹⁷ Ivan and Smerdiakov debate the philosophical meaning of light in the Book of Genesis: “how there could have been light on the first day, when the sun, moon, and stars were only created on the fourth day, and how was to be understood.” «Они говорили и о философских вопросах и даже о том, почему светил свет в первый день, когда солнце, луна и звезды, устроены были лишь на четвертый день, и как это понимать следуе...» (*PSS* 14, 213).

The sun, moreover, as depicted in the manuscript comprising the saint's life of Father Zosima by Alyosha, possesses the power to "germinate the seeds of different worlds."¹¹⁸ Light connects the realm of divinity and flawed empirical reality. The "slanting rays of the setting sun" that Alyosha recalls in his formative memory of his mother, moreover, arguably provide him as much, if not more spiritual sustenance as the enigmatic Sophia Ivanovna.¹¹⁹ The narrator even remarks that Alyosha remembered this detail of the "slanting rays" most of all.¹²⁰ The elevation of humankind, in this vein, results from a kind of metaphorical photosynthesis, whereby the "seeds of other worlds" blossom, after being watered by the tears of their suffering, and warmed by slanting rays of the sun, presented as the divine light of God.

Though they are invisible, Dostoevsky promotes the notion that humanity can attain the ideals of these worlds. They are generally perceived not through the technological devices and methods of science and reason, but mystically through the powers of faith and compassion.¹²¹ The infinite splendor of other worlds surround and subsume all existence. The Ridiculous Man, similarly, in seeing the one bright star in the black expanse of space, asks the Creature, "Is that

¹¹⁸ "God took seeds from different worlds and sowed them on this earth, and His garden grew up and everything came up that could come up, but what grows lives and is alive only through the feeling of its contact with other mysterious worlds." «Бог взял семена из миров иных и посеял на сей земле и взрастил сад свой, и возшло всё, что могло взойти, но возвращенное живет и живо лишь чувством соприкосновения своего таинственным мирам иным...» (PSS 14, 290). Although not in this same quotation, Zosima affirms a child "needs sunshine, childish play, good examples all about him, and at least a little love." «Ему надо солнце, детские игры и всюду светлый пример и хоть каплю любви к нему.» (PSS 14, 286). It is interesting that Zosima uses the adjective *inoi* to describe the otherworldliness of these seeds. This is the same adjective used repeatedly at the beginning of *Crime and Punishment* to describe Raskolnikov.

¹¹⁹ The fact that they are "slanted" is also significant. If these rays of light originate in the domain of spirituality, then they express the intersection between earth and the divine, taken for granted as it were by humanity, whose preference for rational prerogatives prevents individuals from seeing the bigger picture. This detail also tacitly reiterates the aesthetics of Non-Euclidean Geometry and the hypothetical meeting of two wholly separate parallel lines. The rays are not "horizontal" or "parallel", "perpendicular" but "slanted," indirectly allowing their overlap with the physical world of human beings.

«косые лучи заходящего солнца» (PSS 14, 18).

¹²⁰ (косые-то лучи и запомнились всего более) (PSS 14, 18).

¹²¹ "Water the earth with the tears of your joy and love those tears. «Омочи землю слезами радости твоя и люби сии слезы твои.» (PSS 14, 292).

Sirius?”, only to learn that the celestial body reflects what he had seen from the familiar, the paradise of planet earth itself.¹²²

Parallel to the examinations of light in artistic and philosophical discourses, the essence of light, in its befuddling composition as both a particle and a wave, came to the forefront of mathematical and scientific discourses during the lifetime of Dostoevsky.¹²³ The 19th century gave rise to the atomic theory of matter, and Dmitrii Mendeleev, while simultaneously at St. Petersburg University, St. Petersburg Technical Institute, and the Nikolaevsky Military

¹²² “All I remember is that I suddenly beheld a little star in the darkness. ‘Is that Sirius?’ I asked, feeling suddenly unable to restrain myself, for I had made up my mind not to ask any questions. ‘No,’ answered the being who was carrying me, ‘that is the same star you saw between the clouds when you were coming home.’ «Я помню, что вдруг увидел в темноте одну звездочку. «Это Сириус?» спросил я, вдруг не удержавшись, ибо я не хотел ни о чем спрашивать. «Нет, это та самая звезда, которую ты видел между облаками возвращаясь домой.» (PSS 25, 110). Elizabeth Cheresch Allen points out that the bright light of the blue star in the ocean of black space in “Dream of a Ridiculous Man” reflects the inverted color palette of Stavrogin’s nightmare, in which he seems a bright light with a dark spot. Elizabeth Cheresch Allen, “Dostoevsky’s ‘The Dream of a Ridiculous Man’: Unsealing the Generic Envelope,” in *Freedom and Responsibility in Russian Literature: Essays in Honor of Robert Louis Jackson*, ed. Elizabeth Cheresch Allen and Gary Saul Morson, (Evanston, IL: Northwestern UP, 1995), 101. It is interesting that the following sentence shifts focus without clarification to the Creature, purposefully conflating the images of the Creature and the blue star, seemingly both possessing human-like appearance. «Я знал, что оно имело как бы лик человеческий.» (PSS 25, 110).

¹²³ These discourses originated in the natural philosophy of classical antiquity, however, these practitioners often lacked the technological precision to make informed reports on the question of light itself. Aristotle, for instance, argued that light comprised a kind of disturbance of the element aether, whereas Democritus attributed its being to a special kind of solar atom. Investigations regarding light gained momentum throughout the enlightenment with the contributions of Newton, René Descartes, and Christian Huygens. In the 19th century, James Clerk Maxwell (1831-1871) was the first to calculate the speed of light using four wave equations in his 1865, *A Dynamic Theory of the Electromagnetic Field*. Maxwell expanded on the original findings of the Danish scientist, Ole Rømer (1644-1710), who demonstrated that the speed of light is not infinite or instantaneous, as philosophers once thought. In his preliminary studies on light, Rømer recorded rough data that he intended to account for the retardation of light, when reckoning the ephemeris of Io, one of the moons of Jupiter. Although Rømer did not publish a value of the speed himself, others in his wake used his collected research to formulate their own calculations. Bryan Appleyard, *Understanding the Present: An Alternative History of Science*, (New York: Tauris Pike, 2004) 144. Dostoevsky demonstrates his knowledge of these scientific breakthroughs by alluding to the notion that light takes time to travel great distances of the universe. This understanding forms the basis of the light year as the fundamental unit of measure to assess the colossal scope of the cosmos. The Ridiculous Man affirms, “I knew that there were stars in the heavenly spaces whose light took thousands of millions of years to reach the earth. Possibly we were already flying through those spaces.” «Я знал, что есть такие звезды в небесных пространствах, от которых лучи доходят на землю лишь в тысячи и миллионы лет. Может быть, мы уже пролетали эти пространства.» (PSS 25, 111).

Engineering Institute (formerly the Main Engineering School), received worldwide acclaim for his 1871 publication of the periodic table of elements.¹²⁴ The discovery of calculus and complex analysis in the Enlightenment afforded scientists and mathematicians advanced insight into the structure and dynamics of the atom itself, which forms the basis of chemical properties and associated reactions. The discovery of electricity contained within the structure of every atom, namely the electron moving around the nucleus in orbital fields, shifted attention away from particle interpretations of light, and toward the kinetic understanding of light as radiative energy.¹²⁵ The associated debates gave rise to the Photoelectric Effect hypothesized by Einstein, and the Observer Effect in Quantum Mechanics in the early 20th-century. Curiously enough, the underpinnings of these scientific phenomena seem to reflect themes formulated in the narrative commentary and critiques of existentialist thought by Dostoevsky.¹²⁶

¹²⁴ Nina Vladimirovna Uspenskaia, *Dmitrii Ivanovich Mendeleev: dialog s epokhoi* (Moscow: Oktopus, 2010), 31.

¹²⁵ Albert Einstein (1879-1955) received the Nobel Prize in Physics in 1921, for his 1905 publication on the photoelectric effect. The field of quantum mechanics developed somewhat later in the 1920s, as scholars, including Werner Heisenberg, Niels Bohr, and Max Planck, explored the nature of indefinitely small sub-atomic particles, whose dynamics tend to refuse discrete mechanical calculations, but rather conformed loosely to the haze of wave probabilities. The field presumes that energy comes in finite “packets, instead of infinitely divisible quantities.” Einstein, on the whole, disputed the assumptions of quantum uncertainty, but he did acknowledge the problem of exploring the nature of subatomic particles. Robert P. Crease and Alfred Scharff Goldhaber, *The Quantum Moment: How Planck, Bohr, Einstein, and Heisenberg Taught us to Love Uncertainty*, (New York: Norton, 2015), 4; see also David Topper, *How Einstein Created Relativity Out of Physics and Astronomy*, (New York: Springer, 2013), 132.

¹²⁶ The Photoelectric Effect, for example, expresses the notion that different metals emit electrons when light is shined upon them. In works by Dostoevsky, characters act differently, when they feel they are being watched, i.e. when the metaphorical light of someone else’s gaze shines upon them. Often the difference in conduct comes about as a means to elevate or reduce the footing of the observed character in relation to others. The Underground Man, for instance, invents an audience for himself. He invents his own readership as an instrument of relative measurement to assert the lofty evaluation of his own character. The solipsistic protagonists of Dostoevsky, despite denying the existence of a reading audience, will fashion their remarks accordingly. They are always aware of this “other,” and while they may wish to exist independently of society and their voyeuristic readers, they formulate their own self-image based on the reactions of these necessary foils. The Observer Effect in Quantum Mechanics describes the inherent problem of observing properties of subatomic particles. To detect electrons, and even smaller subatomic particles, such as quarks, neutrinos, etc., scientists study changes brought about by exposing such entities to beams of light, or photons. Although other frequencies of radiation exert less influence on the electron, it is currently impossible to observe the electron in a way that will not interfere with its composition and activity. Human personalities, likewise, seem to resist scientific description. Although subatomic particles

Infinity, Dimensionality, and Relative Measurement

In addition to the presentation of light, the conception of space, time, and relative measurement attains unique prominence in works by Dostoevsky. The Ridiculous Man, having committed suicide and attended his own funeral in the contemplation of the dream, finds himself uncomfortably situated in a cold, damp coffin. Without any additional physical stimuli, his consciousness comes to assign a unit of time to each drop of water that slips through the cracks of the coffin and lands on his dead flesh, which unexpectedly retains the sensation of feeling.¹²⁷ The hero describes, “I don’t know how long a time passed, whether an hour, or several days, or many days. But suddenly a drop of water, which had seeped through the lid of the coffin, fell on my closed left eye. It was followed by another drop a minute later, then after another by another drop and so on. One drop every minute.”¹²⁸ The imagery of the drops of water, moreover, reflects the tears of suffering described by Father Zosima. They water the earth, allowing “dead corn of wheat to bring forth much fruit.”¹²⁹

Whether the intervals of the drops actually occur minute by minute is irrelevant. What is significant is that the personage and psychology of the Ridiculous Man strive to impose some rational order on the measure of time construed in the afterlife. Father Zosima senses the

lack the agency of man, it seems near impossible to observe either without some kind of bias or unintentional observer effect.

¹²⁷ The wound from the gunshot causes him pain in the afterlife: “All at once deep indignation blazed in my heart, and I suddenly felt a twinge of physical pain in it. ‘That’s my wound,’ I thought. ‘It’s the shot I fired. There’s a bullet there.’” «Глубокое негодование загорелось вдруг в сердце моем, и вдруг я почувствовал в нем физическую боль: “Это рана моя, - подумал я, - это выстрел, там пуля...”» (*PSS* 25, 110).

¹²⁸ «Не знаю, сколько прошло времени, - час или несколько дней, или много дней. Но вот вдруг на левый закрытый глаз мой упала просочившаяся через крышу гроба капля воды, за ней через минуту другая, затем через минуту третья, и так далее, и так далее, всё через минуту.» (*PSS* 25, 110).

¹²⁹ Zosima refers the mysterious visitor to John 12:24. “Verily, verily, I say unto you, except a corn of wheat fall into the ground and die, it abideth alone, but if it die, it bringeth forth much fruit.” (*Gospel of John*, 12:24). «Истинно, истинно говорю вам, если пшеничное зерно, падши в землю, не умрет, то останется одно, а если умрет, то принесет много плода». (*PSS* 14, 281); *The Holy Bible*, Revised Standard Version (New York: Oxford UP, 1973), 1306.

importance of this rational order, as he affirms in his exhortations, recorded by Alyosha Karamazov, “Know the measure, know the times, study this.”¹³⁰ Reason, accordingly, allows human subjects to grasp the structure underlying the mystery of existence.

Throughout the corpus of his literary works, but perhaps especially in “Dream of a Ridiculous Man” and *The Brothers Karamazov*, Dostoevsky develops a key distinction between the exceptionally great and the infinite in relation to the basis of measurement. This central differentiation exerts immense influence on Ivan, and comprises a central debate underlying his deliberations on faith, and his associated inclinations to accept or deny the existence of God. To establish this delineation, Ivan accepts the premise of “quadrillion” or a “quadrillion quadrillion” as the numeric representation of an stupendously vast finite value.¹³¹ The Ridiculous Man, similarly, conceives of “millions of years” to express this finite greatness.¹³² Despite the colossal size of these values to the perspective of a human individual with an “earthy, Euclidean mind,” they are but a drop in the bucket compared to a divine entity, spanning all of eternity.

Mathematicians have long grappled with definitions of the infinite. The foremost figures of natural philosophy, Euclid himself included, artfully skirted this pressing question by referring

¹³⁰ «Знай меру, знай сроки, научись сему.» (PSS 14, 292).

This emphasis seems to reflect the teachings of Ecclesiastes 3:4: “To Everything There is a Season: a time to kill and a time to heal; a time to tear down and a time to build up. A time to weep and a time to laugh; A time to mourn and a time to dance. A time to throw stones and a time to gather stones. A time to embrace and a time to shun embracing”.

¹³¹ A quadrillion in applied and theoretical mathematical discourses refers to 10^{15} in scientific notation. That is, 1,000,000,000,000,000. The first reference to this figure occurs in Ivan’s nightmare, during his encounter with the devil, but it also appears in Ivan’s testimony at the murder trial of his brother, Dmitrii.

¹³² «в продолжение миллионов лет мученичества!...» (PSS 25, 110).

to “indeterminately large values,” instead of unending lengths, spanning infinitely.¹³³ When Ivan meets with Alyosha in the Metropolis Tavern, for example, Ivan laments that he will be leaving for Moscow the next day, but perplexingly consoles his brother by telling him, “We have plenty of time before I go, an eternity, an immortality!”¹³⁴ Reiterating both his own confusion and that of the novel’s readership, Alyosha responds, “but if you are going away tomorrow, what do you mean by an eternity?”¹³⁵ While this commentary at first does not seem to warrant additional explanation, the statement participates in the broader consideration of infinity and immortality in immortality on the part of Dostoevsky as the author-creator of the work.

Readers, generally, pay this line of the novel little attention, as it appears to infer the outset of a joke, a moment of sarcasm, or even colloquial hyperbole. The associated deliberations of Ivan concerning the approaching limit of his departure, however, reflect polemical questions from the natural philosophy of classical antiquity. Aside from his departure, this model perhaps also applies to the assessment of Ivan that 30 years of age is all the time he needs to experience the whole of life. The narrative of mode of Dostoevsky in engaging these questions echoes the musings of Zeno of Elea (490-430 B.C.E.) and his paradox of Achilles and the Tortoise.¹³⁶ The

¹³³ There are different types of infinities expressed in mathematics by divergent and convergent series. Aristotle, on the whole rejected the material premise of infinity, but conceptualized ways it which it can and cannot exist. He describes in his treatment of ‘*apeiron*,’ that “infinity, insofar as it can exist, exists as something potential and incomplete and as something extendable ad infinitum, like the process of repeatedly bisecting a continuous magnitude, or the endless march of time. Any other sort of infinity- for instance, an infinitely large body or an infinitely large collection of parts cannot exist.” Until the discovery of the Archimedes Palimpsest in 1998, it was thought that nearly every mathematician of the classical world in the wake of Aristotle refuted the universal, ontological existence of infinity. See also Michael Gagarin, “Infinity” in *The Oxford Encyclopedia of Ancient Greece and Rome*, Vol. I, (Oxford: Oxford UP, 2010), 68.

¹³⁴ «У нас с тобой еще бог знает сколько времени до отъезда. Целая вечность времени, бессмертие!» (PSS 14, 212).

¹³⁵ «Если ты завтра уезжаешь, какая же вечность?» (PSS 14, 212).

¹³⁶ John P. Moran situates reflections on Zeno’s Paradox of Achilles and the Tortoise by Dostoevsky and Tolstoy in relation to theories of history, and not in connection to the befuddling commentary on the infinite in *The Brothers Karamazov*. The holistic examination of this discourse by Dostoevsky illuminates mathematical features of his metaphysical regard for eternity and God. John P. Moran, *The Solution of the Fist: Dostoevsky and the Roots of Modern Terrorism*, (Lanham, MD: Lexington Books, 2009), 18-19;

paradox hinges on the central idea “that nothing ever changes, motion is just an illusion, and that time itself does not really exist.”¹³⁷ Although the initial premise of the paradox relies on scientific illogicality, it nevertheless reveals aspects of human perception regarding the infinite.

The paradox is based on the even older fable of the tortoise and the hare, which most children still learn today, attributed to Aesop, who lived about a century before Zeno.¹³⁸ The problem can be summarized as follows:

Achilles, the fleet-footed hero of the Trojan war, is engaged in a race with a lowly tortoise that has been granted a head start. Achilles’ task at first seems easy, but he has a problem. Before he can overtake the tortoise, he must first catch up with it. While Achilles is covering the gap between himself and the tortoise that existed at the start of the race, however, the tortoise creates a new gap. The gap is smaller than the first, but it is still a finite distance that Achilles must cover to catch up with the animal. No matter how quickly Achilles closes each gap, the slow-but-steady tortoise will always open newer smaller ones, and remain just ahead of the Greek hero.¹³⁹

Joseph Mazur describes the paradox as “a trick in making you think about space, time, and motion the wrong way.”¹⁴⁰ The problem in the paradox is caused by the confusion of a continuum with discrete points.¹⁴¹ Achilles runs continuously, and not in decreasing intervals.¹⁴² In other words, he keeps running, as opposed to stopping at each point in the hypothetical model.

see also Brian Palmer, “What is The Answer to Zeno’s Paradox?” *Slate*, 5 March 2014. Accessed online at <http://www.slate.com/articles/health_and_science/science/2014/03/zeno_s_paradox_how_to_explain_the_solution_to_achilles_and_the_tortoise.html>.

¹³⁷ Jim Al-Khalili, *Paradox: The Nine Greatest Enigmas in Physics* (New York: Broadway, 2011), 25.

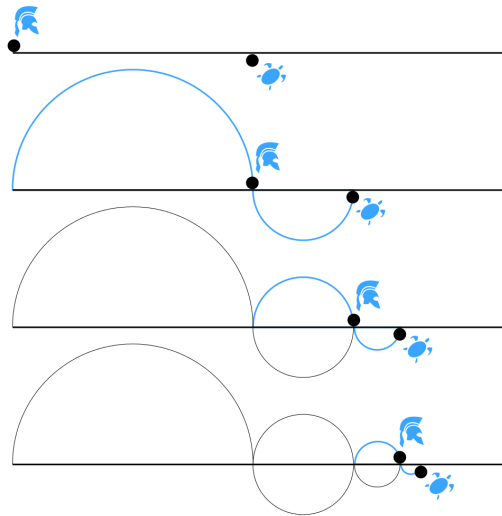
¹³⁸ Ibid. 25

¹³⁹ Brian Palmer, “What is The Answer to Zeno’s Paradox?” *Slate*, 5 March 2014.

¹⁴⁰ As cited in Ibid.

¹⁴¹ James A. Mackin, Jr., *Community Over Chaos: An Ecological Perspective on Communication Ethics* (Tuscaloosa: University of Alabama Press, 1997), 55.

¹⁴² Ibid. 55



Above: Diagrammatic representation of Zeno's Paradox of Achilles and the Tortoise by Martin Grandjean¹⁴³

The fact that a line can be divided into an infinite number of points does not mean that the line is infinitely long.¹⁴⁴ In order to overtake the Tortoise, Achilles would have to run an infinite number of intervals of a finite distance in a finite amount of time.¹⁴⁵ The solution to the paradox depends on the nature of the total sum of the differences in the position of the two contestants in the race. Although it seems mathematically obvious that a faster runner would overtake a slower one, the confusion concerning the paradox stems from the human conception of infinity, and the distinction between convergent and divergent series.

Since it is impossible to write out all of the infinitely many terms comprising the sum of the differences in the paradox of Achilles and the Tortoise, mathematicians refer to such

¹⁴³ Martin Grandjean, *Henri Bergson et les paradoxes de Zénon: Achille battu par la tortue?*, 2014. Fair-use reproduction provided by Wikimedia commons. Accessed online at: <http://www.martingrandjean.ch/bergson-paradoxes-zenon-achille-tortue/>.

¹⁴⁴ James A. Mackin, Jr., *Community Over Chaos: An Ecological Perspective on Communication Ethics* (Tuscaloosa: University of Alabama Press, 1997), 55.

¹⁴⁵ Ibid. 55

expressions as infinite series.¹⁴⁶ There are two overarching classifications of infinite series: convergent and divergent.¹⁴⁷ A convergent series expresses an indeterminate sum that asymptotically approaches a finite limit. For example, the reciprocals of the powers of 2 produce a convergent series that asymptotically approaches the finite value of 2. Expressed mathematically, $1/1+1/2+1/4+1/8+1/16+1/32\dots=2$. Similarly, Euler's number, e , for instance, expresses the convergence of the reciprocals of factorials, following the expression $(1+1/n)^n$ as n approaches infinity. The finite value represented by the constant e , approximately equal to 2.71828, expresses the value of the base of the natural logarithm.

