

Analysis of the impact of psychology in combination with technology on society through behavioral microtargeting

A Research Paper submitted to the Department of Engineering and Society

Presented to the Faculty of the School of Engineering and Applied Science
University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

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Spring, 2021

On my honor as a University Student, I have neither given nor received
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Introduction

Over the past two decades, the online presence of the average person has increased dramatically. One driving factor behind this increased online presence is the increased use of social media platforms. As our social lives become more and more dominated by our social media presence, it is important to consider not only how the content we produce impacts others but how the content we consume impacts our thoughts and behaviors. Although the widespread usage of social media can be largely explained by the inherent utility of such platforms, another contributing factor is the manufactured addictive nature of these systems. This research is focused on the impact of this interface between technology and human psychology that is becoming an increasing prevalent influence on our everyday lives.

Recent technological advancements in fields, such as machine learning, have allowed technology companies to gain meaningful insights from complex data with an accuracy and on a scale never before imagined. In combination with exponential increases in user data and online presence, this technology unlocks the capability of major influence over human psychology. It is vital that the current and potential future effects of this interface be analyzed to ensure that proper regulation and public knowledge exist to prevent widespread human harm whether intentional or accidental. Current applications of this crossover field of technology and psychology range heavily and impact almost every person in the developed world. The largest current application of the field is targeted online advertising. Whether the advertising is commercial or political in nature, it likely is implemented using a combination of emerging technologies and knowledge of human psychology. Most of these advertisements are largely harmless and do not greatly impact the targeted individual's life. However, targeted advertising has the power to make large influences on the public, especially when looking at the public as a whole instead of individual participants. The ex-political consulting firm Cambridge Analytica played a major role in influencing hundreds of elections globally. They did this through acquisition of Facebook user data and individual psychological targeting. Although Cambridge Analytica does not exist anymore, many companies, such as Auspex International and Emerdata, have risen to take advantage of the hole the fall of Cambridge Analytica left. The power of such tools is only going to increase as knowledge of the human psyche is learned and our lives become increasingly digital.

Literature Review

The recent growth in the use of psychology in combination with technology has drawn interest from a wide variety of researchers. Most of the research is concerned with the psychological affects that technology has on individuals instead of the way psychology is utilized. In many cases the technology having the largest psychological impacts also utilizes psychological techniques to improve engagement of their users. In *The Emerging Nature of Psychology of Technology*, Kool et al. (2016) look at the new reality created by technology and criticize the lack of knowledge surrounding the psychological impact of this augmented reality (Kool & Agrawal, 2016; Montag & Diefenbach, 2018). Many other researchers share similar concerns for the lack of knowledge within this newly emerging field. G. Soldatova (2018) utilizes a variety of data sources to study the impact technology has on a developing person's features of cognitive and personal development, relationships with the outside world, social, and cultural

practices in *Digital socialization in the cultural-historical paradigm: a changing child in a changing world* (G.u, 2018). While these authors are mostly focused on the psychological impacts of technology, other researchers focus on an ethical perspective of these newly emerging technologies (Aizenberg & van den Hoven, 2020; Rességuier & Rodrigues, 2020). Both of these works study the numerous human rights issues produced by recent developments in Artificial Intelligence. Both of the authors share a concern for the lack of ethical based control in the current field. In *Emotional AI, soft biometrics and the surveillance of emotional life: An unusual consensus on privacy*, Mcstay (2020) addresses the rising issue of data on the emotional states of individuals. Current practices require the anonymization of such data, but Mcstay expresses concern for the lack of regulation surrounding the privacy of this individual emotion information (McStay, 2020). This data could prove to be extremely useful for psychographic analysis. Thus, it is very important that proper practices and regulations exist to ensure that it does not fall into the wrong hands.