Divergent series, in contrast, do not asymptotically plateau toward a specific value. The limit of a divergent series extends infinitely in the positive or negative direction, or is said not to exist. The sum of the positive integers, i.e. $1+2+3+4+5+\dots+n$, for instance, comprises a divergent series that does not approach a finite limit, but increases *ad infinitum*. Calculus provides a number of tests to determine if a given series is convergent or divergent.¹⁴⁸ When Zeno first developed the Paradox of Achilles and the Tortoise, the methods of calculus were not yet known to determine whether a given infinite series would be convergent or divergent.

Suppose Achilles runs ten times faster than the tortoise, who is given a 10-meter head start. In the time it takes Achilles to cover the 10 meters to the point where the tortoise started,

¹⁴⁶ Keith Devlin, *The Language of Mathematics: Making the Invisible Visible* (New York: Henry Holt, 2000), 102.

¹⁴⁷ Wesley C. Salmon, "Introduction" to *Zeno's Paradoxes* (Indianapolis: Hackett, 2001), 25. See also James M. Hyslop, *Infinite Series* (New York: Dover Publications, 2006), 25-26.

¹⁴⁸ Brian Palmer describes that "the convergence of an infinite series explains countless things in the world, and not just the fact that a fast runner can overtake a tortoise. A distance, time, or force that exists in the world can be broken into an infinite number of pieces." There are many tests in calculus to determine if a series is convergent or divergent with varying levels of complexity. The basic tests include the comparison test, the ratio test, the root test, the integral test, the limit comparison test, and the alternating series test also known as the Leibniz criterion. Mathematicians have developed variations of these tests to coincide with the known parameters of existing problems and unknowns. Cauchy, for instance, developed his condensation test. Dirichlet, Abel, and Raabe also have tests named after them to analyze the hypothetical convergence or divergence of a given series. As cited in Brian Palmer, "What is The Answer to Zeno's Paradox?" *Slate*, 5 March 2014; see also Gilbert Strang, "Convergence Tests", *Calculus*, Vol. 1 (Wellesley: WC Press, 1991), 375-385.

the tortoise has covered one meter, and remains one meter ahead. By the time Achilles has covered this extra meter, the tortoise is a tenth of a meter in the lead. When Achilles reaches the point where the tortoise had been at the previous stage of the race, he still trails by a hundredth of a meter. The sum of these differences comprises the following infinite series: $10+1+1/10+1/100$, and so on. The following model developed by Keith Devlin reflects how the associated sum of the differences between Achilles and the tortoise at infinitely many intervals could be expressed mathematically.¹⁴⁹ In the equation below, S represents the unknown sum of these differences.

$$S=10+1+1/10+1/100+1/1000+ \dots$$

Multiply both sides of expression by 10 to obtain the same series again, albeit now with a new first term of 100.

$$10S=100+10+1+1/10+1/100+1/1000+\dots$$

Subtract the first identity from the second, and all the terms on the right-hand side of the equation cancel out in pairs, apart from the initial term of 100 found above. Consequently,

$$10S-S=100 \text{ or } 9S=100$$

What was once an infinite series is now expressed as an equation with finite terms, which can be solved through algebraic methods.

$$S=100/9$$

$$\therefore S= 11\frac{1}{9}$$

In the model, Achilles catches up with the tortoise when he has covered exactly $11\frac{1}{9}$ meters. This is only so, however, because the values of distance and relative speed selected arbitrarily converge at this particular limit. As Benjamin Allen points out that, however, “It is mathematically possible for a faster thing to pursue a slower thing forever and still never catch it,

¹⁴⁹ The presented mathematical model of the Paradox of Achilles and the Tortoise has been adapted from calculations with theoretical arbitrary values provided by Keith Devlin in *The Language of Mathematics: Making the Invisible Visible* (New York: Henry Holt, 2000), 102.

so long as both the faster thing and the slower thing keep slowing down in the right way.”¹⁵⁰

Consequently, a different set of parameters defining the various variables in the equation, i.e. the speed of each contestant, the magnitude of the head start, and the subsequent distances separating Achilles and the tortoise at infinitely many intervals could have been selected to yield a divergent series. Achilles would be faced with the impossible task of catching up with infinity in a finite amount of time. Achilles would be forever be chasing a tortoise without ever reaching it.

When Ivan Karamazov blithely comments that he has “an eternity” before leaving town the next morning, the sincerity of the remark tacitly infers his acceptance of the underlying premise of Zeno’s Paradox of Achilles and the Tortoise that motion and change are merely illusions. In reconciling the principle of the underlying puzzle formulated by Zeno, Keith Devlin explains “at any one instant, an object must be at rest. Since this is true for all instants, surely the object will always be at rest, so how can motion arise?” Ivan perceives the physical reality of the story not as a continuous stream of “living life” in the same way that Alyosha and Dmitrii do, but rather as the sum of infinitely many frozen moments. His immense skills of analytical deduction at the level of the moment situate his intellect on a par with the Underground Man.

Announcing that he intends to live only to the age of the thirty, Ivan even perhaps envisions his life as a kind of convergent infinite series. When he stammers, “At thirty though, I shall be sure to leave the cup, even if I’ve not emptied it, and turn away- where I do not know,” he not only alludes to a plan to take his own life in the distant future, but he also indicates that he conceptualizes the final moment of his physical existence.¹⁵¹ Ivan is astutely aware of the proportions of every instant, but by considering the infinitely many deconstructed moments of life, he is unable to experience the miracle of existence as a fluid phenomenon of continuity.

¹⁵⁰ As cited in Brian Palmer, “What is The Answer to Zeno’s Paradox,” *Slate*, 5 March 2014.

¹⁵¹ «Впрочем, к тридцати годам, наверно, брошу кубок, хоть и не допью всего и отойду...не знаю куда» (*PSS* 14, 269).

The associated effect is like experiencing reality through photographs without actually living life. Whereas Alyosha and Dmitrii observe and participate in the changes that unfold in the dynamic miracle of existence, Ivan perceives only snapshots of each incredibly detailed moment perceived by his subjective perspective. On an even deeper level of metacognition, this insight perhaps even allows Ivan to surmise his existential status as a character in a fictional work of literature, as opposed to a living human being. His love for the “sticky little leaves,” consequently serves not only to remind him of his belief in the beauty of the world created by God, but also to confirm his own ontological status through sensory perception.¹⁵²

The observation of infinite momentary divisions in a finite amount of time is also experienced by Markel, Zosima’s consumptive older brothers. After hearing the sentiments of false hope delivered in the grim diagnosis by Dr. Eisenschmidt, Markel contemplates enthusiastically, “Why reckon the days? One day is enough for a man to know all happiness My dear ones, why do we quarrel, try to outshine each other and keep grudges against each other? Let’s go straight into the garden, walk and play there, love, appreciate, and kiss other, and glorify life.”¹⁵³ The rhetorical question uttered by Markel, “Why reckon the days?” seems to contradict Zosima’s advice to “know the time.” The recognition of the infinite moments in a given finite

¹⁵² The sticky little leaves become a repeated motif in the novel that remind Ivan of his “base” lust for life, comprising desires that emanate not from his consciousness, but his heart and body. Ivan aptly identifies this “base” lustness as a characteristic common to all the Karamazovs. «Клейкие листочки», голубое небо люблю я» (PSS 14, 210). Alyosha echoes this sentiment after hearing Ivan’s story of the Grand Inquisitor: “But the little sticky leaves, and the precious tombs, and the blue sky, and the woman you love! How will you live, how will you love them?” «А клейкие листочки, а дорогие могилы, а голубое небо, а любимая женщина! Как же жить-то будешь, чем ты любить-то их будешь?» (PSS 14, 239). Dmitrii also describes his love for the little green leaves: “Let us praise nature: you see what sunshine, how clear the sky is, the leaves are all green, it’s still summer; four o’clock in the afternoon and the stillness!” «Восхвалим природу: видишь, солнца сколько, небо-то как чисто, листья все зелены, совсем еще лето, час четвертый пополудни тишина!» (PSS 14, 97).

¹⁵³ «Милые мои, чего мы ссоримся, друг пред другом хвалимся, один на другом обиды помним, прямо в сад пойдем и станем гулять и резвиться, друг друга любить и восхвалять, и целовать, и жизнь нашу балгословлять» (PSS 14, 262).

period of time is a source of optimism for both Ivan and Markel, and they sense the imperative to forge bonds with loved ones before departing toward their respective destinations.¹⁵⁴

Before his spiritual conversion brought on by sickness, Markel exhibited the doubting characteristics that come to define the intellectual persona of Ivan.¹⁵⁵ Whereas Ivan distances himself from the continuous force of life, Markel seems to appreciate it, clinging to every moment as a means that facilitate interactions between the limited scope of human beings with the conception of the infinite. Life, like God, coincides with the unbounded expanse of a divergent series. Figuratively, the scene also suggests that Markel at this advanced stage of his illness, while still possessing his physical bodily form and earthly desire, discerned a necessity for the immortality of the soul, for life to carry on in the ever expansive mercy of God.

The spiritual conception of the afterlife that unfolds in the novel departs from the materialistic conventions of physical life. Expressing doubts about the metaphysical status of the soul after death, Fyodor Pavlovich situates himself between his two sons, Alyosha and Ivan, the former defending his faith in immortality, and the latter denying it. The conversation occurs

¹⁵⁴ Ivan has his first meaningful interaction with his brother in the novel as they reminisce about their childhood over cherry jam and fish soup, while discussing the serious questions grieving their hearts, souls, and minds. Markel, similarly, consoles his anguished mother, while also passing on the wisdom of his enhanced spiritual insights to his younger brother Zosima. His words, feelings, and life function as a seed of virtue that blossoms in the heart of the future monk and elder, comprising a form of resurrection.

¹⁵⁵ Zosima recalls of his brother, “He did well at school...Six months before his death, when he was seventeen, he made friends with a political exile who had been banished from Moscow to our town for freethinking, and led a solitary existence there. He was a good scholar who had gained distinction in philosophy in the university. Something made him take a fancy to Markel, and he used to ask to see him. The young man would spend whole evenings with him...It was the beginning of Lent, and Markel would not fast, he was rude, and laughed at it. ‘That’s all silly twaddle and there is no God’ he said horrifying my mother, the servants, and me, too.” «Учился в гимназии хорошо...За полгода до кончины своей, когда уже минуло ему семнадцать лет, повадился он ходить к одному уединенному в нашем городе человеку, как бы политическому ссыльному, высланному из Москвы в наш город за вольнодумство. Был же этот ссыльный немалый ученый и знатный философ в университете. Почему-то он полюбил Маркела и стал принимать его. Просиживал у него юноша целые вечера...Начался великий пост, а Маркел не хочет поститься, бранится и над этим смеется: «Всё это бредни, -говорит, - и нет никакого и бога» -так что в ужас привел и мать и прислугу, да и меня малого» (*PSS* 14, 261).

without interference on the part of the narrator, but the ideological positions expressed in the exchange, coincide with the paradigmatic representation of the components of the collective self:

“So, do tell, is there a God, or not? Only be serious. I want you to be serious now.”
 “Now there is no God.”
 “Alyosha, is there a God?”
 “There is.”
 “Ivan, and is there immortality of some sort, just a little, just a tiny bit?”
 “There is no immortality either.”
 “None at all?”
 “None at all.”
 “There’s the most perfect zero then. Perhaps there is just something? Anything is better than nothing!”
 “A perfect zero.”
 “Alyosha, is there immortality?”
 “There is.”
 “God and immortality?”
 “God and immortality. In God is immortality.”
 “H’m! It’s more likely Ivan’s right. Good Lord! To think what faith, what force of all kinds, man has lavished for nothing on that dream, and for how many thousands of years. Who is it laughing at man? Ivan! For the last time, once for all, is there a God or not? I ask for the last time!”
 “And for the last time there is not.”
 “Who is laughing at humankind, Ivan?”
 “It must be the devil,” said Ivan smiling.
 “And the devil? Does he exist?”
 “No there’s no devil either.”
 “It’s a pity. Damn it all, what wouldn’t I do to the man who first invented God! Hanging on a bitter aspen tree would be too good for him.
 “There would have been no civilization if they hadn’t invented God.”¹⁵⁶

The associated dialogue offers several interesting points concerning the opposing metaphysical hypotheses of Alyosha and Ivan.

¹⁵⁶ «А все-таки говори: есть бог или нет? Только серьезно! Мне надо теперь серьезно. – Нет, нету бога. – Алешка, есть бог? –Есть бог. –Иван, а бессмертие есть, ну там какое-нибудь, ну хоть маленькое малюсенькое? –Нет и бессмертия. -Никакого? –Никакого. –То есть совершеннейший нуль или нечто? Может быть, нечто какое-нибудь есть? Всё же ведь не ничто! –Совершенный нуль. –Алешка, есть бессмертие? –Есть. –А бог и бессмертие? –И бог, и бессмертие. В боге и бессмертие. –Гм. Вероятнее, что прав Иван. Господи, подумать только о том, сколько отдал человек веры, сколько всяких сил даром на эту мечту, и это столько уж тысяч лет! Кто же это так смеется над человеком? Иван? В последний раз и решительно: есть бог или нет? Я в последний раз! –И в последний раз нет. – Кто же смеется над людьми, Иван? –Черт, должно быть, усмехнулся Иван Федорович. –А черт есть? –Нет, и черта нет. –Жаль. Черт возьми, что б я после того сделал с тем, кто первый выдумал бога! Повесить его мало на горькой осине. –Цивилизации бы тогда совсем не было, если бы не выдумали бога. (PSS 14, 123-124).

First, Fyodor Pavlovich wonders paradoxically if there is even just a “little, just a tiny bit” of immortality in the afterlife. The vast concept of infinity does not function like the “quadrillion quadrillions” presented in Ivan’s contemplations on the finite toil his philosopher would endure to enjoy the infinite splendor of God. In this metaphysical model, infinity, as it were, comprises a continuous whole. It cannot be parsed in the same way that Ivan dissects the entirety of his existence as the sum of discrete moments. If one were somehow able to anatomize the infinite unity represented by the higher-dimensional construct of God and spiritual virtue, it would still be incomprehensibly vast compared to the material world perceived by the earthly, Euclidean mind of man.

Second, the inclusion of the “perfect zero” [*sovershenneshii nul’*] implicitly alludes to the concept of Absolute Zero in physics, or the temperature at which molecules stop moving. The Irish Physicist and Engineer Lord Kelvin (1824-1907) developed the Kelvin temperature scale in 1848, and though he could not reproduce temperatures as cold as absolute zero, (-459.67° F, or -273.15° C), his model established metrics that formed the evaluative basis for measuring the entropy or stasis of a given system in a variety of interdisciplinary pursuits.¹⁵⁷ Reference to the concept of absolute zero also appears in Ivan’s exchange with the devil in his nightmare. By joking that the devil is the one laughing at humankind, Ivan, albeit in a mode of ironic skepticism, allows for supernatural elements to enter into his rigid vision of cold, unchanging nothingness as the fundamental essence of the afterlife. Paradoxically, his assertion that the devil exists hints at his underlying belief in God. Since the ontological existence of God cannot be known by humanity directly in the positive, Ivan reverts to the rhetorical and theological device of apophasis, or the understanding of God in the negative, i.e. what God is not.

¹⁵⁷ David Lindley, *Degrees Kelvin: A Tale of Genius, Invention, and Tragedy*, (New York: Joseph Henry Press, 2004), 100.

The appearance of earthly elements in the conception of immortality reflects the outset of a paradox concerning the opposing metaphysical arguments set forth by Alyosha and Ivan. Fyodor Pavlovich, for example, earlier in the novel, finds it improbable that devils would drag him down to hell with hooks. He begins to question the material basis of this notion, in a series of rhetorical questions: “hooks? Where would they get them? And what would they be made of? Iron hooks? Where do they forge them? Have they a foundry there of some sort?”¹⁵⁸ When Alyosha objects by saying that there are no hooks in the afterlife, Fyodor Pavlovich modifies his estimation of the afterlife, affirming, “Yes, yes, only the shadows of hooks. I know, I know.”¹⁵⁹ Although humanity may mystically sense the gravity of spiritual virtue that is not entirely of this world, the material torture carried out by means of hooks carried by devils is perhaps preferable to the total isolation of one denied God’s infinite mercy.

This ostensible illogicality echoes the musing of the Underground Man, “let the world end, but let me drink my tea.”¹⁶⁰ Grigorii Pomerants argues that drinking tea after the apocalypse and the premise of hooks in the afterlife contribute to a kind of Buddhist *koan*, or a riddle requiring an absurd or illogical response.¹⁶¹ Death does not abide by material proportions. One cannot measure, conceptualize, or explain fully the phenomenon of an infinite afterlife. Eternal salvation can only be experienced by the virtuous soul, possessing sensitivities that are not wholly of the material world, nor stemming solely from the existence known by human beings. In the aligned presentation of God and immortality, the physical trappings of the all earthly

¹⁵⁸ «Ведь невозможно же, думаю, чтобы черти меня крючьями позабыли стащить к себе, когда я помру. Ну вот и думаю: крючья? А откуда они у них? Из чего? Железные? Где же их куют? А откуда они у них? Из чего? Железные? Где же их кют? Фабрика, что ли, у них какая там есть?...» (PSS 14, 23-24).

¹⁵⁹ «Так, так, одни только тени крючьев» (PSS 14, 23-24).

¹⁶⁰ «Свету ли провалиться, или вот мне чаю не пить? Я скажу, что свету провалиться, а чтоб мне чай пить» (PSS 5, 174).

¹⁶¹ Grigorii Pomerants, “Euclidean and Non-Euclidean Reason” in *The New Russian Dostoevsky*, trans. and ed. Carol Apollonio, (Bloomington, IN: Slavica Publishing, 2010), 81.

things dissolve like a “mirage” in the vastness of the higher dimensional construct envisioned and embodied by the divine source of spiritual virtue.¹⁶²

Upon meeting the devil in his nightmare, Ivan discusses the significance of temperatures and physical reality. The devil relays to him the commentary of a cruel game played by village girls: “they invite the unwary to lick an axe in thirty degrees of frost, the tongue instantly freezes to it and the dupe tears the skin off, so it bleeds. But that’s only 30° in 150° I imagine it would be enough to put your finger on the axe and it would be the end of it...if only there could be an axe there.”¹⁶³ This conversation takes place after Ivan and the Devil explore the notion of whether or not spirits freeze. According to the devil, “spirits do not freeze,” reaffirming the notion that the metaphysical realm of the afterlife does not abide by the same laws as those governing material reality.¹⁶⁴ Liza Knapp, similarly, suggests that the Devil does not wear a watch, simply because the afterlife transcends the metrical basis of physical life.¹⁶⁵ The transcendent nature of spirituality marked by the immortality of the soul and the infinite capacity of God for love and forgiveness exist on a higher-dimensional plane governed by wholly different laws than those confronted physically on earth.¹⁶⁶

In a famous diary entry dated April 16, 1864, Dostoevsky recorded heartfelt meditations on the continuation of the soul upon leaving the physical form of the body after the death of his

¹⁶² Ivan estimates that when human souls return to God, “all the humiliating absurdity of human contradictions will vanish like a pitiful mirage.” «весь обидный комизм человеческих противоречий исчезнет, как жалкий мираж» (*PSS* 14, 214-15).

¹⁶³ «Известна забава деревенских девок: на тридцатиградусном морозе предлагают новичку лизнуть топор; язык мгновенно примерзает, и олух в кровь сдирает с него кожу; так ведь это только на тридцати градусах, а на ста-та пятидесяти, да тут только палец, я думаю, приложить к топору, и его как не бывало, если бы... только там мог случиться топор...» (*PSS* 15, 75).

¹⁶⁴ «Духи не замерзают» (*PSS* 15, 75).

¹⁶⁵ Liza Knapp, “The Fourth Dimension of the Non-Euclidean Mind: Time in Brothers Karamazov or Why Ivan Karamazov's Devil Does not Carry a Watch” in *Dostoevsky Studies*, Vol. 8 (1987) 105.

¹⁶⁶ Arguably, Dostoevsky presents an intertextual argument with Dante’s *The Divine Comedy* by questioning whether it is cold in hell. Dante Alighieri, *The Divine Comedy of Dante Alighieri*, trans. C.E. Norton (New York: Houghton Mifflin, 1919), 216.

first wife, Maria (Masha) Dmitrievna. His journal entry takes the form of a confession expressing his metaphysical doubts and the guilt he felt from not having personified the virtue of the Golden Rule in giving her all the love of his being:

Masha is lying on the table. Will I see Masha again? To love a person as one's own self, as Christ commanded, is impossible. On earth the law of the self binds us; the *I* stands in the way... Christ was able, but Christ was eternal, from all ages the ideal toward which man strives and according to the law of nature must strive. After Christ's appearance, it became clear that the highest development of personality must attain to that point where man annihilates his own "I," surrenders it completely to all and everyone without division or reserve... And this is the greatest happiness... This is Christ's paradise... And so, on earth man strives towards an idea contrary to his nature. When man has not fulfilled the law of striving toward the ideal, i.e., has not *by love* offered his "I" in sacrifice to people or to another being (*Masha and I*), he experiences suffering and has called this condition sin.¹⁶⁷

These reflections by Dostoevsky in his time of mourning reflect his own fears and spiritual tribulations. In his argumentative model, Dostoevsky questions whether the spiritual virtue of Christ as an ideological construct reflects an impossibility in the same way that the ontological status of the immortality of the soul remains an incomprehensible mystery relative to the physical limitations of the human condition.

When Ivan alludes directly to the frameworks of Non-Euclidean geometry in discussions with Alyosha in the Metropolis, his statements comprise agnostic sentiments reminiscent of the journal entry recorded by Dostoevsky after the death of Maria Dmitrievna. In Ivan's model, the

¹⁶⁷ «Маша лежит на столе. Увижусь ли Машей? Возлюбить человека, *как самого себя*, по заповеди Христовой, - невозможно. Закон личности на земле связывает. *Я* препятствует... Один Христос мог, но Христос был вековечный от века идеал, к которому стремится и по закону природы должен стремиться человек. После появления Христа, стало ясно, что высочайшее развитие личности должно дойти до того, чтобы человек уничтожил свое "я", отдал его целиком всем и каждому безраздельно и беззаветно... И это величайшее счастье... Это-то и есть рай Христов... Итак, человек стремится на земле к идеалу, противоположному его натуре. Когда человек не исполнил закона стремления к идеалу, т.е. не приносил любовью в жертвы свое "я" людям или другому существу (*я и Мауа*), он чувствует страдание и назвал это состояние грехом». As cited by K.V. Mochulskii, *Dostoevskii: zhizn'* (Paris: YMCA-Press, 1980), 216; see also F.M. Dostoevskii, *Neizdannye Dostoevskii: zapisnye knizhki i tetrad, 1860-1881 gg.* (Moscow: Nauka, 1971), 173.

premise of the infinite coincides with the existence of the God.¹⁶⁸ The supposition that the intersection of two parallel lines “could intersect somewhere in infinity” seemingly renders the limitless virtue and eternal essence of Christ - finite. Dostoevsky wrestled with the implications of Non-Euclidean Geometry. On one hand, the validity of such models would disavow conceptions of the infinite, but on the other, the associated findings would seem to indicate the necessary overlap between flawed reality and the divine, or else the infinite contained possibilities that did not exist on earth.

Mathematics underwent a kind of schism in the late 19th century. The Moscow Mathematical School, following the research of Nikolai Brashman, took up the position that the theoretical convergence of two parallel lines could very well exist, but it would happen at a distance infinitely inconceivable for human consciousness.¹⁶⁹ German mathematicians, in the shadow of Bernhard Riemann, in contrast, labeled this intersection as “*unendlich ferner Punkt*” [“point at infinity”] or “*Fernelement*” [“infinite element”] and interpreted this point as a phenomenological event that humanity could observe, measure, and even experience.¹⁷⁰

In the unofficial medium of his private journal, Dostoevsky formulated his own mathematical treatment of the parallel question in an entry dated 17 August 1880. The argumentative logic formulated in this 1880 entry, ambiguously titled, “Remarks, Words and Expressions” (“*Slova, slovechki, i vyrazheniia*”) comprises the continuation of musings from an

¹⁶⁸ In this regard, the inclusion of the words ‘*beskonechnyi*’, ‘*bespredel’nyi*’, ‘*besgranichnyi*’, and ‘*neogranichnyi*’, meaning ‘endless’, ‘limitless’, ‘boundless’ and ‘unbounded’, respectively, tacitly infer a connection in some respect to the infinite virtue of God extended into the finite world of humanity.

¹⁶⁹ Loren Graham and Jean-Michel Kantor, *Naming Infinity: A True Story of Religious Mysticism and Mathematical Creativity* (Cambridge: Harvard UP, 2009), 66-68.

¹⁷⁰ Klaus Lamotke, *Riemannsche Flächen: Zweite, ergänzte und verbesserte Auflage* (New York: Springer, 2009), 192-193; see also Hermann von Helmholtz, “The Origin and Meaning of Geometrical Axioms” (1870) in *Beyond Geometry: Classic Papers from Riemann to Einstein*, ed. Peter Pesic (Mineola, NY: Dover, 2007), 47-48; Henri Poincaré, “Non-Euclidean Geometries” (1891) in *Beyond Geometry: Classic Papers from Riemann to Einstein*, ed. Peter Pesic (Mineola, NY: Dover, 2007), 99; Bernhard Riemann, “On the Hypotheses that Lie at the Foundations of Geometry” (1854) in *Beyond Geometry: Classic Papers from Riemann to Einstein*, ed. Peter Pesic (Mineola, NY: Dover, 2007), 53.

earlier journal entry recorded Holy Thursday of 1864.¹⁷¹ His rudimentary “proof” explores the ramifications of Non-Euclidean frameworks relative to the existence of God, using the notation of (#) to express parallelism and (Δ) for triangle. The commentary formulated in the journal entry follows thusly:

If there were an end somewhere in the world, then there would be an end to the whole world. Parallelism of lines. A triangle, merger at infinity, a quadrillion is still nothing in the face of infinity. In infinity parallel lines should meet. For, after all, the corners of the triangle exist in finite space, and the rule that the more infinite, the closer to parallelism, should still hold. At infinity, parallel lines should meet, but—this infinity will never come. If it were to come, that would be an end to infinity which is absurd. If parallel lines were to meet, then there would be an end to the world and to the law of geometry and to God, which is absurd, but only for the human mind. The real (created) world has an end, the immaterial world, however, has no end. If parallel lines were to meet, the law of this world would end. But at infinity they do meet, and infinity exists without a doubt. For, if there were no infinity, there would be no finitude; it would be inconceivable. And if there is infinity, then there is God and another world, built on other laws than the real created world.¹⁷²

A copy of his original explanation appears on page 697 of the 1971 collection, *Unpublished Dostoevsky* [*Neizdannyyi Dostoevskii*] The “end of infinity” [*konets beskonechnosti*] equates metonymically to the negation of God in the minds of humans. After dismissing this premise, calling the absence of God an “absurdity”, Dostoevsky presents earthly rational finitude as a foil for the infinite.

¹⁷¹ As cited by Liza Knapp, *The Annihilation of Inertia: Dostoevsky and Metaphysics*, 291.

¹⁷² «Если б где в мире был конец, то был бы всему миру конец. Параллелизм линий. Треугольник, слияние в бесконечности, одна квадрильонная все-таки ничтожность перед бесконечностью. В бесконечности же параллельные линии должны сойтись. Ибо все это вершины треугольника все-таки в конечно пространстве, и правило, что чем бесконечнее, тем ближе к параллелизму, должно остаться. В бесконечности должны слиться параллельные линии но-бесконечность это никогда не придет. Если б пришла, то был бы конец бесконечности, что есть абсурд. Если б сошлись параллельные линии, то был бы конец миру и геометрическому закону и богу, что есть абсурд, но лишь для ума человеческого. Реальный (созданный) мир конечен, невещественный же мир бесконечен. Если б сошлись параллельные линии, кончился бы закон мира сего. Но в бесконечности они сходятся, и бесконечность есть несомненно. Ибо если б не было бесконечности, не было бы и конечности, немислима бы она была. А если есть бесконечность, то есть бог и мир другой, на иных законах, чем реальный (созданный) мир.» (*PSS* 27, 43).

The hypothetical premise of Non-Euclidean geometry developed by Nikolai Lobachevsky in the 1820s caused renewed interest in the question of the infinite. While Lobachevsky's work was largely suppressed during his own lifetime, his ideas started to gain increased attention by the Russian public during the volatile period of the 1860s-1880s. Lobachevsky himself grasped the ramifications of his research in relation to metaphysical and theological discourses concerning the established relationship between God and infinity. By proposing that two parallel lines should intersect, Lobachevsky provided geometric and quantitative frameworks for engaging the metaphysical question of whether two ostensibly separate realms of existence could ever overlap. Like Dostoevsky and Ivan Karamazov, Lobachevsky undoubtedly wrestled to comprehend the significance of this hypothetical convergence of two parallel lines. On one hand, his model would seem to indicate that infinity comprised a theoretical point, as opposed to as an ever-increasing value with no limit. On the other hand, his arguments also seemed to suggest the potential union of the divine spiritual truth of God and the flawed material world of humanity. Despite the divergent nature of their continuous magnitudes, the spiritual and material in the findings of Lobachevsky would be grounded in the same dimensional constructs of being.

The various branches of mathematics express the concept of infinity in slightly different ways. In geometry, Euclid carefully circumvented the debate concerning the infinite by describing a segment of "indeterminate length" as opposed to one stretching onward without end. The geometric model, however, inferred by Euclid presents infinity as a static and immeasurable mathematical entity that occurs without incremental change. If you add a finite value to infinity, the inclusion of the finite entity essentially makes no discernible difference: the sum is still infinity. While infinity admits a number of special properties and appears frequently in

operations that yield the befuddling result of “undefined”, its definitive characteristic is that it expresses an endless entity.

In calculus, mathematicians tend to conceptualize relative degrees of change from one finite point to the next as any number or variable approaches infinity. This is the underlying premise of limits and infinite series. The premise of infinity in calculus, consequently, expresses generally how a variable or function will behave as it approaches infinity. Following the geometric conception of infinity as an endless concept, however, the associated variable or function will never reach it. At the infinitesimal level, moreover, a variable or function may exhibit asymptotic convergence toward a value that it will never truly meet.

The conceptualization of infinity in set theory, however, unfolds with the hierarchical presentation of various degrees of endlessness. In the set theory, the cardinality of a set refers to the number of elements that it contains. When expressing sets of infinite cardinality, the rank of one endless set can be compared to another. For example, the set of positive integers comprises an infinite set, i.e. $\{1,2,3,4,\dots\}$. However, the set of all real numbers is also infinite, but of a greater magnitude of infinity, e.g. $\{.00001, .00002, .00003, .00004,\dots\}$. The degrees of infinity are often ranked with hierarchical values and Greek letters.

David Hilbert’s 1925 Paradox of the Grand Hotel explores the relationships of different infinite sets using Cantor’s theory of transfinite numbers, or numbers that are larger than all finite numbers, yet not necessarily absolutely infinite.¹⁷³ The problem starts out with the conceptualization of a popular hotel, containing an infinite number of rooms, all of which are

¹⁷³ Clifford A. Pickover, *The Math Book: From Pythagoras to the 57th Dimension, 250 Milestones in the History of Mathematics* (New York: Sterling, 2009), 354; see also Georg Cantor, *Contributions to the Founding of the Theory of Transfinite Numbers* (New York: Dover, 1955), 79.

currently occupied.¹⁷⁴ Suppose that a new guest arrives and asks for a room, whom the proprietor readily accommodates by simply moving the current residents down a room.¹⁷⁵ That is, the current guest in room 1 would be shifted to room 2, and the guest in room 2 would be shifted to room 3, and so on.¹⁷⁶ Suddenly, however, an infinite number of guests show up at the hotel, each one demanding a room. The clever proprietor moves the occupant of room 1 to room 2, and the occupant of room 2 to room 4, and the occupant of room 3 to room 6. He repeats the process until all of the odd-numbered rooms are available for the infinite number of new guests. Although set theory permits the hierarchical ranking of degrees of endlessness, the problem indicates an apparent paradox: “in the world of infinity *a part may be equal to the whole!*”¹⁷⁷

Dostoevsky clearly sensed this strange quality of infinity. When Fyodor Pavlovich questions Ivan about the finality of death, the detail about the “tiny bit of immortality” expresses a kind of comic wisdom. A part of infinity is still infinity. This comment demonstrates the cunning of the corrupt Karamazov patriarch. Though he senses that he does not deserve to experience the boundless love and mercy of God, perhaps he can still somehow cheat Ivan and the physical rationality of man into letting him have just a part of this eternal afterlife, which all the same still comprises the infinite.

By suggesting that two parallel lines could meet in infinity, Lobachevsky reignited debates regarding conceptions of endlessness and immortality. The fact that his work unfolded in the mathematical discipline of geometry contributed to the validity of his proposed paradigm shift. Mathematics, after all, had developed almost exclusively in the investigative medium of

¹⁷⁴ Mark Cheng, *Paradoxes in Scientific Interference* (Boca Raton, FL: Taylor and Francis Group, 2013), 28. See also the unpublished, but widely circulating “The Complete Collection of Hilbert Stories” compiled by R. Courant as cited by George Gamow, *One Two Three...Infinity: Facts and Speculations of Science* (New York: Dover, 1974), 17-18.

¹⁷⁵ George Gamow, *One Two Three...Infinity: Facts and Speculations of Science*, 17-18.

¹⁷⁶ Ibid. 18

¹⁷⁷ Ibid. 17

geometry for close to two millennia. Abstract notion in algebra, calculus, and set theory was still relatively new by the time of the Dostoevsky. If one could not draw a mathematical relationship, it was essentially deemed impossible for it to exist.

Despite the fact that neither Lobachevsky, nor any other mathematician for that matter, could explain adequately what exactly could be expected to transpire empirically at the intersection of two parallel lines, his work established models that have only recently contributed to tremendous breakthroughs in astrophysics and cosmology. Albert Einstein grasped the significance of Lobachevsky's research, which he readily incorporated into the Theory of General Relativity. The detection of gravitational waves by LIGO (the twin Laser Interferometer Gravitational-wave Observatory detectors, located in Livingston, Louisiana and Hanford, Washington) on September 14, 2015 confirmed the predictions of Einstein's Theory that space-time itself is curved.¹⁷⁸

“Dream of a Ridiculous Man” and *The Brothers Karamazov*, in conclusion, present a wide variety of mathematical elements. In the fantastic works of F.M. Dostoevsky, scientific laws governing the physical conduct and ideological interactions of human beings are cleverly distorted. This tendency comprises a telling instructive feature of his fantastic prose, appealing to thinkers from different disciplinary backgrounds, but especially those in the hard sciences: perhaps a rule is never understood fully until is broken. By infusing the two works explored in this chapter with interdisciplinary terminology, Dostoevsky explores the role of scientific rationality in relation to the human condition, demonstrates his advanced understanding of physics, astronomy, and theoretical mathematics, and imparts his lasting legacy on quantum mechanics and particle physics in addressing the question of the parallel postulate, relative measurement, and infinity.

¹⁷⁸ Kathy Sivil, “Gravitational Waves Detected 100 Years After Einstein’s Prediction,” *LIGO*. 11 February 2016. Accessed online at < <https://www.ligo.caltech.edu/news/ligo20160211> >.

Conclusion

“The first gulp from the glass of natural science will make you an atheist, but at the bottom of the glass, God is waiting for you.”¹

~Werner Heisenberg

The mathematical and scientific discourses that Dostoevsky engaged in throughout his studies at the Main Engineering School serve to expand the scope of themes presented in his literary works and to deepen the resonance of his metaphysical deliberations. His works communicate advances in number theory, including imaginary numbers and the complex plane, the deductive heuristics of *regula falsi* and *reductio ad absurdum*, statistical fallacies, and Non-Euclidean geometry. Dostoevsky infused his prose with modern narrative aesthetics that appealed to thinkers of dissimilar ideological orientations and insights ranging from all different subject concentrations. His works convey the interconnectedness of art, religion, and philosophy with the seemingly disparate fields of the sciences. This dissertation surveys the ways in which Dostoevsky formulated the production of his creative works in line with the premises and argumentative methods that serve as the foundation of modern mathematics.

Dostoevsky cleverly promoted scientific and mathematical sensibilities that previously did not exist in Russian literature. His writings reveal compelling interdisciplinary subtexts, demonstrating his own curiosity for complex mathematical unknowns. Whereas other authors of the nineteenth century may have included surface plot details related to mathematics, Dostoevsky constructed entire works around central mathematical ideas, evaluated meticulously in the medium of the argumentative logic of the given novel. The difficulties that Princess Maria Bolkonskaya experiences in her geometry lessons comprise a scene that readers often forget relative to the entire scope of Tolstoy’s epic of Russian families immersed in the turmoil of the

¹ “Der erste Schluck aus dem Becher der Wissenschaft führt zum Atheismus, aber auf dem Grund des Bechers wartet Gott.” Werner Heisenberg as cited in Ulrich Hildebrand, “Das Universum- Hinweis auf Gott?” in *Ethos*, No. 10 (October 1988), 10.

Napoleonic Wars. Dostoevsky, in contrast, formulates his literary works around a central mathematical premise or principle. He organizes his stories and novels in a manner reminiscent of a mathematician rendering a proof, or how a scientist conducting an experiment.

The interdisciplinarity of works by Dostoevsky contributes to his classification as a modern author, but not entirely. Following the assessment E.H. Gombrich, the designation of “modern” in relation to artistic expression includes productions spanning roughly from the 1860s to the 1970s, involving the re-assessment of ideas and traditions in a spirit of experimentation, and a tendency toward abstraction away from subjective particulars.² In respect to the development of his literary productions, the authorial focus of Dostoevsky shifts markedly from urban, sociological detail in *Bednye Liudi* (*Poor Folk*, 1846) to fascination with the infinite in *Brat'ia Karamazovy* (*The Brothers Karamazov*, 1880). While the specific personality traits and unique perspectives of his characters are, indeed, relevant for the conveyance of interpersonal dynamics, they also participate more broadly in the holistic conveyance of the human condition in terms that transcend the material basis of existence.

Although Nikolai Chernyshevsky arguably enjoyed greater popularity in Russia in the 1860s compared to Dostoevsky, his associated prioritization of the material nature of life to the exclusion of the spiritual and ideological has not withstood the test of time. Though popular in Russia, Chernyshevsky has not benefited from the same extended international literary celebrity of Dostoevsky. Whereas Chernyshevsky and his followers dismissed all notions of spirituality, Dostoevsky debated ardently for the inclusion of God and the immortality of the soul. Both turned to rational intellect to confirm their opposing theories regarding metaphysical conceptions of truth and the relationship of humanity to the universe. They asked similar questions, considered the same evidence, but each emerged from the debate with a different conclusion.

² E.H. Gombrich, *The Story of Art* (London: Phaidon, 1958), 419.

Chernyshevsky considered material sciences, especially economics, as the ultimate form of truth, while Dostoevsky remained skeptical of systems relying solely on the quantitative enumeration of data. Numbers do not lie, but they can be manipulated by imperfect individuals in ways that persuasively cause humanity to deviate from intuitions toward morality and spiritual virtue. Raskolnikov, for instance, commits murder after testing the ideological consequences of amorality, utilitarianism, the Great Man Theory, as well as the act of experimentation itself. He realizes ultimately that the act of murder, which he so deliberately calculated in ‘rational’ frameworks, came only to embody a wholly ‘irrational’ act. Though part of Raskolnikov may sense something worthwhile in the ideological orientation of his misguided motives, he ultimately finds that no idea surpasses the infinite mercy, morality, and spiritual virtue of God communicated to him by Sonia. In *Crime and Punishment*, and all the other works discussed in this dissertation, the argumentative medium of rational logic is exerted upon itself, demonstrating its own shortcomings and contradictions. Dostoevsky realizes that the physical truth of life, *pravda*, should not be allowed to exceed the eternal, transcendent truth, *istina*. Both are extremely important for the welfare of humanity. It is disastrous, in Dostoevsky’s view to accept one, and not the other.

Scholars, and people in general, still today dispute the hypothetical existence of God. On the whole, it seems fair to suggest that engineers disproportionately admit sympathetic tendencies toward the supposition of atheism. Despite the fact that Dostoevsky would appreciate the skepticism of such individuals willing to question what others sincerely believe, his work also dispels the false certainty that humans derive from rationalistic discourses that, thus far, have yet to provide compelling solutions to the eternal, “accursed” questions, such as does God

exist, is there life after death, and how does one confirm existence?³ Madame Kholakhova speaks to this general uncertainty in *The Brothers Karamazov*, when she affirms, “the future life- it is such an enigma! And no one, no one can solve it! You are a healer, you are deeply versed in the human soul....The thought of life beyond the grave distracts me to anguish to terror, And I don’t know to whom to appeal, and have not dared to all my life...Oh, God! What will you think of me now!”⁴ Dostoevsky reminds readers that what human civilization collectively *does not* know about the universe grossly diminishes all that it *does* know.

Throughout his literary works, Dostoevsky presents an apophatic theology, exploring God indirectly through negation, as opposed to a cataphatic theology, expressed in the positive. The trope of the dreamer or the thinker in works by Dostoevsky alludes, similarly, to the notion that all that humanity perceives pales in comparison to all that actually exists, but remains invisible to the limited scope of human sensory perception. The Underground Man, the Ridiculous Man, and the unnamed dreamer in *White Nights* exist more in thoughts than they do in their external, social physicality. They remain locked in solipsistic consciousness to such a degree that it prevents them from experiencing fully the material sensation of real life. The Golden Rule, moreover, “to love thy neighbor as thyself”, in these terms, unfolds in a medium of negation. To deny the material advantage of the individual ego, virtuous persons do so by negating or forgoing the interests of their own material existence.

The Golden Rule functions as a moral instruction that prolongs the sustainability of the human condition. It is the primary principle by which humanity avoids destroying itself as the dialectic of vanity causes egoistic individuals to seek power, selfishly hoard material wealth, and

³ Nikolai Berdiaev, “Filosofskaia istina i intelligentskaia pravda” in *Dukhovnyi krizis intelligentsia: stat’i po obshchestvennoi i religioznoi psikhologii* (Petersburg, Obshchestvennaia pol’za, 1910), 174.

⁴ «но будущая жизнь- это такая загадка! И никто-то, ведь никто на нее не отвечает! Послушайте, вы целитель, вы знаток души человеческой...мысль это о будущей загробной жизни до страдания волнует меня, до ужаса и испуга...И я не знаю, к кому обратиться, я не смела всю жизнь...О боже, за какую вы меня теперь сочтете!» (PSS 14, 52).

to oppress the status of others. As both a spiritual and material principle, the Golden Rule extends the lifespan of humanity, approaching the infinite essence of God one day at a time. Ivan Karamazov considers both the spiritual and material prerogatives of the divine virtue encapsulated in the principle of the Golden Rule:

You know, dear boy, there was an old sinner in the eighteenth century who declared, that if there were no God, he would have to be invented. *S'il n'existait pas Dieu, il faudrait l'inventer*. And man has actually invented God. And what's strange, what would be marvelous, is not that God should really exist; the marvel is that such an idea, the idea of the necessity of God could enter the head of such a savage, vicious beast as man. So holy it is, so touching, so wise and so great a credit it does to man. As for me, I've long resolved not to think whether man created God or God man.⁵

When Fyodor Pavlovich turns to Ivan in an earlier scene to resolve his doubts, Ivan reiterates the theory that “there would have been no civilization if they hadn't invented God.”⁶ The appearance of the devil in his feverish state blurs the material and the supernatural. Despite the fact that Ivan, the smartest character in *The Brothers Karamazov* expresses the opinion that God is merely an idea, the novel endorses the faith of Alyosha and Father Zosima in God as the invisible infinite world beyond the limited, subjective perception of human consciousness.