Although most researchers are focused on minimizing the negative psychological impacts of current technological practices, some researchers are working to create new systems to improve overall impact on society. In *Contesting algorithms: Restoring the public interest in content filtering by artificial intelligence*, Elkin-Koren (2020) starts by analyzing the potential impacts of automated content censorship on the general public (Elkin-Koren, 2020). The paper specifically focuses on the black box nature of most of these approaches and the public's increasing distrust of such systems. Finally, a new contesting algorithm is proposed as a potential solution to maintain the benefits of automated content filtering, while restoring the societal power to deliberate and determine social tradeoffs. The powerful influence of technology in our everyday lives does not need to have a negative impact on our psyche. This is the perspective of researchers who are dedicated to utilizing technology and psychology to improve overall human psyche (Muñoz, 2019; Villani et al., 1 C.E.). Muñoz (2019) emphasizes the never-before-seen widespread global influence that technology has on the psyche of people in their everyday lives. While this influence is largely negative currently, the authors analyze the potential positive psychological influence of technology arguing that psychology and technology can be harnessed together to contribute to making health care a universal human right.

Current public concern regarding the use of psychology in combination with technology is largely focused on political advertising. In *Political Advertising as a Factor of Socialization in Modern Society*, Yanenko (2020) gives a general overview of the creation of targeted political advertisements (Yanenko, 2020). The overview focuses on the modeling of expected audience behavior using socialization patterns to predict the audience's views of the future and properly tailor the presentation political messages to be best received by the audience. The most notable instance of public outcry within this field of technological development was the Facebook-Cambridge Analytica data scandal. Cambridge Analytica was a British political consulting firm that was involved in hundreds of elections globally, including working with the Trump campaign. The scandal not only brought to light data privacy concerns, specifically within the Facebook API framework, but also more general concerns regarding behavioral microtargeting and its impact on the ability of people to participate as informed citizens and consumers (Cambridge Analytica and Our Lives Inside the Surveillance Machine | The New Yorker, n.d.; Isaak & Hanna, 2018). In *Cambridge Analytica, independent research and the national interest*, Laterza (2018) argues that the role of Cambridge Analytica in the influencing of elections has been downplayed by U.S. government officials and British academia due to the Western military and security funding sources of much of the psychological research at Cambridge that led to the

founding of Cambridge Analytica (Laterza, 2018). He also argues that the influence of Cambridge Analytica in African, Middle Eastern, and Asian elections has been downplayed to further cover up the Western exploitation of these regions largely by European countries.

Although the capabilities of current user behavioral modeling techniques are incredible, development within the field is only speeding up. Kotras (2020) takes a comprehensive look at the current field of personalized marketing algorithms by revealing how consumers are modeled by different companies (Kotras, 2020). It is also discussed how pre-existing consumer information is best utilized to optimize marketing within this new mass personalized marketplace in ways that were previously infeasible. One attempt at personalized neural representations called DimensionRank focuses on creating an optimized search tool for both general search and social media products (Coppola, 2020). The technology works by creating a vector representation of each individual user that can be utilized to predict best online feed content. This neural representation technology has many potential applications than just search, such as insurance and political modeling. While this literature review has largely focused on technical developments that have driven the applications of psychology, there have also been significant psychological research developments that have the potential to greatly revolutionize the way humans are algorithmically modeled. In his book *Thinking, Fast and Slow*, Kahneman models the human brain as having two separate functional parts (Kahneman, 2013). These parts dominate in different instances and determining the participation of each part in contributing to our actions can result in more accurate predictions of human behavior in many edge scenarios. Psychological developments such as the ones presented by Kahneman have the potential power to improve individual behavior prediction and hijack human subliminal consciousness to result in non-logical decision making.

STS Framework and Method

The development of behavioral microtargeting technology can be analyzed using the Large Technical System framework and Surveillance Capitalism system. The major system builders that are determining the current workings of the large technical system are technology companies, advertisers, internet users, government, academia, and content producers.

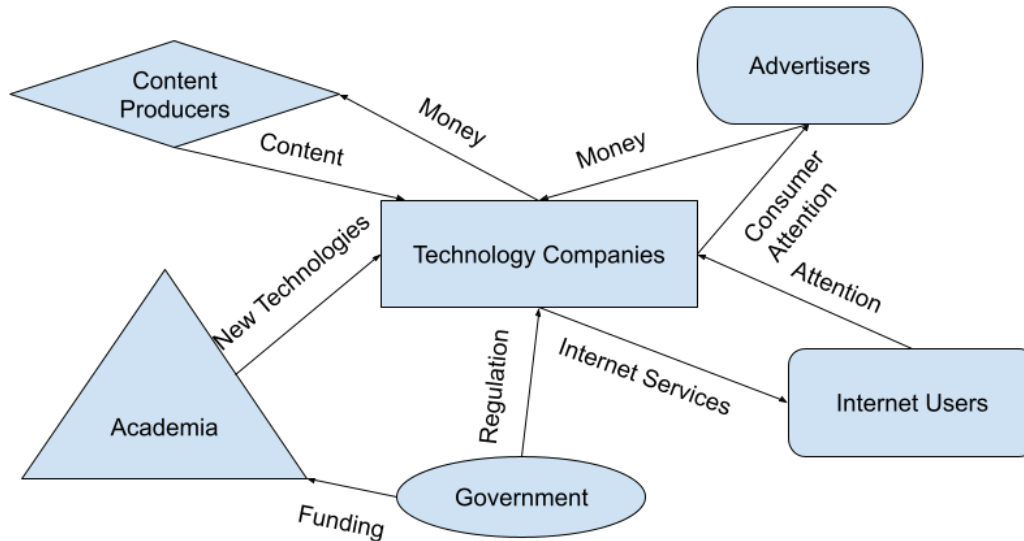


Fig 1: LTS diagram of development of behavioral microtargeting technologies.

The center of the freemium model of the internet, which determines the development of behavioral microtargeting technologies, is technology companies. Through the system of Surveillance Capitalism, data and user attention have become resources that are exchanged for free services. The first company to dominate the internet with the freemium model was Google. “Sergey Brin asked the crucial question early in Google’s history: ‘How does the strategy change if the price is zero?’ The answer turned out to be: ‘We win the entire market.’” (Gilder, 2018). This strategy of providing internet services for free has been so successful at obtaining large market shares that it is now the default of internet companies. In return, internet users simply give their data, time, and attention to internet companies. The companies make money by selling small portions of the attention of their users to advertisers. Content producers are anyone who produces media that is consumed on the internet. Thus, essentially all internet users are content producers to some extent, but very few internet users are content producers to the extent of getting paid. However, as people’s online presence continue to increase, the number of people who financially rely on being content producers increases. Government has so far played a minimal role in the development of the LTS. Governmental regulation over the system has been minimal in the United States, but there are signs that regulation may increase, such as an increase in technology company testimonies before Congress. As well, the constantly changing nature of the field makes government regulation very difficult and frequently deprecated. Lack of technical expertise within governmental agencies also makes it difficult for proper regulation to be implemented. The other major contribution of government to the system is the funding of academia. Academia is the source of many of the technological developments that allow for the recent advancements within behavioral microtargeting. This involves both psychological developments and advancements within computer science. However, many of research behind these developments are now occurring within the technology companies themselves, thus minimizing the contribution that academia makes to the development of the system.

Behavioral microtargeting has two major roles within this system. The first use is the optimization of ads served to maximize benefits for advertisers. This involves both the serving of

ads to users who are most likely influenced by them and the optimized presentation of the ad to maximize influence over users. This is done by collecting data on our activities, mostly online presence, and using the data to predict our response to given ads. The algorithms involved use both recent developments within computer science, such as machine learning, and psychological developments, such as the OCEAN model of personality traits. The second major use of behavioral microtargeting is the optimization of internet feeds to maximize user time spent. Since internet companies using the freemium model make money selling user attention, the more user time they get, the more money they make. Many internet services record the amount of time a given user looks at different media on their feed. Then, this information is used to predict the amount of time users would spend looking at different potential content, and the content that maximized the attention of the user is served. One major effect of this is the polarization of internet feeds to certain content that the user finds enjoyable to consume. Due to a psychological phenomenon known as the familiarity principle, this impact forms a positive feedback loop as users are more likely to enjoy content similar to the content that they have previously seen. The entire freemium model is dependent on the assumption that our actions not only affect our content, but our content affects our actions as well. This can have serious impacts when taken in the context of non-neutral advertising. "A reliable way to make people believe in falsehoods is frequent repetition, because familiarity is not easily distinguished from truth. Authoritarian institutions and marketers have always known this fact" (Kahneman, 2013).