God, in this sense, is not an unknowable idea. Human beings discern God in all His mysterious, elusive, and omnipresent grandeur.⁷ His realm comprises an authentic existential mode that subsumes all physical existence. The divine nature of the infinite underscores all material entities and interactions. This realization contributes to the danger of not taking responsibility for life, and falsely displacing the agency of one's own actions on a rational or

⁵ «Видишь, голубчик, был один старый грешник в восемнадцатом столетии, который изрек, что если бы не было бога, то следовало бы его выдумать, s'il n'existait pas Dieu il faudrait l'inventer. И действительно человек выдумал бога. И не то странно, не то было бы дивно, что бог в самом деле существует, но то дивно, что такая мысль- мысль о необходимости бога – могла залезть в голову такому дикому и злему животному, как человек, до того она свята, до того она трогательна, до того премудра и до того она делает честь человека. Что же до меня, то я давно уже положил не думать о том: человек ли создал бога или бог человека?» (PSS 14, 214).

⁶ «Цивилизации бы тогда совсем не было, если бы не выдумали бога» (PSS 14, 124).

⁷ The masculine possessive pronoun “His” to refer to the belonging of God is selected to reflect the masculine gender of the Russian word, *'bog'*, ‘God.’ It could very well be “Her” or “Its”.

arbitrary system that deviates from the spiritual virtue of God. Father Zosima reminds readers that all human beings share the burden of individual sins, problems, and hardships. All people are brothers and sisters. Father Zosima offers a solution to the impending peril of humanity, “by the experience of active love. Strive to love your neighbor actively and indefatigably. In as far as you advance in love you will grow surer of the reality of God and of the immortality of the soul. If you attain perfect self-forgetfulness in the love of your neighbor, then you will believe without doubt, and no doubt can possibly enter your soul. This been tried. This is certain.”⁸ Faith and the relentless striving toward the Golden Rule presents the only model toward which all other systems fall far short.

The plight of Aleksei Ivanovich in *The Gambler* (*Igrok*, 1866) demonstrates the dangers of leaving all decisions in life to chance and fate. Aleksei Ivanovich abandons his own accountability by turning himself over fully to the game of roulette. The disadvantageous odds of the roulette wheel decide his destiny. As a mathematical system, the game of roulette, following Cardano’s Law of Large Numbers, is one that he will surely lose.

Although players lack the perceptive abilities to calculate the mechanical physics of where the ball will land, the outcome of a given spin admits a kind of false randomness. The movement of the ball is still subject to a variety of physical properties, and as such, could be predicted given the collected assessment of all mechanical data, e.g. speed, mass, as well as the design and proportions of the wheel itself. While it is impossible for humans to complete this kind of calculation in the short amount of time of an individual spin, technology tending toward advanced precision could perhaps one day render with rapid exactitude the destination of where

⁸ «Опытном деятельной любви. Постарайтесь любить ваших ближних деятельно и неустанно. По мере того как будете преуспевать в любви, будете убеждаться и в бытии бога, и в бессмертии души вашей. Если же дойдете до полного самоотвержения в любви к ближнему, тогда уж несомненно уверуете, и никакое сомнение даже и н возможет зайти в вашу душу. Это испутано, это точно» (*PSS* 14, 52).

the ball will land. In the same way that researchers at Stanford University produced mechanical algorithms to predict the outcome of a coin toss, the probabilities involved in the spin of a roulette wheel could eventually transform into a determinate process.

Dostoevsky employs a kind of mathematical irony in his works. The physical dynamics of the material world, though perplexing to limited subjective consciousness, coincide with predictable tendencies. Following the arguments of the Underground Man, “there are laws of nature in the world; so that whatever he does is not done of his will at all, but of itself, according to the laws of nature. Consequently, as soon as these laws of nature are discovered, man will no longer have to answer for his actions and life will be exceedingly easy. All human actions will then, no doubt, be computed according to these laws, mathematically, something like the tables of logarithms, up to 108,000, and indexed accordingly.”⁹ Unpredictability occurs not in the measurable, finite realm of material existence, but in the spiritual dimension of humanity.

The human condition is inherently unpredictable, because people themselves choose whether to pursue virtue or vice, and the gravity of these choices, though often poorly understood, have incredible consequences. Father Zosima, for example, describes the legacy of these choices as “seeds” planted in the hearts of man, which can lead to good or evil developments in the world.¹⁰ Humans are intimately connected with the infinite realm of God,

⁹ «Следственно, эти законы природы стоит только открыть и уж за поступки свои человек отвечать не будет и жить ему будет чрезвычайно легко. Все поступки человеческие, само собою, будут расчислены, тогда по этим законам, математически, вроде таблицы логарифмов, до 108, 000, и занесены в календарь» (*PSS* 5, 112-113).

¹⁰ Father Zosima describes that God sowed seeds from other worlds on earth and in the hearts of man. He advises readers in his exhortations, “Every day and ever hour, every minute, walk round yourself and watch yourself, and see that your image is a seemly one. You pass by a little child, you pass by, spiteful with ugly words, with wrathful heart; you may not have noticed the child, but he has seen you, and your image, unseemly and ignoble, may remain in his defenseless heart. You don’t know it, but you may have sown an evil seed in in him and it may grow, and all because you were not careful before the child, because you did not foster in yourself a careful, actively benevolent love.” «Бог взял семена из миров

which they experience not only after death in the continuation of the immortality of the soul, but in experiencing the immeasurable beauty of physical life.

The divine miracle of spiritual virtue can be sensed in everything and everyone. Just as Ivan Karamazov and Markel discern with wonderment the boundless complexity of the moment, Dostoevsky himself describes that astonishing beauty in every instant. In a letter to his brother Mikhail dated 22 December 1849, Dostoevsky affirmed, “Life is a gift, life is happiness. Each minute could be a century of happiness.”¹¹ Though the use of the word ‘*vek*’ denotes the literal meaning of a ‘century’, it figuratively suggests an eternity. Similarly, his use of the word ‘*minuta*’, or ‘minute’ reflects metaphorically the phenomenological duration of an instant.

While Dostoevsky’s ideas directly challenged scholars in the progressivist West, they resonated with mathematicians and scientists in Russia, who were less willing to part with their belief in God vis-à-vis the conception of infinity and the continuous composition of life experienced by the soul in both material and spiritual proportions. The appearance of mathematical themes in his works suggests the thoughtful engagement of Dostoevsky with the ideas of various natural philosophers of classical antiquity, such as Plato, Aristotle, Archimedes, Euclid, Pythagoras, and Zeno. Likewise, he examines the research and findings of mathematicians from the Enlightenment and scientific revolution, including Leonhard Euler, Mikhail Ostrogradsky, Nikolai Lobachevsky, and Nikolai Brashman. Like Mikhail Lomonosov, Dostoevsky was a polymath, and though he may not have conducted explicit professional

иных и посеял на сей земле и взрастил сад свой» (*PSS* 14, 290); «На всяк день и час, на всякую минуту ходи около себя и смотри за собой, чтоб образ твой был благолепен. Вот ты прошел мимо малого ребенка, прошел злобный, со скверным словом с гневливою душой; ты и не заметил, может, ребенка-то, а он видел тебя, и образ твой, неприглядный и нечестивый, может, в его беззащитном сердечке остался. Ты и не знал сего, а может быть, ты уже тем в него семя бросил дурное, а возрасет оно, пожалуй, а всё потому, что ты не уберегся пред дитятей, потому что любви осмотрительной, деятельной не воспитал в себя» (*PSS* 14, 290-291).

¹¹ «Жизнь-дар, жизнь-счастье, каждая минута могла быть веком счастья» (*PSS* 28, bk. 1, 164).

investigations in the hard sciences, he intimately engaged developments in mathematics and engineering. These sensibilities contributed to new awarenesses presented in his literary works.

Dostoevsky was one of the first novelists to sense the gravity of the mathematical research conducted by Nikolai Lobachevsky. The associated paradigm shift of Non-Euclidean geometry concerned much more than the otherwise arbitrary hypothetical intersection of two parallel lines. The findings of Lobachevsky fundamentally changed the way human subjects conceptualized the composition and dynamics of the universe in relation to space, time, infinity, and God. Although Turgenev, Mikhail Ostrogradsky, and conservative contributors to *Son of the Fatherland* [*Syn otechestva*], scoffed at the basic validity of Non-Euclidean premises, Dostoevsky popularized the technical writings of Nikolai Lobachevsky and Nikolai Brashman with an open-minded approach that encouraged subsequent generation of thinkers to conceptualize the fabric of life in radically new ways.¹² For this reason, Alexander Vucinich and Andrey Popov have appropriately discerned the lasting legacy of Dostoevsky in modern physics.¹³ In varying degrees, the influence of Dostoevsky can be sensed in various scientific advances of the twentieth century, including the Photoelectric Effect, the Theory of General Relativity, and the Uncertainty Principle.

Mathematics is not a rigid discipline. Like any instrument, human subjects will disagree on how to use it. Although mathematics strikes most people as a quantitative field, Dostoevsky calls into question even the most basic assumptions, methods, and conclusions forming the core of the underlying discipline. During the age of scientific progressivism, when technology was

¹² I.S. Turgenev, "Istina i pravda" in *Polnoe sobranie sochinenii i pisem*, (Moscow: Khudozhestvennaia literatura, 1975-1978), tom 8, 472; see also Andrey Popov, *Lobachevsky Geometry and Modern Nonlinear Problems* (New York: Springer, 2014), 10; S.S. Anonymous review of "O nachalakh geometrii soch. G. Lobachevskogo" in *Syn otechestva*, ed. Nikolai Grech and Faddei Bulgarin, tom, XLV, part 167 (St. Petersburg: Tipografiia N. Grech, 1834), 47.

¹³ Alexander Vucinich, *Einstein and Soviet Ideology* (Stanford, CA: Stanford UP, 2001), 181; see also Andrey Popov, *Lobachevsky Geometry and Modern Nonlinear Problems* (New York: Springer, 2014), 10.

touted to solve all the problems, riddles, and mysteries of life, Dostoevsky demonstrated the limits of rationality in the language of its own argumentative medium. Whereas scientists predominantly scoff at religion as unfounded superstition, Dostoevsky uses rational discourses to demonstrate that mathematics perhaps could admit a selection of the mysteries framed by religion, metaphysical conjecture, and faith in God.

The intersection of two parallel lines, theoretically, could allow for the merging of two separate existential realms, suggesting the possibility for the flawed, physical world of humankind to overlap with the realm of the Divine. Similarly, the premise of the complex plane and Leonhard Euler's proof of imaginary numbers supposes the authentic basis of forces and entities that are essentially unattainable or even unknowable in the strict parameters of real events. Mathematics, consequently, affords humanity insight into the structure and dynamics of the universe, however, human subjects remain limited by their faculties to understand it fully. Dostoevsky, consequently, employs mathematical language to preserve the possibility of God, spirituality, and miracles.

Some of the most prominent mathematicians of the twentieth century, likewise did not reject the existential status of God. In a 1954 letter to the philosopher Erik Gutkind, Albert Einstein affirmed, "I am not an atheist....You may call me an agnostic, but I do not share the crusading spirit of the professional atheist whose fervor is mostly due to a painful act of liberation from the fetters of religious indoctrination received in youth. I prefer an attitude of humility corresponding to the weakness of our intellectual understanding of our nature and of our own being."¹⁴ Einstein even formulates his conception of religion in a manner reminiscent of the earthly restrictions of the Euclidean mind identified in *The Brothers Karamazov*: "In view of such harmony in the cosmos which I, with my limited human mind, am able to recognize, there

¹⁴ As cited by Walter Isaacson, *Einstein: His Life and Universe* (New York: Simon and Schuster, 2008), 390.

are yet people who say there is no God. But what makes me angry is that they quote me for the support of such views.”¹⁵ Einstein seems to have grasped the “unified wholeness” of the visible and invisible worlds presented in Dostoevsky’s novels, and combined with elements of Baruch Spinoza’s philosophical writings on Pantheism.¹⁶ Einstein extended the polemics he derived from Dostoevsky in debates with thinkers involved in the development of the field of quantum mechanics, including Max Planck, Niels Bohr, Werner Heisenberg, and Erwin Schrödinger.

The mathematical legacy of Dostoevsky extended also into modes of creative expression in subsequent generations. Evgenii Zamiatin, for instance, situates palpable mathematical imagery in his 1921 dystopian novel, *My (We)*. Imagery in the novel, such as the glass apartment building inhabited by the protagonist, D-503, suggests a parallel to the Crystal Palace. The fact that the characters possess numbers for names demonstrates the oppression of all the emotion to fulfill only the interests of rational sociological efficiency.

The Benefactor, the tyrannical leader of this totalitarian state, embodies an inversion of the Grand Inquisitor.¹⁷ The secret plan to bring down the totalitarian state imparted to D-503 by I-330, moreover, may emanate from the rebellious plot hatched by the radicals in Dostoevsky’s *Besy (Demons)*, 1871-1872). The narrative medium of the novel appears, moreover, in the context of a journal, providing a situational connection to the “Notes” of the Underground Man.

¹⁵ Ronald W. Clark, *Einstein: the Life and Times* (New York: World Publishing Company, 1971), 425.

¹⁶ In a 1930 interview, Einstein commented, “I am not an Atheist. I do not know if I can define myself as a Pantheist. The problem involved is too vast for our limited minds. May I not reply with a parable? The human, no matter how highly trained, cannot grasp the universe. We are in the position of a little child, entering a huge library whose walls are covered to the ceiling with books in many different tongues. The child knows that someone must have written those books. It does not know who or how. It does not understand the languages in which they are written. The child notes a definite plan in the arrangement of the books, a mysterious order, which it does not comprehend, but only dimly suspects. That, it seems to me, is the attitude of the human mind, even the greatest and most cultured toward God. We see a universe marvelously arranged, obeying certain laws, but we understand the laws only dimly.” George Sylvester Viereck, *Glimpses of the Great* (New York: Macauler, 1930), 372-373. As cited in Max Jammer, *Einstein and Religion: Physics and Theology* (Princeton, Princeton UP, 1999), 48.

¹⁷ Julian W. Connolly, *Dostoevsky’s The Brothers Karamazov*, 133.

Situating the text in the body of a journal establishes a necessary distance between the aims of the all-knowing totalitarian state and the desire for privacy and freedom expressed by the individual.¹⁸ The influence of Zamiatin's *We* on George Orwell's *1984*, moreover, establishes the continued trajectory of Dostoevsky's interdisciplinary legacies into the extended scope of world literature. Echoes of Dostoevsky's mathematical genius, furthermore, appear in the works of Nadezhda Grekova and Sonia Kovalevskaia.

Unlike other authors of the same period, Dostoevsky received specialized training in mathematics. The source materials concerning his education at the Main Engineering School will elucidate the educational legacies at state military institutions throughout the Imperial era. The inspection of the chancellery records of the school from the time of his enrollment are important for understanding not only the multifaceted creative genius of Dostoevsky, but also of other Russian artists, who attended the Main Engineering School or Nikolaevsky Military Institute, including Mikhail Lermontov, Dmitrii Grigorovich, Tsesar Kiui, and Modest Mussorgsky. Aside from influencing the output of creative expression in Russia, the academic course offerings at the Main Engineering School reflect the scientific pedagogical and research initiatives prescribed by the Imperial Academy of Sciences. The training that Dostoevsky and other graduates of the school underwent expresses the extended legacy of Leonhard Euler, Daniel and Nicolaus I Bernoulli, Mikhail Lomonosov, Mikhail Ostrogradsky, and Nikolai Brashman. Although

¹⁸ There have been a number of compelling analyses tracing the influence of Dostoevsky on Zamiatin. See Richard A. Gregg, "Two Adams and Even in the Crystal Palace: Dostoevsky, the Bible, and *We*" in *Slavic Review*, published by the American Association for the Advancement of Slavic Studies, Vol. 24, No. 4 (December 1965), 680; Patricia Warrick, "Source of Zamyatin's 'We' in Dostoevsky's *Notes from Underground*" in *Extrapolation*, Vol. 17, No. 1 63; John J. White, "Mathematical Imagery in Musil's *Young Törless* and Zamyatin's *We*" in *Comparative Literature*, Vol. 18, No. 1 (Winter 1966), 71.

Lobachevsky was never admitted to the Imperial Academy of Sciences, his work was eventually included in state educational curricula.¹⁹

The scope of this dissertation, ideally, appeals to Slavists, Russian literary specialists, historians, theologians, and mathematicians. While this project engages a wide array of sources, opportunities still exist for additional research and analysis. Approaches in the digital humanities, such as text-mining, natural language processing, and network analysis will contribute to the broader understanding of mathematical subtexts appearing in works by Dostoevsky. The WordPress site associated with this dissertation employs a variety of applications, such as NowComment, Voyant, and Morphological Parsing Programs, to uncover interdisciplinary references and underlying mathematical structures in Dostoevsky's prose.²⁰

This dissertation provides an original response to what Dostoevsky meant when he described himself to be a “realist in the higher sense.” His interdisciplinary understandings in mathematics, theology, and literature allowed him to engage the accursed questions in a completely novel synergistic approach. Extending mathematics into literature allowed him to expand the general understanding of what is “real” as just one component of broader existential constructs. By alluding to the mathematical concepts of complex numbers, statistics, Non-Euclidean geometry, and the enigma of infinity, Dostoevsky effectively communicates the ontological necessity of all that is imaginary.

The insights that he derived from his studies at the Main Engineering School informed the conception and presentation of his metaphysical arguments, including the ontological relationship between thought, faith, and action, comprising the collective self at the core of the

¹⁹ F. Engel, *Nikolaj Iwanowitsch Lobatschefskij. Zwei geometrische Abhandlungen aus dem Russischen übersetzt, mit Anmerkungen und mit einer Biographie der Verfassers* (Leipzig: Druck und Verlag Van B.G. Teubner, 1899), 421-422.

²⁰ A beta-version of a WordPress site associated with this dissertation will be made public by the date of the defense on Thursday, May 19, 2016 at the following URL: https://pages.shanti.virginia.edu/Dostoevsky_Project/.

human condition. Recognizing the mathematical references and subtexts in his works allows readers to sense the dynamic legacies of the novelist in manifold ideological discourses. Though his works appeared in the nineteenth century, they have markedly influenced historical events, scientific developments, and aesthetic sensibilities of the twentieth and twenty-first centuries.

Appendix

The Historical Development of Mathematics in Imperial Russia

“What is there to say about arithmetic, geometry, and other mathematical arts, which Russian children today learn eagerly, master gladly, and demonstrate in a praiseworthy fashion- was anything like this seen previously? I know not whether in the whole land there was a single compass’, the orator continued. ‘The names of other instruments were not even known. And if someone had used a technique of arithmetic or geometry, it would have been considered magic.’¹

~Feofan Prokopovich, *Slovo na pokhvalu blazhennyia i vechnodostoinyia pamiati Petra Velikago (Eulogy commemorating the blessed and eternally worthy memory of Peter the Great)*, 1725.

Historians almost universally recognize Peter the Great, the notorious modernizer of Russia, as the most important personage in the development of mathematics throughout the Imperial era. In the nineteenth-century, his character and legacy became the subject of controversial debates between the Slavophiles and Westernizers. To the Slavophiles, the tyrannical imposition of his reforms brought about “the tragic end of Holy Russia.”² Following the general rhetoric of the Slavophiles, furthermore, Peter I “disturbed the natural course of Russian life, destroyed the traditional mores and morals, engendered a conflict between higher and lower social segments, . . .and thwarted the development of Russian national

¹ «Что же реши о арифметике, геометрии и прочих математических искусстваах, которых ныне дети россиястии с охотою учатся, с радостию навькают и полученныя показывают с похвалою! Тыя прежде были ли? Не ведаю, во всем государстве был ли хотя один цирклик, а протчаго орудия и имен не слыхано; а есть ли бы где некое явилося арифметическое или геометрическое действие, то тогда волшебством нарицано». Feofan Prokopovich, *Sochineniia*, ed. I.P. Eremin (Moscow-Leningrad: Izd. Akademii Nauk, 1961), 135-136; see also Alexander Karp, “‘Universal Responsiveness’ or ‘Splendid Isolation?’ Episodes from the History of Mathematics Education in Russia,” in *Paedagogica Historica*, Vol. 42, Nos. 4 & 5, August 2006, 615-628; T.S. Poliakova, *Istoriia otechestvennogo shkol'nogo matematicheskogo obrazovaniia* (Rostov: RPI, 1997), 83.

² The Old Believers [*staroobriadtsy* or *starovery*], a conservative religious sect persecuted by the regime of Peter I, came to reject the industrial and technological reforms as dangerous conventions of modernity. Agafiia Lykova, a descendant of Old Believers, who journeyed into the Siberian taiga to escape oppression, continues to live apart from the “godless science” [*bezbozhnaia nauka*] of secular society. Alexander Vucinich, *Science in Russian Culture: A History to 1860*, (Stanford: Stanford UP, 1963), 38; see also “Surviving in the Siberian Wilderness for 70 Years”, Vice Media, 9 April 2013. See 12:38. Accessed online at < <https://youtu.be/tt2AYafET68>>.

consciousness.”³ Westernizers, conversely, proclaimed Peter I as the champion who saved Russia from cultural backwardness, superstition, and isolation.

While standards in education, weights and measures, and industrial production in Russia largely came to fruition after the reforms of Peter the Great, mathematics also underwent significant developments in Pre-Pretrine times. The earliest known legal code of Kievan Rus’, the *Pravda Rous’skaia* (*Russian Truth*), published during the reign of Yaroslav the Wise circa 1280 B.C.E., conveyed didactic content regarding the computation of percentages, the evaluation of areas, increases in livestock, and other chattel.⁴ The mathematical content expressed by these records demonstrates a moderate level of education among the landed nobility and boyars, who could apply such knowledge to the levying and collection of taxes, the setting of trade regulations, and the codification of state infrastructure. Methods derived from inherited Byzantine traditions, moreover, provided the literate citizenry of Rus’ with elementary knowledge of the calendar year. Kirik Novgorodets, in this vein, published *Nastavlenie, kak cheloveku poznat’ schislenie let* (*A Manual of How a Person Comes to Know the Enumeration of Years*), which contained commentary concerning not only measurements of calendars relative to celestial bodies, but also early geometric progressions with a common ratio of five.⁵

The Mongol invasion contributed to what has been described as scholastic “dark ages” in Russia.⁶ Education primarily took place in the context of the ecclesiastical tradition, which fared better in some cities than others. Novgorod, for example, escaped obliteration, and consequently,

³ Ibid.38.

⁴ This transliteration reflects the orthographic conventions of Old East Slavic. The text is known in contemporary Russian as *Ruskaia Pravda*. Tatiana Poliakova, “Mathematics Education in Russia before the 1917 Revolution” in *Russian Mathematics Education: History and World Significance*, ed. Alexander Karp (Hackensack, NJ: World Scientific, 2010), 2.

⁵ Ibid. 2. A geometric progression is a sequence of numbers where each successive term is found by multiplying the previous one by a fixed, non-zero number called the common ratio. For example, the sequence: 2, 8, 32, 128 is a geometric progression with a common ratio of 4.

⁶ Brian Landers, *Empires Apart: A History of American and Russian Imperialism* (New York: Pegasus, 2010), 71.

preserved texts spanning a variety of historical periods. Kiev, on the other hand, burned to the ground for attempting to defy the rampaging Mongol forces. While the city was later restored, irreplaceable chronicles vanished from the annals of history. As the Mongols often granted subjugated populations religious independence, churches, seminaries, and convents became the primary institutions for storing civilizational archives, disseminating written material, and fulfilling pedagogical initiatives in a diversity of subject concentrations. What commenced during the time of the Golden Horde as the unofficial union of a seminary school, library, and center of prayer, the Kievo-Mogiliansky Academy opened formally in 1639 as the first institution of higher education in East Slavic territories.⁷ In addition to religious studies, the school also offered instruction in mathematics and scientific hermeneutics, which distinguished the Kievo-Mogiliansky Academy from corresponding educational institutions in Moscow.⁸

When Peter the Great began formulating the ambitious modernization of Russia, he soon found that his country possessed few specialists to carry out his envisioned initiatives. Schools were generally scarce, and offered insufficient curricula. Education, moreover, was predominately reserved for members of the aristocratic elite. Serfs, in contrast, who comprised the vast majority of the Russian population, were nearly unanimously illiterate.⁹ This corresponding lack of literacy in society contributed to a pervasive inability to comprehend not

⁷ V.V. Kustkov, *A History of Old Russian Literature*, trans. Ronald Vroon (Moscow: Progress Publishing, 1980), 337.

⁸ Tatiana Poliakova, "Mathematics Education in Russia before the 1917 Revolution," 3.

⁹ "In pre-Petrine Russia literacy rates for both men and women were abysmally low because of the lack of a formal system of primary education: by the late seventeenth century less than 10 percent of the entire population was literate." As cited in Rochelle G. Ruthchild, "Reframing Public and Private Space in Mid-Nineteenth-Century Russia: The Triumvirate of Anna Fiolosofova, Nadezhda Stasova, and Mariia Trubnikova," in *The Human Tradition in Imperial Russia*, ed. Christine Worobec (Lanham, MD: Rowman & Littlefield Pub., 2009), 70; see also Richard Stites, *Serfdom, Society, and the Arts in Imperial Russia: The Pleasure and the Power* (New Haven, CT: Yale UP, 2005), 34-35; Jeffrey Brooks, *When Russia Learned to Read: Literacy and Popular Literature, 1861-1917* (Evanston, IL: Northwestern UP, 2003), 3-4.

only popular literary texts, but also the accumulation of numerical data, which would have appeared in business ledgers, engineering blueprints, and almanacs.¹⁰

Before Peter the Great introduced Arabic Numerals in 1700, Cyrillic numerals (*Kirillicheskaia sistema schisleniia*) served as the primary form of numerical notation.¹¹ The associated system assigned unique numerical values to the letters of the Old Church Slavonic alphabet, whose order was originally based on Greek.¹² Cyrillic numerals developed initially in the First Bulgarian Empire of the late 10th century.¹³ Russian monks subsequently adopted the practice while transcribing religious texts in Old Church Slavonic, the liturgical language of Eastern Orthodoxy. While Southern Slavic populations largely abandoned the system when the Balkans came under Ottoman rule after the fall of Constantinople in 1453, Cyrillic numerals remained in popular usage in Russia and other East Slavic lands until the 18th century.¹⁴ They even endured as a formal stylistic convention throughout the end of the Imperial era.¹⁵

¹⁰ Historians customarily consider the first almanac in Russia to be the two-volume text published by Karamzin in Moscow under the title *Aglaia* in 1794-1795, followed by his three-volume edition *Aonidy* in 1796-97 and 1799. The lesser-known almanac, *Rossiskii Parnas (Russian Parnassus)*, published by Mikhail Kheraskov in 1771, however, predates the writings of Karamazin. Although almanacs did not become incorporated into Russian literary traditions until the late 18th-century, information concerning the weather, planting seasons, and farming practices would have passed down through generations in oral traditions, or would have appeared in fragments in variety of less widely distributed pamphlets or guides. See George J. Gutsche and P. Rollberg, *The Modern Encyclopedia of East Slavic, Baltic, and Eurasian Literatures*, Vol. 2 (Gulf Breeze, FL: Academic International Press, 1977), 124.

¹¹ David Longley, *The Longman Companion to Imperial Russia, 1689-1917* (New York: Routledge, 2000), 92; see also Nicholas V. Riasonovsky, *Russian Identities: A Historical Survey* (New York: Oxford UP, 2005), 80.

¹² “While there are only twenty-seven signs listed in Table 1.1, there are more than twenty-seven signs in all varieties of the Cyrillic script; modern Russian Cyrillic uses thirty-three letters, and earlier Cyrillic scripts used a number of older signs that have that have now fallen into disuse. The signs that are assigned numerical values in Cyrillic are those that are directly derived from Greek, including the otherwise rarely used signs for xi (ξ), psi (ψ), and theta (θ).” S.C. Gardiner, *Old Church Slavonic: An Elementary Grammar*, (London: Cambridge UP, 1984), 14-15.

¹³ Paul Cubberley, *Russian: A Linguistic Introduction* (New York: Cambridge UP, 2002), 49.

¹⁴ Stephen Chrisomalis, *Numerical Notation: A Comparative History*, 182.

¹⁵ “As late as 1918, Tsaritsa Aleksandra (Alix of Hesse) was learning Cyrillic numerals to paginate her final diary, demonstrating that their use was still relevant, if increasingly formal, in the late tsarist period.”

To distinguish numbers from text, a titlo (̑) was commonly drawn over the associated Cyrillic letter.¹⁶ While numbers were typically written from left to right, expressing 11 through 19 required the expected sign order to be reversed.¹⁷ As demonstrated in Image 1.1 on the following page, for example, 13 would be written *III*, and not *II* (*note: still trying to format these Cyrillic numerals to appear beneath a titlo*). Similarly, extending a small stroke from the lower-left of a given grapheme indicated that its value should be multiplied by 1000.¹⁸ Two strokes would indicate multiples of 10,000. Enclosing the letter in circles of varying designs would express multiples of even higher powers. Following the astute assessment of Stephen Chrisomalis, “the Cyrillic numerical notation system is thus a hybrid: purely ciphered-additive below 1000, and multiplicative-additive for higher powers.”¹⁹ Table 1.1, on the following page, adapted from the 2013 *Illustrirovannaia istoriia knigopechataniia i tipograficheskogo iskusstva* (*Illustrated History and Book Printing of Typographical Art*) by F.I. Bulgakov, and the 1979 *Encyclopedia of Library and Information Science*, Vol. 27 by Allen Kent et al., outlines the representative values of Cyrillic numerals. The 1635 bell tower clock from the Suzdal Kremlin in Image 1.2, moreover, exemplifies the prevalence of Cyrillic numerals in Russian imperial life.

As theologians represented a disproportionately literate demographic of medieval Russian populations, it is not surprising that Cyrillic Numerals developed in tandem with the proliferation of religious texts. In this regard, early theologians of Eastern Orthodoxy may have borrowed the underlying numerical basis from rabbinical scholars. Every letter in the Hebrew alphabet also corresponds to a number, and the process of assigning and interpreting quantitative values of

The Last Diary of Tsaritsa Alexandra, ed. Vladimir Kozlov and Vladimir M. Khrustalev (New Haven, CT: Yale UP, 1997), 2-3. As cited by: Stephen Chrisomalis, *Numerical Notation: A Comparative History*, 182.

¹⁶ Stephen Chrisomalis, *Numerical Notation: A Comparative History*, 182.

¹⁷ *Ibid.* 182

¹⁸ *Ibid.* 182

¹⁹ *Ibid.* 182

words and sentences in the Torah, Mishna, and Talmud, referred to as *gematria*, forms the basis of the Cabala, a system of occult theosophy in Judaism, involving mystical interpretations of the scriptures.²⁰ The application of this practice in relation to Russian words became a subject of interest for artists and thinkers in the 18th and 19th centuries, and the activity seems to have been promoted by the Masonic Lodges in Moscow and St. Petersburg.²¹

1	2	3	4	5	6	7	8	9
·ā·	·Ѡ·	·Г·	·ā·	·Ѡ·	·Ѡ·	·Ѡ·	·Н·	·Ѡ·
10	20	30	40	50	60	70	80	90
·Г·	·К·	·ā·	·М·	·Н·	·Ѡ·	·Ѡ·	·П·	·Ѡ·
100	200	300	400	500	600	700	800	900
·Р·	·Ѡ·	·Т·	·Ѡ·	·Ѡ·	·Х·	·Ѡ·	·Ѡ·	·Ѡ·
11	12	13	14	15	16	17	18	19
·ā·	·Ѡ·	·Ѡ·	·ā·	·Ѡ·	·Ѡ·	·Ѡ·	·Ѡ·	·Ѡ·
222	319	431	988					
·Ѡ·	·Ѡ·	·Ѡ·	·Ѡ·					
222	319	431	988					
1000	2000	20000	43000					
·ā·	·Ѡ·	·К·	·Ѡ·					
10000	300000	4000000	80000000					
ⓐ	ⓐ	ⓐ	ⓐ					



Left: Table of Cyrillic numerals.²² Right: 1635 Bell tower clock from the Suzdal Kremlin.²³

The application of Cyrillic numerals in

Russian society is significant because it undermines the artificial barriers separating mathematics and language. While Roman numerals embody a similar tradition in the West, their associated conventions rely on a much smaller set of letters (I, V, X, L, C). Cyrillic numerals, in contrast, comprise nearly all of the letters in the Old Church Slavonic alphabet. Instead of having two entirely separate scripts for mathematics and literature, Cyrillic numerals unite numbers and

²⁰ Lauren Leighton, “Gematria in *The Queen of Spades*”, *SE EJ*, Vol. 21, No. 4 (Winter 1977), 458.

²¹ *Ibid.*

²² Picture by Irin Krivosheeva. Public domain fair-use reproduction granted by Wikimedia commons. <<https://www.pinterest.com/pin/450078556479817695/>>.

²³ Picture by Dmitrii Manakhov. Public domain fair-use reproduction granted by Wikimedia commons. <http://www.123rf.com/photo_17456715_suzdal-kremlin-clock-with-letters-instead-of-numbers.html>.

letters in a common orthographic notation, and instantiate a tradition that Dostoevsky would have encountered at a very early age.

Despite the fact that Peter the Great insisted upon a preference for Arabic numerals instead of Cyrillic numerals in 1700, Russian writing conventions did not uniformly accommodate the required prescriptions in notation. The first Russian mathematics textbook, *Arifmetika (Arithmetic)* by L.F. Magnitskii, for example, used both systems side by side in 1703.²⁴ The Holy Russian Synod, similarly, persuaded Peter the Great to provide a special dispensation to members of the clergy in 1710 that allowed “church books” be printed with Cyrillic numerals in traditional ornateness.²⁵ Secular works, however, were to be printed following the imposed conformity of streamlined civil fonts using Arabic numerals.²⁶

Organizations directly supervised by the state, such as the Moscow School of Mathematics and Navigation, transitioned immediately to the new notation system.²⁷ The logarithmic tables published for the first class cadets in 1701 subscribed strictly to Western

²⁴ L. F. Magnitskii, *Arifmetika*, Original 1703 Manuscript digitized by archivists at Moscow State University im. M.V. Lomonosova. Accessed online through math.ru. < <http://math.ru/lib/176>>; =see also W.F. Ryan, “Scientific Instruments in Russia from the Middle Ages to Peter the Great” in *Annals of Science*, Vol. 48, No. 4, 375.

²⁵ James Cracraft, *The Revolution of Peter the Great* (Cambridge: Harvard UP, 2003), 103.

²⁶ Ibid. 103. Although disputed by most historians and mathematicians, several authors, such as Elizabeth Woodcock, Rabah Saoud and Salim T.S. Al-Hassani speculate that the notation of the Arabic numeral system developed out of geometric principles. The presentation of each digit in Hindu-Arabic scripts may have loosely corresponded to the number of angles contained in the given character. The textual representation of 1, for instance, admits one angle formed by the vertical base and the shortened segment. 2, expresses two angles, 3 expresses three angles, and so forth. A horizontal slash across the number 7 would create seven angles. 0, represented with a circle or ellipse, permits no angles. The ancient typographical extracts recorded in the 1757 text, *Histoire de la Mathematique* by Jean-Étienne Montcula and the 1202 *Liber Abaci* by Leonardo Fibonacci, however, seem to refute this tenuous hypothesis. The premise seems even more unlikely out of the consideration that Arabic and Hindu scribes predominately transcribed numbers in rounded caligraphy, as opposed to the sharp straight edges of characters chiseled in stone or clay. See also David Eugene Smith and Louis Charles Karpinski, *The Hindu-Arabic Numerals* (Boston: Ginn and Company, 1911), 20-21; Elizabeth Woodcock and Rabah Saoud, *1001 Inventions: Muslim Heritage in Our World* (Manchester, UK: Foundation for Science Technology and Civilisation, 2007), 64; John Fauvel and Jeremy Gray, *The History of Mathematics: A Reader*, 240-241.

²⁷ Stephen Chrisomalis, *Numerical Notation: A Comparative History*, 182.

numerical conventions.²⁸ Secular mathematical texts standardized and codified the conveyance of numeration, rules for whole numbers and fractions, algorithms for calculations regarding taxes and sales, as well as conventions of measurement.²⁹ The texts were popular among autodidacts, who acquired skills of basic calculation, as well as knowledge concerning more difficult methods of determining the values of unknown variables, such as the rule of *regula falsi*.³⁰

In similar fashion, these secular texts communicated elementary tutorials for using mathematical instrumentation, including the protractor, compass, straight edge, and slide rule.³¹ These works also popularized numerical riddles, puzzles, and games.³² Educated elites would have been expected to possess working knowledge of Arabic, Cyrillic, and Roman numeral systems to engage the diverse disciplines and textual genres that coalesced in the 18th century.

While Peter the Great arguably receives the most credit for modernizing Russia, his tsarist predecessors also willingly imported Western experts and their associated technological advances. As early as the reign of Ivan III (1440-1505), Russian leaders commenced the process of hiring “*matematiki*” from abroad, who in all likelihood, were not actual mathematicians, but

²⁸ Ibid.

²⁹ Tatiana Poliakova, “Mathematics Education in Russia before the 1917 Revolution,” 4.

³⁰ Ibid. 8. *Regula falsi*, or the false position method, is a term for problem-solving methods in arithmetic, algebra, geometry, and calculus. The process involves testing a problem by testing “false” values for unknown variables in an equation, and then adjusting the values as needed. A more complex approach involving the testing of two unknown variables is commonly referred to as “double false position.” See Jean-Luc Chabert et al., *A History of Algorithms: From the Pebble to the Microchip* (Heidelberg: Springer, 1994), 85.

³¹ Iakov Brius, *Priyomy tsirkul'a i lineiki*, 1709. Monograph digitized by math.ru. Accessed online at: <<http://math.ru/lib/489>>; see also, Iakov Brius, *Geometriia Praktika*, 1714. As cited in Tat'iana Poliakova, *Istoriia matematicheskogo obrazovaniia v Rossii* (Moscow: Izd-vo Moskovskogo gosudarstvennogo universiteta, 2002), 83.

³² Tatiana Poliakova, “Mathematics Education in Russia before the 1917 Revolution,” 4. While Georg Trogerman et al. offer the hypothesis that the abacus (*schyoty* or *abak(a)*) became popular in Russia following the Napoleonic Wars, it seems plausible that the counting device reached Russia in even earlier periods. See Georg Trogerman et al., *Computing in Russia: The History of Computer Devices and Information Technology Revealed* (Wiesbaden: Morgan Kaufmann, 2001), 24.

rather sundry scientific specialists.³³ Simultaneously impressed and befuddled by foreign scholars possessing skills and capabilities superior to those that existed in Russia, local populations referred to scientists and charlatans alike by the same nomenclature.³⁴

The so-called “*matematiki*” hired by Ivan III were generally practitioners of other professions, such as astronomers, apothecaries, architects, artilleryists, cartographers, doctors, and engineers.³⁵ Superstition and the general lack of an informed citizenry blurred the distinction between science and pseudoscience. Astronomers, for example, often dabbled in astrology, just as doctors and apothecaries conducted experiments in the discipline of alchemy. While these alternative trades may have inspired distrust, or suggested connections with the demonic, Western specialists and their associated technologies contributed to the fulfillment of pressing social needs, and the holistic development of Russia as a Eurasian hegemonic power.³⁶

³³ There are several noteworthy studies on the proliferation of technical methods and instrumentation in Imperial Russia: See I.A. Apokin and L. E. Maistrov, *Istoriia vychisletel'noi tekhniki: ot prosteishikh schetnykh prispoblenii do slozhnykh releykh system* (Moscow: Nauka, 1990); see also V.L. Chenakal, *Russkie priborostroiteli pervoi poloviny XVIII veka* (Leningrad: Gazetno-zhurnal'noe i knizhnoe izdatel'stvo, 1953); W.F. Ryan, “Scientific Instruments in Russia from the Middle Ages to Peter the Great” in *Annals of Science*, Vol. 48, No. 4, 375; S.L. Sobol', *Istoriia mikroskopa i mikroskopicheskie issledovaniia v Rossii v XVII veke* (Leningrad, Izd. Akademia nauk, 1949); R.A. Simonov, “Rossiiskie pridvornye ‘matematiki’ XVI-XVII vekov”, in *Voprosy istorii*, 1986, 78.

³⁴ W.F. Ryan, “Scientific Instruments in Russia from the Middle Ages to Peter the Great,” 375.

³⁵ *Ibid.* 375

³⁶ While members of the secular civil service readily accepted scientific principles from abroad, church officials and common folk were less willing to subscribe. In the wake of Peter's reforms, two progressive Greek monks travelled to Russia to stress the immense value of scientific inquiry: Eugenios Voulgaris (1716-1806) and Nikephoros Theotokis (1731-1800). They produced compelling texts on the “new science” of the Enlightenment, and their polemics persuaded the highest church authorities in the Eastern Orthodox world to regard favorably the influx of scientific and philosophical advances. For Voulgaris, the success of the Enlightenment relied on realigning the science of the ancients with the breakthroughs of his contemporary era. He considered Diophantus, for example, “the sovereign of all arithmetical thinking,” but maintained that “the art called algebra, His most marvelous invention, was developed and perfected by François Viète, René Descartes, and others.” As cited by Efthymios Nicolaidis, *Science and Eastern Orthodoxy: From the Greek Fathers to the Age of Globalization*, trans. Susan Emanuel (Baltimore: Johns Hopkins UP, 2000), 157; see also Stephen K. Batalden, *Catherine II's Greek Prelate Eugenios Voulgaris in Russia, 1771-1806* (New York: Columbia UP, 1982), 30. For Theotokis, see George Vlahakis, “Nikiphoros Theotokis, Scientist and Theologian” in *Encyclopedia of Greece and the Hellenic Tradition*, Ed. Graham Speake (London: Fitzroy Dearborn, 2000), 163.

Following models of state patronage undertaken by monarchs in Western Europe, tsarist regimes encouraged technological innovation in Russia by incorporating foreign scholars into the state, emulating advances in warfare, diplomacy, travel, and exploration, and founding pedagogical institutions to develop innovation domestically. The latter method of funding research and teaching initiatives on the home front, however, occurred at a slower pace in Russia compared to what unfolded in neighboring sovereignties. Until the ascent of the Romanovs, schools offering instruction in mathematics, the sciences, and the humanistic arts were largely absent in Russian society. Private education in the home was prioritized over the creation of schools and institutions of learning.³⁷

Theological or ‘spiritual’ educational centers, such as parishes, monasteries, seminaries, and academies represented the most common manifestations of organized schooling efforts in the medieval period.³⁸ The reforms of Peter the Great, however, encouraged the proliferation of alternative instructional models. By promoting the incorporation of diverse subjects into state curricula, allocating funds from centralized coffers for the founding of new schools, and expanding the scope of pedagogical initiatives in the sciences, Peter allowed advances of the Enlightenment to penetrate the psyche of Russian society.

Historians Fyodor Kozryev and Vladimir Fedorov reaffirm this tendency, describing that Peter established “civil schools (mostly of military and engineering profiles with so-called ‘numeral’ mathematics schools as a preliminary phase), which were largely subordinated to different state structures.”³⁹ While the sponsorship of these directives by the state may have contributed to the polarization of spiritual and secular institutions, Peter established educational

³⁷ Fedor Kozryev and Vladimir Fedorov, “Religion and Education in Europe: Historical Roots, Cultural Contexts, and Recent Developments” in *Religion and Education in Russia: Developments, Contexts, and Debates*, ed. Robert Jackson (Münster, Germany: Waxmann Publishing, 2007), 138.

³⁸ *Ibid.* 138

³⁹ *Ibid.* 138

paradigms that facilitated the absorption and development of technological inquiry and invention in Imperial Russian life. Echoing the sentiments of the 1997 monument dedicated to him in central Moscow, Peter the Great can be viewed as the helmsman of a great ship, who charted for his nation a new course following the principles of modernization and scientific advancement.

Leading up to the rise of Peter the Great, some of the earliest efforts to organize state educational initiatives were modeled on the undertakings of Simeon Polotsky (1629-1680). Although Polotsky was born in Belarus, he encountered Western discourses during his studies at the Kiev Ecclesiastical Academy, and the Jesuit College of Wilno.⁴⁰ The derivation of his name, and his linguistic proficiencies in Polish also communicate his status in Russia as a foreign scholar. Upon the invitation of Tsar Aleksei, the father of Peter the Great, Polotsky opened one of the first centers of higher education in Moscow.⁴¹ The school was established to educate Russian clerks in Latin, the language of diplomacy at that time. Polotsky was the first to lecture Russian students on grammar, poetics, oratory, and rhetoric in an official capacity.⁴² In addition to his linguistic talents, Polotsky specialized in astronomy and astrology, and his literary works often uniquely reflected mathematical and scientific principles derived from his other professional interest and studies.⁴³

His 1665 panegyric verses, *Blagoprivetstvie tsariu Alekseiu Mikhailovichu po sluchaiu rozhdeniia tsarevicha Simeona (Blessed Greeting to Tsar Aleksei Mikhailovich on the Occasion*

⁴⁰ John-Paul Himka, "Icarian Flights in Almost All Directions" in *Intellectuals and the Articulation of the Nation*, Ed. Ronald Grigor Suny and Michael D. Kennedy, (Ann Arbor: University of Michigan Press, 2001), 151.

⁴¹ Basil Dmytryshyn, *History of Russia* (New York: Prentice-Hall, 1977), 243; Alexander Karp, "'Universal Responsiveness' or 'Splendid Isolation?'" Episodes from the History of Mathematics Education in Russia", in *Paedagogica Historica*, Vol. 42, No. 5, August 2006, 616.

⁴² Ibid. 616

⁴³ Aleksandr Pushkin remarks in his 1835 *Istoriia Petra I (History of Peter I)* that Polotsky made an astrological prophecy to mark the birth of Peter the Great. A.S. Pushkin, "*Istoriia Petra I*", *Sobranie sochinenii v 10 tomakh*. Vol. 8 (Moscow: Gosudarstvennoe izdatel'stvo khudozhestvennoi literatury, 1962), 15.

of the Birth of the Tsarevich Simeon), for example, appeared in the typographical arrangement of an octagram, also referred to as an 8-point star.⁴⁴ Polotsky meticulously selected and calculated the presentation of his poem to appear as a *Rifmologion*, a neologism expressing the presentation of rhyme in a particular shape, in this case, one commonly referred to as the Star of Redemption, or the Prophetic Star of the Incarnation.⁴⁵ The star, which is formed by the intersection of two crosses at 45 degree angles, expresses a metaphor symbolizing the conjoined union of heaven and earth, or God and man together. The eight-pointed star appears prominently in extended architectural and artistic Christian traditions.⁴⁶ It generally expresses the resurrection of Christ and new life, and is typically associated with Easter and baptism.⁴⁷

After overseeing the foundation of state schools, Polotsky received a special commission to tutor the children of Tsar Aleksei I in 1667.⁴⁸ He personally delivered and coordinated the lessons of young Peter the Great.⁴⁹ In 1679, just a year before his death, Polotsky proposed the founding of a university with a special international focus: the Slavic-Greek-Latin Academy (*Slaviano-greko-latinskaia akademiia*).⁵⁰ The school was built in the eastern outskirts of Moscow, and its first classes convened in 1687.⁵¹ Nationalized by Peter I in 1701, the Academy produced not only theologians, but also translators, doctors, lawyers, and specialists for the civil

⁴⁴ I. P. Eremin, “*Poeticheskii stil’ Simeona Polotskogo*” (Leningrad: Trudy Otdela drevnerusskoi literatury, Izd. Akademii nauk SSSR, 1948), 145.

⁴⁵ John P. Lundy, *Monumental Christianity, or the Art and Symbolism of the Primitive Church* (New York: JW Bouton, 1876), 2.

⁴⁶ *Ibid.* 2

⁴⁷ Nigel Pennick, *Sacred Geometry: Symbolism and Purpose in Religious Structures* (San Francisco, CA: Harper & Row, 1982), 82; see also Colin Joseph Dudley, *Cantebury Cathedral: Aspects of Its Sacramental Geometry* (Bloomington, IN: XLibris Corporation, 2010), 95.

⁴⁸ Robert K. Massie, *Peter the Great: His Life and World* (New York: Ballantine Books, 1982) 36. See also Lindsey Hughes, *Peter the Great: A Biography* (New Haven, CT: Yale UP, 2002), 10.

⁴⁹ *Ibid.* 10

⁵⁰ Dean S. Worth and Michael S. Flier, “Language” in *The Cambridge Companion to Modern Russian Culture*, ed. Nicholas Rzhevsky (New York: Cambridge UP, 2012), 34; see also Caroline Brooke, *Moscow: A Cultural History* (New York: Oxford UP, 2006), 194.

⁵¹ *Ibid.* 34

service.⁵² In 1721, Peter the Great transferred supervision of the school to the Holy Russian Synod. Although it closed for several decades during the anti-religious temperament of the early Soviet era, the Slavic-Greek-Latin Academy re-opened in the 1940s, and still confers degrees today. It is currently one of the oldest educational institutions in Russia.⁵³

Members of the Romanov court and local populations ascribed special significance to the genius of Polotsky, and some may have regarded him as something of a soothsayer. His knowledge of astronomy and associated applications in astrology contributed to his reputation as a mystic endowed with the powers of clairvoyance.⁵⁴ As the writings of Polotsky were thought by many to convey prophetic vision, his works edifying the Russian state, personalities at the court, and the accomplishments of his Romanov benefactors served especially effective propaganda for the modernizing aims of the autocracy.⁵⁵ His treatises on the messianic mission of Muscovy to fulfill its destiny as the realization of the Third Rome, as well as his astrological readings of celestial phenomena coinciding with the conception and birth of Peter the Great

⁵² James Cracraft, *Peter the Great Transforms Russia* (Lexington, MA: Heath, 1991), 191.

⁵³ Representatives of different universities dispute this claim. St. Petersburg State University claims to be the oldest university in continuous operation in Russia after it opened in 1724. Similarly, the Immanuel Kant Baltic Federal University in Kaliningrad claims continuity with the University of Königsberg, which opened in 1544, but was not always part of Russia. Daniel Brook, *A History of Future Cities* (New Haven, CT: Yale UP, 2013), 28; see also Richard J. Krickus, *The Kaliningrad Question* (Lanham, MD: Rowman & Littlefield Publishers, 2002), 18.

⁵⁴ I. P. Eremin, "Poeticheskii stil' Simeona Polotskogo," 145; see also A.R. Hippisley, *The Poetic Style of Simeon Polotsky* (Birmingham, UK: Birmingham Slavonic Monographs, 1985), 35.

⁵⁵ See W.F. Ryan, "Magic and Divination: Old Russian Sources" in *The Occult in Russian and Soviet Culture* (Ithaca, NY: Cornell UP, 1997), 47; Lindsey Hughes, *Sophia, Regent of Russia, 1657-1704* (New Haven, CT: Yale UP, 1990), 140.

illustrate his overarching importance.⁵⁶ His role in authoring national myths, promoting the increased inspection of foreign scholarly works, opening international dialogues, and inspiring educational reforms contributed markedly to the holistic development of mathematics in Russia.

Following the death of Polotsky, Peter the Great established schools to acquaint Russian society with the most advanced methods in transportation, communication, and industrial production based on models previously developed in the West. To help achieve these objectives, Peter recruited Henry Farquharson, a tutor in mathematics hailing from Marischal College in Aberdeen, Scotland, and two young graduates from the Royal Mathematical School at Christ's Hospital in Sussex, Stephen Gwyn, aged fifteen, and Richard Grice, aged seventeen, who arrived in Russia in 1698.⁵⁷ In 1701, the School of Artillery, and Farquharson's School of Mathematics

⁵⁶ For commentary on the Third Rome, see: M. M. Rassolov, *Simeon Polotskii: istoricheskii roman*, (Moscow: Terra Kniznyi klub, 2008), 199. For the prophecy on the birth of Peter I, see the unfinished "History of Peter I" by A.S. Pushkin. While the text remains incomplete, and likely includes certain historical exaggerations, it nevertheless espouses useful commentary on the astronomical observations and educated status of Simeon Polotsky. A.S. Pushkin, "Istoriia Petra I", *Sobranie sochinenii v 10 tomakh*. Vol. 8 (Moscow: Gosudarstvennoe izdatel'stvo khudozhestvennoi literatury, 1962), 15; "The monk Simeon Polotsky and the monk Dmitrii (later the Holy Metropolitan of Rostov) conducted astrological observations and predictions in the court of Aleksei Mikhailovich. The first of these prophets confirmed a written account nine months before the birth of Peter I and his glorified deeds: A most lucent star appeared near Mars that he saw clearly, as if he was reading in a book, that conceived in the womb of Tsaritsa Natalia Kirilovna the son of the tsar shall be called Peter. He will inherit the throne and be a hero, that in the glory with him, none of his contemporaries can compare." «Иеромонах Симеон Полоцкий и иеромонах же Дмитрий (впоследствии св. ростовский митрополит) занимались при дворе Алексея Михайловича астрологическими наблюдениями и предсказаниями. Первый из них прорек за девять месяцев до рождения Петра славные его деяния и письменно утвердил, что «по явившейся близ Марса пресветлой звезде он ясно видел и как бы в книге читал, что зачатый в утробе царицы Наталии Кириловны сын его (царя) назовется Петром, что наследует престол его и будет таким героем, что в славе с ним никто из современников сравниться не может».

⁵⁷ Farquharson was incredibly productive in Russia. According to Alexander Vucinich, Farquharson "helped with the translation of thirty-eight scientific manuals into Russian, and he is credited with the translation of extracts from Euclid's elements, the first effort to popularize Euclid's geometry in Russia." Also, he "was responsible for the first Russian bronze engraving of Mercator's map of America; he published a table of latitudes to be used by the students of the Naval Academy; he prepared a manual on the use of mathematical instruments; he left an unpublished manuscript on trigonometry." Paul Dukes, *The Making of Russian Absolutism 1613-1801* (New York: Routledge, 2013), 101; see also Alexander Vucinich, *Science in Russian Culture: A History to 1860* (Stanford: Stanford UP, 1963), 53.

both opened in Moscow.⁵⁸ Several graduates of these schools received commission from the state to open Arithmetic (*Tsifirnye*) schools in the provinces to instruct the sons of the landed nobility.⁵⁹ By 1716, twelve of these schools were in operation.⁶⁰ This campaign to educate the provincial gentry became a mandatory stipulation, as young noblemen living in these regions could not marry without first obtaining graduation certificates until 1744.⁶¹ Other schools founded during the reign of Peter the Great included the School of Medicine (1707), the School of Engineering (1712), the School of Mining (1716), and the Russian Academy of Sciences (1725). When Peter the Great founded St. Petersburg in 1712, the majority of these pedagogical centers and their associated personnel relocated to the new capital.⁶²

During this same period, the state increased its promotion of publishing efforts, and the first pedagogical texts began to appear in wider distribution. In 1700, Peter the Great commissioned Jan Tessing, a printing specialist from Amsterdam, to publish and sell secular Russian texts.⁶³ The state subsidized these activities, which operated at a loss due to the lack of a large literate readership.⁶⁴ Printing presses and publishing houses came under the direct supervision of the state, whose leaders imposed strict censorship on disseminated materials.

Journalistic endeavors also contributed to the promulgation of intellectual discourses. In 1702, Peter the Great founded *Vedomosti* (*Gazette*), a popular newspaper, describing military events, diplomatic relations, and European politics. The stories were usually dictated by the Tsar

⁵⁸ David Longley, *The Longman Companion to Imperial Russia, 1689-1917* (New York: Routledge, 2000), 92.

⁵⁹ Ibid. 92

⁶⁰ Tatiana Poliakova, "Mathematics Education in Russia before the 1917 Revolution" in *Russian Mathematics Education: History and World Significance* (Hackensack, NJ: World Scientific, 2010), 8.

⁶¹ Ibid. 9

⁶² David Longley, *The Longman Companion to Imperial Russia, 1689-1917* (New York: Routledge, 2000), 92-93.

⁶³ Tatiana Poliakova, "Mathematics Education in Russia before the 1917 Revolution" in *Russian Mathematics Education: History and World Significance* (Hackensack, NJ: World Scientific, 2010), 6.

⁶⁴ Ibid. 6

himself, or translated from Dutch sources following subjects in line with his interests, opinions, and state initiatives.⁶⁵ The primary base of operations for the newspaper remained in Moscow until 1710, before it was moved to the St. Petersburg in 1711. Since Peter the Great was the sole contributor, the earliest editions of *Vedomosti* appeared irregularly, as the leader often shifted his attention between multiple projects and state directives.⁶⁶ Upon the death of Peter the Great in 1725, primary control of the newspaper transferred to the Russian Academy of Sciences, who renamed the publication as *Sankt-Peterburgskie Vedomosti* in 1727.⁶⁷

Advised by the prolific polymath Gottfried Leibniz (1646-1716), Peter the Great began laying plans for what was originally to be called the St. Petersburg Academy of Sciences as early as 1703.⁶⁸ Modeled on corresponding centers of inquiry and research in Paris, London, and Berlin, the envisioned project would become the central body in Imperial Russia for funding, evaluating, and standardizing academics and scientific affairs. In 1720, Peter the Great sent emissaries to recruit foreign specialists. Christian Wolff, a Professor of Philosophy and Physics at Halle in Southern Saxony, and J.D. Schumacher, the court librarian of Peter the Great, were charged with the mission of recruiting the sharpest minds in Europe.

⁶⁵ Ibid. 6

⁶⁶ S.M. Tomsinskii, *Pervaia pechatnaia gazeta* (Perm: Monografiia V. Kuz'mina, 1959), 11.

⁶⁷ Miranda Beaven Remnek, "Russia, c. 1790-1830" in *Press, Politics and the Public Sphere in Europe and North America, 1760-1820* (New York: Cambridge UP, 2002), 227.

⁶⁸ Leibniz deserves credit for developing binary code and discovering calculus independently of Sir Isaac Newton. While the institution is known today as the Russian Academy of Sciences (*Rossiiskaia akademiia nauk*), it underwent several name changes throughout its extended history. From 1724 until 1747, it was called the Petersburg Academy of Sciences (*Peterburgskaia Akademiia nauk*). From 1743-1803 it was called the Imperial Academy of Sciences and Arts (*Imperatorskaia Akademiia nauk i khudozhestv*), and from 1803-1836, the Imperial Academy of Sciences (*Imperatorskaia Akademiia nauk*). In 1841, Tsar Nikolai I united the Imperial Academy of Sciences with the Russian Academy, a philological organization concerning humanities and the Russian language. Princess Yekaterina Dashkova presided over both organizations. Under her leadership, the institution became known as the Imperial Saint Petersburg Academy of Sciences (*Imperatorskaia Sankt-Peterburgskaia Akaedemiia Nauk*). Throughout the subsequent period, early Soviet leaders co-opted the Russian Academy of Sciences as "highest all-Union scientific institution", and named it the Academy of Sciences of the USSR. See G.K. Hall, *Bibliographic Guide to Soviet and East European Studies*, Vol. 1 (New York: Gale Group and New York Public Library Slavonic Division, 1997), 16.

The cast of the earliest foreign intellectuals invited to serve at the Academy of Sciences included mathematicians Leonhard Euler (1707-1783), Nicolaus I Bernoulli (1695-1726), Daniel Bernoulli (1700-1782), astronomer and geographer Joseph-Nicolas Delisle (1688-1768), ethnographer Gerhard Friedrich Müller (1705-1783), and physicist Georg Wolfgang Kraft (1701-1754).⁶⁹ During their extended stays in Russia, they conducted experiments and led research expeditions in the northern capital and beyond, including extended provinces and hinterlands. Although political pressures may have dissuaded some of these scholars from settling in Russia permanently, they produced important findings in a variety of subject concentrations.

The tenure of these scholars coincided, unsurprisingly, with the most productive years of the Academy of Sciences. Leonhard Euler and the Bernoullis were among the most creative mathematical thinkers of the 18th century. Whereas scholars previously traveled to Western Europe to find cutting-edge innovation, the success of the opening decades of the Academy of Sciences transformed Russia into a preeminent destination for foreign scholars seeking the most advanced mathematical and scientific theories. Peter the Great, additionally, generously compensated these intellectuals for their research and service. Leonhard Euler, in light of his immense corpus of published works, and diverse scope of research interests, arguably embodies the most prolific mathematician of all time.

Marquis de Condorcet, one of his colleagues at the Academy, observed that Euler “embraced the mathematical sciences in their universality.”⁷⁰ By 1735, he had authored thirteen scientific papers. While working at the Academy, he produced the pivotal works, *Commentarii* and *Mechanica*. Although Newton is widely recognized for discovering calculus, his method

⁶⁹ Alexander Vucinich, *Science in Russian Culture: A History to 1860* (Stanford: Stanford UP, 1963), 77-78. Daniel and Nicholas Bernoulli were first cousins from a family of prominent mathematicians. Their uncles, Jacob (1654-1705), Nicolaus (1662-1716), and Johann (1667-1748), were all mathematicians, known widely as the “Bernoulli Brothers.”

⁷⁰ Leonhard Euler, *Letters of Euler on Different Subjects in Physics and Philosophy*. Addressed to a German Princes, trans. H. Hunter, Vol. 1 (London: Murray and Highle, 1802), xl.

largely relied on conservative geometric approaches, requiring cumbersome diagrams and graphs. In *Commentarii* and *Mechanica*, Euler introduced analytical abstract methods, which contributed to the applied systematization of calculus. He pioneered methods to determine optimization values, to calculate fluid and static dynamics of mechanical systems, and to conceptualize correlations between different variables in the formulation of related rates, integrals, and differentials. His work effectively established a meaningful bridge between mathematical abstraction of the highest order and applications in constantly expanding arenas of engineering, technology, and the sciences.⁷¹

Euler quickly became a fixture of intellectual discourses in the imperial capital. He submitted popular scientific articles to the *Peterburgskie Vedomosti*, and V.E. Adodurov, the first Russian to be elected a member of the Academy's scientific staff, translated manuals prepared by Euler into Russian for use by the students of the Academic Gymnasium.⁷² These works received popular circulation, and served as foundational texts for prospective engineers.

In the 78-volume collection of all his published works, Euler set forth theories and assumptions that contributed significantly to the holistic formulation of modern mathematics. Having inherited the research findings of Gottfried Leibniz (1646-1716) and Sir Isaac Newton (1643-1727), Euler applied the approaches of calculus to every known scientific field. He uncovered advances in number theory, graph theory, astronomy, optics, music, and logic. Of the most important numbers in mathematics, Euler is responsible for uncovering i , the imaginary unit, e , the base of the natural logarithm, and the Euler-Mascheroni constant, usually denoted by

⁷¹ Alexander Vucinich, *Science in Russian Culture: A History to 1860* (Stanford: Stanford UP, 1963), 94.

⁷² *Ibid.* 94

the Greek letter gamma, representing the limiting difference between the harmonic series and the natural logarithm.⁷³

In addition to these numbers, Euler standardized notation expressing different mathematical operations and unities. For instance, he established representations of a function as $f(x)$. Moreover, he devised ways to indicate the numerical relationships of angles, i.e. trigonometric functions, such as $\sin(x)$ and $\cos(x)$, formulaic representations for series of summations expressed by the Greek letter sigma Σ , the natural logarithm $\ln(x)$, and the exponential constant, e .⁷⁴ His groundbreaking work established new branches of mathematics, such as graph theory, complex analysis, and totient function studies.⁷⁵

The success of his investigations inspired a new generation of mathematical thinkers to pursue questions related to these unfolding fields, including Pierre-Simon Laplace (1749-1827), Carl Friedrich Gauss (1777-1855), Bernhard Riemann (1826-1866), Augustin-Louis Cauchy (1789-1857), and Karl Weierstrass (1815-1897).⁷⁶ The maxim of Laplace, “Read Euler, read Euler, he is the master of us all,” situates Euler as one of the preeminent founders of modern mathematics.⁷⁷ The associated studies and research papers conducted by Euler produced

⁷³ The harmonic series expresses the divergent infinite series taking the form of $1/n$. Pythagoras was among the first to conceptualize the harmonic series in relation to the study of music, and the sounds produced by strings of varying lengths. It takes the form, $1+1/2+1/3+1/4+1/5\dots$, with n approaching infinity. C. Edward Sandifer, *The Early Mathematics of Leonhard Euler* (Washington, DC: The Mathematical Association of America, 2007), 174; see also Carlos I. Calle, *Superstrings and Other Things: A Guide to Physics* (Boca Raton, FL: Taylor & Francis, 2010), 284.

⁷⁴ Carl B. Boyer, Uta S. Merzbach, Isaac Asimov, et al., “Chapter 17: Euler” in *A History of Mathematics* (Hoboken, NJ: John Wiley & Sons, Inc., 2011), 408.

⁷⁵ Lokenath Debnath, *The Legacy of Leonhard Euler: A Tricentennial Tribute* (World Scientific, 2009), 37-39.

⁷⁶ Stephen Hawking, *God Created the Integers: The Mathematical Breakthroughs That Changed History* (Running Press, 2007) 411, 591, 663, 979, 1053.

⁷⁷ “Lisez Euler, lisez Euler, c’est notre maître à tous.” As cited by Guglielmo Libri, “Correspondance mathématique et physique de quelques célèbres géomètres du XVIIIe siècle” in Académie des inscriptions et belles-lettres, *Le Journal des sçavans* (Jean Cusson (Paris), January, 1846). Accessed online through Gallica Bibliothèque numérique of the Bibliothèque nationale de France at: <<http://gallica.bnf.fr/ark:/12148/bpt6k57253t/f52.image.langEN>>.

immediate repercussions for nearly all fields of scientific inquiry. Nearly all reputable engineering and mathematics programs around the world today still feature an introductory presentation of his methods and conclusions. Additionally, scholars continue to derive new meaningful applications and insights from his work.

Euler first arrived in St. Petersburg in 1727, having received an appointment to serve as a professor of physics. His earliest experiments concerned navigation, buoyancy, and sound, and he enjoyed working alongside the Bernoullis, whom he had known from his childhood in Switzerland.⁷⁸ During the political volatility that occurred after the death of Peter II in 1730, Daniel and Nicolaus I Bernoulli decided to leave Russia in the face of increasing xenophobia, state censorship, and political pressure. Euler, however, decided to prolong his stay after marrying Katharina Gsell (1703-1773), the daughter of a Swiss artist also working in Russia, in 1734.⁷⁹ Despite having three children, and purchasing a comfortable stone house on the embankment of the Neva, Euler and his family quickly left Russia, fearing the “pro-Russian” campaign of Tsarina Elizaveta I, which seemed poised to persecute foreign academics.⁸⁰

Euler found patronage elsewhere, namely in the Prussian court of Frederick the Great. While in Prussia, Euler published a series of noteworthy mathematics papers, including his treatment of the “Seven Bridges of Königsberg” problem. Using graphical analysis, Euler impressed his Prussian hosts by publishing an analysis of a local anecdotal quandary regarding whether it would be possible to traverse the city by crossing each of its seven bridges once and only once, provided that a bridge, once accessed, must be crossed to its other end. The start and

See also William Dunham, *Euler: The Master of Us All* (Mathematical Association of America, 1999), xii.

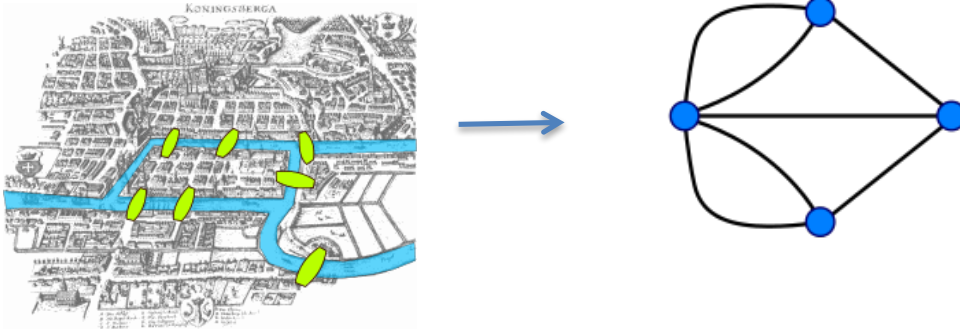
⁷⁸ Lokenath Debnath, *The Legacy of Leonhard Euler* (Hackensack, NJ: World Scientific, 2010), 32.

⁷⁹ *Ibid.* 38

⁸⁰ *Ibid.* 38

See also Alexander Vucinich, *Science in Russian Culture: A History to 1860* (Stanford: Stanford UP, 1963), 85.

end points for the journey need not be the same. Reducing the system to a series of abstract nodes, Euler demonstrated that the choice of the route inside each land mass was irrelevant, and that only the sequence of bridges traveled across proved significant.⁸¹ This supposition allowed him to express the dilemma graphically. In the graph on the right below, each node represents a land mass, and the lines between the nodes represent each of the seven bridges:



Left: Map of Königsberg.⁸²

Right: Eulerian Graphical Analysis of the Seven Bridges of Königsberg Problem.⁸³

If every bridge has been crossed exactly once, it follows that for each land mass, except for the ones chosen for the start and finish of the journey, the number of bridges touching that land mass must be even. However, all four of the landmasses in the problem are conjoined by an odd number of bridges: one is connected to five bridges, while the others are connected by three. Accordingly, for such a journey to be possible, each land mass would need to have an even number of bridges. Euler demonstrated that having an odd number of connections at each node presented an impossible path given the parameters that each bridge must be crossed once and only once in the course of the journey. The problem hinges not on the geographical orientation of

⁸¹ C. Edward Sandifer, *The Early Mathematics of Leonhard Euler* (Washington, DC: The Mathematical Association of America, 2007), 196.

⁸² Map of Königsberg by Bogdan Giuşă, 2005. Public domain fair-use reproduction granted by SciencesPo MediaLab.

< <http://www.medialab.sciences-po.fr/blog/the-seven-bridges-of-konigsberg/>>.

⁸³ Eulerian Graphical Analysis of the “Seven Bridges of Königsberg Problem” from *The Australian Mathematics Trust*, 2007. Public domain fair-use reproduction granted by Wikimedia Commons.

< <http://www.amt.edu.au/euler.html>>.

the Königsberg, but rather the nature of even and odd numbers. Consequently, it is impossible to traverse the city by crossing each of its bridges once and only once. While Euler's analysis may have refuted a popular Prussian tradition of counting bridge crossings, his work served as a remarkable contribution to the developing fields of topology, graph theory, and number theory.

Despite his early success, Euler soon fell out of favor with Frederick II. Throughout his adult life, Euler suffered acute strabismus. Caused by an extreme fever in 1735, or perhaps his extensive work in optics that may have lodged microscopic glass shards in his retinae, the medical condition prevented his eyesight from coming into focus.⁸⁴ His sensitive eyes made it difficult for him to continue his research. After suffering a series of cataracts in 1766, Euler was rendered nearly completely blind. Frederick II cruelly referred to Euler as “the Cyclops”, and this cruel moniker caught on with others at court.⁸⁵ In spite of Euler's debilitating medical condition, Frederick insisted on assigning the foremost genius in theoretical mathematics tasks that would have been better suited for architects or construction foremen with healthy eyesight.⁸⁶ Euler was dismissed from his service to Frederick II in 1766, after a series of setbacks building fountains at the foot of the grand staircase at the Palace of Sanssouci.⁸⁷

⁸⁴ William Dunham, *Euler: The Master of Us All*, Vol. 22 (Washington, D.C.: The Mathematical Association of America, 1999), xxvi.

⁸⁵ *Ibid.* xxvi Other celebrities in the court of Frederick the Great, including Voltaire, Immanuel Kant, and Johann Sebastian Bach did little to extend a warm welcome to the mathematician. The political discord of the Seven Years War made affiliations with multiple sovereignties across the European continent politically problematic. Voltaire, in particular, took exception to the presence of Euler in Prussia, and launched a vitriolic campaign against the mathematician. Euler befriended Pierre Louis Moreau de Maupertuis, the President of the Prussian Academy of Science, and tended to take his side in polemics on a range of questions and assumptions disputed by Voltaire. Although there were certain ideological and disciplinary differences between Euler and Voltaire, they also competed for status and recognition at court. See Klaus Mainzer, *Symmetries of Nature: A Handbook for Philosophy of Nature and Science* (New York: Walter de Gruyter, 1996), 311; Preserved Smith, *A History of Modern Culture*, Vol. 2 (London: George Routledge, 1934), 113

⁸⁶ Michael Eckert, “Euler and the Fountains of Sanssouci” in *The Archive for History of Exact Sciences*, No. 56, 2002, 451-452.

⁸⁷ *Ibid.* 451-452

Euler returned to Russia in the summer of 1766, and quickly resumed his prodigious work in theoretical mathematics. As one of his most significant contributions, Euler made unique breakthroughs in number theory by establishing the ontological validity of the imaginary unit, i . Speculation about the imaginary unit and the complex plane appeared first in mathematical studies of the Renaissance.⁸⁸ The idea originated as a rhetorical form based on perplexing arithmetical calculations involving negative numbers (*otristsatel'nye chisla*), or the set of all real numbers less than zero. Whereas scholars previously thought that it was impossible to take the square root of a negative number, Euler demonstrated that the operation, in fact, produced a verifiable numerical result, albeit, one that did not exist in *real* terms.

He first proposed his theory of complex numbers in a letter to Daniel Bernoulli in 1747, titled “De la contraverse entre Messrs. Leibnitz et Bernoulli sur les logarithms des nombres negatifs et imaginaires” (“On the Controversy between Messrs. Leibniz and Johann Bernoulli on the Logarithms of Negative numbers”).⁸⁹ When he returned to Russia in 1766, number theory became one of his central interests, and the identity bearing his namesake, $e^{i\pi} + 1 = 0$, served to confirm his mathematical assumptions regarding the interrelationship of different kinds of

⁸⁸ Gerolamo Cardano (1501-1576) and Rafael Bombelli (1526-1572) were the first scholars to offer conjecture on the imaginary unit. Cardano was among the earliest thinkers in Western discourses to make systematic use of numbers less than zero. He encountered the imaginary unit while investigating calculations of negative numbers in his 1545 book *Ars Magna*. Shortly thereafter, Bombelli devised the standard notation of i to signify the imaginary unit, and demonstrated the ways in which the rules of arithmetic for imaginary numbers differ from those for real numbers in his 1572 treatise, *L'Algebra*. See: Helena M. Pycior, *Symbols, Impossible Numbers, and Geometric Entanglements: British Algebra Through the Commentaries on Newton's Universal Arithmetick* (Cambridge University Press, 2006), 23. See also Apostolos Doxiadis and Barry Mazur, *Circles Disturbed: The Interplay of Mathematics and Narrative* (Princeton University Press, 2012), 83.

⁸⁹ Leonhard Euler, “De la contraverse entre Messrs. Leibnitz et Bernoulli sur les logarithms des nombres negatifs et imaginaires” *Memoires de l'academie des sciences de Berlin* 5 (1751), 139-179. Leonhard Euler, *Opera Omnia: Series 1, Volume 17, 195-232*; Florian Cajori, *A History of Mathematics* (Macmillan & Company, 1893), 317.

numbers.⁹⁰ His work was the among the first to explore different number fields, and laid the foundations for a new concentration of mathematical inquiry that would later occupy the genius of Carl Friedrich Gauss, and the early specialists in Quantum Mechanics-- complex analysis.⁹¹ In contemporary science, complex analysis is used extensively in electrical engineering and computer programming. As the ramifications of his mathematical research inferred the existence of numerical constructs beyond that of the real number line, his work also inspired the intrigue of philosophers and theologians.⁹²

American mathematicians Edward Kasner and James Newman describe Euler's identity as "a mystic union between arithmetic, represented by 0 and 1, algebra by π , the complex plane

⁹⁰ In the formulation of the identity, $e^{i\pi} + 1 = 0$, Euler derived this identity through conjecture and algorithmic brute force using calculations devised by the mathematicians Roger Cotes (1682-1716) and Abraham de Moivre (1667-1754) who both worked closely with Sir Isaac Newton (1642-1726). While Euler conceived of this identity as a proof of the associated relationships between different number fields, subsequent scholars refined the argumentative basis of the proof, thereby establishing its factual basis.

⁹¹ Gauss expanded upon the foundations of complex number theory devised by Euler. He devised the concept of a Gaussian integer, which comprises a complex number whose real and imaginary parts are both integers. Gauss, furthermore, was among the first mathematicians to consider complex numbers of higher orders, as well as the hypercomplex number system. At this juncture, I must tread lightly with this difficult terminology, but these number fields seem to express dynamic relationships of complex polynomials in algebraic vector analysis. These concepts influenced the subsequent research of Sir William Rowan Hamilton (1805-1865) and James Clerk Maxwell (1831-1879). Sandra Pulver, "Quaternions: The Hypercomplex Number System" in *The Mathematical Gazette*, Published the Mathematical Association, Vol. 92, No. 525 (November 2008), 431-432; see also George M. Rassias, *The Mathematical Heritage of C.F. Gauss* (London: World Scientific, 1991), 542.

⁹² According to legend, Euler referred to his mathematical work as confirmation of the existence of God in order to refute the atheistic rhetoric of Diderot. The debate allegedly occurred publicly in the court of Catherine the Great. Dostoevsky alludes to this debate in *The Brothers Karamazov*, curiously, without referring to Euler. Fyodor Pavlovich Karamazov parodies the instantaneous religious conversion of Diderot in Book One, "An Unfortunate Gathering," affirming, "I'm like the philosopher, Diderot, your revernce. Did you ever hear, most Holy Father, how Diderot went to see the Metropolitan Platon in the time of the Empress Catherine. He went in and said straight out, 'There is no God.' To which the great Bishop lifted up his finger and answered, 'The fool has said in his heart there is no God.' And he fell down at his feet on the spot. 'I believe,' he cried, 'and will be christened.' And so he was. Princess Dashkov was his gadmother, and Potyomkin his godfather." «Я, ваше преподобие, как философ Дидерот. Известно ли вам, святейший отец, как Дидерот-философ явился к митрополиту Платону при императрице Екатерине. Входит и прямо сразу: "Нет бога." На что великий святитель подымает перст и отвечает: "Рече безумец в сердце своем несть бог!" Тот как был, так и в ноги: "Верую, кричит, и крещение принимаю". Так его и окрестили тут же. Княгиня Дашкова была восприемницей, а Потемкин крестным отцом...» (PSS 14, 39); see also V.H. Brown, "The Euler-Diderot Anecdote" in *The American Mathematical Monthly*, Vol. 49, May, 1942, 302.

by i , and exponential analysis by the transcendental number e .⁹³ Recognizing that the identity connected the five most important numbers in mathematics, American physicist Richard Feynman referred to the equation as “the most remarkable formula in mathematics.”⁹⁴ As opposed to relying on unwieldy geometric standards of rigor, Euler introduced analytical methods contributing to the systematization of calculus. He developed groundbreaking connections between mathematical abstraction of the highest order and applications that could be used to improve scientific measurements, industrial production, and manufacturing.⁹⁵

The death of Euler was an immense blow to the stability and prestige of the St. Petersburg Academy. Among the faculty, there was no one who came close to replicating his genius. Peter Simon Pallas (1741-1811) directed the immense task of translating Euler’s research into French, English, Russian, and Italian.⁹⁶ Lepekhin, Gmelin, Güldenstädt, and Ozeretskovskii provided instrumental support to Pallas in achieving these aims.⁹⁷ Although Euler predates Dostoevsky by several generations, disciples of the mathematician popularized Eulerian approaches amongst the intelligentsia, and incorporated them into state curricula following the death of the Swiss thinker in 1783.

When the Academy opened in 1725, none of its original members was ethnically Russian.⁹⁸ Tsarina Anna Ivanovna, who ruled Russia from 1730-1740, remained wary of foreign scholars in her domain. She pushed for the increased inclusion of Russian scholars in the Academy. Vasilii Trediakovsky (1703-1769), from Astrakhan, consequently, received

⁹³ Edward Kasner and James Newton, *Mathematics and the Imagination* (New York: Courier Dover, 1940), 65.

⁹⁴ R.P. Feynman, R.B. Leighton, and M.L. Sands, *Feynman Lectures on Physics*, Vol. 1 (Reading, MA: Addison-Wesley, 1963), 22-10.

⁹⁵ Alexander Vucinich, *Science in Russian Culture: A History to 1860*, 94.

⁹⁶ *Ibid.* 152

⁹⁷ *Ibid.* 152

⁹⁸ *Ibid.* 75

appointment to serve as secretary of the St. Petersburg Academy of Sciences in 1732.⁹⁹ Shortly thereafter, V.F. Adadurov (1709-1780) from Novgorod, became the first Russian academic elected to teach and conduct research as an adjunct in mathematics.¹⁰⁰ The fact that both Trediakovsky and Adadurov were graduates of the Slavic-Greek-Latin Academy in Moscow demonstrates the lasting legacy of Peter's educational reforms, as well as the overall transition of intellectual capital from old Muscovy to Petersburg.

In the period marked by frequent military confrontation across the European continent, nationalism and xenophobia contributed to isolationist tendencies on the part of state decision makers to exclude foreign specialists from academic affairs, and to promote scientific development through internal channels. During periods of peace, in contrast, when Russia enjoyed normalized relations with other European powers, foreign specialists were eagerly invited to serve in state academic institutions.¹⁰¹ In the tense period following the Napoleonic Wars, M.L. Magnitskii, one of the leading academics under Tsar Aleksandr I, divided Russia into six territorial school districts, and coordinated a conservative overhaul of state institutions with the intention of purging non-Russian professors from multiple universities in 1819.¹⁰²

Magnitiskii, coincidentally, also served as the rector at Kazan University, where he often

⁹⁹ William Edward Brown, *A History of 18th Century Russian Literature*, (Ann Arbor: Ardis, 1980), 58.

¹⁰⁰ Alexander Vucinich, *Science in Russian Culture: A History to 1860*, 85.

¹⁰¹ Yuri Lotman and Boris Uspenskii describe the pendulum-like process of cultural change in Russia. Between opposing norms and opinions, the pendulum tends to swing to one extreme, before reverting in the direction of the other. See Yuri Lotman and Boris A. Uspenskii, "Binary Models in the Dynamics of Russian Culture" in *The Semiotics of Russian Cultural History*, ed. A.D. Nakhimovsky and A.S. Nakhimovsky, (Ithaca, NY: Cornell UP, 1985), 4.

¹⁰² James T. Flynn, *The University Reform of Tsar Alexander I, 1802-1835* (Washington, D.C.: Catholic UP, 1988), 90.

came into conflict with the rebellious young mathematician, Nikolai Lobachevsky.¹⁰³ During this time, Magnitskii compiled scathing disciplinary reports of Lobachevsky, detailing his liberal political and religious convictions. The associated dossier served to stifle the career and resonance of the geometer and his work.

While the reforms of Peter the Great exerted immediate influence on the development of mathematics and the sciences, his associated educational initiatives also set in motion challenges to the existing Russian class structure. Education provided Russian citizenry with a means for social ascension. Throughout the Imperial era, Russian society conformed strictly to designated classes and estates. Pressures and prejudices generally discouraged the intermingling of members belonging to different strata. The rise of a Russian middle class, coupled with the projected political influence of republican and egalitarian ideologies from abroad served to obfuscate the explicit demarcation of these sociological boundaries.

The Table of Ranks, introduced by Peter the Great in 1722, established new criteria for determining social status.¹⁰⁴ In the proposed system, representatives of military, civil, and court service were assigned ranks, which could move up or down, depending on performance. The incorporation of a meritocracy in Russian governance challenged the hereditary nobility to validate their esteemed positions that had previously been afforded to them purely on the basis of birthright. In theory, every nobleman started at the lowest tier, and attained promotion to the highest rank allowed by his native ability, education, and devotion to the interests of the state.¹⁰⁵

¹⁰³ E.M. Feoktistov, *Magnitskii, materialy dlia istorii prosveshcheniia v Rossii* (St. Petersburg: Monograph, 1864), 66; see also N. Zagoskin, *Istoriia kazanskogo universiteta za pervye sto let ego sushchestvovaniia* (Kazan, 1904), 340. As cited in Anatole Gregory Mazour, *The First Russian Revolution, 1825: The Decembrist Movement* (Stanford, CA: Stanford UP, 1937), 35; see also A. Iu. Minakov, "M. L. Magnitskii: k voprosu o biogrfii i mirovozzrenii predtechi russkikh pravoslavnykh konservatorov" in *Konservativizm v Rossii i mire: proshloe i nastoiashchee. Sbornik nauchnykh trudov* (Voronezh: Vypusk 1, 2001) 7.

¹⁰⁴ James Cracraft, *The Petrine Revolution in Russian Culture* (Cambridge, MA: Harvard UP, 2009), 35.

¹⁰⁵ *Ibid.* 35

Members of the *raznochintsy*, or “people of miscellaneous ranks”, a caste comprising merchants, lower court officials, and medical professionals, quickly acquired higher social standing through the popularity and utility of their social intellectual contributions.¹⁰⁶ Even the Russian peasantry could attain social mobility by participating in state educational initiatives.

The influential genius of Mikhail Lomonosov (1711-1765), for instance, best exemplifies this tendency. The son of a peasant fisherman in the far Russian north, Lomonosov traveled to Moscow on foot to study at the Slavic-Greek-Latin Academy in 1730.¹⁰⁷ Before arriving in Moscow, Lomonosov was largely a self-taught prodigy. When he was 14 years old, he received copies of the aforementioned 1703 textbook *Arifmetika* by Leontii Magnitskii, and the 1609 *Grammatika* by Meleii Smotritskii.¹⁰⁸ Having established a foundation for his studies in both mathematics and language arts, he later referred to these books as “the gates to his own erudition.”¹⁰⁹ His rise to prominence, however, was not without difficulty.

To enroll at the Slavic-Greek-Latin Academy, Lomonosov falsely claimed to have been born the son of a priest, since admission to the school was limited to students of certain social backgrounds.¹¹⁰ While he was nearly expelled for lying to school officials, Lomonosov was allowed to continue his studies, granted state funds to conduct research abroad, and praised for his contributions in diverse disciplines. He was even the first ethnic Russian to be elected a full

¹⁰⁶ Elise Kimerling Wirtschafter, “The Groups Between: *Raznochintsy*, Intelligentsia, Professionals”, in *The Cambridge History of Russia: Volume 2, Imperial Russia, 1689-1917*, ed. Dominic Lieven (New York: Cambridge UP, 2006), 251.

¹⁰⁷ Andrew Baruch Wachtel and Ilya Vinitsky, *Russian Literature: A Cultural History of Literature* (Malden, MA: Polity Press, 2009), 48.

¹⁰⁸ G.S. Vasetskii, *Lomonosov's Philosophy*, trans. Robert Daglish (Moscow: Progress Publishers, 1968), 31.

¹⁰⁹ As cited in *Ibid.* 31

¹¹⁰ Boris N. Menshutkin, *Russia's Lomonosov: Chemist, Courtier, Physicist, Poet* (Princeton, NJ: Princeton, NJ, 1952), 20.

member of the Academy of Sciences.¹¹¹ His intellectual output included literary works, comprised of odic verses, historical texts, neo-Classical and baroque translations, as well as grammatical studies surveying the various registers of the Russian language spanning from formal Old Church Slavonic to the spoken vernacular. Lomonosov also produced compelling mathematical and scientific texts concerning astronomy, material sciences, chemistry, and his specialty at the Academy of Sciences - physics.¹¹²

Lomonosov was not the only member of the lower classes to achieve social advancement through education. The egalitarian leanings of Peter the Great encouraged the inclusion of the lower classes in state educational initiatives. On January 16, 1716, for instance, state officials announced that nobles were to be excluded from the mathematical schools of Moscow.¹¹³ Only the lower estates would be entitled to seek enrollment at these institutions.¹¹⁴ The decision seems to have indirectly established norms of various professions and academic concentrations that would be acceptable for representatives of different social groups.

Mathematics, consequently, acquired a special association among people in the common estate. Political revolutionaries of the 19th century perhaps sensed this social current, and they often accused the nobility of partaking in the frivolous distractions of “art for art’s sake”, as opposed to subjects deemed more directly responsible for the material well-being and sustenance

¹¹¹ Andrew Baruch Wachtel and Ilya Vinitsky, *Russian Literature: A Cultural History of Literature*, 48-49.

¹¹² Lomonosov produced a well-known treatise on glass, studied the Law of Mass Conservation in chemical reactions in replications of the 1673 experiments by Robert Boyle, hypothesized the existence of an atmosphere on Venus using special refractors that detected the arc of light around the planet, produced geological surveys on the strata of the earth, and became the first person to freeze mercury. See G.E. Pavlova and A.S. Fedorov, *Mikhail Lomonosov: His Life and Work*, (Moscow: Mir Publishers, 1984), 98, 154, 175, 202-203, 220.

¹¹³ David Longley, *The Longman Companion to Imperial Russia, 1689-1917*, 92.

¹¹⁴ *Ibid.* 92

of the rest of the population.¹¹⁵ These notions contributed to a demand for art to fulfill a social mission. The ascribed mission of art to accomplish material directives voiced by social radicals in the 1860s arguably influenced the aesthetic orientation of subsequent political regimes.¹¹⁶

Other Russian leaders throughout the Enlightenment continued this legacy of extending education reforms to members of lower social orders. In 1731, Anna Ivanovna established the *Kadetskii korpus* to educate the children of Russian servicemen.¹¹⁷ The initiative served a dual purpose: one, to increase national literacy rates, and two, to encourage young men to serve in the armed services following in the footsteps of their fathers. In 1747, furthermore, Tsarina Elizaveta

¹¹⁵ Dostoevsky weighed in on this debate in indirect polemics with Nikolai Chernyshevsky, vis-a-vis the latter's disciple Nikolai Dobroliubov, in his 1861 article, "G-n –bov i vopros ob iskusstve" ("Mr. –Bov and the Question About Art"). The radical socialist camp of Chernyshevsky upheld the material concerns of art. Following from his 1853 master's dissertation, Chernyshevsky promoted the belief that an actual apple was infinitely superior to a painting of an apple for its social utility to function as food. The central idea was captured perhaps more memorably by Dmitrii Pisarev, who recorded the sentiment, "Boots in any case are better than Pushkin." «Сапоги во всяком случае лучше Пушкина». Despite his critics, Dostoevsky maintained the imaginative worth of a work of art, and for the value of an artist to give you a new multisensory impression, in both real and imaginary terms, of something you already know. The appropriate function or focus of art in relation to society became a subject of intense discussion and debate in the second half of the nineteenth century. N. Chernyshevsky, "Esteticheskie otnoshenie iskusstva k dejstvitel'nosti," 1853 in N.G. Chernyshevskii, *Sobranie sochinenii v piati tomakh*, Vol. 4, (Moscow: Pravda, 1974), 7; see also (*PSS* 18, 70); Dostoevsky likewise reflects on the saying commonly attributed to Pisarev in his notebook from 1864-1865 (*PSS* 20, 192-193). Saltykov-Shchedrin, in his 1880 popular novel, *Gospoda Golovlyovy*, (*The Golovlyovs*), likens the creative process of "art for art sake" as an activity akin to imitating various bird calls in isolation. While not commonly read in the West, *The Golovlyov Family* parallels some of the major social themes touched upon in Dostoevsky's 1881 *The Brothers Karamazov*. See M.E. Saltykov-Shchedrin, *Gospoda Golovlyovy* (Moscow: Olma Education Press, 2003), 54.

¹¹⁶ Conceivably, the necessity of art to contribute to the material development of society advocated by Nikolai Chernyshevsky developed an aesthetic model that would later come to underscore Socialist Realism. A.V. Lunacharsky, for example, wrote in the early 1930s, «I say that Chernyshevsky is a great writer of fiction and that not only his works are profoundly gripping and artistically valuable, but they are, possibly, the best models of the kind of novel we need.» While these ideas circulated widely throughout the 1920s, participants of the Soviet Writers Congress attempted to codify the overarching tenets of Socialist Realism in 1934, developed from models attributed to Chernyshevsky and his followers. «Я скажу, что Чернышевский- великий писатель-беллетрист и что не только его произведения глубоки захватывающи и художественно полноценны, но что они, быть может, являются наилучшими образцами того романа, который нам нужен.» A.V. Lunacharsky, "Chernyshevskii kak pisatel'" in N.G. Chernyshevskii, *Izbrannye proizvedeniia: Estetika-Kritika* (Moscow: Goslitizdat, 1934), 13; see also G. Zhekulin, "Forerunner of Socialist Realism: The Novel *What to Do?* by N.G. Chernyshevsky," in *The Slavonic and East European Review*, Vol. 41, No. 97 (June 1963), 467.

¹¹⁷ David Longley, *The Longman Companion to Imperial Russia, 1689-1917*, 93.

I (1709-1762) created annual scholarships for students with backgrounds of economic hardship to attend the gymnasium of the Russian Academy of Sciences with full scholarships provided by the state.¹¹⁸ Additionally, Elizaveta decreed that private tutors would need to pass state examinations to be to receive qualifications required by all teaching posts.¹¹⁹

While members of the lower classes were slowly integrated into state educational institutions, the wealthy aristocracy largely opted to hire teachers from abroad to deliver private instruction in family domiciles. Tutors, governesses, and au pairs hailing from Western Europe were usually considered superior to those with native Russian backgrounds. They became symbols of prosperity and influence, about whom their noble patrons could boast to improve their credibility as educated elites, and to solidify their position relative to other aristocratic families competing for rank, status, and influence.

Infrequently, these foreign tutors held dubious credentials. This tendency became the target of satire in Russian dramatic works. Denis Fonvizin, for example, criticizes the semi-educated *petits-mâîtres* in his two popular comedies, *Brigadir* (*The Brigadier-General*, 1769) and *Nedorosl'* (*The Minor*, 1782).¹²⁰ In *The Minor*, the young provincial master, Mitrofan struggles to learn from his three tutors: Tsyfirkin, specializing in mathematics, Vralman, the French teacher, and Kuteikin, his grammar and religion instructor. While the tutors struggle to connect to the stubborn and easily distracted Mitrofan, Tsyfirkin (from *tsifra*, the Russian noun,

¹¹⁸ Ibid. 93

¹¹⁹ Ibid. 93

¹²⁰ See also Alexander Karp, “‘Universal Responsiveness’ or ‘Splendid Isolation?’ Episodes from the History of Mathematics Education in Russia”, in *Paedagogica Historica*, Vol. 42, No. 4 & 5, August 2006, 616-617.

meaning ‘number’), fares better in the comic trajectory of the play than do the other tutors. Their plights amused audience members, likely engaged pedagogical undertakings themselves.¹²¹

Vralman (from the Russian verb, *vrat*’, meaning to lie), for instance, is exposed as a fraud. He is not a learned French scholar, but rather a common German footman. Kuteikin, likewise, (from *kut’ia*- a Russian fruit porridge traditionally served at wakes), turns out to be a seminary school dropout, possessing unsettling spiritual doubts and controversial political ideas. Tsyfirkin, despite his pedantic teaching methods, represents the only tutor who represents his training and background honestly. In this regard, he is the only teacher embodying any semblance of a positive representation of his discipline. Resisting the patient mathematics teacher, however, Mitrofan opposes the insistent wishes of his parents to engage his studies in preparation for higher service to the tsar. He seems to possess no interest in intellectual pursuits, and prefers instead to bide his time caring for livestock, imitating their gestures and sounds, comically instantiating activities deemed unfit for “worldly” and “erudite” Russian nobility.

Despite the humorous skepticism expressed toward existing instructional models, educational initiatives arguably reached their pinnacle in the historical period concurrent to the staging of these plays. During her 34-year reign, Catherine the Great (1729-1796) established key reforms in education, and promoted objectives that would sustain the objectives of higher learning in centuries to come. The inclusion of women in state educational institutions exemplifies one of her most successful initiatives. After ratifying the 1764 *General Plan for the Education of Youth of Both Sexes* (*General’noye uchrezhdeniye o vospitanii iunoshestva oboego*

¹²¹ The Russian word *tsifra* [цифра] is defined as a ‘number’ and ‘numeral’, but it also conveys the secondary meaning of ‘cipher’. The word originated in Arabic as ‘šifr,’ which became ‘cifre’ in French, and ‘chiffre’ in German. Curiously enough, the Russian language possesses both *tsifra* and *shifr*, reflecting calques from French and German, respectively. While both words convey the meaning of cipher, however, *shifr* is used primarily in reference to a numerical passcode or pin number, whereas *tsifra* tends express the more general meaning of a number. The two words, however, seem interchangeable in certain contexts, and perhaps convey common semantic meaning.

pola), drafted by Ivan Betskoi, Catherine the Great encouraged the daughters of nobility to attend the Smolny Institute, and the daughters of commoners to study at the Novodevichii Institute.¹²² These reforms established a legacy of equal-opportunity learning at state institutions, which contributed to the appearance of prominent Russian female scholars in international scientific discourses throughout the nineteenth-century, including mathematicians Sofía Kovalevskaia (1850-1891) and Natalia Armfeldt (1852-1887), chemists Anna Volkova (1800-1876), Vera Bogdanovskaia (1867-1896) and Iulia Lermontova (1846-1919), and the medical doctor Varvara Rudneva (1844-1899).¹²³ Women became active participants in the intellectual advancement of Russia.

In conjunction with these objectives, Catherine II coordinated exchanges of Russian students with British universities, providing study abroad opportunities to members of both sexes. She also approved decisions of a legislative subcommittee to make education for males compulsory, based on a corresponding Prussian model.¹²⁴ Under the provisions of the plan, every village with 100-250 households was required to provide schooling to eligible male students with special municipal and state funds. For education in urban centers, Catherine the Great appointed the esteemed journalist and philanthropist Nikolai Novikov (1744-1818) to oversee the construction and administration of secondary schools in St. Petersburg and Moscow.¹²⁵ In 1773, moreover, she oversaw the founding of the Mining Academy in St. Petersburg, where specialists were conducted applied research in metallurgy and material sciences.¹²⁶

¹²² Mark Cruse and Hilde Hoogenboom, *Memoirs of Catherine the Great* (New York: Random House, 2005), xxix; see also Barbara Evans Clements, *A History of Women in Russia: From Earliest Times to the Present* (Bloomington, IN: Bloomington UP, 2012), 74.

¹²³ *Ibid.* 123, 165; see also Ann Hibner Koblitz, *Science, Women, and Revolution in Russia* (New York: Harwood, 2000), 62,

¹²⁴ David Longley, *The Longman Companion to Imperial Russia, 1689-1917*, 94.

¹²⁵ *Ibid.* 94

¹²⁶ Stephen P. Timoshenko, "The Development of Engineering Education in Russia," in *Russian Review*, Vol. 15, No. 3 (July 1956), 175.

Unnerved by reports of beheadings and social uproar in the turmoil of the French Revolution, however, Catherine the Great also took steps to limit the extent to which various political discourses and ideas could circulate freely in her domain. She established special commissions to ensure that Russian schools used only books officially sanctioned by state authorities.¹²⁷ State censors, moreover, received special directives to report and repress the dissemination of materials deemed harmful to the security of the autocracy. Egalitarian ideals, which were once very popular in her progressive court, quickly became taboo subjects of intrigue and inquiry at court. Writers, who once openly promoted the incorporation of democratic reforms in Russia prior to the French Revolution, soon found that such commentary could elicit harsh punishment from the state.

Aleksandr Radishchev, for instance, was sentenced to exile in Siberia for seven years for praising the intentions of the French Revolution and the campaign for American independence led by George Washington.¹²⁸ N.I. Novikov, similarly, who previously enjoyed the trust and patronage of Catherine the Great, likewise endured stern sentencing for propagating Western political ideas. State censors closed his printing houses, including his popular journal *Truten'* (*The Drone*), and subjected Novikov to imprisonment for 15 years without trial.¹²⁹ The figure of Catherine the Great in Russian history, consequently, comprises a dual nature. On one hand, her verdicts served to limit the dissemination of Western ideas and suppress public discourses. On the other hand, she also carried out successful educational reforms on an incredible scale that advanced the status of scientific inquiry and debate, and established lasting legacies stressing the importance of higher learning in Russian Imperial society.

¹²⁷ Alexander Vucinich, *Science in Russian Culture: A History to 1860*, 138.

¹²⁸ Gerald Irwin Leonard, Novikov, Shcherbatov, *Radishchev: The Intellectual in the Age of Catherine the Great* (Binghamton, NY: SUNY Binghamton UP, 1980), 151; see also Andrzej Walici, *A History of Russian Thought from the Enlightenment to Marxism* (Stanford, CA: Stanford UP, 1979), 43.

¹²⁹ Andrzej Walici, *A History of Russian Thought from the Enlightenment to Marxism*, 8.

The nineteenth century gave rise to the established professionalization of mathematics and engineering. As industrial capabilities increased, so too, did the demand for scientific specialists. Russian elites traveled abroad, attended Western universities, and returned to Russia with insights and skills that contributed to technological and sociological change. While educational institutions predominately aggregated in the urban centers of St. Petersburg and Moscow, peripheral cities, towns, and villages in the Russian provinces also became locales of mathematical and scientific inquiry. The University of Kazan, for instance, perhaps best exemplifies this tendency after hosting Martin Bartels (1769-183), the German mathematician who previously tutored Carl Friedrich Gauss in Braunschweig, and Joseph Johann von Littrow (1781-1840), the Austrian astronomer, who founded the Kazan Observatory in 1810.¹³⁰ Nikolai Lobachevsky studied under the auspices of these two great thinkers, and derived motivation and understanding of mathematical principles, which later formed the basis of his research investigations and debates in Non-Euclidean geometry.

The expansion of Russian manufacturing, natural resource extraction, and communication networks into the vast countryside usually developed concurrently with the growing interconnectedness of state and private educational establishments. The advent and propagation of state infrastructure supporting railroad, telegraph, factory, and sanitation capabilities reflect the successes of mathematics and engineering in both private and public life. The research advances made by Leonhard Euler and Nikolai Lobachevsky ushered forth a kind of mathematical reawakening in the mid 19th-century. Scholars, including Nikolai Brashman (1796-1866), Iosif Somov (1815- 1876), Aleksandr Ershov (1818-1867), Mikhail Ostrogradsky (1801-1862), and Pafnuty Chebyshev (1821-1894), contributed to the highest levels of

¹³⁰ For Johann Bartels and his relationship to Gauss, see Andrey Popov, *Lobachevsky Geometry and Modern Nonlinear Problems* (New York: Springer, 2014), 9; for Joseph Johann von Littrow, see Katherine Bracher et al., *Biographical Encyclopedia of Astronomers*, (Cedar Falls, IA: Springer Science, 2007), 700.

mathematical research in Russia.¹³¹ Throughout the imperial era, Russian thinkers published papers that were often examined and evaluated by other scholars at the Académie des Sciences, the Prussian Academy of Science, and the Royal Society in London.

While Russian mathematicians increased their level of engagement with foreign colleagues, they also organized internally, and developed approaches that espoused overriding skepticism toward conclusions widely upheld elsewhere as fact. Divisions between disciplines also appeared in different proportions. Unlike mathematical inquiry conducted in the secular West, religious elements and themes were more openly included in Russian scientific discourses and debates. The figure of Pavel Florensky (1882-1937), a Russian Orthodox priest, philosopher, and mathematician, perhaps best exemplifies the ascribed union of spiritual and scientific aims. Other mathematicians in the wake of Florensky, including Dmitrii Egorov (1869-1931), and Nikolai Luzin (1883-1950) maintained the commonalities of religion and science, despite the threat of Soviet censorship and repression.¹³² In Russian mathematical circles, scientific inquiry and exercises in rational logic tended not to preclude God and religion.

The Moscow Mathematics Society (*Moskovskoe matematicheskoe obshchestvo*), founded in 1864, for example, represented one of the earliest tendencies on the part of Russian thinkers to collectivize and collaborate on a variety of pressing questions. Members of the society produced texts regarding number theory, physics, statistics, complex analysis, and the overarching interrelationships between applied scientific disciplines. Nikolai Brashman, the author of

¹³¹Alexander Vucinich, *Science in Russian Culture: A History to 1860*, 329.

¹³²Dmitrii Egorov (1869-1931) was President of the Moscow Mathematical Society, and Director of the Institute for Mechanics and Mathematics at Moscow State University in the 1920s. He produced seminal works on differential geometry and integral equations. In 1929, however, he was dismissed from his academic duties, and imprisoned in 1930 for speaking out publicly against the repression of the Orthodox Church. He held a hunger strike in prison, and was released, but soon died from the physical detriment of his extended starvation. Nikolai Luzin (1883-1950) was a younger advisee of Dmitrii Egorov. Luzin was also implicated in the charges levied against Egorov, but avoided repression. Loren Graham and Jean-Michel Kantor, *Naming Infinity: A True Story of Religious Mysticism and Mathematical Creativity* (Cambridge: Harvard UP, 2009), 66-68.

Dostoevsky's geometry textbook at the Main Engineering School, served as the first president of the Moscow Mathematics Society until his death in 1866.¹³³ The Moscow Mathematical Society enjoyed prominence well into the twentieth century, and it still exists today.

The organization effectively expanded Russian participation in international polemics, and contributed to the development of a body of methods and ideas that did not conform automatically to accepted conventions and "truths" propagated by liberal academics in the West. In addition to publishing the quarterly journal *Matematicheskii sbornik* (*The Mathematical Compendium*), members of the society convened at Russian universities, public forums, and private events to discuss the philosophical undercurrents of ongoing disciplinary initiatives in research and instruction. They also conceived of mathematical concepts in relation to other subject concentrations, including philosophy, theology, and the arts.

Although Dostoevsky graduated from the Main Engineering School several decades before the Moscow Mathematical Society first convened, he perhaps sensed that Russian interpretations in the field would come to diverge from secular conventions popularized in the West.¹³⁴ The Moscow Mathematics society likely expressed in mathematics what Dostoevsky refers to generally in *Diary of a Writer* as the "the Russian aspect" of European ideas. In this assessment, Dostoevsky refers to the inclinations of Russian intellectuals to "draw conclusions from those ideas that their European formulators never suspected but which in Russia seem quite natural. Push all notions to their extreme, beyond all reason and common sense, and then try to

¹³³ Ioan James, *Remarkable Mathematicians: From Euler to Von Neumann*, (New York: Cambridge UP, 2002), 160.

¹³⁴ Russian philosopher-artists Vladimir Solov'yov and Fyodor Tiutchev stressed the mystic essence of Russia counter to the various criters of secular materialism in the West. Solov'yov formulated his arguments relative to the spiritual mission of Russia, following the teachings of Eastern Orthodoxy. Tiutchev, in a similar regard, emphasized that the significance of Russia could only be sensed through belief and fait, as opposed to scientific measurements and the appraisals of rationality alone. See D. Strémooukhoff, *Vladimir Sloviev and His Messianic Work*, trans. Elizabeth Meyendorff (Belmont, MA: Nordland Publishing Co., 1980), 149.

put those extremities into practice.”¹³⁵ This tendency often charts the progression of discourses that at first follow similar paths in both the West and in Russia, but then suddenly veer off in separate directions. Loren Graham attributes mathematical advancements of the twentieth century to this same propensity, arguing that the discipline underwent a schism that divided Russian and Western thinkers engaging similar problems in the period of the late 1800s.

Questions concerning, for instance, conceptions of the infinite, the existence of God, and the meaning of life divided mathematicians. Their judgement on these matters was in many ways molded by the cultural, political, and artistic atmospheres of their individual perspectives. While Graham focuses his analysis of debates between Russian and Western mathematicians, he refers only tangentially to the trajectory of these discourses, which emanating in part from the intellectual contributions of Euler and Lobachevsky. When Lobachevsky proposed that two parallel lines could meet somewhere off in infinite space, Russian mathematicians, following the model of N. Brashman, upheld the notion that infinity remained so incredibly vast, it would essentially remain inconceivable to earthly, human consciousness. Western mathematicians, in contrast, led primarily by Bernhard Riemann (1826-1866), labeled this intersection as *unendlich ferne Punkt*, thereby interpreting infinity as an explicitly vast value, but still perhaps within reach of human observation and experience.

Despite the fact that Dostoevsky did not become an engineer or mathematician, the opinions and ideas that he expressed in coursework, discussion groups, and private writings demonstrate his early understanding of mathematics as a field that concerned much more than rote memorization and calculation. Although he may have struggled in the atmosphere of rigid martial discipline and anxious evaluation at the Main Engineering School, Dostoevsky nevertheless sensed the importance of mathematics. It encompasses a branch of scientific inquiry

¹³⁵ Gary Saul Morson, “Editor’s Introduction: The Process and Composition of *A Writer’s Diary*” in *A Writer’s Diary* by F.M. Dostoevsky, trans. Kenneth Lantz (Evanston, IL: Northwestern UP, 2009), xxiii.

capable of elucidating the phenomenological dynamics of the universe, while also comprising a concentration that is not always at direct odds with the spiritual orientation and striving of humanity.

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