The largest proportion of data collection was performed through online document research. The main goal of the document analysis is to gauge the current and predicted impact that behavioral microtargeting has on society. Data was collected to view how internet usage has changed over the past few decades and the pattern that will likely drive the future of behavioral microtargeting technological development. Data was also collected to analyze the Cambridge Analytica scandal as a case study for the Large Technical System and the financial motivations provided by the Surveillance Capitalism system. Books were also included to gain more data backed expert perspectives. Finally, interviews were conducted with the goal of determining the factors that drive human influence over the system. The responses were analyzed to expose how a change in perspective of the freemium model is needed to create real change within the development and deployment of behavioral microtargeting technologies.

Data Analysis

The main goal of the document analysis is to gauge the current and predicted impact that behavioral microtargeting has on society. The most notable public event regarding concern over behavioral microtargeting was the Cambridge Analytica scandal. The inherently political nature of the scandal likely contributed to its relatively large public response. Although the scope of impact that Cambridge Analytica truly had is heavily debated, it is largely agreed that there was noticeable impact in at least a few of the political campaigns assisted by the company. Cambridge Analytica utilized personal data to create Big Five personality trait profiles, also known as OCEAN modeling, for potential voters. Then, these profiles were used to maximize the impact that political ads would have on potential voters by optimizing the content and presentation for the individual user. The majority of the data used by Cambridge Analytica came from the improper acquisition of data from up to 87 million Facebook profiles, and the company claimed to have between 4,000 and 5,000 data points on each American voter ('The

Great Hack,' 2019). Although this seems like a lot of data, this data is dwarfed by the total amount of profile data that exists on almost all internet users. "In the last two years alone, the astonishing 90% of the world's data has been created" (How Much Data Is Created Every Day in 2020?, 2020). For example, the Google search rate increases approximately 10-15% every year. Currently Google receives over 3.5 billion searches per day (Google Search Statistics - Internet Live Stats, 2021).

The next major point of research is the current impact that behavioral microtargeting has on society. The Facebook emotional contagion experiment in 2014 showed the significant impact that intentional changing of user's Facebook feeds could have on the content of their Facebook status updates (Jouhki et al., 2016). However, the research caused major ethical concerns surrounding the idea of researching manipulation and the problematic definition of informed consent. Thus, future academic research of online emotional contagion has been largely stifled.

The research question was further analyzed from the financial perspective. Initial research shows that it is very difficult to quantify the economic value of user data. One reason is that the value of data greatly changes from individual to individual, but also the technological capabilities to derive insight from the data is constantly improving, which increases the value of certain types of data. Thus, the true economic value of any given data is impossible to calculate. According to Vox.com, in 2019 there was approximately \$106 billion in online ad spending. When divided by the number of adults in the U.S. this equates to an average of \$35 per adult per month in targeted ad spending (Molla, 2019). In order to evaluate how much consumers are willing to pay for services that are currently free on the internet, a massive online choice experiments were conducted. It was found that the median WTA (willingness to accept) estimates for internet services in 2017 were \$17,530, \$8,414, and \$3,648 per year for Search Engines, Email, and digital Maps respectively (Brynjolfsson et al., 2019). Although these were the services with the three highest estimations, many other internet services also had median WTAs significantly above the estimated \$420 a year in per adult targeted advertising revenues.

Another major consideration is the amount of time people spend consuming media on the internet. The average internet user spends 2 hours and 24 minutes daily on social media in 2020. This is up only 2 minutes a day from 2019, but it is up around an hour from 2012 usage (How Much Time Do People Spend on Social Media in 2020?, 2019). According to Forbes, global online content consumption soared in the 2020s. A study of over 10,000 people in five countries says that the normal daily online consumption is up from just over 3 hours to now 6 hours and 59 minutes (Koetsier, 2020). Although these numbers are only from a subset of the population, they show a trend of increased internet usage that no one would argue. Not only is the amount of content changing, but the type of content is greatly changing. More and more internet content is being produced by content creating professionals. According to hoosuite.com, 200 million Instagram users visit at least one business profile daily out of around 500 million daily active users ("44 Instagram Statistics That Matter to Marketers in 2021," 2021). The confidence in professionally produced content is also increasing. According to the Influencer Orchestration Network, in 2016 "Google found that 4 in 10 millennials say their favorite creators understand them better than their own friends" (Social Media Creators Are More Influential Than Celebrities, 2016).

Interviews were conducted over zoom to gauge the public knowledge and interest in data privacy concerns related to the current model of the internet. The interviewees were asked a variety of questions relating to their use of the internet and their opinions on data privacy rights. After that, the interviewees were asked to rank different characteristics of the internet for their main online activities. The characteristics ranked were privacy, efficiency, quality of content, amount of content, and cost.

The majority of interviewees claimed that data privacy rights did not significantly concern them. Most people ranked their concern of data privacy rights as a 2 out of 5. These interviewees did not see a problem in the tracking of their internet traffic as they claimed they were not doing anything illegal. However, the majority of interviewees agreed that there should be content limits on targeted advertising. For example, all interviewees agreed that false advertising should be limited. As well, some interviewees stated that there should be restrictions on methods used to serve targeted ads. For example, concerns over data collection and ad serving for children were messaged. The most common concern mentioned was the serving of ads that appear to be targeted based on unsolicited phone audio recording.

The ranking question revealed that data privacy concerns do not get prioritized over other characteristics of the internet. The highest-ranking data privacy category received was for social media, but this was still either last or second last for the majority of interviewees. Cost also received consistently low rankings, but this was not surprising as currently very few consumers need to consider cost when choosing their internet platforms.

Discussion

The current model of the internet prioritizes building large user bases over receiving immediate payment for services provided. This model is dependent on heavy internet usage, leading internet service companies to utilize new technologies and knowledge to increase the consumers attention devoted to their internet presence. This is one reason that the average time spent on the internet has drastically increased over the past decade. As the time spent on the internet increases, our internet presence becomes an increasingly important proportion of our lives. Not only does our susceptibility to influence increase naturally with an increase in time spent on the internet, but the data used to maximize influence over us increases. In combination with development of novel human modeling technologies, the rate of power obtained by technology companies shows no sign of slowing.

There are numerous ways in which this current model of the internet could be modified to limit the power of influence these few companies have over the entire world. For example, many technical experts believe that block chain technology has the capabilities to revolutionize internet transactions and become a replacement of many current systems. However, all of these changes will likely require a significant change in the consumers perception of the internet and their associated priorities. There have been many attempts by a wide range of companies and researchers to utilize the constantly increasing power of the interface between technology and human psychology with the goal of bettering the human condition. However, the question remains whether this interface can truly be bettered through further research and technological advancements. As technology advances human psychology inherently becomes more and more susceptible to influence through the interface in spite of developmental goals of minimizing this

susceptibility. Thus, in order to minimize this ever-growing imbalance of power, researchers and companies should turn to non-technical solutions to properly address this crisis.

Conclusion

The internet has revolutionized the way the world works from the way business is conducted to the way people meet and socialize with others. As online presence becomes an increasingly significant proportion of our lives, the interface between technology and human psychology becomes a growing influence over human life on an individual and societal level. Any significant change in the technological development surrounding this interface must first start with increasing general public awareness and knowledge of the system and how it is a growing threat to the notions of individualism and free thought.

Continued research is needed to analyze the interface between technology and human psychology and the driving factors behind major developments in the field. Large randomized surveys and interviews should be conducted to gauge the current perception of the interface and opinions on how it could be changed. As interest in the interface grows, more researchers are developing expertise in analyzing the way it works and is constantly changing and expanding. A creative solution is needed to revolutionize the way the internet works to maintain the utility and technological developments that has made the internet what it is today, while minimizing the growing susceptibility the model inherently opens in individual's psychological state.

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Interview Guide:

Questions:

1. What are the main platforms you access the internet through?
2. What is your primary news source?
3. How much time do you spend on the internet in a given day?
4. How much do you pay in internet subscriptions?
5. On a scale from 1-5 how much do data privacy rights concern you? Explain.
6. Around what percent of social media content that you consume is from people you have a personal relationship with?
7. Should there be content limits on targeted advertising? (ex: political, medical, drugs)
8. Should there be method limits on targeted advertising? (ex: certain types of data can't be used, advertising needs to be labeled as such, age)
9. Do you know what Cambridge Analytica is?

Rank preferred characteristics of internet

1. Privacy
2. Efficiency (least amount of time to accomplish goal)
3. Quality of content
4. Amount of content
5. Cost of service

Different ranking for each activity

1. Social media:
2. Search:
3. Streaming:
4. Other uses: