Magnitudes: A Descriptive Metaphysics of Quantity

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Introduction

> FOR PLATONISM, the real had a more or less perfect methexis in the ideal. This afforded ancient geometry possibilities of a primitive application to reality. [But] through Galileo's mathematization of nature, nature itself is idealized under the guidance of the new mathematics; nature itself becomes — to express it in a modern way — a mathematical manifold.
> (Husserl 1970: 23)

This is an essay of descriptive metaphysics. P. F. Strawson says:

> Descriptive metaphysics is content to describe the actual structure of our thought about the world […]. [T]here is a massive central core of human thinking which has no history — or none recorded in histories of thought; there are categories and concepts which , in their most fundamental character, change not at all […]. It is with these, their interconnexions, and the structure that they form, that a descriptive metaphysics will be primarily concerned. (1959: xiii-xiv)

The idea that reflecting on the way we think about the world can help us do metaphysics informs Strawson's work on many issues. For example, that forms the basis of one of his famous arguments for compatibilism about free will. In 'Freedom and Resentment' (1962), he begins with the thought that our reactive attitudes (e.g., blame, resentment, praise, etc.) are applicable only to things that can make free choices. Then, he argues that, since it is psychologically impossible for us to get rid of our

reactive attitudes fully, nothing, not even determinism, can require us to think about the world completely free from reactive attitudes. He concludes that we should not accept incompatibilism. (He calls incompatibilism pessimism instead.) This is a clear attempt to draw a metaphysical conclusion from the way the world is inevitably presented to our mind. He employs the same strategy to wrestle with external world skepticism: 'in order for the intelligible formulation of skeptical doubts to be possible or, more generally, in order for self-conscious thought and experience to be possible, we must take it, or *believe*, that we have knowledge of external physical objects or other minds.' (1987: 21; italic in original)

Such an approach to metaphysics draws two kinds of criticism naturally. First, say Strawson is right that we cannot think of the world without reactive attitudes even if we assume determinism; and suppose we cannot but believe that we have knowledge of an external world. That our psychology does not allow us to think about a world in a certain way does not entail that the world is not that way. It shouldn't surprise us that our mind may be poorly configured to represent a certain corner of reality accurately. This renders descriptive metaphysics a questionable way of doing metaphysics. Secondly, the psychological claims that ground the efforts of descriptive metaphysics are no less suspicious than the metaphysical conclusions that they are supposed to show us. This is an important part of Stroud's (1968) criticism of Strawson's treatment of external world skepticism: the psychological claim that believing in an external world is a necessary condition for having conscious thought is more controversial than the claim that the external world exists, making it dialectically moot to try to defend the latter via the former.

Strawson himself is quite dismissive about these concerns. In response to the first concern, he says, 'having given up the unreal project of wholesale validation, the naturalist philosopher will embrace the real project of investigating the connection between the major structural elements of our conceptual scheme.' (1987: 22) Yet, even if studying our conceptual scheme is, as Strawson puts

it, *the* real project, it remains unclear in what sense that is *metaphysics*. With respect to the second concern, he thinks, 'even if [the psychological claims] do not succeed in establishing such tight or rigid connections [between our different mental states] as they initially promise, they do at least indicate or bring out conceptual connections, even if only of a looser kind'. (ibid: 23) This response is odd. Consider Strawson's argument for compatibilism for example. He originally states that it is *psychologically impossible* for us to get rid of our reactive attitudes. If we weaken the claim and say that it is psychologically difficult, not impossible, for us to get rid of our reactive attitudes, it is hard to see in what sense we have a case for compatibilism.

Strawson's responses are dismissive in the following sense. Instead of taking on the challenges by bridging the mind-world gap and by offering a stronger ground for his psychological claims, he dismisses the need or value of doing so as *unreal* projects. Although we are free to not care about whatever we want, such a dismissive approach has a paradoxical undertone: it is an attempt to offer substantive answers to debates by dismissing the intellectual substantiveness of those debates themselves.

Such is the context of this dissertation. I believe there is a more constructive way to establish a legitimate form of descriptive metaphysics by combining resources drawn from modal epistemology and philosophy of mind. Here is the rough idea. The nature of our mental representations determine the bounds of our conceivings. If a sincere but failed attempt to conceive that p gives us pro tanto justification for believing that p is metaphysically impossible, studying the nature of mental representation allows us to draw substantive metaphysical conclusions about reality. I will demonstrate the fruitfulness of this way of doing descriptive metaphysics by using it to study the metaphysics of quantity, i.e., properties that come in fine-grained degrees/magnitudes. These properties play a prominent role in the mathematization of nature.

This dissertation consists of three chapters. In **Chapter One**, I argue that success and failure of sincere attempts to conceive of something provide pro tanto justification for belief about that thing's possibility and impossibility. I defend this modal epistemological principle against some skeptical objections in the literature.[1] The purpose of **Chapter Two** is to defend a certain constraint on our power to mentally represent things based on cognitive psychological considerations. If our mental representations are analogous to photos, they are photos with low resolution, not ones that can carry super fine-grained information. I want to argue that our mind's coarse-grained representational resources do not allow us to pick out any individual magnitude specifically. We do not have the capacity to either name or descriptively single out a particular magnitude. As a result, when I utter *words* like 'this shade of brownness', 'the temperature of boiling water', and 'Pain_{67}' *as if* I am singling out a particular magnitude of color, temperature, and pain, we should not view ourselves as processing a mental demonstrative, a mental description, or a mental proper name to pick out a specific magnitude. In **Chapter Three**, I will first introduce Lowe's distinction between objects and quasi-objects. Very roughly put, quasi-objects are things that are countable but have no fact of the matter about their identities (e.g., electrons). I will explain and defend the intelligibility of this metaphysical distinction by demonstrating its usefulness in some scientific explanations. Then, I will use resources obtained from Chapter One and Chapter Two to argue that we have a good pro tanto reason for believing that, necessarily, magnitudes are quasi-objects. I will call this thesis Magnitude Non-Individualism. Several apparently promising defeaters for this pro tanto justification will be critically examined.

I have situated and motivated this dissertation primarily as a methodological project, whose goal is to demonstrate the legitimacy of descriptive metaphysics as a method of doing metaphysics. But

[1] A big portion of Chapter One is from Lam (2017).

that is not to downplay the first-order significance of the metaphysics of quantity that I will defend. For instance, if Magnitude Non-Individualism is true, questions that ask us to identify a specific magnitude (e.g., 'which temperature is the first that counts as being hot?') would be meaningless due to the metaphysical nature of magnitudes. That can shed new light on the problem of vagueness. Furthermore, the metaphysics of quantity will require us to *not* interpret the practice of measurement in a certain way: it cannot be understood as us systematically labeling each magnitude of a quantity with a real number because magnitudes are not individuated for labeling, like other quasi-objects. That is important for understanding the practice of mathematization of nature in the natural sciences. All these further implications/applications of Magnitude Non-Individualism have to be left for future research. In this dissertation, I will focus on offering an argument for the thesis by descriptive metaphysics.

Due to the kind of descriptive metaphysics I do in this dissertation, mental and linguistic representations will feature quite heavily. To avoid confusion, I will use '…' for linguistic representations, <…> for concepts, and italics for properties. For example, 'redness' is a word, <redness> is a concept, and *redness* (or: *being red*) is a property.

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Chapter One

Being Reasonable About Modality

1 Justifying Modal Beliefs

I believe that I could have been 2 inches taller than I am. And I believe that Chelsea could have won the Champions League in 2015. I believe that 2 + 2 necessarily equals 4. And I believe that it's impossible that kicking puppies for fun is morally permissible. These are modal beliefs. And presumably, they are *epistemically justified* modal beliefs. Chalmers (1996) believes that there could have been purely physical and unconscious zombies. Plantinga (1974) thinks that there could have been a necessary being. Kripke (1980) believes that his table is necessarily made of wood. These are also modal beliefs. But are they justified?

In this chapter, I don't view justification simply as *that third element* which makes true beliefs knowledge. For considerations already well known, it seems quite plausible that a true belief can be justified but fail to be knowledge. In any case, knowledge is not my main concern. I am here only concerned with justification. My goal is to defend a simple principle about justification of modal beliefs I call Imaginative Conservatism.

> **[Imaginative Conservatism]** For any statement S, if z successfully conceives that S, then z is fully justified in believing that S is possible unless there are proper defeaters; and for any statement S, if z tries but fails to conceive that S, then z is fully justified in believing that S is impossible unless there are proper defeaters.

In spirit, Imaginative Conservatism echoes the kind of modal epistemology that takes conceivability as guide to possibility. Such a conceivability-based approach to modal epistemology

was famously articulated in Yablo (1993) and further developed by Geirsson (2005). And I think what counts as an indirect version of the view is also defended by Williamson (2007).[2, 3]

Although Imaginative Conservatism is in line with the spirit of the typical conceivability-based approach to modal epistemology, the two are noticeably different. Whereas it is often said that **conceiv*ability*** is evidence for possibility (and **inconceiv*ability*** for impossibility), Imaginative Conservatism says **success (and failure) in conceiving** are evidence for modal beliefs. (Talk of failure is ambiguous in English. By failure in conceiving here, I mean tried but fail. This excludes cases where one does not even try.) There is no direct mentioning of conceiv-*ability* in Imaginative Conservatism at all.

Appealing to success and failure in conceiving is weaker than appealing to conceivability and inconceivability. If we think that the conceivability of p is evidence for the possibility of p, then successfully conceiving p gives us reason to think that p is conceivable *and hence* gives us evidence for

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[2] It is indirect in the sense that Williamson thinks that imagination gives us evidential justification for counter-factual beliefs. And modal claims are provably equivalent to counter-factual claims. Our access to modal truths comes indirectly via our access to counter-factual truths. Despite the indirectness, however, imagination is still our epistemic doorway to modality.

[3] Apparently, conceivability-based modal epistemology is defended in yet another way by Ichikawa & Jarvis (2012). But I do not consider their view as genuinely conceivability-based. (I do not take this as an objection against their view though.) I think it is more useful to call their view a *supposition*-based modal epistemology. What they defend is the idea that the ability to form a supposition with no immediately absurd consequences is a means to obtain justification for beliefs about what is conceptually possible or necessary. And that in turn can inform us about metaphysical possibility and necessity. I believe that *supposing* or *assuming* things, however, is a different mental attitude from *conceiving* or *imagining* things (Ichikawa & Jarvis explicitly *define* the word 'imagining' to mean some kind of supposing. They are free to use the word their way. But it is an uncommon usage, which I do not endorse). Whereas I do not wish to contest the modal epistemic value of *supposing*, the task of defending their view shouldn't be conflated with the task of defending the modal epistemic value of *imagining/conceiving*.

the possibility of p. And similarly, if we think that inconceivability of p is evidence for the impossibility of p, then similarly, failed attempts to conceive that p give us reason to think that p is inconceivable (because conceiving something is supposed to be easy) and hence gives us evidence for impossibility of p. So, if (in)conceivability is evidence for modal beliefs, success and failure of conceiving are evidence for modal beliefs, too. On the flip side, however, it is *at least perfectly coherent* to think that, although conceiving is evidence for possibility, mere conceivability is not. Analogically put: although perceiving a pineapple on the table is evidence for the presence of a pineapple on the table, the mere possibility to perceive (i.e., the perceivability of) a pineapple on the table *might* not be (it depends on one's view about perceptual evidence).[4] Therefore, Imaginative Conservatism is weaker than a modal epistemology based on conceivability.

As a result, defenders of the more typical conceivability-based modal epistemology should not reject Imaginative Conservatism; but defenders of Imaginative Conservatism do not need to commit themselves to the typical conceivability-based modal epistemology. I defend the weaker Imaginative Conservatism because the weaker principle is sufficient for my ultimate goal of descriptive metaphysics (Chapter Three). I do not want to introduce extra theoretical burden by defending a principle stronger than I need.

Secondly, a conceivability-based approach usually focuses on the justification for judgments about possibility and not judgments about impossibility. We will see very soon that the reason for accepting successful conceiving as evidence for possibility is equally a reason for accepting failed attempts to conceive as evidence for impossibility. So, although advocates of a conceivability-based approach tend to turn their back on inconceivability and impossibility, whatever they say about the

[4] On the inconceivability side, if one appeals to failed attempt of conceiving as evidence for impossibility, then one should also accept inconceivability as evidence. So appealing to failed conceiving and appealing to inconceivability are equally strong.

justification for judgments about possibility based on conceivings should naturally extend to justification for judgments about impossibility based on failed attempts to conceive.

Unsurprisingly, there is no shortage of skepticism about conceivability-based modal epistemology. Although the skeptical challenges primarily target the epistemic value of conceivability, they question the epistemic value of conceivability by challenging the epistemic value of *conceiving*. Hence, those challenges, if they work, threaten Imaginative Conservatism as well. The primary goal of this chapter is to offer a comprehensive defense of Imaginative Conservatism against these skeptical challenges.

This chapter is divided into three main parts. **Section 2-4:** I begin by arguing that Imaginative Conservatism captures our standing epistemic practices in modal reasoning. And I argue in favor of taking that actual epistemic practice as the default position. **Section 5-7:** In the second part of this essay, I will introduce two *moderately skeptical* views against the epistemic relevance of conceivings (and hence against Imaginative Conservatism) in the literature. Each of them maintains that only some but not all conceivings are modal epistemic valuable. I will examined the arguments offered in favor of these moderately skeptical views and show that these arguments are not compelling. **Section 8-10:** Our attention will then turn to a *radically skeptical* view, which says that *no* conceivings are relevant to modal epistemic justification. I will examine the radical argument and show that it requires us to accept a contestable principle without proper motivation. So, I conclude that we have good reason to hold on to the default position as it is expressed by Imaginative Conservatism.

2 A Default Position in Modal Epistemology

2.1 Appealing to Conceiving

When I am asked whether I could have been taller than I actually am, how do I proceed to answer the question? I try to conceive of myself being taller. I successfully conceive of that. *For that*

reason, I am justified in believing that I could have been taller. When I am asked whether something could be completely red and completely green at the same time, how do I proceed to answer the question? I try to conceive of something completely red and completely green. I realize that I really can't; I fail no matter how hard I try. So, I am justified to believe that something like that is impossible.[5] When I am presented with modal questions, one of my *immediate reactions* is to appeal to my power to imagine or conceive. And I believe I am not alone. Presumably, appealing to conceiving is one of the most natural responses people have in response to modal questions.

More importantly, I believe that most people would consider it a *reasonable* reaction to appeal to conceiving as well. Certainly we do not consider all our immediate reactions reasonable; but, for immediate reactions that we consider unreasonable, we would feel embarrassed or feel the urge to retract our reactions once it is brought to our attention that we have those reactions. E.g. that is the case with a lot of the implicit sexist or racist biases. On the contrary, appealing to conceiving to answer a modal question is not the kind of immediate reaction that we would ordinarily feel the need to retract or feel embarrassed by, even when it is brought to our full attention that we are doing so.

The modal epistemological relevance of conceiving in forming justified modal beliefs has long been acknowledged. The connection between conceiving and possibility seems so natural that, of all the people, the otherwise über-skeptical Hume thought that the connection had been 'establish'd':

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[5] One may protest that we usually find something completely red and completely green impossible not via inconceivability but via the *contradiction* of the idea (this is not to say that it is conceivable). First of all, whereas I grant that it's metaphysically impossible for something to be completely red and completely green, it's controversial to say that something completely red and completely green is *contradictory*. But even if I grant the claim, it seems to me that the only reason we find contradictions impossible is because we find them inconceivable. So, after all, our judgement about the impossibility of something completely red and completely green at the same time is based on the idea's inconceivability.

> 'Tis an establish'd maxim in metaphysics, *That whatever the mind clearly conceives includes the idea of possible existence*, or in other words, *that nothing we imagine is absolutely impossible*. We can form the idea of a golden mountain, and from thence conclude that such a mountain may actually exist. We can form no idea of a mountain without a valley, and therefore regard it as impossible. (1978: 32)

2.2 'Conceiving' is not Ambiguous

In the quotation from the last section, Hume shifts from talk of 'whatever the mind clearly conceives' to talk of what we '*can* form [an] idea of'. In other words, Hume shifts from talking about a connection between conceiving and possibility to a connection between conceivability and possibility. Many contemporary modal epistemologists follow Hume in making that shift and embrace conceivability (instead of conceiving) as a source of modal justification.

One tricky issue for the conceivability-based approach to modal epistemology is that the word 'conceivability' seems to be used in multiple ways in ordinary language; and not all of them are relevant to reasoning about modality.

For example, we sometimes use the term 'inconceivable' like 'incredible' to characterize states of affair that are very unlikely to be true. Although this is a perfectly legitimate and not uncommon way to use the word 'conceivability', this is clearly not the kind of conceivability we rely on when we justify modal beliefs. Consider this: It is not likely to be true that I will win the lottery; nonetheless, I find it conceivable *and therefore* possible that I will.

Other times, 'inconceivable' is used to mean unintelligible. Again, although this is a perfectly legitimate way to use the word, this is not really the sense of conceivability that we rely on when we form modal beliefs in everyday life. Consider this: I think that a round-square is inconceivable and

hence impossible, but surely I understand what you mean when you talk about round-squares. Yablo (1993) has done a good job disambiguating various senses in which the word 'conceivability' are used and showing why most of them are modal-epistemologically irrelevant.

It is interesting to note that, despite the ambiguity of 'conceivability', there seems to be no parallel ambiguity attached to the notion of *conceiving*. Whereas 'conceivability' can sometimes mean 'believability', 'conceiving' never means 'believing' in ordinary language. Whereas 'conceivability' can sometimes mean 'understandable', 'conceiving' never means 'understanding'. Whereas 'conceivability' can sometimes mean 'suppose-ability', 'conceiving' can never mean 'supposing'. For one thing, it makes very little sense to say that one supposes something *sensorily*, whereas one can conceive of something sensorily by *visualizing* it. There is a very odd asymmetry between the two words 'conceivability' and 'conceiving' that, curiously, fails to get much attention from philosophers.

I have no interesting explanation to offer for the odd semantic asymmetry. (Exploring this issue any further would probably lead us astray.) I bring attention to the ambiguity of 'conceivability' in order to highlight the *unambiguous* nature of 'conceiving'. By appealing to success and failure of *conceiving* instead of (in)conceivability, we sidestep an obstacle all conceivability-based accounts face: having to disambiguate the notion of conceivability appropriately. I will not follow Hume in shifting from conceiving to conceivability.

Whereas there can still be substantive disagreement about the nature of conceiving, unlike the notion of conceivability, there is no ambiguity with respect to the notion of conceiving. I believe we have a basic and intuitive grasp of what I mean when I say that we naturally appeal to *conceiving* when we have to answer a modal question.

2.3 'Conceiving' or 'Imagining'

Generally, I am inclined to follow Yablo et. al. and take conceiving S to be imagining S, or in a more wordy way, imagining a situation which makes S true or verifies S. And hence, success and failure of conceiving just is success and failure of imagining. Call this an imagination-based account of conceiving. Defenders of the conceivability-based approach often use 'conceiving' and 'imagining' inter-changeably. In the famous passage I quoted, Hume also seemed to use the words 'conceive' and 'imagine' as synonymous.

Despite my personal allegiance to the imagination-based account, I will, however, avoid using the two terms inter-changeably and just stick to 'conceiving' as far as possible from now on for the following dialectical reason.

Suppose I ask whether it is possible for me to have a million dollars in my bank account. My immediate reaction is to try to conceive of myself having that kind of money in my account. It seems like an easy thing to do. I just did it as I wrote the previous sentence. Therefore, I am justified to believe that it is possible. In my conceiving that I have a million dollars in my bank account, I *may* include *a simulated happy feeling* about all the money I can spend on books and gummies, and I *may* also include *a visualization* of the numeral displayed on my online banking screen. But all these extra bits that help enhance the *sensory vividness* of the conceiving are not necessary components of the conceiving of the propositional content that I have a million dollars in my bank account. Sensory content is not required for conceivings. In fact, conceiving of propositional content can be done without *imagery* at all. I can simply conceive of myself having a million dollars in my bank account with my cognitive/conceptual resources alone. I successfully conceive of that; therefore, I am justified in believing that it is possible for me to have a million dollars in my bank account. This example shows us that conceiving *can* have sensory elements; but sensory elements are not necessary for conceivings.

Philosophers who use the notion of imagination to help explain the nature of conceiving typically embrace the idea of non-sensory imagination, i.e. imagination without sensory imagery (e.g. Yablo (1993); Currie & Ravenscroft's (2002); McGinn (2004); Kung (2010); Ichikawa & Jarvis (2012)). For that reason, the non-sensory conceivings I was just talking about do not pose any difficulty for those philosophers. However, it is an independently debatable issue whether *imagination* should be understood as essentially sensory.[6] And I want to remain neutral on the issue about the nature of imagination.

Given that conceiving can be sensory or non-sensory and I want to remain neutral whether there are non-sensory imaginings, instead of *defining* conceiving by imagining and using 'conceiving' and 'imagining' inter-changeably, I will simply use the notion of imagining as a *heuristic device* to help us get a grip on the notion of conceivability: conceiving is a *sui generis* mental attitude that is very much like imagining and it does not need to invoke sensory features. (Notice that sensory imagery is not needed even when one is conceiving *about one's sensory perception*; e.g. I can conceive of myself *seeing* a blue moon without *visualizing* or *having any sensory imagery of* a blue moon; or I can conceive of myself sensorily perceiving ultra-violet rays, which I of course cannot visualize.) I think this should provide us with enough grip on the notion to work with — especially when the word 'conceiving' is not ambiguous like 'conceivability', as I have argued in the previous section.

2.4 The Current Policy is the Default Policy

[6] The majority view is that there are non-sensory or cognitive imaginings. But see Kind (2001) for an argument that imagination is essentially sensory. Of course, to say that an imagination is sensory is not to say that it has no conceptual component at the same time. It is common to think that sensory imaginations must also have conceptual components in their contents. Lowe (2012), following Descartes, argues that we should distinguish imagining and conceiving exactly because both of them think that imagination requires sensory imagery but conceiving does not (923-924).

Now that we have a shared and relatively unambiguous notion of conceiving to work with, let us turn our attention back to Hume's principle. As plausible as Hume's principle may appear, not all philosophers are sympathetic to the thought that our conceivings are relevant guides to modal facts. Mill, for example, thinks that the intuition that there is some sort of evidential connection between conceiving and possibility is just 'very much an affair of accident, and depends on the past history and habits of our own minds.' (1900: 178)

And in contemporary discussion, there is persistent resistance to the view that conceiving is epistemically relevant to the justification of modal beliefs. Here are two examples. Lowe (2012), for instance, believes that the legitimate way to learn about modal facts is via our grasp of the *real definitions* or *essences* of things and our conceivings have no role to play in proper modal epistemology. Therefore, it is a mistake, according to Lowe's view, to let conceivings and failures of conceiving guide our modal beliefs.

Another example of resistance to the epistemic relevance of conceiving is the kind of view defended by Bealer (2002) and Fiocco (2007), who think that the right way to do modal epistemology is to postulate a power of modal intuition as the source of justification for modal beliefs, instead of appealing to conceiving.

Even for those who do not deny the relevance of conceivings completely, Hume's principle is considered too strong and in need of qualifications. I will discuss proper qualifications on Hume's principle shortly (section 3). Still, in spite of the skepticism and concerns that I have just described, I am inclined to take the *general spirit* of Hume's principle at least *by default*. That is, I believe that it should be our default position in modal epistemology to regard success and failure of conceiving as *generally* relevant for justifying modal beliefs. And we should not abandon the epistemic relevance of conceivings, unless there are good reasons demanding us to do so.

The reason that the epistemic relevance of the success and failure of conceiving should be accepted by default is that it is, as I argued earlier in section 2.1, a commitment of our *standing epistemic practice* in reasoning about modality. By adhering to the status quo of actual epistemic practices, I am not in principle against revisionary epistemology, which implies that our actual epistemic practices are in fact (partly) irrational and require substantive modifications. We should only revise our standing epistemic practices when there are positive reasons for doing so.

The view that the epistemic policies that we actually practice *should* be considered the rational epistemic policies is based on epistemic conservatism as a theoretical virtue.[7] I have no interesting non-question-begging argument for epistemic conservatism except for the remark that sticking to the ordinary and avoiding the extraordinary unless the former is proven inadequate underlies most philosophical arguments which begin by relying on premises that we find intuitive pre-theoretically. If one rejects my actual-practices-by-default view, then one must find most contemporary philosophical discussions deeply misguided. I believe it is reasonable for me to assume that most discussions in contemporary philosophy are *not* deeply misguided.

If our conceivings in fact have nothing to do with justifying beliefs about modality, it is not clear what we have all been doing by all those instances of conceiving when we are addressing modal questions. And it might even threaten the idea that we can be rational about modality at all. As Chalmers (1999) puts it: '[B]reaking the tie between conceivability and possibility breaks the tie between rationality and modality.'

3 Articulating *Imaginative Conservatism*

[7] We can treat this view as a kind of epistemic conservatism, which is defended in slightly different forms by, just to name a few, Quine (1953), Chisholm (1980), Kvanvig (1989), and McCain (2008).

I argued that we should treat *the general spirit* of Hume's principle as correct by default. But there is just so much we can do with a 'general spirit'. What we need is to formulate a concrete modal epistemological principle that appropriately captures this general spirit.

The principle as Hume articulated it is not plausible. It appears to be too strong, for it takes successful conceivings to **entail** possibility. Although it is clear that our actual epistemic practices take conceivings to be epistemically relevant to justifying modal beliefs, it is less clear that our standing practices commit us to an epistemic relation between beliefs about conceivings and modal beliefs as strong as entailment. Thanks to Kripke's discussion of the necessary a posteriori, it now seems to most philosophers that there are cases in which we do conceive of what is in fact impossible.

Theoretically, one can certainly hold on to the Humean view that there is a general entailment relation between successful conceiving and possibility even in the face of the *apparent* cases of conceivable impossibilities. One can do so by arguing that we are simply mistaken about what we are actually conceiving in *all* those cases. For instance, one might say, when I think that I am conceiving that water is not H_2O, I am wrong about my own conceiving. In fact, I cannot conceive of that because it is impossible for water to be anything other than H_2O. Such strong error theory about the content of our conceiving is surely an option. (This is strong in the sense that it says we are mistaken about what we conceive in *all* those cases where we allegedly conceive of something impossible.) I do not deny that we can sometimes be wrong about the content of our conceivings. But the motivation for such a strong error theory is not particularly clear. At the very least, when I take our actual epistemic practices to be the default position, this strong error theory should not be part of the default position (for a similar point, see Ichikawa & Jarvais (2012: 132-133)).

There are philosophers who offer theoretical frameworks that appear to enable us to neatly accommodate the possibility of modal errors and the entailment relation to a certain extent while at

the same time not be a strong error theorist about the content of our conceiving. For example, Chalmers' epistemic two-dimensionalism *may be used* for such a purpose. But it is important to note that Chalmers' two-dimenstionalism restricts the entailment relation between conceivability of S and possibility of S with his epistemic two-dimensionalist framework in two ways. First, the entailment only happens with *ideal* instead of prima facie conceivings. Ideal conceivings are conceivings that cannot be refuted by any further reflections.[8] Second, the relevant entailment only happens in cases where S is about the fundamental features of reality (for more detail, see Chalmers 1996; 2002; 2012).[9]

Whereas the epistemic two-dimensionalist framework is very valuable for many philosophical purposes, it does not give us compelling reason to adopt *as our epistemic policy* that (in-)conceivability entails (im-)possibility. This is because we are not ideal epistemic agents. When we conceive of something successfully, there is no guarantee that we are conceiving of it in a way that no further reflections can show otherwise. If the best we can do to hold on to an entailment relation is to talk about ideal conceivings, I think the moral of the story *for our purpose* (i.e., to articulate a useful modal epistemological policy for ourselves) is to give up the strong notion of entailment and go for a weaker concept to articulate the epistemic relevance of conceivings — namely, the notion of **pro tanto justification**. Success and failure of sincere attempts to conceive of p give us pro tanto justification for believing that p is possible and impossible respectively.

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[8] Chalmers talks about (ideal) conceivability instead of (ideal) conceiving.

[9] The second point has been instrumental to Chalmers' Zombie Argument for dualism. Since phenomenal qualities are meant to be fundamental features of reality, the conceivability of zombies entails the possibility of zombies. But by putting it this way, I believe I have also made clear that there is a question-begging aspect of the Zombie Argument — the modal-epistemological move only works because phenomenology is taken to be part of the fundamental reality. An assumption that a physicalist would not find acceptable. Physicalist complaints along this line can be found in Stalnaker (2002) and Hawthorne (2002).

By 'pro tanto' justification (some prefer the phrase 'prima facie justification'), I mean justification that is defeasible but provides full or all-things-considered justification for the relevant beliefs *if there are no proper defeaters* (I am thereby adopting Pryor's (2000: 535) definition of 'prima facie justification'). For example, with perceptual experience of a tomato on a chair, I have pro tanto justification for believing that there is a tomato on a chair. If I have no defeaters against the perceptual justification, I have all-things-considered justification for believing that there is a tomato on a chair. But if I also have compelling evidence for thinking that I am in a virtual reality that is programmed to show me a tomato on a chair perceptually, this evidence would be a proper defeater which undermines my perceptual evidence that there is a tomato on a chair. As a result of the presence of that defeater, although I *still have* pro tanto justification for believing that there is a tomato on a chair (the perception is still there), I do not have full or all-things-considered justification for the belief that there is a tomato on a chair.

I leave it open whether being fully justified in believing that p means one *should* believe that p or simply that it is *permissible* for one to believe that p.[10] With this notion of pro tanto justification in mind, I propose that our standing modal epistemological practice, which I take to be the default position, can be captured in the form of Imaginative Conservatism:

> **[Imaginative Conservatism]** For any statement S, if z successfully conceives that S, then z is fully justified in believing that S is possible unless there are proper defeaters; and for any statement S, if z tries but fails to conceive that S, then z is fully justified in believing that S is impossible unless there are proper defeaters.

[10] For an argument against the permissive conception of epistemic justification, for example, see White (2005). For a recent, interesting defense of the permissive conception by appealing to the phenomenon of an epistemic blindspot, see Raleigh (2016).

Imaginative Conservatism is a very liberal principle. It does not rule out the epistemic input of other factors. One may still think that we have modal intuitions or essence grasping power. What the principle above does is simply affirm our current practice by acknowledging the general epistemic relevance of success and failure in conceiving to the justification of modal beliefs.

Since Imaginative Conservatism is such a weak claim, it avoids a particular kind of criticism that is raised against conceivability-based modal epistemology. For example, Roca-Royes (2011) complains that appealing to conceivability and inconceivability alone cannot explain all the modal knowledge that we seem to have. In particular, she thinks that, if we have knowledge about de re necessities at all, such knowledge cannot be accounted for by appealing to conceivability or inconceivability (and presumably also not by appealing to successes or failures of conceiving). And we seem to have some knowledge about de re necessities (the example Roca-Royes uses is the alleged knowledge that an entity has its origin essentially).[11]

It is, however, important to note that Roca-Royes' objection — even if it is sound — only poses trouble for those who think that conceivability and inconceivability are jointly the *exhaustive* source of modal justification for us. As far as I can tell, no one should defend such a strong claim about appealing to conceivability as *our actual epistemic policy*.[12] The same can be said about appealing

[11] I say 'alleged' because I am very skeptical that it is true that objects have essential material origin. And I am not convinced that the arguments in support of the claim work. See Cameron (2005); Cameron & Roca (2006).

[12] For Chalmers (2002), an ideal epistemic agent's conceivability, i.e. ideal conceivability, about things at the fundamental level of reality *exhausts* all there is to know about possibility. So, Roca-Royes' argument appears to apply to such a kind of modal rationalism that maps modality with ideal conceivability completely. Setting aside my earlier complaint against appealing to the ideal for the sake of argument, advocates of Chalmers' kind of modal rationalism are typically quite deflationary about substantive metaphysical claims about de re

to success and failure of conceiving. There could be modal knowledge that cannot be accounted for by appealing to success or failure of conceiving. For example, there might be *testimonial justification* for believing something is possible. And for what it's worth, if we are convinced by Lackey's (1999) argument and believe that a testimony provider does not have to be justified in believing that p herself for a testimony receiver to be justified in believing that p based on the former's testimony that p, then testimonial justification for modal beliefs does not have to be traced back to the success or failure of conceiving of the testimony provider as the ultimate source of modal justification.

In any case, Imaginative Conservatism does not make the strong claim that success and failure of conceiving is the exhaustive source of modal justification. All it claims is that conceiving is *a legitimate source* of pro tanto justification for our modal beliefs.

4 Conservatism in Both Directions

There is one last preliminary remark about Imaginative Conservatism before we are in a proper position to examine the skeptical arguments for giving up the default position.

Much of the discussion in the literature on the conceivability-based modal epistemology focuses on conceivability as justification for beliefs about possibility. Not too much attention is given to inconceivability as justification for beliefs about impossibility. Rephrasing it for this context, much attention is given to the epistemic relevance of successful conceiving, not of the failure of conceiving. Contrary to that trend, I treat the two — success and failure of conceiving — in one single principle in the same way (like Hume did in the quote).

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necessity like essentialism about objects' material origin. Thus, it is unclear to me whether Roca-Royes' claim that conceivability cannot account for substantive metaphysical knowledge of this sort carries much dialectical force at all, even if we focus on the kind of conceivability-based epistemology that views conceivability as the exhaustive source of modal justification.

For many metaphysical discussions, the inference from conceivability or conceiving to possibility happens to be the more important one (e.g., the Zombie Argument, the Modal Ontological Argument). So, I have no complaint about the asymmetry of attention. But I do not think there is any principled reason to think that we should treat the connection between failure of conceiving and impossibility differently from the connection between successful conceiving and possibility.

If one worries that the failure of conceiving only reveals the limits of our mind and is irrelevant to reasonable modal beliefs, one should be *equally worried* that successful conceiving is just the result of the lack of constraints of our conceiving power and does not have anything to do with reasonable modal beliefs about possibility. The two worries are basically the same sort of skeptical concern: success or failure of conceiving is a peculiarity of our mind which has nothing to do with the mind-independent modal reality. (I will address this epistemic worry at length later; what is important for now is the symmetry.)

In our actual epistemic practice, we appeal to *both* success and failure of conceiving, as I have illustrated with examples before. (It is no accident that Hume also endorses both relevant to modal epistemology.) Since we started with the default position that success and failure of conceiving is epistemically relevant in justifying beliefs about possibility, we need a positive reason to treat successful and failed attempts of conceivings differently. And I am yet to see a good reason for that. In want of such a reason, *if* one finds it reasonable to accept that successful conceivings are at least by default pro tanto justification for believing in possibilities, then it should be equally reasonable to think that failed attempts of conceiving also by default provide defeasible justification for impossibilities.

One might resist the symmetry I advocate by an analogy about mathematical justification. For some mathematical statement S, if I have a proof for S, I have justification for S. Finding no proof

for S is, however, not a justification for believing that not-S. Analogically, one might think, successfully conceiving p provides justification for believing that p is possible. *Trying* but failing to conceive of p is *just* a lack of justification for the possibility of p; that does not imply a justification for the impossibility of p.

We can all agree that *having a proof for S justifies S* **does not entail** that *not having a proof for S justifies not-S*. The analogy seems to suggest that, by endorsing the modal epistemological relevance of both success and failure of conceiving, one is making a fallacious inference of this sort. But the truth is, one does not have to perform that fallacious inference to think that both success and failure of conceivings are modal-epistemologically significant. The default position consists of two **independent** epistemological claims: (a) conceivability provides defeasible justification for possibility and (b) inconceivability provides defeasible justification for impossibility. The default position **does not say** that (b) *follows from* (a) because having no justification for p (in this case, a claim about possibility) is to have justification for not-p (in this case, a claim about impossibility).

Since endorsing the default position does not really commit one to the fallacious inference, I don't think there is a real objection against the symmetry here. In the way I introduced and motivated Imaginative Conservatism earlier, *both directions* of Imaginative Conservatism are based on the actual epistemic practices: we naturally appeal to both successes and failures of conceiving when we are to answer a modal question (consider all the cases I mentioned in the beginning of this essay). So, certainly, the mathematical case shows us that not having justification for something *does not mean* having justification for the negation of something. But that says nothing directly against the default position.

5 Two Forms of Skepticism

I hope I have made my thesis, namely Imaginative Conservatism, sufficiently clear in the preliminary discussion above. And I have also argued for the principle's default and privileged status in the relevant dialectic. In the rest of this essay, I will critically examine some important skeptical arguments that challenge the *general* epistemic relevance of conceiving, and hence challenge Imaginative Conservatism.

Philosophers have expressed various degrees of skepticism about the epistemic relevance of conceivings. As a result, the epistemic relevance of conceiving is often restricted in one way or another. I will set aside those who deny the relevance of conceiving *all together* until section 8-11. In the following two sections, I will focus on examining two types of **moderate skepticism**.

In the recent literature, two kinds of moderate skepticism have been raised against the general principle of Imaginative Conservatism. They are *moderate* in the sense that, instead of banishing all conceivings from modal epistemology, they argue that some *but not all* conceivings provide modal justification. These moderate skeptics differ in their way of distinguishing the 'good' conceivings from the 'bad' ones.

The first kind of moderate skeptic distinguishes the good conceivings from the bad ones based on the *subject matter* of those conceivings. It says that only conceivings about mundane facts can justify beliefs about possibilities; conceivings about facts distant from actuality cannot. I call this **Type-1 moderate skepticism** (Van Inwagen 1997; Hawke 2011).

The second kind separates the good ones from the bad ones, roughly speaking, based not on the subject matter but on *the manners* in which the conceiving is done. Very roughly put, they distinguish sensory conceivings from the non-sensory ones and argue that the non-sensory conceivings don't provide even *pro tanto* justification for claims about possibilities. I call this **Type-2 moderate skepticism** (Gregory 2010; Kung 2010).

In section 6 and 7, I will show that the arguments philosophers offer to support these two kinds of moderate skepticism fail. Hence, they do not give us any compelling reason for abandoning the default position.

6 Type-1 Moderate Skepticism

Van Inwagen (1998) defends Type-1 moderate skepticism. His view consists of two claims. First, conceivings provide *fallible evidence* for possibility in *everyday cases*. And secondly, conceivings provide *no evidence at all* (not even fallible evidence) for possibility in *remote cases* that a lot of metaphysical discussions rely on, e.g., the conceiving of zombies, the conceiving of necessary beings.

The argument for Type-1 Moderate Skepticism is first devised by van Inwagen and refined by Hawke (2011). Recently, Geirsson (2005) and Hartl (2016) have quite convincingly shown that those arguments for Type-1 skepticism are not compelling. In the following, I shall offer an overview of the skeptical argument and explain why it fails.

6.1 The Argument

Hawke organized van Inwagen's skeptical argument in the following way (2011: 352):

> P1. For any proposition p, one is justified in asserting the possibility of p only if someone has imagined a world that the imaginer takes to verify that p (Yablo).
>
> P2. For any proposition p, someone has imagined a world that the imaginer takes to verify p only if someone has imagined a world in a sufficient amount of detail, relevant to p, so as to rule out the compatibility of the specified details of that world with ~p.

> P3. If proposition p belongs to the class FP (where a proposition is a member of this class iff it is a philosophical claim that is far-removed from everyday experience), then no-one has imagined a world in a sufficient amount of detail relevant to p.
>
> C. So, if proposition p belongs to class FP, then one is not justified in asserting the possibility of proposition p.

P1 is basically Yablo's modal epistemological principle. The plausibility of P3 hinges on the way one understands what counts as 'a sufficient amount of detail'; and that is provided by P2.

In support of a claim like P2, van Inwagen considers what counts as justifying the possibility of transparent iron, which is worth quoting at length:

> Can we imagine a world in which there is transparent iron? […] If we simply imagine a Nobel Prize acceptance speech in which the new Nobel laureate thanks those who supported him in his long and discouraging quest for transparent iron and displays to a cheering crowd something that looks (in our imaginations) like a chunk of glass, we shall indeed have imagined a world, but it will not be a world in which there is transparent iron. […] This sort of effort of imagination will, or so I should suppose, show that a certain proposition has the modal status 'possible', but the proposition will be a disjunctive one. Here are some of its disjuncts:
>
> – Transparent iron exists
>
> – The scientific community has somehow been deceived into thinking that transparent iron exists

> – A crackpot physicist who thinks he has created transparent iron is the butt of a cruel and very elaborate practical joke
>
> – A group of fun-loving scientists have got together to enact a burlesque of a Nobel Awards Ceremony.

> And we do know that this disjunctive proposition is possible. We know it because we know of at least one of its disjuncts that it is possible and we know that a disjunction is possible if any of its disjuncts is possible. No doubt, by working our imaginations a bit harder, we could imagine a world in which some of the 'unwanted' disjuncts failed. We might, for example, add to what we have already imagined a codicil to the effect that all the scientists in the cheering audience are sincere. But this would not rule out the second of the above disjuncts ('mass deception'). To rule that out, our imaginations would have to descend to 'a level of structural detail comparable to that of the imaginings of condensed-matter physicists who are trying to explain superconductivity.' […] Perhaps, therefore, in attempting to imagine a world containing transparent iron, we could properly allow such things as Planck's Constant and the electromagnetic coupling constant to vary in our imaginations. […] In any case, so far as I know no one has imagined, at the necessary level of structural detail, a world – whether its laws are the actual laws or some others – in which there is transparent iron. (1998: 79-80)

Van Inwagen's requirement of ruling out 'mass deception' cannot be met unless P2 is true: that the conceived scenario is incompatible with the negation of the proposition whose possibility is meant to be justified by the conceiving. No one has justification for remote possibility claims because no

one has ever conceived of scenarios detailed enough to be strictly speaking incompatible with the negation of those claims.[13]

6.2 Response#1: Not that Hard

P3 is false. Even if I accept that we need to conceive of a scenario that is incompatible with the target proposition's negation to justify its possibility, I do not think it is as hard to do as van Inwagen portrays it to be that no one has ever done it, let alone no one has the capacity to do it.

Suppose I am to justify the possibility of philosophical zombies. How do I imagine a scenario that is incompatible with the claim that there are no philosophical zombies? Simple: I just conceive of a scenario where there is a philosophical zombie directly — something that behaves exactly like us without the phenomenal qualities we are aware of. Since it is a scenario where there is a zombie, it is incompatible with the claim that there are no zombies. Hence, it is a scenario that verifies the existence of zombies. How hard can that be? Van Inwagen has not said much about that.

In defense of van Inwagen's skeptical argument, Hawke says:

> [I]t is potentially trivial to construct a fictional world so that some proposition holds for that world—but trivial in a very problematic way. Since one constructs a fictional world, one seemingly is able to **stipulate** that proposition p holds for that world. This surely counts as a trivial verification that p holds for the world. Indeed, it is not clear if there are any useful limits as to what can be stipulated to hold for a fictional world: clearly, inconsistencies can be stipulated to hold for fictional worlds ('holes in the plot'), as can other propositions whose

[13] Van Inwagen remains ambivalent about whether his claim is we *cannot* have modal justification of that sort or simply that we *do not* have such justification. But I suppose he does not bother to make that clear because, either way, we do not have knowledge about possibilities remote from everyday life.

> metaphysical possibility is dubious (for instance, that George W. Bush is a Soviet robot). […] Now, since we presumably use conceivability techniques to test the status of modally controversial claims, it seems that verifying the truth of such a claim in a fictional world **by mere stipulation** will only be counter-productive. (2011: 357; my emphasis)

Hawke basically concedes the point that conceiving of things like zombies is easy. But he thinks that it is easy in a questionable way because doing so is just to *stipulate* that zombies exist in an imaginary scenario and stipulation comes too cheaply to count as evidence. Stipulation is too cheap because even contradictions can be stipulated. I find Hawke's defense unsatisfactory.

Notice that in my original response, I said that it is easy to **conceive** of zombies. I *just conceive* that there are entities that behave like us except that they are not conscious. No where did I say stipulation. On the face of it, it seems that Hawke's defense is dealing with a straw man.

Perhaps Hawke is suggesting that conceiving *just is* stipulation. If so, he surely owes us an argument because 'stipulate' and 'conceive (non-sensorily)' isn't interchangeable. 'The constitution *stipulates* that a new President must be elected every four years' obviously cannot be substituted with 'the constitution *non-sensorily conceives* that a new President must be elected every four years'. 'Sarah *stipulated* certain conditions before their marriage' cannot be replaced by 'Sarah *non-sensorily conceived* certain conditions before their marriage'. So, presumably, (non-sensory) conceiving and stipulating are different mental operations. It is then not obvious that I am verifying a modal claim *by mere stipulation* when I conceive of zombies (non-sensorily). And as long as we assume that conceiving does not have to be sensory (see section 2.3 above), it is not clear why I cannot *just* conceive of zombies, in other words, it is not clear why Hawke feels the need and the warrant to replace talk of conceiving to talk of stipulating, which is not the same thing. As a result, it remains unclear why simply because one can say something about stipulation, one can say the same about conceiving.

After all, without proper argument, it does not seem plausible to assert that conceiving is so cheap that just anything is conceivable; otherwise, the word 'inconceivable' probably would not be in the circulation in the first place.

Even if we set the distinction between conceiving and stipulating aside, what Hawke says *about stipulation* isn't clearly true. If we are going to draw any conclusion from the nature of stipulation, we should pay closer attention to the way stipulation actually works. A family can stipulate Friday nights to be their family nights when everyone should be home from dinner. Their stipulation ***makes*** Friday nights their family nights. On the contrary, I cannot stipulate Friday nights to be *their* family nights. At best, I can *assume* or *guess* or *make-believe* that Friday nights are their family nights. Stipulation is a mental or linguistic act to make certain things the case. I am not in a rightful position to make Fridays their family night. Hence, that is not something that I can stipulate. With a more substantial understanding of what stipulation is, we can see that, since no one can make contradiction the case, no one can stipulate contradictions. (Stipulating contradictions *in a fiction* is not to stipulate contradictions.)

Perhaps there is yet something else Hawke tries to capture by the word 'stipulate' even if that deviates a bit from what we ordinarily use the word to refer to. Mental processes can be roughly divided into the passive ones and the active ones. Perceptions, for example, are passive — they are *given* to us. Conceivings, on the contrary, are active — we *decide* to conceive of this or that. Maybe, by 'stipulation', Hawke just means one *decides* to conceive of whatever one conceives. But if we understand 'stipulation' that way, it would not do the argumentative work Hawke intends it to do. That is because ***all*** conceivings are about what we *decide* to conceive. It is not clear why that should undermine conceivings' epistemic value. And also, that would lead to a more radical and complete form of modal skepticism than both van Inwagen and Hawke are willing to accept.

Given all these considerations, it remains unclear why conceiving zombies in an imagined scenario to justify the possibility of zombies is 'counter-productive'. Van Inwagen thinks that it is hard to conceive of a scenario inconsistent with p when p is about something remote from everyday life to provide modal justification. But I think he has overcomplicated what it takes to conceive of something for modal justification; it is not that difficult. And while Hawke concedes that it is easy, he fails to show that it is problematically easy. As we shall see, this is a problem shared by the skeptical arguments for Type-2 modal skepticism.

6.3 Response#2: Too Demanding

I have just argued that, even if van Inwagen's demand as it is expressed in P2 is correct, P3 is false. But philosophers also question whether P2 is too demanding to begin with.

For the sake of argument, let us suppose that Hawke is right that we cannot *directly* conceive of p to justify the possibility of p (because doing so would be to stipulate p and hence be 'counter-productive', whatever that means). To conceive of something indirectly, we need to meet a requirement along the line of P2. Hawke fleshes the requirement out in the following way:

> **[P2+]** p is philosophically conceived by person x [indirectly] iff that person is familiar with a consistent, reasonably detailed fictional world (possibly constructed by person x) of which some set of propositions p_1, p_2, ..., p_n are fictionally true, such that (i) p is a logical implication of p_1, p_2, ..., p_n, (ii) p_1, p_2, ..., p_n are all less modally controversial than p and (iii) person x knows that (i) and (ii) hold. (Hawke 2011: 359; my emphasis)

With this requirement in place, conceiving something remote from everyday life indirectly is indeed not easy, as van Inwagen would have wanted it. Hence, conceiving would not be suitable for justifying modal beliefs about remote subject matter.

It should be obvious that, given the kind of moderate skepticism van Inwagen and Hawke want to defend, they should not make the bar for indirectly conceiving something so high that we cannot even appeal to conceivings to justify mundane modal beliefs, e.g., to justify the belief that I could have been 2 inches taller than I actually am. The worry is, as Geirsson (2005) points out, the bar for indirectly conceiving something expressed in P2+ has exactly this unfortunate implication.

I believe that I could have been 2 inches taller than I actually am. Suppose I am asked to justify this modal belief. If conceivability-based modal epistemology has any intuitive pull at all, it is based on the fact that ordinary modal beliefs like that can be justified by appealing to conceivings. The question is, if P2+ is true, no conceivings can justify that belief. Condition (ii) cannot be fulfilled; I cannot think of any modal claim that can do the job, but is less controversial than the claim that I could have been 2 inches taller. If I am ever justified in believing that I could have been 2 inches taller based on conceivings, that is based on my *directly* conceiving that I am 2 inches taller.

So, the requirement expressed by P2, which is further elaborated as P2+, is far too demanding for conceivability-based modal epistemology. If van Inwagen and Hawke endorse this requirement, they would end up having to accept a very radical form of modal skepticism, not the kind of moderate skepticism they try to defend.

6.4 Response#3: Too Demanding Again

Setting aside Hawke's overly demanding idea that conceivings can only generate modal justifications when done indirectly, there is another aspect in which Type-1 modal skeptics are holding too demanding a standard for using conceivings to justify modal beliefs. Both P2 and P2+

demand that a conceiving has to *logically* exclude the negation of p to justify the possibility of p. Despite van Inwagen's attempt to justify the claim (as we have seen earlier), one cannot help wonder whether such a strong demand is warranted.

The point becomes particularly suspicious when we realize that there is no similar concern for perceptual justification. For example, when I have a perceptual experience as of my cat, I am thereby pro tanto justified in believing that my cat is in front of me. The perceptual justification is not ruined simply by the fact that the content of my perceptual experience does not logically rule out the scenario that what I see is a very realistic robot cat (of course, the content of the *belief* I form does rule that out).[14] Such scenarios never prevent us from saying that I perceive my cat. And that does not prevent the perception from justifying my belief that my cat is in front of me. So, why is it that a conceiving only counts as a conceiving that p if the content of the conceiving rules out ~p logically? Why must a conceiving logically rule out ~p to qualify as justification for the possibility that p?

As Geirsson rightly points out, justification comes in degree. The natural thing to say seems to be that the more details a conceiving contains to rule out more ways of being ~p, the stronger is the modal justification delivered by the conceiving for the possibility of p. If a conceiving logically excludes the negation of p, then it is a case in which we have a very strong justification for believing that p is possible. But there is nothing wrong for thinking that a conceiving that does not logically exclude the negation of p can still give us some degree of justification for the possibility of p, in the same way my perception of my cat can still produce some degree of justification for the belief that my cat is here despite the perceptual content's being logically compatible with my cat's not being there.

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[14] Here I am relying on two assumptions. First, perceptual content is determined by a perception's phenomenal character. Second, I assume that a perception of a real cat and a perception of a realistic robot cat is phenomenologically the same. Some might disagree with these assumptions.

In defense of van Inwagen, Hawke considered the following option (where 'provide evidence for' does not mean logical entailment):

> To verify that proposition p holds in a fictional world is to realize that the modally uncontroversial, fictionally true propositions p_1, p_2, ..., p_n *provide evidence* for proposition p. (2011: 358)

But he rejects this suggestion very quickly:

> [I]f by evidence we mean 'inconclusive evidence', then this way of taking 'verification' will not do in the context of imagining fictional worlds. Imagined evidence is simply too cheap: I can imagine plenty of evidence that Clarabell is a naturally purple cow: Clarabell's purple tone never fades; Clarabell was born of two equally purple cows; and so on. None of this seems the slightest bit persuasive however, with regards to convincing one of the possibility of a naturally purple cow. This lack of persuasiveness is no doubt due to the fact that imagined evidence is made up, and it seems crucial to the persuasiveness of inconclusive evidence that it be discovered. (ibid: 538)

As I have admitted earlier, conceivings are indeed cheap. But what Hawke and van Inwagen need to show is that they are *too* cheap. To account for that, Hawke points to the fact that conceivings are 'made up'. How are we supposed to understand the phrase 'made up'? Now of course human agency is involved when we conceive of things. And of course what is conceived need not be actual. So, there is a trivial sense in which the evidence we conceive of is 'made up'. In the context of investigating *actuality*, that a piece of evidence is 'made up' in this sense is no doubt problematic. But

it is not obvious at all that being 'made up' in that sense is objectionable when we are seeking modal justification about the merely possible. I suspect Hawke's defense consists of mistakenly drawing intuition against 'made up' evidence in the context of investigation of actuality to the context of modal epistemology.

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A quick recap: we have examined arguments for what I call Type-1 moderate modal skepticism, the view that only conceivings about certain subject matter (namely, everyday life matter) yield modal justification. And I have presented reasons for thinking that these arguments all fall short of justifying a restricted modal epistemological appeal to conceivings, as oppose to the simple and unrestricted Imaginative Conservatism.

7 Type-2 Moderate Skepticism

As I've said, Type-1 skepticism is not the only kind of skepticism out there. There is also Type-2 skepticism, which does not draw the line between the good vs. bad conceivings by appealing to the *subject matter* of the conceivings. Type-2 skepticism can come in slightly different forms. But one feature unites them: they all find conceivings that are not based on the sensory too liberal to have any justificatory value.

Unlike Geirsson's and Hartl's work against the arguments for Type-1 skepticism, there hasn't been a focused response to the Type-2 skeptical worry in the literature yet. In this section, I will offer a response. My primary goal is *not* to prove Imaginative Conservatism, but to show that the arguments against it from the Type-2 skeptics specifically are not effective. I'll argue that there is no good reason for thinking that our imagination, sensory or not, is too liberal for modal epistemology.

Type-2 moderate skepticism is defended in slightly different ways by Gregory (2010) and Kung (2010). By contrasting their efforts, an assumption indispensable to an argument that targets the liberal nature of non-sensory imagination will be brought to light. I'll argue that this assumption makes the moderate position sought by the Type-2 moderate skeptics highly unstable.

It is noteworthy that, since both Gregory and Kung take conceiving and imagining to be the same thing and use the word 'imagining' extensively, I will use the word 'imagining' when I discuss their work (this is to avoid having to heavily edit their words when I cite them). Everything I say in the following remains the same by replacing all 'imagining' with 'conceiving'.

7.1 Gregory's Argument

Gregory's (2010) project is in fact *anti*-skeptical by nature in the sense that he explores and defends the modal epistemological relevance of some imaginings against the radical skeptics who think that imaginings have absolutely nothing to do with modal justification at all. Gregory distinguishes three kinds of imaginings — the sensory ones, the perceptual ones, and the non-imaginary ones, and then argues that, although the non-imaginary imaginings cannot provide modal justification and he leaves it open whether the perceptual ones can, the sensory imaginings can generate appearance of and hence pro tanto justification for possibilities. So, according to Gregory, *at least some* imaginings are relevant to modal justification. This is the anti-skeptical aspect of his project.

I classify Gregory's view as moderate skepticism (Type 2), however, because his acceptance of the modal epistemological relevance of imaginings is restricted.[15] Non-imaginary imaginings are,

[15] Some readers might resist applying the label 'skepticism' to Gregory due to the anti-skeptical aspiration of his overall project. But I think this is by large a mere verbal issue. I am calling Gregory a skeptic for the same

according to Gregory, not generating any appearance of possibilities and hence *not offering even pro tanto justification* for possibilities. So, despite the general anti-skeptical aspiration, there is a skeptical side to his project. And his argument for thinking that non-imaginary imaginings, unlike sensory imaginings, don't provide modal justification at all, if it works, would be an argument against Imaginative Conservatism, which says that *all* imaginings provide pro tanto modal justification. For our current purpose of defending Imaginative Conservatism, we are primarily interested in this skeptical aspect of Gregory's work.

To examine Gregory's skeptical argument, let us first get clear on the three kinds of imaginings Gregory has in mind. Suppose I imagine Teddy eating a blue tomato by visualization. Such an imagining involves sensory qualities, e.g., the imagined visual experience of blue. But the imagining involves not just those sensory features but also a *conceptual interpretation* of the imagery, e.g., a portion of the sensory image is **labeled** as Teddy. Such a conceptual interpretation is called an **assignment**.[16]

An imagining that consists of both imageries *and* assignments is an **imagistic imagining**. There are **non-imagistic imaginings**, too. I can imagine that water molecules are composed of four hydrogen atoms and two oxygen atoms. I can also imagine that space has five instead of three dimensions. Such imaginings don't involve any sensory imagery; I didn't and couldn't visualize a five-dimensional space. Such imaginings have assignments without sensory imagery.

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reason that van Inwagen is labeled a modal skeptic in the literature — both of them think that only some but not all kinds of imagining/conceiving are relevant for modal justification. I hope I have explained clear enough that, by calling Gregory a moderate skeptic, I am not conflating his view with the radical skeptics who think that no conceivings or imaginings are relevant to modal justification.

[16] Talk of 'labels' and 'assignments' is Kung's (2010) terminology, not Gregory's. I borrow Kung's terminology here because his framework for describing the different components in an imagining is relatively better developed.

Gregory believes that the imagining of p can be a rational guide to the belief that p is possible *only when* the imagining of p makes p *appear* possible. Non-imagistic imaginings, according to him, do not make anything appear possible. Therefore, non-imagistic imaginings do not even provide defeasible pro tanto justification for possibilities. They have no modal epistemological value, unlike imagistic imaginings, which offer pro tanto justification for possibilities by making things appear possible.

The question is, why does Gregory think that the non-imagistic imagining that p does not make p appear possible? In his own words:

> Reconsider, first, our [A]-imaginings [i.e. sensory imaginings]. If we were to accept that we cannot have sensations of the type specified in [A], we would view our [A]-imaginings as having misinformed us about our sensory capacities; in that respect, our imaginations would have generated illusions. But if we were to accept that universes can only have finitely many stars, we wouldn't similarly regard our [B]-imaginings [i.e. non-imagistic imaginings] as misinforming us about what's possible—our [B]-imaginings wouldn't themselves have had an illusory character. (2010: 329)

Gregory's argument seems to be that, if non-sensory imagining of p makes p appear possible, then we would find the non-sensory imagining illusory and misleading if p turns out to be impossible. However, Gregory thinks that we would *not* find our non-sensory imagining of p misinforming even if it turns out that p is not possible. Therefore, he concludes that non-sensory imaginings do not make things appear possible in the first place.

It seems pretty clear to me that, if I conceive of p in a non-imagistic way but it turns out that p is not possible, I *would* consider my non-imagistic conceiving misleading. Before learning about

Russell's paradox, I found a set of all the things that do not contain themselves as member conceivable. And that non-imagistic conceiving led me to think that a set of all the things that do not contain themselves as a member is possible. Once I learned about the paradox, I realized that my original conceiving was *misleading*, indicating that the conceiving *did* make the set seem possible to me. I was misled by my imagining. Thus, Gregory's argument against non-sensory imaginings is based on a very questionable premise, one that is not evident enough to be the basis of a compelling argument for thinking that non-imagistic conceivings don't make things appear possible.

Gregory goes on to say:

> In particular, our imaginative imposition of non-imagistic constraints is like mere supposition and mere labelling in the following respect: our having imposed the constraints doesn't generally make their satisfaction appear possible, no more than mere suppositions and mere labellings typically produce appearances of possibility. In that sense, nothing generally 'follows from' a nonimagistic imagining concerning the possibility of its objects. (2010: 330)

This remark should not be read as an attempt to *argue* that, first, our non-imagistic imaginings are like suppositions, and second, our suppositions do not make what is supposed appear possible, *therefore* our non-imagistic imaginings do not make the imagined appear possible too. The remark cannot be read this way because there is an important difference between our non-imagistic imaginings and our suppositions: There are things that we can suppose but cannot imagine (in a non-imagistic way).

We suppose things that are *plainly contradictory* for the sake of reductio all the time — or just for the sake of it. Plain contradictions are *inconceivable*. Say I grant that some impossibilities can be

imagined. (See Kung 2010: 626, also footnote 19 below.) But not all impossibilities are plain contradictions: it is not contradictory that water is XYZ, even though it is necessarily false. I'm also ready to concede that contradictions are also conceivable as long as they are well concealed. But *plain* contradictions like an apple's being both red and not red are inconceivable.[17] Most people believe that explicit contradictions are impossible. How would people justify that modal belief if they were to justify it? It is unlikely that their justification would have anything to do with the difficulties in developing paraconsistent logic systems. Instead, it is most likely that people will say they believe that explicit contradictions are impossible because they cannot conceive of whatever explicit contradictions we are considering.[18] If the range of non-imagistic imagination and the range of supposition are not the same, we cannot *argue* that non-imagistic imagination does not make things appear possible *simply because* supposition doesn't.[19]

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[17] Geirsson (2005) makes a similar point about the inconceivability of contradiction. But I disagree with him when he says that this is due to the fact that we *cannot understand* contradiction. Non-sensory conceiving should not be identified with understanding. And that is exactly because we *do* understand contradiction; otherwise, we wouldn't be able to understand a reductio argument. (See also Yablo (1993) for a similar point.) Here I am not *arguing* that plain contradiction is inconceivable; I am *stating* as an introspective fact about our propositional attitudes that I cannot conceive of contradictions.

[18] For what it is worth, I do not think it can be conceived that something is completely red and completely blue at the same time. Not only is this not explicitly contradictory, this is not a contradiction at all.

[19] This is a reason to reject Currie & Ravenscroft's (2002) view that non-sensory imagination/conceiving ***just is*** assuming (9). Similarly, Ichikawa & Jarvis (2012) defend the view that non-sensory imagination just is some kind of supposing. But to avoid the kind of worry I raise here, they add that imagining that p is supposing that p ***and*** finding no absurdity among p's immediate logical consequences. Adding the bit about no immediate logical absurdity is to avoid the *imagining* of the plain inconsistencies, which can be *supposed* as I pointed out. Technically, that extra bit can do the job. I have my concerns about Ichikawa & Jarvis' approach, but addressing that is beyond the scope of this paper. Instead, I will just point out that, by adding that extra restriction on imagining, we are already admitting that imagining is more restrictive than supposing and hence

More importantly, even Gregory acknowledges the difference:

> The range of things which we are capable of supposing outruns the range of things which we are typically happy to regard as imaginable. For instance, we can suppose that explicit contradictions hold, but more people deny being able to imagine explicit contradictions. I have no idea why this discrepancy exists. (2010: 330, footnote 26)

So he admits that 'more people' are inclined to draw a distinction between supposing and imagining when it comes to explicit contradiction. That alone should make it dialectically problematic for one to argue that imaginings have no modal epistemological value simply because supposings don't. Such a move is questionable even if Gregory himself appears to have reservations about the discrepancy. After all, although people's self-reports about their mental states are fallible, they should be taken seriously. As long as Gregory does not give us a compelling reason to think that the majority are wrong about their own mental states in this regard, such self-reports should be taken at face value.

It is due to this discrepancy that Gregory needs to *qualify* the alleged similarity between our non-imagistic imaginings and our suppositions in the follow way: they are similar in the sense that they both do not make things appear possible. But, of course, if this is the way to spell out the intended similarity between our non-imagistic imaginings and our suppositions, we cannot rely on this similarity to *argue* that our non-imagistic imaginings do not generate the appearance of possibilities without begging the question.

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one can't directly infer from what supposing can't justify to what imagining can't justify. (That is *not* what Ichikawa & Jarvis does.)

The comparison with supposition shouldn't be read as an argument for skepticism against the justificatory value of non-imagistic imaginings. However, the fact that Gregory made that comparison in the first place gives us some hint about what exactly about the non-imagistic imaginings that inspires his suspicion that non-imagistic imaginings do not produce appearances of possibilities. It seems to me that the suspicion stems from the fact that, just like our power of forming supposition, our power of non-imagistic imagination is *very liberal*.

But this suspicion alone doesn't yet give us any compelling argument against appealing to non-imagistic imagination in our modal epistemology. The world could have been *wildly different in numerous ways*. If so, it's simply to be expected that, whatever capacity we can rely on to form a broad range of justified modal beliefs, that capacity is *meant to be very liberal* in granting possibilities. Thus, simply pointing out that our non-imagistic imagination is very liberal doesn't say much against non-imagistic imagination's modal epistemological value.

To build a case against non-imagistic imaginings, much more has to be said about the liberal nature of those imaginings — not just that they are *very* liberal, but in what sense they are *too* liberal to have modal epistemological value. Gregory fails to offer any explanation as to why they are too liberal to make things appear possible. Without such an explanation, we do not yet have a compelling skeptical argument. This is where Kung has more to offer.

7.2 Kung's Argument

Just like Gregory, Kung's (2010) project is meant to be anti-skeptical. It is an attempt to resist radical skepticism about the modal epistemological value of imaginings. He observes that we can imagine impossibilities. He takes this to show that our imagination is an unreliable source of modal justification. We should not rely on imagination for modal justification unless we can show that (i) there is a sub-category of imaginings that do not provide modal justification for a principled reason

and that (ii) all imaginings of impossibilities happen to fall neatly into this sub-category. By showing that, the imaginings of impossibilities would be 'quarantined' and prevented from threatening our appeal to *other* imaginings for modal justification. And Kung argues that *non-sensory imaginings* is the sub-category we need. (Kung's 'non-sensory imagining' is, roughly speaking, Gregory's 'non-imagistic imagining.')

Kung's anti-skeptical project is ill-motivated. Let us grant him that we can imagine impossibilities. (Otherwise, there is no issue about reliability to begin with.)[20] But still, that alone doesn't show that imaginings are unreliable. For most advocates of conceivability-based modal epistemology, imaginings are meant to be a *fallible* guide to possibilities. So surely there are impossibilities that we can imagine. That does not mean our imagination is unreliable. It would not help to say that we can imagine impossibilities '*very easily*' (Kung 2010: 633), for 'reliability' is a *statistical* notion, not a notion about how much *psychological effort* we have to put into imagining

[20] Here I am just playing along with Kung's claim that we can imagine impossibilities. Kripke famously disagrees. He thinks that cases where we seem to conceive of something impossible are deceptive (e.g., we are not *really* conceiving that Hesperus is not identical to Phosphorus when we *appear* to do so). Although Kripke is very influential on the contemporary discussions of modality, I do not think this particular view is widely accepted. Although it is plausible to say that we are occasionally mistaken when we think we are conceiving of something impossible, it is not widely accepted that this is always the case. For example, one of the things that Chalmers's popular two-dimensional framework does is to pull apart two different layers/dimensions of mental content (primary vs. secondary intension). By doing so it allows conceivability (possibility along the primary intension) and metaphysical possibility (possibility along the secondary intension) to come apart. It is conceivable that water is not H_2O in Chalmers's framework. See also Kung (2016: footnote 11) and Ichikawa & Jarvis (2012) about the Kripkean view that we cannot imagine the impossible. Furthermore, since I am granting Kung the point that we can imagine impossibility, I set aside Byrne's (2007) view. This view holds that to say that p is conceivable just is to say that p is possible, not only because the two can come apart, but also because, presumably, I can *coherently and meaningfully say* that they come apart.

impossibilities. Since I can imagine a vast number of things that are unquestionably possible, it remains far from obvious that imaginings are indeed unreliable.

Setting the concern about Kung's anti-skeptical project aside, what we want to focus on is the skeptical aspect of his work: the part where he says that there is independent reason for thinking that non-sensory imagining is not a source for modal justification. As long as that independent reason stands, we have an argument against Imaginative Conservatism.

Kung argues that there are three restrictions upon non-sensory imagination: (i) certainty about otherwise, (ii) incoherence, and (iii) imaginative resistance. For a statement S, we would fail to conceive that S when we're absolutely certain that not-S, leaving us no room for imagination. And we would also fail to imagine that S when imagining that S is to imagine something incoherent. Finally, imagining that S is sometimes difficult when we're, for whatever reason, unwilling to find S conceivable and hence experience what philosophers sometimes call imaginative resistance. So, I can conceive that S as long as (i) I'm not certain that not-S, (ii) S is coherent with what I believe, and (iii) I'm willing to conceive that S (2010: 628-633).

But, according to Kung, the fulfillment of these three conditions doesn't seem to relate us to modal truths. For example, on condition (i), Kung says:

> Believability just is lack of certainty. […] It would be very odd if our non-certainty counted as evidence of P's possibility. […] [T]o be non-certain is to fall short of the very best epistemic position one can be in […]. We need positive evidence for our claims of possibility, but assignments don't provide it; they merely reflect our less-than-ideal epistemic position. (ibid: 634)

Kung says it would be 'very odd' for believability (i.e., non-certainty of some sort, according to Kung) to provide modal evidence. But why is it very odd? If we can't tell what's so odd about it, we can't just assert that assignments don't provide evidence for possibility. I take it that this is the supposed oddity: Non-certainty is about our less-than-ideal epistemic position and that doesn't seem to be related to any modal truths. Thus, this constraint on assignments has no modal epistemological value. And something similar can be said about all three constraints: 'What this means is that none of the three constraints on imagining — certainty, conceptual, or conative — have any epistemic features to support assignments as evidence for possibility' (ibid: 636).

The constraints on non-imagistic imagination are not related to truths about possibility. That's why Kung thinks that, if non-sensory imagination is a faculty that works as long as the three conditions are met, it's *too liberal* a power to have anything valuable to say about modality. Hence, non-sensory imaginings don't provide even prima facie justification for modal beliefs and, in his own words, '[t]he reason is that stipulations and labels [i.e. the non-sensory assignments] are **virtually unconstrained**, and what minimal constraints there are have no modal epistemological value' (Ibid: 634; my highlighting).

Kung's argument isn't just based on the claim that imagination is very liberal. He explains why imagination is *too liberal* or *insufficiently constrained* by appealing to the fact that the only three constraints on non-sensory imagination don't seem to stand in any relevant relation with modal truths for the non-sensory imaginings to be a source of modal justification. That's why Kung's skeptical argument is immune to my concern about Gregory's attempt.

7.3 A Dilemma for Moderate Skepticism

Comparing Gregory's and Kung's arguments for Type-2 moderate skepticism shows the need for them to explain satisfactorily why non-sensory imaginings are not just very liberal, but *too liberal*

for modal epistemology. Kung argues that the way to do so is to say that the restrictions on non-sensory imagination don't seem to relate our imaginings to modal truths. We have seen how he does this by proposing the three restrictions on non-imagistic imagining.

I am sure that many would have doubts about each of the three restrictions.[21] I am not committed to the truth of these three restrictions. But I am not going to challenge them either. What I want to focus on is Kung's *general skeptical strategy* against the epistemological value of non-sensory imaginings. It is a strategy that helps fill in the gap that Gregory's attempt leaves open. The strategy begins by locating the constraints of non-sensory imaginings; then, by pointing out that those constraints do not relate our imaginings to modal truths, Kung appeals to the absence of a relation to modal truth as evidence against the epistemic relevance of those non-sensory imaginings.

The aforementioned skeptical strategy requires an assumption that is not yet explicit. Simply pointing out that X doesn't seem to be restricted in a way that is related to modal truths does not yet show that X is not a source of modal justification, *unless* we assume that being restricted in some way that is related to modal truths is necessary for something to be a source of modal justification. But that assumption poses a dilemma for the moderate skeptic. Why doesn't this concern about non-sensory conceivings challenge the epistemic value of our sensory conceivings too?

Kung says: 'Basic qualitative [i.e. sensory] contents are not unconstrained the way assigned [i.e. non-sensory] contents are, and so the foregoing concerns about assigned contents do not transfer to qualitative contents' (2010: 635). But the mere fact that the sensory conceivings are restricted by more than the three allegedly irrelevant limitations upon non-sensory conceivings doesn't make the sensory conceivings seem to be restricted *in a more relevant way*.

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[21] Yablo, for example, would have a major qualm with Kung's claim that believability is the major restriction on non-sensory imagining.

If the thought is that it'd be odd to say that the constraints on the non-sensory imaginings are evidence for modal beliefs in the sense that those constraints *don't seem to be related to modal truths*, it is not at all clear the constraints on sensory conceivings are any better. Do the constraints on the intrinsic qualitative features of my sensory imaginings really seem to be related to the wild modal reality, e.g., the possibility of a pink flying donkey? They don't seem any more related to modal truths than the constraints upon non-sensory imaginings. By parity of reasoning, shouldn't Kung be more radical in his skepticism about the epistemic value of our imaginings? What is so special about sensory imaginings that they can avoid the problem?

To explain the specialness of the sensory imaginings, Gregory writes:

> Here is one way of incorporating appearance-based approaches to the imagination within a scheme for the justification of ascriptions of possibility. Begin with the idea that we are entitled to accept whatever is presented as being the case by some nondoxastic seeming [i.e. sensory appearance]. Next, take some occasion on which you imagine an *F*, with something's thereby appearing to you to be the case, where the accuracy of the foregoing appearance seems very obviously to imply the possibility of *F*s. Then (and assuming that you're entitled to assume that the previous implication holds) you are entitled to accept that *F*s are possible. Hence your belief was in fact justified by your initial imagining. (2010: 327)

If I understand Gregory's reasoning correctly, the thought is that evidence for actuality is evidence for possibility. Sensory imageries are evidence for actuality; therefore, they are evidence for possibility. Sensory imaginings contain sensory imageries. That is why those imaginings are evidence for possibility. And this is a feature that non-sensory imaginings do not have.

This is an interesting suggestion, but I do not think it works. By simply visualizing a red tomato, do I thereby have any evidence at all that there is actually a red tomato? *Of course not*. Thus, sensory imageries *alone* clearly do not justify claims about actuality; only sensory imageries *embedded in perceptions* do. Since the sensory imageries in our sensory imaginings are not embedded in perceptions, they are not evidence for actuality. So, surely, Gregory is right that evidence for actuality is also evidence for possibility. But that gives us no reason at all to think that sensory imaginings provide evidence for possibilities while non-sensory imaginings do not.

About the specialness of sensory imaginings, Kung says something that sounds similar:

> I think it is plausible that states with basic qualitative content provide evidence for possibility. The basic qualitative content of perceptual experience presents a way that space can consistently be filled around the perceiver. When my perceptual experience presents a red surface to my right and a black surface to my left, we theorists can say that, as far as the experience presents, a red surface on the right is consistent with a black surface on the left. That is one way that space could be filled. (2010: 637)

Kung appears to be making the same point as Gregory: the qualitative contents (i.e., the sensory imageries) provides modal justification in the case of perception, so it should provide modal justification in sensory imaginings as well. That is why sensory imaginings are special. However, there is a crucial difference. Kung explicitly denies in a footnote that perception of p justifies the possibility of p via (i) justifying the actuality of p plus (ii) the principle that actuality entails possibility:

> One way to block the intuition that qualitative contents provide evidence for possibility is to hold that we infer possibility from actuality; perceptual experiences furnish no evidence for possibility except insofar as can be inferred from actuality. (I.e., experience presents space in way W; the world is such that W; whatever is actual is possible; therefore, way W presents space consistently.)
>
> It strikes me that this confuses conceptual priority with epistemic priority. It may very well be that the concept of truth is more fundamental than the concept of possibility, and possessing the former concept is a prerequisite for acquiring the latter. But it does not follow that perceptual experiences cannot be a basic source of evidence for possibility. I think that is the more plausible view; and in fact I am inclined toward an even stronger line of reasoning: perceptual experience must provide evidence for possibility for it to provide evidence of actuality. (ibid: 638 footnote 22)

Kung thinks that sensory qualities provide modal justification *directly* — there is no inference from actuality to possibility involved. That makes his response immune to my objection to Gergory's response.

But Kung's assertion that sensory qualities provide modal justification directly is very controversial. And he offers no motivation, let alone justification, for the assertion. In particular, his response is not dialectically helpful in the current context, where modal skepticism is exactly the issue at stake. We want to know why having sensory imageries makes sensory imaginings *modal epistemologically special,* such that they can circumvent the skeptical concern for non-sensory

imaginings. Kung's answer is tantamount to just asserting that sensory imaginings are epistemically special.[22]

Kung is not unaware of the dialectical shortcoming of his assertion of our sensory imaginings' specialness:

> Although I think these considerations about basic qualitative content are plausible [i.e. that the qualitative content of sensory imaginings are not only bound by the three restrictions upon no-sensory imaginings], I realize they may not convince a hardened modal skeptic. I am engaged in what Pryor calls (with respect to external world skepticism) a 'modest anti-skeptical project' (Pryor, 2000, p. 517) for modal epistemology: showing that by starting with premises that we find plausible—rather than only those the skeptic will grant us—we can defend an imagination-based modal epistemology. (2010: 638)

Pryor et al. think that anti-skepticism doesn't have to be exclusively based on premises acceptable from a skeptic's point of view. Pryor thinks that, as long as one perceives that p, one has pro tanto justification for believing that p. We don't need any underlying theory to justify

[22] On a similar note, Gregory writes: 'Those are good questions and I've not got answers to them. […] But the queries just raised don't undermine the claim that sensory imaginings produce appearances of possibility; they merely underscore how hard it is to provide a philosophically adequate description of what's going on when imaginings produce such appearances' (2010: 332). I find such kind of hand-waving remark dialectically problematic, particularly in a context where Gregory is raising an argument against the epistemic relevance of non-sensory imaginings.

perception's prima facie justificatory value. This allows Pryor to *rationally resist* falling into skepticism, even if that reasoning cannot convince a skeptic in a non-question-begging manner.[23]

Kung tries to say something similar about the sensory conceivings. There's no non-question-begging argument against the radical skeptics who dismiss the epistemic relevance of any conceiving (sensory or not). But it can be a starting point for *non-skeptics* to think that sensory conceivings provide pro tanto modal justification. And such a starting point would allow philosophers like Kung to rationally resist falling into radical skepticism. The underlying constraints on the sensory imaginings don't seem to relate to modal facts? That's alright. Sensory imagining is a source of *foundational* modal justification that makes things seem possible. As a source of modal justification, its justificatory power does not need to be further explained by its underlying constraints' relation to modal facts.

However, I believe a double standard is at work in the way Kung uses Pryor's approach to defend the epistemic relevance of sensory conceivings *alone*. If Pryor's dogmatist approach works for defending the epistemic relevance of sensory conceivings, nothing prevents one from saying the same thing about conceivability in general. The skeptical worry about the non-sensory conceivings is basically in the same spirit as the radical skeptical worry about the sensory conceivings.

The underlying constraints on our non-sensory imaginings don't seem to relate to modal facts? That's alright. Non-sensory imagining is also a source of foundational modal justification that makes things seem possible. As a source of modal justification, its justificatory power does not need to be further explained by its underlying constraints' relation to modal facts. It seems that there is no principled way in which Kung can allow the dogmatist approach to save the sensory imaginings

[23] A similar approach in epistemology has been further developed to include not only perceptions, but seemings in general (whatever they are) by Huemer (2001; 2007) in the form of Phenomenal Conservatism.

from radical skepticism without allowing the same dogmatist approach to save the non-sensory imaginings from his own moderate skepticism.

It is certainly not logically inconsistent to treat the two kinds of imaginings differently. But his reason for holding the hybrid view puts him in a *dialectically* awkward position. As long as Kung doesn't want to be skeptical about sensory imaginations *for the kind of reason he offers*, the only fair thing to do is to accept that conceivings *generally* provide pro tanto modal justification, i.e., to accept Imaginative Conservatism.[24]

8 Radical Skeptics

I have argued that the general strategy for defending Type-2 moderate skepticism puts the advocates of Type-2 moderate skepticism in a dilemma: either give up the moderately skeptical argument and accept Imaginative Conservatism, or stick to the spirit of their skeptical argument and abandon imagination completely. There is no principled way that Kung's argument would work against non-sensory imaginings without also working against sensory imaginings. There's no well-motivated middle ground. Since the Type-2 skeptics don't want to give up sensory imagination, they should accept Imaginative Conservatism.

That might be good enough to persuade most Type-2 skeptics to embrace Imaginative Conservatism. But can they opt to give up sensory imagination instead, and be radically skeptical about the role of conceivings in modal epistemology? In a sense, this is what Fiocco (2007) does.

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[24] It is instructive to observe that it would not be helpful simply to point out that, with all the Kripkean necessary a posteriori truths around, it is *easier* to find non-sensory imaginings of impossibilities than to find sensory imaginings of impossibilities. The fact that it is easier does not mean it is *too easy*. Even if it is easier for non-sensory imaginings to get modal truths wrong, that would not explain why non-sensory imaginings do not provide modal justification at all.

Fiocco denies the epistemic relevance of imagination completely, which he deems too liberal to be epistemically relevant at all. He argues that, if we think that we can have modal knowledge at all, we have to follow Bealer (2002) in postulating a distinct faculty of modal intuition.[25] I'll complete my defense by arguing that, when it comes down to a choice between Imaginative Conservatism and radicalizing the skeptical argument, there's an *independent* reason for picking Imaginative Conservatism instead of doubling down on the skeptical argument.

If Kung et al. want to stick to the spirit of the argument and be radical skeptics about the epistemic value of conceivability, the skeptical argument should be radicalized in the following way: [a] if imaginings (sensory or not) are not too liberal to be epistemically relevant, they should be restricted in a way that somehow relates us to truths about possibilities. [b] But they don't seem to be restricted in such a way. Thus, we have a reason to think that, generally, conceiving is too liberal to be epistemically relevant.

My response is this. [1] Appealing to conceivings to justify beliefs about possibility is our current epistemic practice. [2] We shouldn't give up our current epistemic practice unless there's strong reason to do so.[26] [3] The radically skeptical argument requires a hidden assumption which is

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[25] I say 'in a sense', because Fiocco doesn't make the distinction between sensory and non-sensory conceiving.

[26] This is why I call my main thesis Imaginative *Conservatism*. It should be noted that Imaginative Conservatism is *neutral* with respect to Huemer's Phenomenal Conservatism, which says that *seemings* give us prima facie justification. Imaginative Conservatism remains neutral in the sense that it says nothing about seemings at all. As we have seen earlier, Gregory believes that if imaginings can offer modal justification at all this must be done via generating seemings of possibilities. And he believes that non-sensory imaginings do not generate modal seemings. In section 2, I granted Gregory the assumption and played along; I argued that Gregory has offered no good reason to think that non-sensory imaginings produce no modal seemings. So there is no reason for an advocate of Phenomenal Conservatism like Gregory to reject Imaginative Conservatism. But that does *not* mean I am committed to the claim that imaginings provide modal

very controversial. [4] The controversial assumption makes the radically skeptical argument too weak to demand giving up our current epistemic practice. Thus, if we have to choose between Imaginative Conservatism and the radically skeptical argument, it's more reasonable to choose the former.

Let's examine the premises of my response. My stance on [1] and [2] have been discussed earlier. I think whatever one's considered modal epistemology turns out to be, premise [1] is plausible. I take premise [2] for granted too. We can view [2] as a form of epistemic conservatism, which is defended in slightly different forms by, just to name a few, Quine (1953), Chisholm (1980), Kvanvig (1989), and McCain (2008). I find [2] rather intuitive and don't have much to add in its defense. But it'll take some work to justify [3] and [4].

8.1 The Hidden Assumption and its Motivation

Premise [3] says that there is a hidden assumption in the radically skeptical argument. Here it is:

> **[Truth Relating]** If X is the source of epistemic justification for our belief on a subject matter, X ***must be*** related to the truth on that subject matter in a way that does not have to be characterized in terms of epistemic justification.

The qualification 'in a way that does not have to be characterized in terms of epistemic justification' is needed to avoid trivializing the relation to truth the skeptics have in mind. Without this qualification, Kung's argument cannot go through, for defenders of Imaginative Conservativism can

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justification only if they generate modal seemings. A defender of Imaginative Conservatism has the option to reject Phenomenal Conservatism (perhaps by denying that there are such things as seemings). In fact, as the argument [1] - [4] shows, Imaginative Conservatism can be defended on the basis of being conservative about the standing epistemic practices, with no mentioning of seemings at all. I am grateful to an anonymous reviewer for pressing me to clarify the relation between my view and Phenomenal Conservatism.

then say that the constraints upon our conceivings are related to modal truths because our conceivings provide justification for believing that certain modal claims are true. What skeptics like Kung are getting at is a relation to modal truths that *explains* justification, not one that is characterized in terms of justification.

A tacit endorsement of this *necessary condition* for epistemic justification is the only reason for one to accept the radically skeptical argument's premise [a], namely: as long as it doesn't seem that our conceivings are restricted in a way that relates appropriately to modal truths, we have good reason to think that our conceivings do not justify modal beliefs.

It is fine to say that a certain relation to truth is sufficient for epistemic justification. It is, however, a different thing to say that it is necessary. Given that we appeal to so many different things to justify our beliefs/theories (e.g., perception, testimony, parsimony, mathematical elegance, moral sentiments, etc.) and *not all* of them are *obviously* truth relating, a monopolizing claim like Truth Relating isn't self-evident and needs proper motivation *if* we want to use it to challenge a standing epistemic practice. Certainly one can have the theoretical *aspiration* to try to unify all kinds of epistemic justification with a necessary condition like Truth Relating (e.g., Kelly (2004) tries to justify appeal to parsimony in terms of its truth conduciveness), and rule out everything else as an illegitimate source of epistemic justification. But for the radically skeptical argument to demand the abandonment of one of our epistemic practices, one needs to explain why there *must* be such a unifying necessary condition for epistemic justification. That is, Truth Relating had better be well-motivated.[27]

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[27] Questions about this single-minded conception of epistemic rationality have, in recent years, been raised not only by those who challenge epistemic consequentialism (e.g. Berker 2013), but also by some virtue epistemologists (e.g., Montmarquet 1993), by philosophers defending the idea of pragmatic encroachment (e.g., Fantl & McGrath 2009), and by feminist metaphysicians following Haslanger's ameliorative project

How can Truth Relating be motivated, then? As far as I can tell, the only way to motivate it would be to claim that epistemic value is a kind of instrumental value in the following sense: epistemic justification is *nothing but* a means or an **instrument** for guiding us to truth by recommending that we accept certain beliefs.[28] If we think that there can be some other goals for epistemic justification, we have no reason to rule out the possibility that there are sources of justification that do not relate to truth in the way that Truth Relating requires. For example, a descriptive metaphysician *might* think that part of the goal of metaphysics is to find a theory that is rational in the sense that accepting it, in addition to being psychologically realistic for us, enriches our lives. (See, e.g., Strawson 1962). Such a goal does not seem to be related to truth at all.

To see why Truth Relating is controversial and hence why [3] is true, we need to examine what this instrument-for-truth conception of epistemic justification implies by taking a little detour: We need to examine the concept of a ***good instrument***.

8.2 What Makes an Instrument Particularly Bad?

We can talk about the goodness of an instrument in two ways: either with respect to a *type* of job in a *type* of situation, or with respect to a job *token* in a situation *token*. For example, suppose a zombie is running towards me, and I am wondering whether my gun is a good instrument for killing the zombie. There are two different questions I might be asking myself.

First, I might be asking whether the gun I am holding is good for zombie killing (as a type of job) in a certain type of circumstance where a zombie is running. Let's call this a question about

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(2000; 2006). They all, in their own way, try to explore the idea that there are factors that can serve as reasons for theory choice that do not involve relating us to the relevant truths.

[28] I could be wrong and there might be other ways to motivate Truth Relating. I don't have an argument to show that this is the only way other than that this is the only promising way I can see.

General Evaluation. But, secondly, I might be asking whether my gun is good for killing this particular zombie in this particular circumstance (not this or that *type* of circumstance, but this circumstance in particular). Let's call this a question about **Particular Evaluation**. General Evaluation and Particular Evaluation can come apart. A lullaby can be *good generally* for getting a baby to sleep on a typical night; but that same lullaby can nevertheless be an instrument that is *not good particularly* for getting *this* baby to get to sleep on *this* night. Both evaluations (one positive, one negative) can be true of the lullaby as an instrument at the same time.

We know how to carry out a General Evaluation; all we need is to see whether an instrument is *statistically likely* to generate the desired result for a job type in the targeted situation type. For that reason, it's quite clear an instrument can be **good generally** for a type of job in a type of situation ***even if*** that instrument doesn't work for a particular job in a particular case, as I have illustrated with the lullaby case. How about Particular Evaluation? How do we carry it out? Unlike General Evaluation, I don't think that an instrument can be **good particularly** for *this* job in *this* situation if the instrument doesn't work for this particular job in this particular situation. That is, I endorse the following:

> **[Job Failed]** *If* x fails in doing a particular job in a particular situation, x is not a good instrument particularly for that particular job in that particular situation.

Whereas failing to do a particular job is not sufficient for an instrument to be evaluated as bad generally, failure is sufficient for the instrument to be evaluated as bad particularly. According to Job Failed, if I shoot *this* zombie in its head in *this* token situation and this zombie doesn't die, my gun is an instrument not good particularly for *this* token job in *this* token situation — it does not matter what exactly about this very zombie or this very situation that causes the failure. This is perfectly

compatible with saying that the gun is still an instrument that is good generally *for a zombie-killing job in that kind of situation*.[29]

Job Failed is motivated by the way we judge the instruments we use in everyday life. For example, Job Failed explains why we are inclined to say, in the lullaby case, that – if the lullaby fails to put this baby to sleep tonight – the lullaby is not an instrument that is good for putting *this* baby to sleep on *this* particular night, even though the lullaby may still be generally good for putting babies to sleep at night. It would be reasonable for us to switch to another lullaby exactly because of that. There is absolutely no point at all for insisting that the lullaby is good for putting *this* baby to sleep on *this very night* given that it does not work (whatever it is about this baby and/or this night that explains the failure).

The point generalizes to the Particular Evaluations of all instruments. Hence, actual failure is sufficient for a bad Particular Evaluation. When we talk about the goodness of an instrument, we need to be clear what kind of evaluation we care about.

8.3 Good Epistemic Justification as Good Instrument for Truth

Back from the detour. Suppose I have a particular belief B in a particular situation S. I wonder whether B is well justified. For the sake of argument, let's assume that epistemic justification is an

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[29] Note that saying that my gun is bad particularly for killing this very zombie Z does not immediately imply that it is irrational for me to pick my gun to kill Z. For, in picking my gun to kill Z, I might not be in a position to know that my gun is particularly bad for killing Z. We need to separate the metaphysical issue from the epistemic issue. Job Failed is about the metaphysical issue of what constitutes the goodness of an instrument for a particular job in a particular situation. What is rational for one to do at a time, however, is partly an epistemic issue, depending partly on whether one knows at the time which instrument is really good. Sometimes, we have to act by **betting** on what is good generally and hope that it is also good particularly. But the mere fact that it is rational to bet on something to work does not make that thing actually a good instrument for the job.

instrument for truth. Then, to ask whether B is well justified is to ask whether we have good instruments that guide us to truth by recommending B. Our discussion about instrument evaluation applies.

Given the distinction between the General Evaluation and Particular Evaluation of an instrument, and given that we are to view good epistemic justification as a good instrument of some sort, we should now ask ourselves: When we ask whether I have good epistemic justification for B, are we really asking (i) whether I have instruments that are good generally for targeting truth by recommending a certain *type* of belief in a certain *type* of situation, or are we really asking (ii) whether I have any instrument that is good for targeting truth by recommending this *token* belief B in this *token* situation, right here and right now?

Here is a simple argument for (ii). When we are wondering whether my belief B is justified, our concern is primarily about the truth of the following statement:

[a] I have justification for the belief B in this very situation S.

We would be disappointed as long as [a] is false. Since we are assuming that justification *just is* an instrument for targeting truth, we should be allowed to substitute 'have justification' with 'have a good truth targeting instrument for':[30]

[a'] I have a good truth targeting instrument for the belief B in this very situation S.

[30] If one resists the substitution, one basically resists the truth-targeting instrument conception of epistemic justification.

And what we said about [a] should apply to [a']. So, when we inquire about the justificatory status of my belief B, our *primary concern* is the truth of [a] and hence [a'].

Note that to say [a'] is our primary concern is just to say that having a good truth-targeting instrument *for this particular belief in this particular situation* is our primary concern. And that is tantamount to saying that Particular Evaluation is our primary concern when we inquire about the justificatory statuses of our beliefs — *assuming that* justification is to be understood as a truth targeting instrument. Our interest in General Evaluation, on the contrary, is secondary or derivative.

It is noteworthy that this conclusion echoes the way we think about ordinary instruments. When I want to put a nail through the wall of my office, I pick a hammer. By picking the hammer, my primary concern is that that hammer can put the very nail I am holding into that particular wall in my office. Surely I also care whether a hammer is *generally* a good instrument for putting nails in walls. But I care about that *only insofar as* the general goodness of a hammer is a hint of the fact that this hammer can put this nail through this wall.

As I have argued in our detour, Particular Evaluations of instruments are governed by the principle Job Failed. According to Job Failed, an epistemic justification for B is bad if it fails its particular job, namely, fails in guiding us to the truth by recommending B. That happens when B is false. As a result, an epistemic justification for B is bad if B is false. Generalizing this reasoning beyond the belief B, if Job Failed is true, then the assumption that epistemic justification is nothing but a truth targeting instrument implies that an epistemic justification is no good if the particular belief that that justification purports to support is false (i.e., if it failed at its job). Note that to have bad justification is to have no justification at all. So, our assumption has led to the claim that false

beliefs aren't justified at all. Surprisingly, this is infallibilism about epistemic justification.[31] So, although Truth Relating *itself* does not imply infallibilism, to accept Truth Relating not as brute but as a motivated principle, we have to accept a conception of epistemic justification that implies infallibilism.

Of course most people who accept Truth Relating (e.g., reliabilists) *want* to say that justified false beliefs are possible (after all, the plausibility of fallibilism is exactly the force of my argument). For example, when I hallucinate an apple on the table, most people want to say that, all else being equal, I am thereby justified in believing that there is an apple on the table even though there is no apple on the table. They can say so. I am not denying that it is consistent for them to *assert* both Truth Relating and fallibilism. The consistency of these claims is beside the point.

What I have argued is that, although the plausibility of fallibilism may urge us to deny that Particular Evaluation is the standard for good justification, the truth-targeting-instrument conception of epistemic justification tacitly requires us to accept that Particular Evaluation is the primary concern for justification. If the skeptics do not want Truth Relating to be an unmotivated brute assertion, their only option (that I can see) is to motivate it with the truth-targeting-instrument conception of epistemic justification. And it is this conception of epistemic justification that, whether they like it or not, entails infallibilism.

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[31] See Maitzen (1995) and Pollock (2004) for an argument in a similar spirit. This kind of argument is, as Maitzen points out, analogous to the argument against rule utilitarianism that it either turns into some form of rule worshipping or collapses into act utilitarianism. My argument, however, does not purport to challenge externalism as, e.g., Pollock (2004) does. I only question the motivation for accepting Truth-Relating as a ***necessary*** condition for epistemic justification; it may still be reasonable to consider certain externalist relations to truth to be ***sufficient*** conditions for epistemic justification and, hence, externalism could still be well motivated.

Let's take stock. The radicalized skeptical argument works only if we accept the hidden assumption Truth Relating, which expresses a necessary condition for epistemic justification. And the skeptics either have to accept Truth Relating as *brute*, or offer some motivation for Truth Relating. Since not all the things we rely on as sources of justification obviously relate to truth (e.g., parsimony), it is controversial whether we should accept Truth Relating as brute. This is not a reason to reject Truth Relating, per se. There is nothing philosophically wrong in itself in accepting something controversial as brute. The problem arises, however, when we have to choose between accepting that as brute or sticking to our standing epistemic practice, and we cannot have both. To motivate Truth Relating, however, we need to accept the conception of epistemic justification that it is nothing but an instrument for guiding us to truth by recommending beliefs to us. By arguing for a principle about instrument evaluation, I have shown that the truth targeting instrument conception of epistemic justification turns out to imply infallibilism,[32] which is, to say the least, extremely controversial. So, accepting Truth Relating is a controversial move no matter what; and that's why premises [3] and [4] are true. Since a crucial premise of the radically skeptical argument needs but lacks proper motivation, it's more reasonable to choose Imaginative Conservatism instead of doubling down on the skeptical argument to its radical end.

[32] As Maitzen (1995) points out, this observation (mis-)leads some philosophers to think that all it takes to have knowledge is to have true beliefs — justification is redundant. Going on a slightly different route, Steglich-Petersen (2009) defends the truth-aiming conception of epistemic justification by embracing infallibilism (see also, Littlejohn (2012) who argues that when a belief is false the best we have is an epistemic *excuse* from epistemic blame, not *justification*; and the intuition against infallibilism is based on confusing excuse and justification). It is also interesting to note that, defending infallibilism of perceptual justification, instead of eschewing justification, McDowell (2011) is led to think that all it takes to have perceptual knowledge is justified belief — truth is redundant.

8.4 Objection from Naturalism?

My response to the radical skeptics in section 6 - 8 has a significance for conceivability-based modal epistemology that goes beyond simply urging the moderate skeptics to resist the temptation to go radical. It also serves as a principled answer to what Yablo calls 'the objection from naturalism' against conceivability-based modal epistemology (1993: 3-4). According to the objection, appealing to conceivings cannot provide modal justification because conceivings are *causally isolated* from the relevant modal facts.[33]

Instead of answering the objection head on, Yablo simply responds by gesturing at our mathematical knowledge — which is *supposed* to have a subject matter to which we have epistemic access despite our being causally isolated from it. But such a gesture is dialectically weak. After all, it is not as if people generally think that such an objection does not apply to mathematical knowledge. Quite the contrary, something similar to the objection from naturalism manifests itself as the famous Integration Challenge in the context of mathematical knowledge (Benaceraff 1973).

Note that the objection assumes that, if conceivings are epistemologically relevant, there must be a causal relation between our conceivings and the modal facts. Let's call this the *Naturalistic Assumption*.

If Truth Relating requires motivation, so does the Naturalistic Assumption. That is because the Naturalistic Assumption is in fact a restricted version of Truth Relating. Whereas Truth Relating says that some relation to modal truth is a necessary condition for modal justification, the Naturalistic Assumption says more specifically that a *causal* relation to modal truth is a necessary condition for modal justification. An analogy might help: If we need proper motivation for thinking that there are some unicorns *in the universe*, then we need proper motivation for thinking that there

[33] I think this objection is similar in spirit to Peacocke's (2002) Integration Challenge about modality.

are some unicorns *in USA specifically*. If we aren't even motivated to accept the former, we most certainly aren't motivated to accept the latter. Therefore, if Truth Relating is not well motivated, neither is the Naturalistic Assumption.

Hence, my counterargument against the radically skeptical argument gives us the resources to resist the objection from naturalism as well: appealing to conceivings generally (sensory or not) for modal justification is part of our current epistemic practice, which should not be abandoned without good reason; the objection from naturalism is based on a premise that requires but lacks proper motivation unless we endorse the truth targeting instrument conception of epistemic justification, which implies the controversial infallibilism; therefore, the objection is not good enough to challenge the general appeal to conceivings for modal justification. The reasonable course to take is still to accept Imaginative Conservatism.

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Chapter Two

On Representational Humility

1 Achieving Mental Representations for Quantities

Over thirty years ago, Dretske wrote:

> Believing is easy, knowing is hard. Believing is easy because it is just a way of saying something in the internal language of thought. No trick at all once you have the language. Talk is cheap. […] Such is the conventional contrast between knowledge and belief. […] I think, though, that this picture distorts the epistemological task by grossly underestimating the cognitive demands of simple belief. Knowing is hard, but believing is no piece of cake either. (1983: 4-5)

He was right. Unlike the kind of mental effort required to acquire knowledge, forming beliefs does not require us to break any sweat. It is, however, a mistake to assume that, due to said effortlessness, having a belief is not a complicated matter that happens only under conditions not trivially met. Dretske's point can be generalized beyond beliefs to all intentional mental states: being in a mental state about something is a remarkable achievement, the success of which should not be taken for granted.

If to get our mind into a state about something is an achievement and 'no piece of cake', we should be willing to accept that our attempt can fail. That is, there must be a limit to our mind's intentional capacity. In this chapter, I aim to focus on the limits of our capacity to get into intentional states about the kind of property called **quantities**.

A rigorous definition for 'quantity' is difficult to formulate. I do not intend to offer one. But we all have a very rough intuitive grasp of the idea. Generally speaking, quantities are those properties

that come in fine-grained degrees/magnitudes. Temperature, length, duration, mass, pain, etc. are all typical examples of quantities. They all come in fine-grained degrees/magnitudes; for some of them we have an established scale of measurement, for others we don't. On the contrary, properties like *being a prime number* are not quantities. An object is either a prime number or it is not. I will rely heavily on our intuitive grasp of the distinction between quantitative and non-quantitative properties.[34]

I assume realism about magnitudes. That is, I take the magnitudes of a quantity, e.g., all the degrees of temperature, to be properties out there in the world. Their properties are neither constructs of our measurement practices, nor are they reducible to comparative relations (e.g., the relation of *less-than-or-equal-to-with-respect-to-mass*) among *objects*.[35] The magnitudes of a quantity (e.g. the various magnitudes of temperature) are *determinates* of the quantity (e.g. having temperature); the quantity is, therefore, a determinable of all its magnitudes. However, not all determinates of a quantity are magnitudes of that quantity. The degrees of a quantity are **maximally determinate ways** to instantiate that quantity. For example, *being 5 kg* is a magnitude of mass, but *being between 2*

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[34] The ordinary word 'quantity' is ambiguous between *count* (how many) and *magnitude* (how much). It is perhaps not an accident that some of the discussion about mental representation of magnitude talks about mental representation of count and mental representation of magnitude indiscriminately as if it is one single mental phenomenon (e.g., Feigenson (2007); Jacob, Nieder & Vallentin (2012)). Recently, Liebesmann (2014; 2016) *argues* that count just is a special case of magnitude; if he is right, then *the mental representation of* count and that of magnitude are instances of the same kind of mental phenomenon. Liebesmann makes an interesting case of his view. But I believe there is at least a prima facie distinction between count and magnitude. And I do not intend to engage in that debate here. In this essay, I uphold the distinction and will set the mental representation of the count of things aside as irrelevant to our investigation.

[35] The reductive and nominalist theory of quantity is developed in Ellis (1966), Forge (1987), Bigelow & Pargetter (1988), and recently Dascupta (2013). For the difficulties of a nominalist theory of quantity and various ways in which a theory of quantity based on magnitude realism can be developed, see for instance Swoyer (1987), Mundy (1987), Armstrong (1988), Eddon (2013), and Peacocke (2015).

kg to 5 kg and *being very heavy* are not magnitudes of mass, for the former has the further determinate *being 4 kg* and the latter has *being 10 tons* as a determinate. I find this claim rather intuitive. After all, it does not make sense to say that something has two masses: *being 4 kg* and *being between 2 kg to 5 kg*. And the most straightforward reason that saying so does not make sense is that magnitudes are meant to be maximally determinate.

Contemporary philosophical inquiries about quantities and their magnitudes focus mainly on two questions. First, there is the absolutism vs. comparativism debate, in which I have already taken a side when I said I am a realist about magnitudes; that is because realists do not think that talk about magnitudes is reducible to comparison among objects with respect to a given quantity. Secondly, there are philosophers who, following Suppes & Zinnes (1963), Ellis (1966) et al., devote their attention to the formalization and justification of our *measurements* of magnitudes (i.e., the representational theory of measurement).

In this chapter, my interest lies beyond these two major focal points in the contemporary philosophical literature about quantities. I am interested in investigating the limit of our capacity to have mental representations about magnitudes.

2 Introducing Representational Humility

An oft-cited passage by Heck is a good place to start:

> Consider your current perceptual state — and now imagine what a complete description of the way the world appears to you at this moment might be like. Surely a thousand words would hardly begin to do the job. […] Before me now, for example, are arranged various objects with various shapes and colors, of which, it might seem, I have no concept. My desk exhibits a whole host of shades of brown, for which I have no names. The speakers to the

> sides of my computer are not quite flat, but have curved faces; I could not begin to describe their shape in anything like adequate terms. […] The problem is not lack of time, but lack of descriptive resources, that is, lack of appropriate concepts. (2001: 489-490)

This passage expresses the widely shared opinion that perceptual content is richer than what we could articulate with our concepts. Our perceptions deliver information that we don't have concepts to fully articulate because 'my experience of these things represents them *far more precisely* than that, *far more distinctively*, it would seem, than any characterization I could hope to formulate, for myself or for others, in terms of the concepts I presently possess.' [ibid: 490; my italics].

The fact that I don't have such fine-grained conceptual resources deprives me of the capacity for *either naming or describing* the precise and distinctive way I perceive the world to be. In Heck's own words: 'My desk exhibits a whole host of shades of brown, *for which I have no names*' and 'it seems at least as hard to imagine that you now possess all the concepts that would be expressed by the words occurring in such a *description*' [ibid: 489; my italic]. For example, not only do I fail to have a name for, I also do not have conceptual resources to descriptively single out the very specific way brownness is perceived to be instantiated by my desk.

A closer look at the cases Heck brings up to motivate the claim about the perceptual richness (and the conceptual poverty) indicates that they are all cases of perceptual experiences of **quantities**, e.g., the *hue*, *brightness*, and *saturation* that form a shade of brown of the table, the *curvature* of the arc in which the leaf swings, the shapes, which are essentially combinations of *distances* on different coordinates, etc. It is my contention that the observation about perceptual richness can be understood as an observation about the richness of our *quantity perceptions*.

From the thought that perceptual content is richer than our concepts, some philosophers conclude that our perception must have *a special kind of mental content* that is distinct from the kind of

content propositional attitudes like belief can have, namely, the kind of content that does not go beyond the boundary of the concepts we possess. E.g. we cannot belief that rabbits are fluffy if we do not have the concept of rabbit. This special kind of mental content is called the non-conceptual content of perception. And the argument is usually called the Richness Argument for non-conceptual content of perception.[36]

There is a heated debate about whether it is valid to move from the observation about perceptual richness to the claim that perception has non-conceptual content. In spite of this disagreement, philosophers generally seem happy to accept the initial observation that perceptions represent quantities in a richer manner than our concepts. Those who think that there are no non-conceptual content simply don't think the observation is good evidence for the existence of a distinct kind of mental content (e.g., Byrne 2003, 2007; Speaks 2005; Heck 2007).

Certainly, there're philosophers who question even the initial observation that perceptual content is richer than conceptual content. McDowell (1994), for example, argues that we have implicit demonstrative concepts (e.g., *this magnitude of temperature*) at our disposal for each of the specific ways in which we perceive the world to be. So our perceptions aren't richer than our concepts. But it's safe to say that this view is firmly in the minority. And a standard response to such a minority view is to say that that kind of fine-grained demonstrative is psychologically impossible because it fails to 'satisfy some central criteria of concepthood' (Dokic & Pacherie 2001: 194) — we must be capable of *retaining and reliably re-applying* such super fine-grained concepts to legitimately claim that we possess those concepts, but:

[36] This kind of argument originates from Evans (1982).

> [I]f concept possession requires a certain recognitional capacity, the maximal fineness of grain of our perceptual concepts will correspond to the maximal fineness of grain of perceptual memory encoding. It is overwhelmingly unlikely that DCCs [i.e., demonstrative color concepts] meet this constraint and hence are associated with a recognitional capacity. (ibid: 198)

Given this standard response, which can also be found in Raffmann (1995), Kelly (2001), Peacocke (2001a), (2001b), Tye (2006), Wright (2003), the standard view is that not only do we actually lack concepts to capture the fine-grained way in which the world is perceived, it's *psychologically impossible* that we have such fine-grained concepts.[37]

My own inclination is with the majority: I find it plausible that our perception is richer than our conceptual capacities when representation of quantities is concerned. For my purpose, I want to focus only on this initial observation that our quantity perception is richer than our quantity concepts, and that the coarse-grained nature of our concepts makes it impossible for us to conceptually capture the precise and distinctive ways in which we perceive the world to be. I do not care whether this observation implies that there is a distinct kind of mental content.

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[37] It could be tempting to say that our quantity concepts cannot be less fine-grained than our quantity percepts because we have infinitely many number concepts. But that's a mistake. First of all, notice that magnitudes aren't numbers; our concepts of numbers aren't concepts of magnitudes. The number of our number concepts doesn't have to match the number of magnitude concepts we possess. Secondly, our ability to conceptualize quantity is limited in terms of fineness of grain because, as we have seen, we don't have the ability to reliably reapply quantity concepts as fine-grained as our quantity percepts. This limit on our conceptualizing ability isn't about the *number of concepts* we have. That we have infinitely many number concepts doesn't mean that we have the conceptualizing ability to ***apply*** any of those numbers to represent a specific magnitude as fine-grained as our quantity percepts.

Whereas philosophers in the debate about non-conceptual content have focused on comparing the richness of *two kinds of mental representations*, namely our perceptual and conceptual representations, I want to shift our attention to comparing our mental representations with *the quantities themselves*. If our quantity perceptions are richer than our quantity concepts, then surely the quantities themselves must be richer than our quantity concepts too. To present the point with an analogy: If photo A and photo B are of the same object O, and if photo B's resolution is too low to match the fine-grained way photo A represents O, then it obviously follows that the image provided by photo B is not rich enough to represent all the fine-grained details of O itself.

Let us take one further step back from our conceptual capacity, and consider our mental representational machinery as a whole. If we conceive of our minds' representation of the world like photos, it does seem more plausible to think that our minds are photos with a low/limited resolution — at least not having a high enough resolution to perfectly capture the fine-grained ways in which quantities are instantiated. So, perhaps we should not only believe in the poverty of our quantity concepts, but also the poverty of our quantity mental representations in general. I am inclined to say that anyone who feels the intuitive pull of the claim that our concepts are too coarse-grained to represent quantities as fine-grained as our perceptions do should feel a similar intuitive pull for thinking that our mental representations in general — perceptual or not — do not give us resources to represent quantities as fine-grained as the quantities themselves are.

So far, I have simply drawn upon some analogies to 'pump our intuitions' in the direction of being modest about our capacity to mentally represent fine-grained magnitudes. In this chapter, I aim to offer a proper argument for the coarse-grained nature of our quantity mental representations. My primary goal is to develop and argue for the following thesis:

[Representational Humility] Our mind cannot *specify* any magnitude of any quantity.

Three clarifications to the meaning of this thesis are needed before I can defend it properly.

(a) *Specificity vs. Determinacy*

To begin with, we need to distinguish 'specificity' from 'determinacy'. On the one hand, 'determinacy' is about a property's position in a determinable-determinate hierarchy. So, for instance, *being scarlet* is more determinate than *being red*, *being as hot as boiling water* is more determinate than *being very hot*. 'Specificity', on the other hand, is about the *manner* in which we talk/think about things.

That the two notions are distinct is best illustrated by the fact that one can specify a determinable instead of a determinate. I can meaningfully say, it is redness (not scarlet, not crimson, nor any more determinate shade of red) that irritates the bull. By saying so, I pick out *specifically* what irritates the bull even though what is being specified is not maximally determinate. Representational Humility is a thesis about our capacity to single out a particular magnitude — it just so happen that magnitudes are also maximally determinate.[38]

(b) *Specific vs. Nonspecific Thoughts*

[38] Our ordinary language is not always very clear about this distinction. It is not uncommon for people to speak of specificity when they mean determinacy. People are free to use their words their own way. I just want to bring attention to the distinction and stipulate a way to use the words 'specificity' and 'determinacy' that does not threaten to confuse the distinction.

Representational Humility does not imply that we cannot mentally represent magnitudes at all. The claim is just about mental *specification*. One can think about Fs nonspecifically without singling out any of those Fs in particular (i.e., without specifying any of the Fs). For instance, I can think about Black Friday shoppers nonspecifically without singling out any particular one.

If Representational Humility is true, this follows: Even though we may entertain true *nonspecific* thoughts about magnitudes, e.g., we can think that the glass of water instantiates *a* magnitude or *some* magnitudes, we cannot entertain thoughts with respect to *which* specific magnitude(s) is (or are) instantiated. To put the point *metaphorically*, it is *not* that we cannot think nonspecifically that there is *someone* in the bathroom, the claim is rather that it is not possible to entertain thoughts concerning *who*, specifically, is in the bathroom.

One can specify something either by referring to it, or specifying it indirectly by referring to something else. That is, one can specify something either via **reference** or via **quantification/description**. Let me illustrate with examples.

To begin with mental reference, the most straightforward way to mentally specify something is in terms of a mental proper name. Addressing the question 'who is in the bathroom?', I may think to myself, '*Teddy* is in the bathroom'. A proper name refers to an object specifically, setting it apart from everything else. Not just any person, but *Teddy* is in the bathroom. One can also specify the person in the bathroom by referring to that person via simple mental demonstratives, e.g., *this*.

We can also specify an object by combining mental representations to form a complex mental representation that quantifies over the object. That is to specify an object by referring to the *properties* and *relations* it instantiates (in a context). A paradigmatic way to single out an object by quantifying over it is to use *definite descriptions*. Addressing the question 'who is in the bathroom?', one can respond, '*the man I just met in the candy shop* is in the bathroom'. According to Russell's (1905) standard

analysis, a definite description is not a referring term. It is purely quantificational. 'The F' only involves reference to the property F.[39]

That a definite description purports to **identify something specifically** is brought to the fore by the contrast between (i) '*the killer* exists' and (ii) '*only one killer* exists'. Intuitively (to me at least), (i) says more than (ii). The claim (i) specifies something that is the only killer and says that *that particular thing* exists. The identity of that very thing matters. It is no accident that definite descriptions are standardly analyzed with the notion of identity. With (ii), however, the identity of the killer is not part of what is being said; all that matters is the *number* of killers.

(Usually, claims like (i) and (ii) are translated into first-order predicate logic in the same way, thereby obscuring the intuitive difference. Even if we accept that (i) and (ii) have the same truth-value in all possible worlds, that does not imply that (i) and (ii) say the same thing. That just means the difference between (i) and (ii) is hyperintensional. As we shall see in Chapter Three, there are good, independent reasons not to analyze enumerative claims like (ii) with the notion of identity, unlike (i). That vindicates the intuitive difference between (i) and (ii), and the intuition that (ii) does not invoke the identity of the thing being spoken of.)

Representational Humility says that we lack the mental resources to specify any magnitude. For example, we do not have the mental capacity to name a degree of temperature instantiated by the glass of water in front of me 'Teddy' and entertain thoughts about Teddy specifically (e.g., that Teddy is too hot for making tea). We cannot do that. But it is unproblematic to have **nonspecific**

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[39] Depending on one's view about the nature of complex demonstratives, one might think that using complex demonstratives is another way to specify something by description without referring to it (e.g., King 2001). For example, complex demonstratives like '*that* guy who wears funny hats' is an intelligible response to a who-question by quantifying over the person.

thoughts about magnitudes. For example, I can think that *one* temperature is instantiated by all boiling water; doing so does not involve specifying *which* magnitude of temperature is that.

(c) *Incapability of Specification vs. Mistaken Specification*

Finally, it is crucial to note that the claim is not that our specifications of magnitudes are doomed to be *mistaken*. The claim is that we are incapable of performing mental specification of magnitude. We are incapable of mentally representing magnitudes specifically by naming them, describing them, demonstrating them, etc., let alone being right or mistaken about our specifications.

I could be mistaken when I think that Teddy is in the bathroom because the person in the bathroom is in fact Susan, not Teddy. But despite the mistake, I have indeed performed a mental act of specification when I think that Teddy is in the bathroom (i.e., I have indeed specified Teddy, not anyone else). The thought simply fails to be true; I simply have specified the wrong person. For magnitudes, Representational Humility says we lack the mental resources to even specify any of them to begin with.

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Now that we are clear what Representational Humility means, I suppose the reader's initial reaction must be: of course we are capable of specifying a magnitude. We *appear* to do that all the time. We point at a glass of water and say, 'this temperature'. If anything is a successful performance of mental specification, this seems to be it.

I do not think that we are infallible about our own mental states. But I admit that, contrary to Representational Humility, there is a strong counter-intuition that we do think about specific

magnitudes all the time, and this counter-intuition is something that I have to explain away eventually in one way or another (section 6). But before we are in a position to even start trying to explain the counter-intuition away, I have an argument to offer, which purports to show that, *despite appearances*, we cannot mentally specify any magnitude. Presenting this argument is the primary task of this chapter.

My argument for Representational Humility comes in two steps. **Section 3:** I will first focus on the limitation on mental specification of magnitudes *via reference*. **Section 4:** Then, I will argue that mental specification *via quantification* requires the capacity of mental specification via reference. For that reason, we cannot mentally specify any magnitude via description either. I conclude that there is a general limitation on our mind's capacity for specifying magnitudes, i.e., Representational Humility. **Section 6:** Finally, I will offer an alternative explanation for the appearance that we specify individual magnitudes to ease the apparent counter-intuitiveness of the view.

3 Step One: Against Specification via Reference

3.1 Introducing a Hypothesis: Mind Computes Representations

I take the following claim to be a *hypothesis* or *assumption*: Our mind is a computer that processes inner mental representations;[40] it is via mental representations that we *refer* to things. Some of these

[40] It is common to describe these mental representations as *inner*, in contrast to external representations like words written on a piece of paper or road signs. Recently, questions have been raised about the inner/outer distinction in the philosophy of mind (e.g., Farkas 2003; Gertler 2012). It is worth noting that that debate pertains mainly to the inner/outer distinction in the *content* internalism vs. externalism discussion. I believe that the notion 'inner' in the context of the computational conception of the mind is distinct from the notion 'inner' in the content internalism vs. externalism debate. For example, when we speak of inner mental representation, we by no means imply that the mental representation has to be introspectively available to the subject. Due to considerations pertaining to Clark & Chalmers' (1998) Extended Mind Thesis, I leave it open whether inner mental representations have to be inner in the sense of being inside our skull.

mental representations are sensory and figure in our perceptions and sensory imaginings; others are non-sensory like concepts.

As part of the hypothesis, mental representations are *theoretical postulates*. They help us explain our bodily and mental behaviors/functioning; just like any theoretical posits, the explanandum includes not only our *actual* bodily and mental functionings, but also the *potential* ones. For example, we posit the existence of a mental representation <CUP> that represents cups in order to provide systematic explanations for my actual and potential cup-related behaviors and emotional responses, e.g., having the tendency to smash a cup if I am angry, appearing somewhat systematic in our reasoning about cups, etc. The postulation of mental representations *as units of computation* is a common hypothesis. Its adequacy can surely be debated. But I am going to take that as a starting point.

To understand the hypothesis correctly, it is instructive to distinguish **mental representations** and **intentional mental states**, e.g., belief, perception, etc. Roughly put, intentional mental states are mental states that are *about something*, e.g., currently I am in a belief state about bagels and a perceptual state about the lovely smell of a freshly baked bagel. My hypothesis says that these intentional mental states are states that should be *theoretically analyzed* as being partly constituted by inner mental representations. These inner mental representations are theoretical posits in our analyses of intentional mental states.

The distinction between intentional states and mental representations is particularly clear when we realize that it is coherent to think that our intentional mental states are real *without* thinking that our mind computes inner representations. For example, some philosophers think that intentional mental states are real but the proper model of these mental states should be connectionist and mirror the *neural network* of our brain. And *some* of these connectionists believe that doing so does

not require the notion of mental representation as a computational unit at all, and hence we should give up thinking about our mind that way.[41]

The point of highlighting the distinction is to emphasize that my assumption is not primarily about the nature of intentional mental states (of course there are implications about them). My hypothesis is not saying (nor denying) that intentional states like beliefs and perceptions are theoretical posits. It is a theoretical postulation, however, to speak of inner mental representations, in terms of which the intentional mental states are analyzed. I am thereby distancing my hypothesis from the *theory-theory* about folk psychology.

Eliminative materialists argue that the mental talk in our ordinary life (i.e., our folk psychology) is a *proto-scientific theory* we introduce to explain our behaviors, and since our neural-scientific theory will do the job much better, we will, in the long run, eliminate our ordinary folk psychology like all the out-dated scientific theories we discarded in the history of science. As a result, the eliminativists argue that the categories employed in our folk psychology (e.g. 'belief', 'pain', etc.) will not survive in our final theory of the mind and so we should conclude that there is in fact no such thing as belief, pain, etc. The view that our folk psychology is in fact a theory like any other scientific theory and mental states like belief and pain are theoretical posits similar to ether and phlogiston is the *theory-theory* about folk psychology (e.g., Churchland (1981); see Paul (2015) for a theory-theory limited to our intentions). According to this controversial view, the intentional mental states are theoretical

[41] E.g., Churchland (1989) and Horgan & Tienson (1996). For an interesting example of non-connectionist reason against postulating mental representations, see Brooks (1991). I am, however, sympathetic to Fodor & Pylyshyn's (1988) suggestion that a connectionist model is better understood as modeling the neural *implementation* of, and hence not competing with, the computational conception of the mind.

posits for explanatory purposes as well. I hope I have made it clear that my hypothesis takes no stance on this issue.[42]

Finally, it is also worth pointing out that the hypothesis that our mind is a machine that computes mental representations is commonly associated with physicalism. But, the way I see it, there is nothing about the hypothesis *per se* that *demands* physicalism. For example, substance dualism is totally compatible with the hypothesis in that one may think the mind is a non-material substance that processes non-material internal symbols. Thus, my subsequent discussions based on this assumption should speak to physicalists and non-physicalists alike.

Just like any theoretical posits, the postulation of mental representations is driven by explanatory needs. For example, although it may sound very natural now, postulating mental representations to analyze visual experiences was a move first taken seriously because of experimental results about our behaviors:

> In 1971, Roger N. Shepard and Jacqueline Metzler made line drawings of simple objects that differed from one another either by a three-dimensional rotation or by a rotation plus a reflection […]. They asked how long it took to decide whether two depicted objects differed by a rotation and a reflection or merely a rotation. They found that the time taken depended on the three-dimensional angle of rotation necessary to bring the two objects into correspondence. Indeed, the time varied linearly with this angle. One is led thereby to the notion that a mental rotation of sorts is actually being performed […]. [U]ntil then, the

[42] I'm grateful to the audience in my presentation at the OZSW conference in Amsterdam for pressing me to clarify my hypothesis and its relation to the theory-theory. I try to keep the distance between my hypothesis and the theory-theory because the theory-theory is controversial; assuming it would reduce the dialectic force of my argument.

> notion of a representation was not one that visual psychologists took seriously. This type of experiment meant that the notion had to be considered. (Marr 1982: 10)

Based on the hypothesis, our mind refers via its mental representations. Examining what mental representations we should or should not posit will shed light on the limitation of mental specification via reference. Hence, reflecting on these mental representations *as theoretical posits* according to norms that govern theoretical postulations can give us valuable insights that help us *refine* and *adjust* the way we think about our intentional mental states, which we have a (fallible) grip on pre-theoretically. What we will have is then a spiral of illumination. We start with things that we have a rough pre-theoretical grasp of (intentional states); then, we make sense of these things via theoretical models and theoretical posits (mental representations); and finally, reflections on these theoretical models and posits urge us to refine our pre-theoretical conceptions of things. I believe such reflection speaks in favor of Representational Humility.

3.2 Introducing the Notion of Representational Resolution

Let us begin by borrowing Dretske's (1981: 139-141) classic example of the mechanism for representing the magnitude of speed instantiated by a car. A car has a speedometer that reads the speed of the car. Suppose the information is then fed into a converter which has four outputs. If the speed range is between 0 to 14 mph, it should register the signal output #1; if it is between 15 to 24 mph, the signal output #2; 25 to 49 mph, output #3; and 50 to 99 mph, output #4. These output signals are then used to determine the vehicle's automatic transmissions among gears. (I have changed some details in Dretske's example for the sake of convenience.)

The content conveyed by the 4-output representational system is not as fine-grained as the content conveyed by the speedometer. Let us say that the 4-output representational system and the

speedometer differ in terms of **representational resolution**. (The notion is to allude to an analogy with the resolution of images.) And the 4-output representational system has limited representational resolution (just in the same way that a blurry photo has low resolution).

To further articulate the idea of limited representational resolution, let me introduce the idea of **representation satisfaction**. The concept <LION>, which is a mental representation, is satisfied by lion as a species. The concept <SANTA CLAUS>, however, is not satisfied by anything (unless one defends Thomasson's (1999) or Kripke's (2013) theory of fictional objects, in which case the concept would be satisfied by Santa Claus as an abstract object).

A representational system for some objects Os has **limited representational resolution** if and only if the singular representations (in contrast to plural referring representations, which we will set aside in this work) that the system processes *can be satisfied by more than one* of the Os individually. For example, suppose, during a mathematical proof, I say 'let n be a random odd number'. The notion 'n' is a singular representation that refers to only one odd number, but it isn't meant to represent any odd number in particular; I am not saying 'let 3 be a random odd number', for instance. Suppose I then say 'n is the sum of 1 and an even number'. This singular statement can be made true by multiple odd numbers *individually*. That means the singular notion 'n' can be individually satisfied by multiple things. The notion has a limited representational resolution — *it isn't picky about what it represents*.[43]

[43] Fine and Tennant think that a notion like 'n' in my example actually singles out something they call an *arbitrary object* (Fine & Tennant 1983; Fine 1985). They think that: 'In addition to individual objects, there are arbitrary objects; in addition to individual numbers, arbitrary numbers; in addition to individual men, arbitrary men' (Fine & Tennant 1983: 55). I must confess that I have never really understood what an arbitrary object is supposed to be. For that reason, I will have to set their suggestion aside. What I aim to do here is to get the readers into the headspace of the idea that there can be singular representations that can be satisfied by multiple objects.

Focusing on representation for quantity instantiation, a representational system for the magnitudes of a quantity has limited representational resolution if and only if the singular representations processed by the system can be satisfied by more than one magnitude of the target quantity. For example, the 4-output system for the speed of a car we talked about earlier is limited in representational resolution because all four of the *singular* representations the system produces can be satisfied by multiple speeds of the car individually. For instance, Output #4 is singular, for it does not represent the car to be in more than one speed, and it can be satisfied by multiple magnitudes of speed.[44]

Now some might feel tempted to insist that each of the four outputs in fact singles out a particular speed magnitude. For example, although the system gives us output#4 as long as the car is running between 50-99 mph, output#4 actually only represents and can only be satisfied by one particular magnitude. And the reason that we do not complain and do not consider the system malfunctioning for giving us output#4 for any speed between 50-99 mph is purely pragmatic: it is good enough for our purpose. The idea is supposed to be very much like a kid who utters the word 'dog' whenever he sees a four-legged hairy animal. We may have no intention to correct the kid for pragmatic reasons (maybe we don't want to upset him because of his rich and powerful parents); but that does not alter the fact that the word 'dog' refers only to dogs, not just any four-legged hairy animal.

This isn't a plausible way to view the 4-output system. When the kid labels a cat 'dog', we might have pragmatic reason not to bother correcting him. But although we decide to let it go, we are still inclined to say that it is indeed a mistake for him to apply the word 'dog' to a cat. There would be

[44] I do not think much hangs on this, but I prefer saying that each of the four outputs are satisfiable by more than one magnitude instead of saying that each of the outputs are satisfied by a particular range of magnitudes. It remains true that it cannot tell us about which particular speed the car is traveling at.

nothing to let go of if it were not considered a mistake in the first place. In the case of the 4-output system, however, I do not think anyone would say the system has made a mistake when output#4 is shown in response to the car's running at 70 mph. By not complaining about the output, we are not letting go of a mistake due to pragmatic reasons, for there is no mistake to begin with. Hence, I find it much more plausible to say that the four outputs are singular representations that are individually satisfiable by multiple magnitudes.

(Perhaps it is worth emphasizing that, *therefore*, what I am getting at with the idea of limited representational resolution should be distinguished from the statistical notion of **variance**. For example, a representational state for temperature S may be triggered by a range of temperatures that converge on a mean value. S may be taken to stand for or represent that very mean value specifically. The *variance* of S indicates how much the error cases — the production of S is an error as long as it is produced by a temperature other than the one value it stands for — crowd towards the mean value. Since S stands for a very specific value of temperature, it is picky about what it represents and can be satisfied by only one particular temperature. That is consistent with the claim that it has a non-zero variance, which is about S's range of statistical *error*. On the contrary, when a representation is said to be satisfiable by more than one thing, it is not a claim about the representation's range of error.)

As long as one agrees with what I say about the 4-output system, it seems clear that even if we increase the representational resolution of the system by making it a 5-output or 6-output or even 50-output system, the outputs will still be satisfiable by multiple speeds, and the system would still have a limited representational resolution with respect to speed. And as long as the system is still limited in terms of representational resolution, it cannot tell us anything about any particular magnitude of speed.

3.3 Argument for a Limitation on Mental *Reference*

As an empirical hypothesis, our mind is a representational system — like Dretske's 4-output system. Here is an argument about the limitation of our mind's representational resolution with respect to the quantity of temperature:

> (1) If a representational system processes only singular representations for magnitudes of temperature that can be satisfied by more than one magnitude of temperature, then the system does not process singular representations that *refer to* any magnitude of temperature specifically.
>
> (2) Our mind is a representational system that processes only singular mental representations for temperature that can be satisfied by more than one magnitude of temperature.
>
> (3) Conclusion: Our mind does not process singular representations that *refer to* any magnitudes of temperature specifically.

Whereas focusing on the quantity *temperature* is a good way to introduce the argument, I believe the argument can be generalized to apply to our mental representations for magnitudes of any quantity.

> (1') If a representational system can process only singular representations for magnitudes of a quantity that can be satisfied by more than one magnitude of that quantity, the system cannot process a singular representation that *refers to* any one of the magnitudes *specifically*.
>
> (2') Our mind is a representational system that can process only singular mental representations for the magnitudes of a quantity that can be satisfied by more than one magnitudes of that quantity.

(3') Conclusion: Our mind cannot process a singular mental representation that refers to any magnitude specifically.

Both argument (1) - (3) and argument (1') - (3') are valid. Premise (1) and (1') are justified by analogy with the help of the example of the 4-output system about speed. What we have learned from reflecting on the 4-output system example is that as long as a representational system for speed has limited representational resolution, it cannot process a representation that singles out a particular speed. A similar reasoning seems to be applicable to a representational system for temperature (think about a 4-output system for the temperature in a room instead of a 4-output system for the speed of a car). This also seems to apply to any quantity.

What I need is justification for premise (2) and (2'). Since it is easier to wrap our head around concrete cases, I will focus on (2) instead of the more abstract (2'). My argument for this premise is inspired by Beck's (2012; 2014) argument for analog cognitive representations.

(4) We should not postulate mental representation in us that does not better explain our (actual or potential) bodily and mental behaviors.

(5) Postulating mental representations in us that can be satisfied by only one temperature does not better explain our (actual or potential) bodily and mental behaviors.

(6) Conclusion: We should not postulate mental representations in us that can be satisfied by only one temperature.

The conclusion (6) is prescriptive. By following the rational prescription, I believe that (2) is true.

Premise (4) is a requirement of parsimony about theoretical postulates. Surely the word 'better' is quite ambiguous and requires some elaboration. I do not have a full account of theoretical virtues

nor a full account of what makes a theoretical posit explanatorily fruitful. But, for our purpose, I will endorse at least two plausible necessary conditions for good theoretical posits: our theoretical postulation should be **proportional** to what it is postulated to explain, and it should **not be redundant** for the explanatory work it is postulated to do. The plausibility of (4) derives solely from the claim that mental representations are theoretical posits. That places them under the purview of the norms that govern all theoretical postulations — proportionality and parsimony.

So, the key question for my argument is why we should accept premise (5). For the sake of convenience, I will call the singular representations which can be satisfied by more than one magnitude **non-picky representations** (like the representations in the 4-output system for speed); and I will call those which can be satisfied by only one magnitude **picky representations**. There are two main reasons for accepting premise (5): one about proportionality, the other about redundancy.

3.3.1 Proportionality

When we postulate something to explain a set of data, the explanans has to be proportional in terms of determinacy to the explanandum. Suppose I yelled 'Merry Christmas' at my sleeping cat. And my cat wakes up. What explains my cat's waking up is my yelling, not my yelling 'Merry Christmas'. I could have yelled 'Happy Halloween' instead and my cat would still have woken up. Thus, the fact *that I yelled at it* is a better explanation than the fact *that I yelled 'Merry Christmas' at it* because the latter is disproportionate to the explanandum by including too much detail. This is the proportionality requirement for good explanation.[45]

[45] My thoughts on this requirement of proportionality are inspired by Yablo's (1997) proportionality requirement for causation, which he uses to defend the causal efficacy of mental states with wide content. He argues that for an event C to be a cause of another event E, C and E must be proportional in terms of their level of determinacy. So, e.g., my yelling 'Merry Christmas' cannot be a cause of my cat's waking up because

When it comes to representing temperatures, it is certainly possible to view our mind as a system that processes *only* picky mental representations that pick out maximally determinate ways to instantiate temperature. However, it seems undeniable that our actual and potential bodily and mental behaviors are not absolutely sensitive and picky with respect to temperature instantiations. That is, it seems that, whatever we do bodily and mentally, those bodily and mental behaviors would not change a bit had the temperature instantiations in the world changed a little. Surely, said insensitivity can be accounted for purely in terms of non-ideal *performance*, i.e., purely in terms of the non-ideal way the mental representations are *used*. But that does not change the fact that, in regard to specificity about temperature, postulating picky mental representations is **vastly disproportionate to** the data to be explained — namely, our bodily and mental functionings.

Using picky mental representations to explain the relevant data is like explaining our clumsy mathematical activities by first postulating a mathematical genius in each of us and then explaining the clumsy appearance in terms of the non-ideal way in which the mathematical genius in us is

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my yelling just anything would yield the same result. Despite the similarity, my requirement and Yablo's requirement are different. Whereas Yablo's is a metaphysical requirement about *causation*, mine is an pragmatic requirement about *explanation*. And his metaphysical requirement is controversial in ways that my pragmatic requirement is not. For example, it seems plausible to think that events at different levels of determinacy are *metaphysically intimate* enough (in some identity-like way) that they do not compete with each other in causation; as a result, both my yelling and my yelling 'Merry Christmas' are causes of my cat's waking up (that is Yablo's (1992) earlier view, see also Wilson (2009: 153) for metaphysical views that can avoid making determinables and determinates competitors in causation). The point about metaphysical intimacy among levels of determinacy, however, does not eliminate the need for an *explanation* to be proportional to what it explains. Recently, Shapiro & Sober (2012) challenge both the metaphysical and the pragmatic requirement of proportionality. I think their objection is based on a mistake. But evaluating their argument will bring us too far astray from our discussion. Here, I hope the strong intuitive appeal of the claim that explanation has to be proportional alone allows me to set that aside and take the pragmatic proportionality requirement as a basic assumption.

manifested in all our mathematically related activities. Certainly, the manifestation or performance is an actual factor in our mathematic activities. But postulating in us something that is *absolutely perfect* in doing calculation is clearly postulating in us something vastly disproportionate to the clumsy mathematical activities we want to explain.

I have just described our insensitivity to minute quantity variations in negative terms, e.g., 'non-ideal'. It is worth noting that this kind of insensitivity is closely related to a positive phenomenon about our perception, namely, we perceive the world with various kinds of *constancies*. For example, although there is constant fluctuations in the light-wave being reflected from a surface onto our retina, we perceive surfaces to have invariant colors. Our perceptual representations of the world screen out such fluctuations. (This feature of perception is explored in group-theoretic terms by Cassier (1944).) My claim, however, goes beyond perceptual representations alone and covers all mental representations of quantities.

Given that we are not responsive to the maximally determinate ways quantities are instantiated, postulating non-picky mental representations (like the four outputs in Dretske's example) is to construct a proportional theoretical model to explain the data. On the contrary, postulating picky mental representations surely presents our mind as a more precise representational device, but doing so is not an explanatory virtue. By doing so, the explanans is made disproportionate to the explanandum and hence makes the theoretical model worse for explanatory purposes. That is why premise (5) is true.

3.3.2 Redundancy

Another important reason to accept (5) is that the postulation of picky mental representations about temperature is postulating *redundant* theoretical entities. And the concern can be crystalized in the form of the following argument:

(7) The explanation of some of our behaviors *requires* the postulation of non-picky mental representations about temperature.

(8) Our bodily and mental behaviors with respect to temperature *can be* completely explained by postulating *only* non-picky mental representations about temperature.

(9) If we already have independent reason to postulate something other than picky mental representations, and if those things leave nothing about our bodily and mental behaviors unexplained, postulating picky representations about temperature cannot help explain our bodily and mental behaviors better.

(10) Conclusion: Postulating picky representations about temperature does not help explain our bodily and mental behaviors with respect to temperature better.

Premise (7) is needed. The fact that one does not need to postulate x to explain a phenomenon could just mean that there is an alternative explanation for the phenomenon that does not appeal to postulating x; that does not yet show that the explanation that postulates x is postulating something redundant. For example, positing the existence of the ordinary external world is not necessary to explain our experiences because positing an evil demon can also do the job, but that does not mean we are positing redundant entities when we explain our experiences by positing ordinary external objects. Different explanations postulate different entities to explain the same phenomenon. That does not make their respective ontologies redundant.

The postulation of x in an explanation would be redundant, however, if the phenomenon to be explained could be explained by something else that must, for independent reasons, already be *in the very explanation* that postulates x. For example, positing a thirst quenching spiritual element in water would be redundant, since we already have independent good reason to posit a certain chemical

structure to water which can fully explain the thirst quenching power of water. Even if the spiritual element can also do the explanation, there is no explanatory work left for it to do. And that is the point of premise (7): it guarantees that we already have independent good reason to postulate such 'something else' (namely, non-picky representations) which render the postulation of x (namely, picky representations) explanatorily redundant — if (8) is also true.

Here is why premise (7) is plausible. Suppose an object fluctuates between two magnitudes of temperature whose difference we are completely insensitive to. I hold the object in my hand. It appears to me that I experience only one temperature and I behave bodily and mentally as if I perceive only one temperature (e.g., I *think* that there is only one temperature instantiated). It seems that we have to say either one of the following two things:

> [A] Since I experience only one temperature, my experience of the object's temperature consists of only one mental representation.

> [B] My experience of the object's temperature involves two mental representations that represent the two magnitudes of temperature that object is fluctuating between.

Let us consider [B] first. Given that the fluctuation of temperature can be extremely small, there are simply no bodily or mental functioning (actual or just potential) that would warrant the postulation of two mental representations instead of one in spite of the report that I experience one temperature. So, [B] is not the way to go.

Suppose we go with [A]. Since we are currently assuming that we postulate only picky mental representations, that one mental representation is supposed to be a picky one that singles out one magnitude of temperature in particular. Now since it is picky, the perceptual representation of the

object's temperature in this scenario can *at most* be accurate half the time while the object's temperature is fluctuating. If so, a question is left open: *Which* of the two indistinguishable temperatures does my picky perceptual representation refer to, i.e., *which half* of the time is my picky perceptual representation accurate? Any choice we make would seem inappropriately arbitrary. So, by postulating *only* picky mental representations, we — as theorists — corner ourselves into postulating mental representations whose representational content we cannot determine reasonably. That runs afoul of the whole point of postulating mental representations, which is to explain our physical and mental activities by appealing to *the representational content of those mental representations*.

For that reason, to explain my bodily and mental behaviors with respect to that object with fluctuating temperatures, we should postulate singular *non-picky* mental representations that can be satisfied by *either* one of the magnitudes, just like the 4-output system's output #4, which can be satisfied by multiple speeds of the car. So, I find premise (7) plausible: there are at least *some* cases whose explanation demands the postulation of *non-picky* mental representations.

I think it is quite clear that premise (8) is true too. Whatever we really do bodily and mentally with respect to temperature, they would not change a bit had temperatures of things in the world just changed a little bit (the minute change does not even have to be systematic or isomorphic to the original temperature distribution). If our bodily and mental behaviors with respect to temperature are not responsive to *particular* temperatures of things, explaining those behaviors ***should not require*** postulating mental representations which single out a specific magnitude of temperature. Non-picky mental representations which can be satisfied by instances in a rough range of magnitudes should be sufficient to explain all we need to explain.

Finally, premise (9) seems plausible enough to me as an assumption. I do not have a further defense for it. We should accept all three premises (7) - (9). And since the inference from (7) to (10) is valid, the conclusion (10) is true. Hence, this is a second reason that we should accept premise (5).

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Since (4) and (5) are both true, we should accept the prescriptive conclusion (6), which follows from the two premises. So, I accept (2), and hence the conclusion (3). As I said when I introduced the argument from (1) to (3), I believe what I have just said goes beyond temperature and applies to our mental representations for any properties that come in degrees, i.e. any quantity. So, I believe we are justified to embrace also the generalized argument from (1') to (3') and accept that our mind has limited representational resolution for any quantity and hence cannot generate mental representations that refer to any magnitude specifically, just like the 4-output system cannot generate representations that refer to one particular speed that the car instantiates.

If mental representations are theoretical posits to help explain our bodily and mental functioning, and if postulating mental representations which are picky, i.e., satisfiable by only one magnitude of temperature, does not help us explain ourselves better, then we should only postulate non-picky mental representations for magnitudes, which is a type of mental representation we have to postulate anyway and can do *all* the explanation we need. We can do without picky mental representations for magnitudes as a *type* of theoretical posit.

Thus, we should think that our mind has *limited representational resolution* with respect to temperature or any other quantity. Therefore, just like the 4-output system which has limited representational resolution with respect to speed, we should think that our mind cannot generate any

mental representation that *refers* to any one magnitude specifically. Our mind does not have the resources to perform a mental specification of a magnitude of any quantity *via reference*.[46]

3.4 Objection to the Argument from Redundancy

In my argument against mental specification via reference, I make a move based on parsimony (i.e., the inference (7) - (10)). I argue that postulating picky mental representation is redundant because non-picky mental representations alone can do all the relevant explanatory work. It is instructive to note that my move is an appeal to *qualitative* parsimony as opposed to *quantitative* parsimony. The former is about the number of *types* of things a theory commits us to; and the latter is about the sheer number of things a theory commits us to.

Here is a way to resist my appeal to qualitative parsimony. It is too quick to say that, as long as postulating some Xs brings a new category into one's theory and those Xs do not do any explanatory work, such postulation is susceptible to challenge in terms of qualitative parsimony

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[46] It is worth mentioning that I focus on presenting a philosophical reason for thinking that we do not have picky mental representations, a reason that abstracts away from the concrete features of human beings' representational systems. But I do not deny that one can reach a similar conclusion by attending to those concrete detail. Our mental representations of quantities are adaptive. For example, an object's temperature is presented perceptually as a contrast to the background temperature. We perceive an object's temperature differently under different background temperatures. (We feel something's temperature differently if we dip our hands in ice water for a while first.) One may cite this adaptive feature as an extra reason for believing that our perceptual representations are not *meant* to pick out specific magnitudes, but the *structural relations* among objects with respect to a quantity. Hence, one might argue, none of those representations singles out any magnitude specifically. Certainly, a lot more need be said for this to be a fully developed argument for Representational Humility. For instance, the fact that a representation is *employed* by our biological system to capture certain structural feature does not logically entail that the representation does not represent something more. Representations can represent more than what we happen to use it for. More work is needed to articulate the adaptive feature as alternate evidence for Representational Humility. In any case, that is not my major concern in this paper. And I will set that aside for future investigations.

(whether this would still be a problem in terms of *quantitative* parsimony is a separate issue). There is a concern of qualitative parsimony only when the new category being brought into one's theory is one that is meant to carve deep into nature's joint. In other words, one might argue that it is qualitatively non-parsimonious only if the useless postulation brings a new category into the *fundamental* reality.

In my argument from (7) to (10), a new category of things — picky mental representation — is brought into the model of our mind. But the distinction between picky vs. non-picky mental representation is not a metaphysically deep distinction, or so it might be argued. Suppose that is the case; then even if I was right that postulating picky mental representations do no extra explanatory work, there is no worry about qualitative parsimony because no *new fundamental category* is brought into the picture.

I disagree with the restriction on qualitative parsimony in regard to metaphysical depth. Postulating a new type of thing that does no explanatory work is theoretically undesirable whether or not the new type is meant to be fundamental. A parsimony argument of this kind does not need the categorization to be metaphysically deep, it just needs to be not gerrymandered. Here is an example to justify my claim.

Suppose there is a candy machine that, if one throws in a coin and presses a button, a piece of candy drops out. The candies the machine spit out happen to be red constantly. I stipulate/theorize: the candies in the machine are all red. That is not 100% certain, for sure, but my stipulation is not meant to be a deduction. All else being equal, the stipulation is nonetheless reasonable. But if instead, I say, not all candies in it are red, there are green ones, which got stuck somewhere in the machine and hence are not spit out. Wouldn't a parsimony concern urge us to say that the postulation of an un-manifest type of candy (namely, the green candies) here is not called for

(although it might be true)? I believe so. But the distinction between red and green, I presume, is not metaphysically deep.

What this example shows is that the distinction between red and green *does* matter for qualitative parsimony, despite the distinction not being metaphysically deep; it all depends on whether the data to be explained call for them. That metaphysical depth is not a factor in qualitative parsimony can be made even more explicit when we realize that the same train of reasoning can be replicated by the distinction 'made in USA' vs 'made in Mexico' candies, or the distinction of 'tasty' and 'non-tasty' candies — which are evidently not metaphysically deep distinctions (in case one might think that color distinction is metaphysically deep enough).

The requirement for metaphysical deepness seems to be unfounded. Hence, one cannot resist my parsimony argument by appealing to such a requirement.

4 A *Generalized* Representational Limitation

4.1 Name Baptism?

The argument I offered in section 3 is limited in scope. It does not yet show that there are no mental specification of magnitudes, because mental specification *via quantification/description* is still left open. Although it is my intention to compartmentalize the subject matter in order to employ a divide-and-conquer strategy, leaving mental specification via quantification open could be the source of a potential objection to my argument against mental specification of magnitude via reference.

Suppose I specify my neighbor's dog in my mind with the mental description <the dog that belongs to my neighbor>. By means of this complex mental representation, I refer to the properties that my neighbor's dog has and single out that dog via these properties. But it seems that whenever we have a mental description that specifies something, we can baptize a proper name concept that

refers to whatever that description specifies. By leaving open the possibility of mental specification via quantification, we have the following counter-argument:

(11) We can specify magnitudes via descriptions.

(12) If we can specify something via a description, we can baptize a proper name by the description and specify that thing with the proper name.

(13) To specify something via proper name is to specify via reference.

(14) Conclusion: we can specify magnitudes via reference.

So, whereas section 3 is basically an argument for ~(14), here we have an independent argument for (14). The argument from (11) to (14) is valid. The question that remains then is whether it is more plausible to accept the truth of the premises I relied on in section 3 against (14) or to accept the premises (11) to (13) here. By weighing the motivation behind my premises in section 3 against the motivation behind (11) to (13), I find it more reasonable to reject the latter. And in particular, I reject (11).

On the one hand, the plausibility behind the premises I used in section 3 rests upon the wish to refine our pre-theoretical intuitions about our mental contents by appealing to an explanatorily adequate theoretical model of our mind. I argued that a model with non-picky representation should be explanatorily sufficient because our bodily/mental functionings — whatever these functionings are — are never sensitive to any particular magnitudes. Refining our pre-theoretical concepts of things may not be the only reason we develop theoretical models but surely it is one of the most important motivations.

On the other hand, the plausibility of (11) rests on its pre-theoretical, intuitive plausibility. When I point at a glass of water and piece together the *words* 'the temperature of this glass of water',

those words *seem* to jointly express a mental definite description that purports to single out a particular magnitude of temperature.

By saying that (11)'s plausibility is pre-theoretical, I surely don't mean that we do not appear to specify magnitudes via description in theoretical contexts. A chemist probably utters phrases like 'the temperature of the sample' and hence *appears* to specify magnitudes descriptively all the time in her laboratory. But it is instructive to see that such linguistic expressions' prevalence in scientific contexts does not make the intuitive appeal of (11) any more scientific and less pre-theoretical.

An analogy might help illustrate the point better. It's pre-theoretically intuitive that rocks, and tables, and chairs exist. Surely scientists talk about rocks in their laboratories too. But that does not make the intuitive appeal of the existence of rocks any more theoretical or scientific. That is just the same kind of pre-theoretic intuitive appeal that supports my acceptance of rocks, only that some of our pre-theoretical commitments have a non-eliminable foothold in our theoretical practices. Those commitments are not driven by any particular scientific concerns despite being part of the scientific discourse. Similarly, it certainly *seems* that we single out individual magnitudes via mental descriptions both in pre-theoretical and theoretical contexts. But that does not make the *seemings* any more theoretically driven.

Once the motivation behind the premises for and against (14) is made clear, I think it becomes clear which side we should lean. Since our goal is to refine our pre-theoretical intuitions about X by reflecting on the theoretical model for X that best explains all the relevant data pertaining to X, it would be self-undermining for us to stick to our pre-theoretical intuition when such an intuition conflicts with an explanatorily adequate theoretical model. After all, that is what refinement of pre-theoretical intuitions does — correcting what we feel intuitive by appealing to a theoretical model that does the required explanatory work adequately. For example, when an economist develops a theoretical model based on the relevant data we have to help us understand economic phenomena

and refine/correct some of our economic preconceptions, the theoretical model is of course fallible but we should not insist on sticking to our guts *just because* the explanatorily adequate theoretical model conflicts with our preconceptions. It would be unreasonable, for instance, to insist on the 'commonsensical plausibility' of trickle-down economics, *if* our economic theoretical model that adequately handles all the relevant data we have suggests that it would not work. Moreover, it would also be a mistake to think that, in this case, we have the commonsensical appeal of trickle-down economics on the one hand and scientific reason against it on the other hand, as if the two are on equal footing in the dialectic.[47]

In a discussion where the point is to refine our pre-theoretical intuition based on theoretical models, the conclusion based on theoretical consideration I raised in section 3, namely ~(14), *should* override the pre-theoretical intuitiveness of (11). After all, when I point at a glass of water and utter the words 'the temperature of this water', I know full well there is more than one magnitude of temperature being instantiated across the water mass and fluctuating through time. It is not crazy to think that putting words together in the form 'the temperature of this water' does *not* indicate that the subject entertains a mental definite description <the temperature of this water> that singles out an individual magnitude specifically. It is perhaps worth remembering that this result actually echoes the things philosophers say when it comes to the Richness Argument: we lack not only the capacity to refer to, but also the capacity to *descriptively single out* the specific ways in which quantities are instantiated.

4.2 Pushbacks

[47] This is just an example to illustrate a methodological point. I am not committing myself to any particular economic policy here.

There are several ways a skeptical reader might push back against the response I have just given in defense of my argument in section 3. In the following, I will address three potential pushbacks against my response.

4.2.1 Fairness

One might push back and say, 'What you just did in section 4.1 is to blatantly reject a counterexample to your thesis. One cannot just refuse to acknowledge a counterexample.' To answer this potential pushback, I should clarify certain dialectically salient distinctions.

Suppose I hold the belief that all tomatoes are red. You show me something that looks very much like a tomato except that it's green and say, 'You are wrong. Look, here is a green tomato!' You are trying to offer a counterexample. An alleged counterexample does not always win the day, of course. It depends on two major factors: (a) whether there is compelling reason behind my belief (in this case, whether I have good reason to think that all tomatoes are red in the first place), and (b) whether there is a strong reason to think that what is offered is a genuine counterexample (e.g., in this case, whether there is strong reason to think that what you show me is *really* a tomato).[48]

Suppose, however, instead of bringing me a green tomato, you offer something else. Suppose you cite testimonies from people who claim to have seen green tomatoes. Alternatively, suppose you show me that the genetic make-up of tomatos somehow makes it the case that there have to be non-red tomatoes. What happens now is that you have an *argument* for the existence of counterexamples. In either case, instead of giving me a counterexample, you are giving me a *counterargument*.

There are two kinds of counterarguments one might offer. One kind of counterargument challenges a premise of the target argument. The other kind of counterargument is an independent

[48] For more on the dialectical balance between theory and counterexamples, see Weatherson (2002).

argument against the conclusion of the target argument. The distinction between the two kinds of counterargument is dialectically salient.

Suppose I offer an argument for thinking that all tomatoes are red. Now if what you offer is a counterargument *against my premises*, generally I cannot respond *simply* by insisting that my argument is right and use it to motivate the rejection of one of the premises in your counterargument.[49] In the face of this particular kind of counterargument, I can hold on to my original argument only if I also have a convincing independent defense of the premise under question against the counterargument.[50] In such a case, the counterargument and the targeted argument are not dialectically on a par with each other.

However, if what you offer is a counterargument *against my conclusion*, the counterargument you offer and my argument is on equal footing dialectically. In such a case, as long as it is not clear that the intuitive appeal of the counterargument's premises overrides that of my argument's premises, generally it'd be fair for me to stick to my argument and use it to motivate rejecting one of the premises of the counterargument (my opponent can do the same and pick one of my premises to reject in light of her counterargument if the intuitive pull of the premises are on par with each other).

So we have a tripartition about what an opponent says in response to what we say: what our opponent says can be a reference to a counterexample, can be a counterargument that challenges our premises, or it can be a counterargument that challenges our conclusion. Whether the pushback against me is fair depends on how we are supposed to classify the objection expressed by (11) - (14).

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[49] Perhaps with rare exceptions when the premises under attack are claims like 'I exist', which one might say are absolutely indefeasible.

[50] Even simply by saying that the relevant premise is a Moorean belief would be an independent defense.

To begin with, what my opponent offers by (11) - (14) is not a counterexample. Notice that my conclusion in section 3 is that we cannot specify any magnitude *via reference*. To present a relevant counterexample, one has to offer a case of us specifying a magnitude via reference, *not with description*. With the claim (11), which is about *descriptively* picking out specific magnitudes, one is not offering a counterexample. One cannot offer an orange as a counterexample to a thesis about tomatoes.

Instead, by bringing up (11), one offers a claim that can serve as a premise, which, together with other premises (namely, (12) and (13)), help constitute an argument for (14), i.e., a counterargument against what I said in section 3. So a quick response to the pushback: No, I am not just blatantly refusing to acknowledge a counterexample because what is being offered is not a counterexample but a counterargument.[51]

In particular, the counterargument I am dealing with is an independent argument against my conclusion. The argument (11) - (14) does not directly challenge any of my premises in section 3. (Of course, it does so indirectly.) Instead, it challenges my conclusion ~(14). As I have explained, dialectically speaking, this kind of counterargument is on equal footing as the targeted argument. The premises I used back in section 3 are either themselves plausible (e.g., the parsimony and proportionality requirement for theoretical postulates, and the status of mental representations qua internal units of computation as theoretical postulates) or explicitly defended by appealing to plausible premises (e.g., the premise that we can but do not need to postulate picky mental representations to explain all the relevant data). Hence, there is nothing objectionable that I choose

[51] Here I focus on responding to the argument as it is presented by (11) - (14). And that is not an objection by counterexample. I am not thereby denying that there are potential objections based on counterexamples. I will address such objections after I have completely presented my argument for Representational Humility — see section 6.

to hold on to my argument in section 3 and reject one of the premises in the counterargument (11) - (14) in light of my argument.[52]

But I am aware that I cannot satisfy the skeptics simply by arguing that it is *permissible* for me to hold on to ~(14). Instead of just doing that (which would have been sufficient for the sake of defending my argument, I believe), I went the extra mile in section 4.1 by offering a stronger response. I compare the strength of the motivation of my premises to that of my opponents' premises. And I argued that the pre-theoretic intuition that supports (11) is in fact not compelling within a context where we are trying to use a theoretical model to refine our pre-theoretical intuitions about our mental content. Thus, when the premises of the two arguments are weighed side by side, my premises should trump those of the counterargument.

So not only have I shown that it is fair and reasonable for me to stick to my argument to reject one of the premises of the counterargument, I have shown that this is not even a case where my opponent can do the reverse by holding on to her counterargument and pick one of my premises to reject based on her counterargument. The dialectical asymmetry exists because the pre-theoretical motivation of her premises does not match up to the theoretical drive behind my argument as I have explained earlier. Thus, I believe my response to (11) - (14) is fair and compelling.

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[52] Some might insist that to completely settle the case, I must also present an alternative explanation to the intuition that (11) seems true instead of simply offering an argument showing that it is false. I do not think I need that for my defense here to work. We can think that we are doing something while in fact we are not. That happens all the time. As long as I have a sound argument with properly motivated premises to support my claim, I've made my case. I do not think an explanation for *why and how* we are mistaken is required for an argument *that* we are mistaken to work. After all, people can be mistaken for so many reasons. Who knows? That being said, I am sympathetic to the idea that it would be a bonus if I can offer an account of the source of the allegedly misguided beliefs. I will offer that alternative explanation in section 6.

4.2.2 Generality Constraint

A second potential pushback against my response to the counterargument (11) - (14) is this: 'You said that (11) is motivated by our pre-theoretical intuition. But that is not true. It is motivated by a *theoretical* principle, namely, Evans' *Generality Constraint*. If so, your response does not work.'

Evans' Generality Constraint is basically the same as what Fodor & Pylyshyn (1988) later call the *Systematicity* of cognition. As Beck (2012) puts it, 'the Generality Constraint holds that if one's mental states have conceptual content, then one's ability to enter into those mental states is closed under all meaningful recombinations of the constituents of the sentences that best express them.' (563) Building a principle like this into the theoretical model of our mind is motivated by the desire to account for the observation that our cognitive process is both inferentially and productively systematic — by being systematic productively, I mean that we are capable of systematically forming new thoughts based on old concepts by certain meaningful recombinations.

The apparent relevance of such a principle to our case is that, just as we can pull the words 'the particular speed of this car' together to form an (apparently) meaningful definite description, we can pull the relevant concepts together to form the complex *mental* description <the particular speed of this car>. And so we have (11) based on the Generality Constraint.

Notice that the Generality Constraint does not require us to be able to entertain thoughts expressed by *any* recombination of words. The recombination has to be ***meaningful***. And this is an important constraint, because I do not think I can entertain any thought expressed by uttering 'butter the blue two', even though I can express a meaningful concept by using each of those words individually. And the explanation is that piecing 'butter', 'the', 'blue', and 'two' together in that way is not a meaningful recombination.

The Generality Constraint alone leaves it wide open what kinds of recombination count as meaningful. With the restriction about meaningful recombination in play, one cannot use the

Generality Constraint to get (11) without already assuming that expressions like 'the current speed of this car' is meaningful. Here is why.

A linguistic expression is literally meaningful in virtue of expressing a concept or a thought. So, assuming that expressions like 'the current speed of this car' are meaningful involves assuming that we can have mental descriptions or complex concepts like <the current speed of this car>. But if we *could* form mental descriptions about particular magnitude like <the current speed of this car>, we could mentally specifying magnitudes. E.g., by having the mental description <the biggest unicorn in history> alone, I am thinking specifically about the biggest unicorn in history and nothing else; that is, I am mentally specifying the biggest unicorn in history, *regardless* of whether my mental specification *succeeds* in actually latching onto something. In other words, assuming that 'the current speed of this car' is literally meaningful basically requires us to assume (11). So, only by assuming (11) beforehand can we use the Generality Constraint to obtain (11). As a result, the Generality Constraint cannot be used to properly motivate (11) in a non-question-begging way.

By saying that, I am not challenging the Generality Constraint per se. I am just arguing that, contrary to what my opponent might say, the constraint is not a theoretical principle one can appeal to in order to motivate the premises of the counterargument against my argument in section 3. And I hold on to my opinion that the main motivation behind premise (11) is its pre-theoretical intuitiveness. (It should be noted that saying that utterances like 'the current speed of the car' is not literally meaningful — due to Representational Humility — does not mean that those utterances are just gibberish. They can be significant in other ways; I will come back to this issue in section 6.)

4.2.3 Switching Vehicles

A third potential pushback that could happen is for someone to say, 'What you say is fair to the extent that it is reasonable for you to reject the conjunction of (11), (12), and (13). But it seems unreasonably arbitrary for you to pick on (11) in particular.'

First of all, I will take (13) for granted. So, the essence of the pushback boils down to the question about on what grounds I choose to reject (11) instead of (12), even if we agree on everything I said, namely that, between my argument in section 3 and the potential counterargument we are dealing with, we should lean towards my argument against (14). Why do I choose to deny that we can specify magnitudes via description instead of denying that, as long as we have a description of something, we can name it?

There is an instructive distinction between (11) and (12). On the one hand, (11) is about our ability to single out an individual instance of a particular kind of thing via description (not just about our ability to put words together as if we can do so). On the other hand, (12) is about our ability to *switch vehicles* in picking out individual instances of that kind of thing with our mind. The truth value of (12) is about whether it is always the case that, once we form a mental description about something, we can switch 'mental vehicles', so to speak, to pick that thing out via a mental referring term instead.

So, unlike (11), (12) is not about our capacity to pick certain things out; it is about our capacity to switch our means of picking out the things that we have picked out already (by mental description).

If we look at (11) and (12) this way, and if we are not allowed to accept both, I want to argue that we have a good reason to discard (11) ahead of (12). Very roughly put, that is because the kind of capacity (11) describes — our mind's capacity to latch onto things in the world — is relatively more incredible than the capacity of switching representational vehicles as (12) describes. So, as a matter of pecking order, it is rational to discard (11) first, before we have to consider discarding (12).

To illustrate my point with a rough but hopefully illuminating analogy, let's suppose there is a kind of entity F that we literally cannot grab with our right hand. Now say, as we are told, we can accept at most one of the following two claims:

[a] We can grab instances of Fs with our left hand.

[b] If we can grab those Fs with our left hand, we can grab them with our right hand.

All else being equal, I find it reasonable to think that we can't grab the Fs with our left hand too, i.e., rejecting [a], instead of thinking that there are things that we can grab with our left hand but not our right hand, i.e., rejecting [b]. This is not because the negation of [b] is something inherently crazy; instead, that is because it seems to me that the ability of switching hands seems to be a much more trivial ability than grabbing things in the first place, so that if I have to discard either [a] or [b], [a] has to be abandoned first. For things that we already have the ability to grab with our left hand, it is no longer a big challenge to grab it with our right hand instead.

It is important to note that the rational pecking order is qualified by 'all else being equal'. That means, the pecking order can be altered if we acquire information showing that all else is not equal. For example, if we learn that the Fs in [a] and [b] are our own right hands, then we know that our incapability of grabbing the Fs by our right hands is due to some factors that clearly do not affect our left hands. With that extra information, and with everything else being equal, surely rejecting [a] is no longer higher in the rational pecking order than rejecting [b]. But in the initial setting, in which there is no specific information about the Fs, I believe it is rational to reject [a] and hold on to [b] first. After all, if I try to pick something up and feel a mild electric shock, without any extra information, I find it a bit odd and not particularly reasonable for me to say, 'all right, let me try it with my other hand then.'

Hence, switching back to the case about discarding (11), I find it rational to accept that we lack the ability to have mental descriptions about specific magnitudes instead of that we lack the capacity to switch vehicles when picking out specific magnitudes. That is not because there is something inherently problematic in rejecting (12), i.e., denying that we can 'switch vehicle' when we try to pick out magnitudes in our mind. This is an issue about the rational pecking order instead: all else being equal, we should first believe that we also cannot pick out specific magnitudes via description. Hence, having argued against (14), all else being equal, we should reject (11).

4.3 Argument for Representational Humility

Based on what we have obtained so far, we have the following reason to accept Representational Humility:

(15) Mental specification is done either via reference or via description.

(16) We cannot mentally specify a magnitude of any quantity via reference.

(17) We cannot mentally specify a magnitude of any quantity via description.

(18) Conclusion: We cannot mentally specify a magnitude of any quantity.

I find the validity of this inference beyond question. So, let us focus on the truth of the premises. Premise (15) is an assumption that I have been working with since the beginning. I take it for granted. Premise (16) is the result of section 3. With this premise, I rule out both sensory and non-sensory mental representations for specific magnitudes. Premise (17) has been established in section 4.1 and 4.2 in the form of ~(11). With premise (17) in play, I rule out our capacity to single out a magnitude by quantification/description, i.e., by appealing to the compositional nature of non-sensory mental representations.

As a result, I think we have a very good reason to endorse my main thesis Representational Humility and accept our mind's general limitation in singling out any particular magnitude of any quantity.

5 The How Possible Question

I have argued for some substantive ***that-claims***. Despite appearance, (i) I argue ***that*** we do not have the mental resources to refer to a specific magnitude of any quantity; and (ii) I argue ***that*** we do not have the mental capacity to perform an act of mental description that picks out a magnitude specifically. And I obtained Representational Humility from these two that-claims.

Sometimes, when a claim p is astonishing enough, an argument *that p* alone can still leave some lingering doubts — we cannot help desiring to know *how* p is possible. Consider the infamous Grandfather's Paradox. For the sake of consistency, it seems *that* I must not be able to go back in time to kill my grandfather. But the question is, assuming that I can go back in time before my birth and face my grandfather, *how* is it possible for me not to be able to push a knife through that guy's heart and for him not to die as a result? It does not seem satisfactory to say that, somehow, for the sake of consistency, I would trip on a banana peel whenever I try to kill my grandfather. That seems to be the wrong kind of explanation. So it is sensible to desire an informative how possible answer.[53]

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[53] Overlooking this distinction leads to a problem in philosophy of spacetime. Based on the theory of general relativity, we have geometrical justification for thinking *that* time stretches or shrinks relative to different reference points. But as Maudlin (2012) points out, by conflating a that-question with a how-possible-question, people tend to mistakenly treat the geometrical reason as an explanation of how it is possible for time to stretch and shrink relative to reference points. Saying that time has to be this or that way due to geometrical consistency is like saying that I must not be able to kill my grandfather due to logical consistency, how-possible-questions are left open: How is it possible that I cannot push a knife through the heart of a young man (my grandfather) and fail to kill him? How is it possible for time to stretch and shrink relative to different reference points?

The examples show that a how possible question is a question that demands elaboration about the *underlying mechanism* (in a very loose sense of the word 'mechanism') that makes a that-claim true. The point of offering an account of an underlying mechanism is to relieve the that-claim from the incredulous stare by demonstrating how it is not crazy to think that our capacity of mental specification *could* break down in some cases in the way (i) and (ii) say it does.

When I appear to refer to my cat Bill in my thoughts, I actually perform an act of mental specification about my cat via reference with the simple concept <BILL>. It is surprising that my mental capacity will 'break down', so to speak, when my cat is replaced by a glass of water. That is, when I *appear* to refer to a specific temperature the glass of water instantiates (e.g., with the simple concept <THIS>), somehow I am in fact not doing what I am appear to be doing because that goes beyond my mental capacity. The same can be said about our capacity of mental specification via description. When I pull the words 'my cat' together, I am performing a mental act of specification about my cat via quantification. But if (ii) is true, somehow this capacity just 'breaks down' when my cat is replaced by a glass of water. When I pull the words 'the temperature of this glass of water' together in a similar fashion, I am in fact not performing an act of mental specification via quantification, unlike the cat case. It is natural that some might raise a how possible question about our mental capacity's alleged 'breaking down'.

What I have to offer in response could be a bit disappointing, because I have no how possible answer for the that-claims (i) and (ii).[54] However, I will argue that there is a legitimate reason that I have no how possible answer to offer and that will also explain why it is in fact not a big problem. The lack of a how possible answer should not prevent us from acknowledging the force of my arguments for (i) and (ii).

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[54] I will have a better answer to offer in Chapter Three. But that answer depends on a move I will make from a thesis about mental representation of quantity to a thesis about metaphysics of quantity.

One can study a phenomenon top down or bottom up. To study something bottom up, one focuses on the *underlying constitution* of the target phenomenon and tries to shed light on the phenomenon from underneath. For example, with regard to mental phenomena, the neural scientists go for the bottom up approach. They begin with the assumption that whatever those mental phenomena are, they are there in virtue of some neural events. So, they set forth to shed light on the nature of those mental phenomena by directly engaging the underlying neurology.

But studying bottom up is not the only way to go. One can also learn much about a phenomenon by setting aside whatever underlies the phenomenon and theorizing about it directly based on the way it manifests itself at the *surface* level. Take our study of the mental phenomena as an example again: when Fodor reasons that, given the manifest features of our cognitive performance, e.g., systematicity, productivity, compositionality, etc., it is prima facie more reasonable to conceptualize our mind as something that processes in a language of thought, he is trying to obtain a principle about the nature of mental phenomena top down, i.e., *regardless of* how these mental phenomena turn out to be implemented at the underlying level.

How exactly a top down principle gets mechanically implemented at the underlying level is a legitimate question, but not part of the top down project. That is, after all, the main claim of a top down project: *no matter how* the target phenomenon turns out to be implemented underneath, so and so has to be true of the phenomenon due to certain manifest/surface features of said phenomenon. Of course, that does not mean that the top down reasoning is indefeasible from underneath — there is a limit to the 'no matter how'. There could be a reasonable bottom up *objection* to a top down principle — that is exactly what *some* connectionists do, as I have mentioned earlier very briefly. But I think given the whole idea of top down reasoning, it is not right to *demand* that a top down principle be accompanied or even justified by a bottom up reason. Something similar can be said

about the special sciences. Even if a biologist cannot tell us the fundamental physics of our immune system, that says nothing against the biologist's account about our immune system.

In this chapter, I consider myself to be engaging in a top down project. In section 3, I pointed out that our bodily and mental activities are not sensitive to any particular magnitudes. Due to this observation, postulating extremely sensitive mental representations, i.e., picky mental representations, to explain the relevant data will either be postulating explanans vastly disproportionate to the explanandum, or postulating explanatorily redundant entities in one's theoretical model. Either way, this gives us a respectable *top down reason* to think that the best theoretical model about our mind probably should not include these absolutely sensitive representations. As a result, we should not think that we have the mental resources to specify any magnitude via reference.

The top down reasoning did not stop there. I brought up a second observation: we can always introduce proper name concepts for things we have singled out descriptively. This observation urges us to extend the conclusion in section 3 and accept that we do not have the mental capacity to specify a magnitude descriptively as well, leading to a general thesis about our mental capacity: Representational Humility. Stepping back from the details of my arguments, my plea for Representational Humility is a top down reasoning that is driven by two observations about our bodily and mental activities. The point of the arguments is to offer a way to think about our mind that can best cohere to these macro-level observations.

The search for an underlying mechanism of Representational Humility will require an account for the underlying mechanism of mental reference and an account for the underlying mechanism of our proper name baptism via description. A bottom up analysis of this sort would, however, commit one to, among other things, *a specific underlying metaphysics of mental reference*. E.g. one can expect that a physicalist and a dualist would have very different things to say about the metaphysics of mental

reference. Since I want my top down argument for Representational Humility to be relatively *neutral* with respect to the underlying mechanism (as any top down reasoning does), it is no accident that I will not have the resources to offer a bottom up account of mental reference and proper name baptism. Looking into the mechanisms will tell us more about the underlying implementation of the mental limitation Representational Humility describes, and tell us more about how the 'breaking down' gets realized downstairs; but a top down reason for thinking that such a limitation exists does not require us to have such a bottom up account at our disposal.

6 Explaining away Apparent Counterexamples

6.1 Appearance of Counterexamples

We *appear* to do the following three kinds of thing very often: (a) use mental descriptions to single out magnitudes, (b) use mental proper names to single out magnitudes, and (c) assign numbers to label the specific magnitudes when measuring quantities. They all require mental specification of magnitudes. As it stands, the apparent cases of (a), (b), and (c) have a claim to be *counterexamples* to Representational Humility.

A quick response to these apparent counterexamples is to repeat what I said in section 4.1. Intuitively, we do (a) - (c). But such pre-theoretical intuitions carry very little weight when they go against our explanatorily adequate theoretical model. So, in spite of the fact that we *appear* to do (a) - (c), my arguments show that we ought not think that we really do (a) - (c).

Although I stand by the view that pre-theoretical seemings count little in the face of the arguments in favor of revising our intuitions, I admit that a response like this may leave something more to be desired. To feel secure about my revisionary thesis, one might want to see a relatively plausible alternative story that explains why we appear to do (a) - (c) if that is in fact not what we do. Analogically put, having seen the evidence that the Earth is not flat, it is perhaps understandable that

the flat-Earth believers still desire to see an alternative explanation of why the Earth appears flat to them.

But let us be clear what we can reasonably ask for. People can be misled to hold false beliefs in so many ways. What an alternative explanation is meant to offer in this kind of discussion is not so much a definitive account of what *really* happens generally when the Earth appears flat to everyone anytime anywhere even though the Earth is not flat. I do not think such a definite account is required. Similarly, when scientists show evidence based on our best meteorological models for the disastrous outcomes of global warming, that is it — we have our evidence for the undesirability of global warming. Of course it is a legitimate project to seek *the* explanation for why it seems otherwise to many people, but there is no theoretical need or obligation for doing so for the scientific evidence to work.

What we get from an alternative explanation is a how possible story (instead of a *how actual* story): how something that seems so real to us *could possibly* be a mistake. The point is to show the 'unsafe' character of the relevant intuitive pull, i.e., to show that such appearances could in fact very easily be wrong and that its falsehood despite appearances shouldn't be all that surprising. Hence, the intuitive pull shouldn't be considered a good reason to dismiss that evidence. By having an alternative story for the Earth's apparent flatness, we get some psychological reassurance about the evidence that shows that the Earth is not flat.[55]

My main goal in this section is to offer such an alternative story for the fact that we appear to single out magnitudes (e.g., (a) - (c)). I will show that there is a rather plausible way to explain what is going on when we appear to be singling out magnitudes *without* really doing so. Since such an alternative account aims to show *how it is possible* that we are not really singling out magnitudes when

[55] We happen to have a definitely explanation for why the Earth seems flat to us. But my point is that we do not need to have that even if having that is a bonus.

we appear to be doing so all the time, not to show the how actual, it is not my intention to prove that the story is true. It suffices if I can develop the alternative story in enough detail to show that it is relatively plausible that my story may very well be the case. That being said, developing a full-blown alternative story is beyond the scope of this essay. What I am going to offer is a sketch of such an alternative account — just enough to show how such an alternative account could work in principle, so that we can have a plausible enough how possible story to relieve concerns about alleged counterexamples to Representational Humility.

6.2 A Pretense Theory of Magnitude Specification

Our capacity to represent mentally, just like any of our other capacities, is not a magic power that we can wield around at will without limit — this is one of the main themes of this chapter. Things appear otherwise though. It *appears* that we can mentally represent whatever we want. In particular, it *appears* as if we can single out a particular magnitude in our mind whenever we want: just say 'that' — that's all it takes, apparently. When it appears that p, the most straightforward thing to say is it is true that p. But there are other plausible options.

My alternative story is a form of fictionalism about *the mental acts* of magnitudes specification (*not* fictionalism about the magnitudes themselves). The core idea is that what happens when we appear to do (a) - (c) involves a form of *simulation* or *make-believe* or *pretense* (it does not matter what you call it). It appears to us that we perform (a) - (c) because that is what we *pretend* to do. This is a way to explain the appearance of (a) - (c) without saying that we actually do (a) - (c). My sketch of such an alternative story consists of two parts: first, I will describe the working of the relevant make-believe (section 6.2.1); second, I will argue that the story in terms of make-believe is a plausible how possible story (section 6.2.2).

6.2.1 Fictionalism about the Act of Mental Specification

Fictionalism is a popular way to handle claims which are intuitive but seem to commit us to the existence of things that we do not want to commit ourselves to. That is exactly what we need here: we want to admit that we appear to perform mental specification of magnitude without committing ourselves to there really being such a thing as *mental specifications of magnitudes*.

According to fictionalism,[56] a claim can be correct in at least two different ways: *either* in the sense that it is a **fictionally correct** claim (for example: it is fictionally correct that Snow White is a princess, but it is not fictionally correct that Sherlock Holmes is a rapper), *or* in the sense that it is a **literally correct** claim (for example: it is literally correct that Angela Merkel is a woman, but it is not literally correct that the sun rises from the west). When a claim is literally correct, it is *true*. So, a claim can be correct without being true: it is correct that Sherlock Holmes is a detective, but it is not true.

When we find certain claims intuitive, the intuitiveness of our claims about a subject matter can be fleshed out in two ways: either they are intuitive because they are *fictionally correct* or they are intuitive because they are *literally correct* (a claim can be both, because sometimes fictions contain real events).[57] Since endorsing a claim as fictionally correct does not commit us to the ontology that the claim would force us into *had* we taken that claim as *literally* correct, fictionalism gives us the conceptual resources to accept and account for the intuitiveness of claims without the ontological

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[56] The following is not a standard characterization of fictionalism. Actually, I do not think that there is a standard characterization. I believe, however, my characterization best captures the various dialectic pulls at play.

[57] It is tempting to express the distinction in terms of *literal truth* and *fictional truth*. I opt for literal and fictional correctness because I do not wish to give the impression that there are two kinds of truth or, worse, two kinds of reality. See Walton (1990: 41-42) for a similar thought.

commitments we do not want. For example, a fictionalist about mathematical objects can account for the intuitiveness of mathematical discourse without accepting the existence of abstract objects like numbers and graphs, which the mathematical claims would (arguably) commit us to if those claims were taken literally.[58]

With this conceptual apparatus, we can say the following: whenever it seems to be the case that we have singled out a magnitude of some quantity, it is simply fictionally correct and not literally correct to say that we have done so. This gives us an alternative explanation of the intuitive talk of magnitude specifications without having to commit ourselves to the genuine existence of magnitude specifications. But what does it mean to say it's *merely fictionally correct* that we single out a particular magnitude?

What further complicates the matter is that the idea *that a claim S is fictionally correct* has been further elaborated in two different ways. It has been fleshed out in terms of certain mental attitude (e.g., pretense, make-believe, simulation) we should hold toward S (e.g., Walton 1990). It has also been fleshed out in terms of the literal correctness of the following claim: *according to the relevant fiction, S* (e.g., Lewis 1978). These two ways to make sense of fictional correctness result in two kinds of fictionalism: **attitude-fictionalism** and **content-fictionalism**. (The latter is also called meta-fictionalism.)

According to attitude-fictionalism about a particular subject matter, the proper claims on that subject matter are fictionally correct in the sense that applying the propositional attitude of *make-believe* or *pretense* or *simulation* to those claims is appropriate; fictional correctness has nothing to do with what we should *believe*. For example, if I am an attitude-fictionalist about numbers, I would think that a correct mathematical claim M about numbers is fictionally correct in the sense that, as

[58] Unless one is a nominalist who thinks that mathematical claims should be translated literally into a 'proper language' that does not commit us to abstract mathematical objects even when taken literally.

participants of the mathematics game of make-believe, we should make-believe that M (e.g., Yablo 2001). The view is about certain attitude of pretense being appropriate for the relevant claims.

According to content-fictionalism about a subject matter, a proper claim S on that subject matter is appropriate for being fictionally correct too. But being fictionally correct has nothing to do with certain non-belief propositional attitudes being deemed appropriate for S. Instead, S is fictionally correct in the sense that it is in fact the following *literally correct* claim in disguise: *according to the relevant fiction, S*. So, unlike attitude-fictionalism, according to content-fictionalism, fictionally correct claims are also literally correct; it is only that those fictional claims have a concealed/suppressed component in their content that can be expressed by the fictional operator 'according to the relevant fiction,…'. For example, if I am a content-fictionalist about possible worlds, I would think that it is fictionally correct that there is a possible world at which donkeys are purple in the sense that the claim is a shorthand for the following literally correct claim: *according to the fiction of possible world*, there is a possible world at which donkeys are purple (e.g., Rosen 1990). Since a fictional claim S is taken to be in fact a meta-level claim about S, content-fictionalism is also called meta-fictionalism.

This further distinction leads to the question: when I say that talk about singling out magnitudes is intuitive but only in the sense that such talk is fictionally correct, how are we supposed to understand the phrase 'fictionally correct' in this context?

For our purpose, there is a straightforward reason that content-fictionalism does not work. Suppose I *appear* to have named a temperature 'Teddy' and *appear* to believe that boiling water instantiates Teddy; so, the following claim *appears* to be true: I have singled out a magnitude. But given Representational Humility, that could not have really happened, despite appearances. So what does my alternative story say about the apparently plausible claim that I believe that boiling water instantiates Teddy? My alternative story says: it is not literally true that I believe that boiling water

instantiates Teddy; it's only intuitive in the sense that it is the fictionally correct thing to say. Now if we employ the content-fictionalist approach to articulate the claim, we would have to accept the following claim as literal truth: *according to the fiction of mental specification*, I believe that boiling water instantiates Teddy.

Here is the problem of the story. If I cannot and thereby do not accept that *I believe that p* because I do not have the mental resources to represent p, I should not be able to accept the following claim either: *according to the relevant fiction, I believe that p*. Accepting such a claim also requires mentally representing p. Prefixing p by a fictional operator (i.e., 'according to the relevant fiction…') and a belief operator (i.e., 'I believe that…') does not suddenly give me the mental resources to represent p. So, employing the content-fictionalist approach to account for the appearance of (a) - (c) would require us to accept claims that we do not have the conceptual resources to accept according to Representational Humility. Since accepting Representational Humility is the reason we are in the fictionalist business in the first place, content-fictionalism is not the way to go.

Unlike content-fictionalism, attitude-fictionalism does not need to fall into the same trap. Whereas accepting <according to the relevant fiction, p> still requires one to mentally represent p, *pretending* to accept p does not require so.[59] All it takes is to act as if one accepts p.[60] That is why to handle the potential objection from the appearance of (a) - (c) by fictionalism, attitude-fictionalism is preferable.

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[59] Surely one might have a theory of pretense or make-believe that requires so, but that theory of pretense wouldn't be suitable for our task.

[60] With a proper theory of counterpossible (e.g., Nolan (1997); Jago (2013)), content-fictionalism can work *even if* it is metaphysically impossible for one to accept that p. But that cannot help if p is supposed to be beyond our mind's capacity to represent.

To put some more flesh on the bones of that idea, one needs a proper account about the relevant attitude of make-believe, like one that Walton (1990) developed. Walton argues that a make-believe essentially involves two elements: (i) a set of props (ibid: 19), and (ii) a set of obligations based on the props (ibid: 40). The following is a concrete example of make-believe at work:

Suppose Teddy and Emma are playing a game in the yard. They engage in a game of make-believe by pretending that the trees in the yard are stormtroopers and the sticks they hold are lightsabers; they pretend that they are Jedi knights fighting the First Order by brutally slaying the Stormtroopers. In that game of make-believe, sticks and trees are used as **props** to stand for lightsabers and stormtroopers in order to facilitate a game of make-believe. The props help generate **obligations** for the participants in the game of make-believe, dictating *when* the participants *should* make-believe *what* — these are not totally arbitrary (though not totally fixed either). Suppose that, in the game, Emma accidentally pushed Teddy, who then bumps into a tree behind him. As a participant of the game of make-believe, Teddy *should* make-believe that he got pushed into a Stormtrooper even if neither Emma nor Teddy made any conscious decision about that specific tree (they may not even notice that there is a tree there before Emma pushed Teddy into it). That obligation is required by the presence of an instance of the right kind of prop — the tree.

Similarly, if we endorse attitude-fictionalism about mental specification of magnitudes, we think that, whenever we appear to specify a magnitude of certain quantity in our mind, we are in fact pretending to do so by doing something else with props. So, to flesh out my alternative account, there are two further questions. What kinds of thing are used as props when we pretend to specify magnitudes? What rules govern the generation of obligations in the relevant game of make-believe?[61]

[61] For a general study of these questions pertaining to a game of make-believe, see Walton 1990: chapter 4.

First of all, Teddy used sticks as props to stand for lightsabers; what kinds of thing do we use as props to stand for the simulated mental specifications for magnitudes? I do not think there is and need be a unified answer for all contexts to that question. But here is one suggestion: we *sometimes* use our **thoughts about specific real numbers** as props (it's important to be clear that the props are not the numbers but our *thoughts* about the numbers; I am articulating a fictionalism about quantity thoughts, not the quantities themselves). We mentally specify *numbers* while pretending to mentally specify *magnitudes*; representations about specific numbers are taken to stand for representations about specific magnitudes.

Of course, the pretense does not have to invoke thoughts about numbers as props for the pretense. The props involved change from case to case. But the pretense mechanism remains the same. We can pretend to pick out a particular degree of temperature by thinking about *the phrase* 'this temperature' (instead of a number like 30) — where 'this temperature' cannot be used to really *express* a demonstrative concept that picks out any particular degree of temperature, because we do not have that kind of fine-grained quantity concept.

The kind of make-believe that uses certain states of ourselves (our thoughts about, say, numbers, instead of external objects like sticks) as prop to entertain make-believe about ourselves is in fact very common. For example, in a boys' choir, it is not uncommon for the director to tell the boys to pretend that their voice originates from their belly, goes straight through their spine, and gets emitted from the top of their heads towards the ceiling. *Of course*, that is not what they are actually doing. That is not how our vocal system works at all — even the boys know that (except perhaps for the few gullible ones). But to *pretend* that they are doing so, the boys *coordinate their body parts* to do other things, things that are good for singing: e.g. control their diaphragm muscle, open the back of their mouth, relax their vocal cord, stand straight, etc. Doing all these for the pretense is instrumental for producing good music.

Secondly, in the Jedi pretending game, notice that whereas the length of the stick generates the obligation for game participants to form the make-believe of a corresponding length of a lightsaber, the colors of the stick need not generate obligation for make-believe of the lightsaber being in any color. There are rules mediating the use of props and the obligations for make-believe. And these rules can be made explicit for each game of make-believe. Hence the question arises: In the case of pretended mental specifications of magnitudes of pain, for example, what rules are there?

Again, let's agree that there is no reason to think that there is a unified set of rules governing all pretended magnitude talk and thoughts, just like there is no reason to think that there must be a unified set of rules governing all Jedi pretending games. A lot of contextual factors, e.g., interests, habits, etc., come into play. And issues about the rules of a game of pretense can only be discussed on a case by case basis. For example, we would certainly have different rules that demand us to use different kinds of instruments in different ways for mapping things with numbers when we are dealing with different quantities. Even for the same quantity, rules for make-believe change from context to context. In the context of a particular scientific experiment, a rule might require us to pretend to label magnitudes of things (say, temperature) with a certain kind of number (say, real numbers to a certain decimal place), according to a certain procedure, with a certain type of instrument (say, a very fine-grained thermometer). But such a rule of pretense would not survive when we switch to a context of a different kind of scientific research or a context other than scientific research (say, adjusting the heat on the stove while cooking, where thermometers *might* not even be involved).

I call the alternative account for the appearance of (a) - (c) I just outlined **the pretense theory of quantity thought**. As I have mentioned, I do not intend to lay out and endorse Walton's entire theory about make-believe. Neither do I intend to spell out all the props and rules involved in the make-believe about specifying magnitudes comprehensively. I only intend to offer enough detail of

how a fictionalist approach works in order to show that there is a good enough *how possible* account. I leave the task of completely articulating the pretense theory for another occasion.

6.2.2 Plausibility of the Pretense Theory

Suppose attitude fictionalism offers us a how possible story to account for the *appearance* of us (a) using descriptions for magnitudes, (b) naming magnitudes, and (c) attributing numbers as labels for specific magnitudes without committing us to think that we ever mentally specify a magnitude. I now need to show that this account is relatively plausible.

The kind of make-believe about magnitudes I suggest isn't foreign to us. In many cases, the pretense is obvious and *independent of what I said about the richness of quantities*. For example, suppose a nurse asked me how painful my broken leg was. 'On a scale from 1 to 10,' she said. '7!' I answered. In such a case, I'm not trying to name a particular magnitude of pain with the number 7. Evidence: I surely didn't mean that my broken leg and my bad tooth instantiate *exactly the same* magnitude of pain even though I used the same number 7 to answer my dentist when he asked me how painful my bad tooth was simultaneously. Had I meant to name a magnitude of pain literally with '7', what I said to the nurse and the dentist would have implied so. Instead, I'm under pretense when I speak in terms of '7' *as if* I'm referring to a specific magnitude of pain. Why do we do that? It's plausible to think that we pretend for the sole purpose of *coordinating what people do*. By thinking about my pain and communicating with the nurses (and with the dentist) with the number 7, I'm orienting my expectations of what the nurse (and the dentist) would do for me and their expectations of how I'd react to things they do.

Or suppose I point at a glass of water and say 'this temperature'. Am I entertaining a demonstrative thought about a specific magnitude of temperature? It isn't crazy at all to think that the water is constantly fluctuating with respect to temperature; and, furthermore, there probably isn't

a uniform temperature across the water mass at any given moment. Say the water fluctuates among ten magnitudes of temperature. When I say 'this temperature', do we really think that there's a matter of fact concerning which among those ten magnitudes 'this temperature' refers to? I'm strongly inclined to say no. It seems very plausible to say that whenever we speak in terms of demonstratives in this kind of situation, we are only speaking *as if* (i.e., pretending) we are using a demonstrative to pick out a unique magnitude for pragmatic purposes.

The talk of pretense also applies to less mundane contexts. Suppose I experiment on a kind of material C. Here's the datum I jotted down: by decreasing the temperature gradually, C begins to turn into another kind of material C* at 10 degree Celsius. By using the specific number 10, do I mean to pick out a specific magnitude of temperature? Probably not. Consider the following subjective conditional:

> [*] *Had* C begun to turn into C* at a *minutely different* temperature instead, what I jotted down using the number 10 would have been false.

[*] *should* be true *if* I meant to pick out a specific temperature by the number 10 in my experiment record. But [*] is false, which is a reason for thinking that, instead of labeling particular temperatures, we're pretending to label particular magnitudes while appealing to numbers in our quantity thoughts. Such a kind of shared pretense is important for scientific and technological collaborations.

Thus, even in the context of scientific pursuit, when we press the issue hard enough, it seems that it's just as plausible to admit that we actually don't specify a magnitude in spite of the fact that we act and speak *as if* we do. It is an as-if. But why then do we act as if we are specifying an individual magnitude if in fact we don't? Similar to the nurse/dentist case, I propose that our

pretense is for pragmatic reasons. By pretending to specify a magnitude in such scientific contexts, we have an elaborate instrument to coordinate people's behaviors and expectations *for common technological goals* (instead of personal benefit as in the nurse/dentist case).

What that shows is, even in less mundane cases where it doesn't seem as obvious that we're pretending, there's good reason to believe that we're indeed just pretending to pick out specific magnitudes for pragmatic reasons. If this kind of pretense is in fact so prevalent already, that's all the more reason for thinking that the pretense theory about quantity concept, which is a theory that generalizes the talk of pretense that we already accept in many cases and applies it to all cases, isn't some outlandishly speculative claim about our mind. And it offers a general account of what happens when we appear to specify a magnitude in a way that can neatly accommodate Representational Humility.

As I have conceded, all things being equal, surely that we actually do (a) - (c) is the best explanation for our appearing to do (a) - (c). But given my argument for Representational Humility, all things are not equal. Now if I am right that the kind of pretense I described is already very prevalent (independent of considerations about Representational Humility), and if there are no *independent* reasons against the claim that that kind of pretense is what we in fact do in *all* the cases where we appear to specify particular magnitudes by doing (a) - (c), then I would say the pretense theory offers a *plausible enough* alternative story to account for the appearance: We appear to do (a) - (c) because that is exactly what we are pretending to do for various pragmatic reasons.

Surely that does not mean readers who are skeptical of Representational Humility cannot resolve to hold on to the claim that we actually do (a) - (c) despite everything I've said. The moral of the story is rather that holding on to those cases and simply insisting that they are genuine counterexamples would not be effective against Representational Humility given that there is a plausible enough alternative account for the appearance of mental specifications of magnitudes that

is friendly to Representational Humility, which I have defended with an argument based on premises that override the pre-theoretic appeal of the claim that we actually perform (a) - (c). To hold on to the claim that we really do (a) - (c), one actually needs to first come up with some *independent* reason against my positive argument for Representational Humility.

7 Refining Representational Humility: Why Instruments Might Not Help

Suppose I have offered a satisfactory justification for Representational Humility. My view still has room for further refinement or disambiguation with respect to the strength of my claim about our incapability when I said we *cannot* mentally specify any magnitude.

There are a lot of things that technological advances allow us to do that we weren't able to do. For example, we can fly on planes; we can dive in submarines; and we can perform complicated calculations with super-computers. Given that my argument for Representational Humility *seems* to focus on establishing the limitation of the human mind with no reference to technology, a question arises naturally:

> (Q1) Is the limitation described by Representational Humility one that *is* overcome by our current technology?

That is, do we have technology that helps us specify an individual magnitude even if we could not have done so otherwise. If the answer to Q1 is 'no', there is a further question:

> (Q2) Is the limitation described by Representational Humility one that *can* be overcome by technological advances or are we so limited in principle?

What Q2 asks is whether technological advances can help us *human beings as we are* overcome our limitation as it is described by Representational Humility. This question focuses on technological *aids*. So, it sets aside technological *modifications* of human beings. I think we simply have no resources to properly reason about the limitations of trans-human (or even post-human) development.

I believe the right answer to Q2 is this: No, it is an in principle limitation. A negative answer to Q2 obviously implies a negative answer to Q1 as well.[62] If the limitation cannot be surpassed by technology in principle, it is not surpassed by our current technology.

One might find it surprising that I would answer Q2 negatively (instead of either positively or agnostically). Our measurement devices have much higher representational resolution with respect to any quantity than our unaided mental capacity. After all, that is the point of having instruments. With the help of a thermometer, i.e., by picking out the *readings* on the thermometer, we are supposed to be able to represent temperature in a much more fine-grained manner. The same can be said about speed, mass, duration, length, or any other quantity.

The reason for answering Q2 negatively is actually quite straightforward. Let us first suppose, for the sake of argument, a weak reading of Representational Humility. So, Representational Humility describes a human limitation that can in principle be overcome by technology, or to be specific, by future measurement devices. Measurement devices help us represent magnitudes by their outputs or readings. By using such devices, we indirectly represent magnitudes by means of mentally representing the readings of the devices.

Now *if* we suppose an instrument can help us overcome the limit that Representational Humility describes, that instrument itself has to be a representational system which does not have a limited representational resolution. Otherwise, i.e., if the instrument itself has limited

[62] I believe the reasonable answer to Q1 is negative even if we remain agnostic to Q2.

representational resolution, the device would lack the resources to specify any one magnitude of the target quantity (just like Dretske's 4-output system).

For a representation system of a quantity (e.g. temperature) to be unlimited in terms of representational resolution, it is necessary (albeit certainly not sufficient) that the instrument's readings or outputs are also magnitudes of a quantity (e.g. *length* of the mercury column). Thus, if there is an instrument that can help us overcome the limit Representational Humility describes, that instrument's readings must be magnitudes of a quantity.

In order to *use* an instrument to specifying a magnitude, we need to mentally specify a reading that, in turn, specifies a magnitude. For that to happen, one of the following two things has to happen: **Either** we *mentally specify* a reading of the instrument without the help of any further instrument (e.g., I specify a particular length of the mercury column by looking at the thermometer with my bare eyes), **or** we use yet another instrument to help us specify a reading of the first instrument.

But if Representational Humility is true under the weak reading, that is, if we cannot mentally specify a magnitude without an instrument, we would not be able to mentally specify a particular reading of said instrument without the aid of a further instrument. Using a concrete example to help illustrate the point: to mentally specify a temperature with the help of a mercury thermometer, we need to be able to specify a magnitude of length of the mercury column. Since the length of the mercury column is a quantity that comes in degree as well, we will need yet another instrument, e.g. a ruler, to specify a magnitude of length of the mercury column. That is, we have to specify a magnitude of length of the mercury column by specifying a magnitude of length on the ruler, which is yet another quantity instantiation. As long as the weak reading of Representational Humility is true, the mental specification of a magnitude implies an infinitely regressive appeal to instruments.

To think that Representational Humility is true under the weak reading *only* and hence to answer Q2 positively, but to also think that the claim is not true under the strong reading, will lead to an infinite regress. Thus, *if* we think that Representational Humility is true under the weak reading, we should also think that it is true under the strong reading: we are inevitably incapable of mentally specifying any magnitude. That is why I answered both Q2 and Q1 negatively.

Human beings are finite. Whereas technology helps us surpass many of our limits, we face an in principle limitation when our ability to rely on technological enhancement (in this case, using measurement devices) itself involves the very activity (in this case, mental specification of a magnitude) we want technology to help us with in the first place. Although technology gives us more fine-grained measurement devices that allow us to coordinate our trajectories in the world in a more sophisticated manner, such instruments can never help us overcome our limited representational resolution completely and specify a particular magnitude.

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Chapter Three

A Metaphysics of Quantity

1 Metaphysical Non-Individuality

Suppose we include money in our ontology (it does not have to be fundamental). It would be a very peculiar kind of thing. Teddy hacked into Amanda's *online* bank account. He changed the deposit of her account from $n to $n-1. Then, he hacked into Derek's bank account and did the same thing. So Amanda and Derek each lost a dollar. After that, Teddy added a dollar in his account and a dollar to his friend Madison's account. Here is a question: *Who has whose dollar?* Is the dollar that Madison gained the dollar that Derek lost, or is it the dollar that Amanda lost? Does the dollar that Teddy gained belong to Amanda or Derek? I am strongly inclined to say that *there is no fact of the matter* about who has whose dollar. By saying that, I do not only mean that it isn't the case that Teddy has Derek's dollar; it also isn't the case that Teddy *does not have* Derek's dollar. Money is just the kind of thing that it does not make sense to speak of their identities — it doesn't matter whether one is making a positive or a negative claim about their identities. Amanda and Derek each loses *a* dollar; Teddy and Madison each gains *a* dollar. That is it. There are no further facts about this or that dollar.[63]

It would have been very different if we were talking about ping-pong balls instead of money (assuming that we have ping-pong balls in our ontology). Suppose Teddy took a ping-pong ball from Derek and a ping-pong ball from Amanda, giving one to Madison and keeping one. There is clearly a matter of fact about who has whose ping-pong ball. Whether anyone cares or anyone has been

[63] Notice that we are here not talking about the *physical implementations* of money like paper notes and coins. None of these is involved in the example.

keeping track to tell is not the issue. The point is, *metaphysically*, there is a matter of fact about the identities of the ping-pong balls, unlike the case about money.

The metaphysical feature that the ping-pong balls have and money lacks is **individuality**.[64] A ping-pong ball has individuality (or, is an individual), meaning that there is a matter of fact whether a ping-pong ball is identical to *this* or *that* object — it is metaphysically individuated. It is only because ping-pong balls are metaphysically individuated that it makes sense to make identity claims about ping-pong balls. It is also only due to ping-pong balls' being metaphysically individuated that it makes sense to single out an individual ping-pong ball by, e.g., labelling it with a proper name. I can name a ping-pong ball Nancy and ask whether the ping-pong ball someone holds is Nancy. The individuality of ping-pong balls is manifested in the fact that it does make a difference to swap ping-pong balls; when ping-pong balls are swapped, the world is a little bit different. But money is not that way. As we have seen, there is no matter of fact as to whether a dollar that Derek lost is this dollar that Teddy gained or that dollar that Madison gained. Derek cannot name a dollar Craig and asks whether Teddy or Madison is keeping Craig. Dollars are not metaphysically individuated. And there is simply no such thing as swapping dollars.[65]

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[64] Pesic (2002) advised against using the phrase 'lack of individuality' because it falsely implies that these things are supposed but fail to be individuated (102). He suggests introducing a new term to characterize this feature positively; he used the word 'identicality'. Although I can see 'A lacks B' might carry an unwanted implicature that A is supposed to have B in conversation, I do not see why there is such *implication*. Although the word 'lack' usually has the implicature Pesic mentioned in many contexts, I am pretty sure no one who has been following the discussion would mistakenly think that I mean US dollars are *supposed* to have individuality that they fail to have. So, I see no good reason to risk obscuring our prose for being purist by introducing a new positive term of the feature.

[65] A slightly misleading (but perhaps useful) way to put the point is to say that swapping dollars does not give rise to a new state of affair. This is misleading because to say that two dollars are *swapped* already implied that they have changed their positions, implying that this dollar which is here is not the same as that dollar which

Although I try to introduce the idea of things without individuality by appealing to ordinary things like money, the idea is certainly not explicitly embraced in everyday life. Instead, the idea has been motivated by philosophers via other means. For example, Lowe (1998) calls things that lack individuality *quasi-objects* (70-71). Instead of appealing to mundane things, Lowe uses electrons as a prime example of things that lack individuality:

> Here is a putative example of countability without determinate identity. The single electron shell of a neutral helium atom contains precisely two electrons: and yet, apparently, there is no determinate fact of the matter as to the identity of those electrons. This is because the two electrons in the atom's shell exist in a state of so-called 'superposition', or 'quantum entanglement'. Our inability to say which electron is which is not merely due to our ignorance, or inability to 'keep track' of an electron in such circumstances: not even God could say which electron was which, because there is simply no fact of the matter about this. It is well known, indeed, that the sort of indeterminacy presupposed by orthodox interpretations of quantum theory is more than merely epistemic in nature — it is ontic. (1998: 62)

> If what I have said so far is correct, then electrons provide an example of a category of entities which are determinately countable but not always determinately identifiable. I propose to call such entities *quasi-objects*. (ibid: 70; italic in the original)

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was here, contradicting the idea that the dollars have no individuality. So it is the best to just say there is no such thing as swapping dollars.

The advantage of appealing to electrons is that whereas one might reasonably refuse to include money in one's ontology, it is harder to be an eliminativist about electrons. And the entanglement of electrons is a scientifically well-documented phenomenon, which, presumably, is epistemically more significant than our intuitions about money when it comes to theory choice.

Two things are worth noting. First of all, there is a tiny detail in Lowe's characterization of quasi-objects that I want to distance myself from. Early in the first quote above, Lowe says 'there is no *determinate* fact of the matter as to the identity of those electrons'. I would rather just say, for the electrons in the state of superposition, there is no fact of the matter about their identities. There is no need to bring the notion of determinacy into this. The fact that the notion of determinacy is redundant is backed up by Lowe's own words a few lines below in the same quote where he says, 'not even God could say which electron was which, because *there is simply no fact of the matter* about this'. The word 'determinate' does not even show up. I am not saying that Lowe cannot use the term 'indeterminate' to just mean 'there is no fact of the matter'. But since the nature of indeterminacy is itself a substantive philosophical issue and, arguably, there are cases where there is no fact of the matter regarding p but that we are reluctant to consider examples of indeterminacy (e.g., when the statement p is meaningless), I believe it is unwise to bring in the notion of determinacy when it is not called for.

Secondly, Lowe rightly points out that lack of individuality does not mean lack of countability. That is in fact the heart of the idea of quasi-object. As we have seen in the money case, although there is no matter of fact whether Derek has lost this or that very dollar, there is a matter of fact whether he has lost 1 dollar or 2 dollars. This might raise some eyebrows, for statements about enumeration are standardly rendered (i.e., with first-order predicate logic) in terms of the identities of the objects enumerated. For example, to say that there are 2 Fs, one standardly says: there is an x and a y such that x is F and y is F and x is *not identical to* y. The enumeration is analyzed in terms of

an identity claim about the enumerated objects. If something lacks metaphysical individuation, no meaningful identity claims may be made about it. So, it would seem that, if there are things with no fact of the matter about their identities, then 'questions about how many objects are such-and-such will sometimes have no determinate answers'. (Parson 2000:134) If the standard analysis of enumeration claims is correct, there is no such thing as counting without appealing to the identities of the enumerated. But certainly, there is a matter of fact that a non-ionized hydrogen atom has 1 electron and a helium atom has 2. A deviation from the standard analysis is therefore required for us to be able to say that electrons are quasi-objects and that they can be counted.

Philosophers have tried to offer a non-standard analysis that makes enumeration primitive so that enumerative claims do not need to invoke the identities of the enumerated objects. Such an alternative analysis will be presented very shortly. For now, I just want to point out that there is an independent argument against analyzing enumeration claims in terms of the enumerated objects' identities. As a result, the deviation from the standard analysis should not give us a reason against the intelligibility of countable quasi-objects.

Liebesmann (2014) argues that analyzing enumeration in terms of identity fails because it cannot handle all pre-theoretically legitimate enumeration claims. Whereas the traditional analysis can deal with 'there are exactly 2 bagels' and 'there are exactly 3 bagels', it cannot properly analyze 'there are exactly 2 *and a half* bagels'. The traditional analysis does not allow the enumeration of things to be more than 2 without being 3. Saying that there are 2 and a half bagel is, however, a perfectly legitimate enumeration claim that any proper analysis of enumeration should be able to accommodate. The failure to accommodate non-natural number enumeration is therefore a fatal problem for analyzing enumeration in terms of the enumerated objects' identities.

One might try to defend the orthodoxy by saying that 'there are exactly 2 and a half bagels' can be analyzed by treating 'being a bagel' and 'being a half bagel' as two distinct predicates: there is an x,

a y, and a z such that x is a bagel and y is bagel and x is not identical to y and z is a half-bagel. Sticking to the orthodoxy this way, we make saying that there are 2 and a half bagel like saying that there are 2 bagels and 1 apple; important information is lost in the translation. And questionable implications are also added to enumerative claims, seriously disrupting the inferential behaviors of enumerative claims. E.g., when I cut a million bagels all in half, I end up having no bagels.

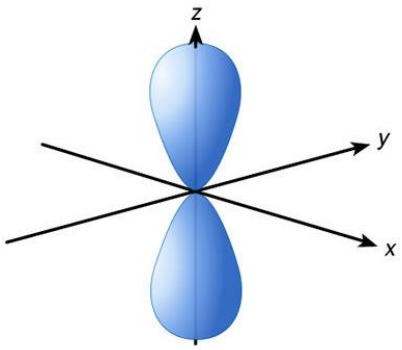
The key of making sense of the idea of a quasi-object is to be able to make sense of a conception of enumeration that does not logically rely on facts about the identities of the enumerated. Regardless of what we think a proper analysis of enumeration would look like in the end, Liebesmann's argument at least shows that analyzing enumeration in terms of identity is problematic. Hence, if we refuse to acknowledge the intelligibility of the idea of a quasi-object, we should have a proper argument and not simply because we have grown used to the traditional way of thinking about enumeration in terms of identities.[66]

2 Explanatory Significance of Non-Individuality

[66] It is important to emphasize the fact that we are interested in the *metaphysical connection* between facts about identity of objects and facts about the enumeration of those objects, and not the *epistemic connection*, because discussions in the literature do not always keep the metaphysical issue and the epistemic issue apart as clearly as they should. For example, while discussing the possibility of divorcing identity and enumeration, Arenhart (2012) suggests, in passing, that such a possibility can be illustrated by the fact that we can come to know the number of a kind of object by dividing the total mass with the unit mass of the kind of object to be counted (803). In fact, the point cannot be illustrated this way. Surely there are means to obtain the number of objects without appealing to their identity conditions. But that does not tell us much about the *metaphysical* relation between identity and count. Analogically, of course, one can obtain information about a person's sex by checking his/her medical documents without looking at that person's biological features. But that surely does not imply that it is one's documents, instead of biological features, that *constitutes* one's sex metaphysically. Part of the confusion, I think, is due to the ambiguity of the words 'enumeration' and 'count', which can refer to either our epistemic activity of inquiring the number of things or refer to the count of those things.

I use Liebesmann's argument to show that we should not let the conceptual inertia pertaining to the standard conception of enumeration hold us back from accepting at least the intelligibility of the notion of quasi-object. But more importantly, there is a strong positive reason for embracing the notion — it does explanatory work in our understanding of the actual world. The idea of quasi-objects helps account for certain important scientific data. In the following, I will discuss two important scientific explanations where the idea of quasi-objects proves very fruitful.

Case One. Some atoms have non-continuous p-orbitals, which have the following shape:



An orbital is a region around the nucleus of an atom, where it is highly probable to find a particular number of electrons at a particular energy level. And there is a limit to the number of electron one can find in an orbital. A p-orbital is an orbital that shapes like two balloons sticking out to opposite directions as shown in the picture above. Imagine a plane that cut between the two 'balloons' that form the p-orbital (the plane formed by the x- and y-axes in the picture). Whereas there is a high chance of finding electrons in the two 'balloons' (very high chance at the round ends of the two 'balloons'), the probability of finding any electrons that belongs to this p-orbital on that plane is zero — that is, the 'balloons' are disconnected.

If we conceive of electrons as ordinary objects like ping-pong balls, this statistical/probabilistic fact is rather paradoxical. Say I find n electrons in one of the 'balloons' (where n is the maximal

number of electrons in the orbital), and later detect some electrons in the other 'balloon'. If we are conceiving of electrons like ping-pong balls, we would have to say that those very electrons have traveled from one 'balloon' to the other 'balloon' during the interval of the two detections. But then it cannot be right to say that there is zero probability to have electrons on the x-y plane, which is supposed to be the only 'doorway' to travel from one balloon to the other, hence the paradox.

The paradox can be explained away. Electrons are not like ping-pong balls. To talk about objects' traveling, one has to speak of the identities of objects at different spacetime locations.[67] The fact that a tennis ball is in my apartment at time t and a tennis ball is at the White House at a later time t' does not yet mean that a tennis ball has traveled from my apartment to the White House. Traveling happens only when a tennis ball is in my apartment at time t and *the same tennis ball* is in the White House at a later time t'. If we accept that electrons are quasi-objects, they are countable but don't have individuality or identities. There is no fact of the matter about whether *exactly those electrons* have been detected again in the other 'balloon' of the p-orbital. Hence, strictly speaking, electrons are not the kind of thing such that there is a matter of fact about whether they have travelled from one 'balloon' to the other 'balloon', for that would imply that there is a matter of fact regarding whether the electrons you first found in one 'balloon' and those you found in the other 'balloon' later are *identical*. We find a number of electrons here, and then we find a number of electrons

[67] Some metaphysicians might immediately protest that, given this case, what we need to give up is only the notion of diachronic identity or **persistence** for electrons. So strictly speaking this is not an issue of electrons having no identities — just that they do not persist. If we limit our attention to the case of orbitals of atoms and the kind of case Lowe (1994) talks about, then that would be a fair remark. But, as we will see in the second case, there are other scientific data that non-individuality can neatly account for, and diachronic identity is not involved at all. That gives us good reason to think that the case of electrons in p-orbitals is part of a unified phenomenon of quasi-object that should not be understood as primarily having anything to do with the metaphysics of persistence.

elsewhere later. That is the end of the story. Due to the lack of individuality, there is *no further fact of the matter* about any particular electrons and electron traveling. Hence, if we accept that electrons are quasi-objects, there is nothing paradoxical about the electron-free x-y plane, which should not be viewed as the 'doorway' for electrons to travel from one side of the orbital to the other side.

So not only is it intelligible to speak of quasi-objects, it is scientifically fruitful to accept that electrons are *actual* quasi-objects. This is a good scientific reason to think that we should revise our standard conception of enumeration and embrace the conceptual space for countable objects that have no matter of fact about their identities.

Case Two. What Lowe calls quasi-objects, French & Krause (2006) call *non-individuals* (due to the lack of individuality). French (2015: section 2) points out that the lack of individuality is the received way to account for the peculiar statistical behavior of quantum objects. Let us start with proper objects (i.e., non-quasi-objects). Suppose I have two ping-pong balls and I will decide whether to paint each of them black or white by flipping a fair coin. So there are two objects each of which can be in two different states randomly (being black and being white). In this situation, the following are obviously true:

(i) The probability of both ping-pong balls being black = 1/4

(ii) The probability of both ping-pong balls being white = 1/4

(iii) The probability of one ping-pong ball being black and one being white = 1/2

The statement (iii) is true because there are four possible outcomes and two of which are outcomes when one ping-pong ball is black and one ping-pong ball is white. Thus, the chance of that obtaining is 2/4.

Now suppose we are dealing with quantum entities. Suppose we are dealing with two quantum entities which can be in two different states, say F and G, with equal chance. The following statistical statements turn out to be true:

(i') The probability of both quantum entities being F = 1/3

(ii') The probability of both quantum entities being G = 1/3

(iii') The probability of one quantum entity being F and one being G = 1/3

Given that the case about quantum entities and ping-pong balls are structurally identical, the statistical difference calls for explanation. The standard explanation appeals to the non-individuality of quantum entities.

Since quantum entities do not have identities, they are not the kind of thing that can be swapped (similar to the case of money). If one quantum entity is F and one quantum entity is G, that is the end of the story; there is no further fact of the matter with respect to which one is F and which one G. Thus, in the quantum entity case, there are only three possible outcomes, unlike the ping-pong ball case, where there are four. That provides an elegant explanation of the probability 1/3 for each of the cases.[68]

French and Krause do not call this the *Received View* for no reason. The fruitfulness and need for the idea of non-individuals to account for quantum phenomena has been acknowledged right from the beginning of quantum physics by many physicists and philosophers of physics:

[68] Notice that diachronic identity is not the issue. Hence the phenomenon has nothing to do with the metaphysics of persistence, as I have mentioned in footnote 66.

> […] that two states which differ only by the exchange of two photons are physically indistinguishable and have statistically to be counted only as one state. In other words, photons have no individuality. (Born 1943: 27-28: quote from French & Krause 2006: 116)

> […] the possibility that one of the identical twins Mike and Ike is in the quantum state E and the other in the quantum state E does not include two differentiable cases which are permuted on permuting Mike and Ike; it is impossible for either of these individuals to retain his identity so that one of them will always be able to say 'I'm Mike' and the other 'I'm Ike.' Even in principle one cannot demand an alibi of an electron! (Weyl 1931; quote from French & Krause 2006: 105)

Divorcing plurality/countability from identity — making enumeration a primitive notion without analyzing it in terms of identity — gives us an elegant explanation of these scientific data. And this is a compelling reason for accepting a shift in our conceptual framework in order to acknowledge the intelligibility of the notion of quasi-objects.

Of course, appealing to non-individuality is not the only logically possible way to account for these data (see, e.g., French (2015: section 3) for a more convoluted approach that does not appeal to non-individuals). But if giving up an old way of thinking about the count of objects, which we already have independent reason to do anyway due to Liebesmann's argument, provides us with a neat and straightforward explanation of these otherwise paradoxical phenomena, we have a very powerful reason to revise our old way of thinking about objects.[69]

[69] One might wonder, since I suggested that money is quasi-object, whether money demonstrates the same probabilistic behavior. If not, that would be a reason to think that the odd probabilistic behavior is not a

3 Constructing an Intelligible Notion of Non-Individuality

The notion of quasi-object is intelligible if and only if it is intelligible to take enumeration as a primitive notion without analyzing it in terms of facts about identities of the enumerated (as we shall see, this does not need to preclude all inferential connections between enumerative claims and identity claims). In the previous section, I appealed to Liebesmann's argument and two sets of scientific data to defend the usefulness and hence intelligibility of a primitive notion of enumeration, and consequently, the intelligibility of a quasi-object.

But arguing that we should acknowledge the intelligibility of a quasi-object is one thing, actually building an intelligible notion of quasi-object is another thing. We do not only want an argument to think *that* the notion is intelligible, we also want to know *how* exactly to think about quasi-objects intelligibly, i.e., *how* to think about the multiplicity of some objects without implying any facts about the identities of those objects.

French and Krause approach the task by building a formal language in which enumeration is introduced as a new primitive notion, whose inferential behavior is fixed by a set of axioms that do not invoke identity claims about the enumerated objects. Under their formal language, the revised notion of enumeration can sometimes be used coherently without entailing anything about the identities of the enumerated. They call the revised notion *quasi-cardinality*. In this section, I will first lay out the basics of this formal language, which French and Krause call the **quasi-set theory**. Then,

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reason for thinking that quantum entities are quasi-objects. Suppose we randomly distribute two dollars among two persons. If dollars are quasi-objects, the probability of each having one dollar is 1/3 (instead of 1/4). Is there any experiment that we can perform to help confirm or disconfirm this implication about money? I am honestly not sure. But in any case, it is important not to confuse randomly distributing two dollars with randomly distributing two one-dollar paper notes, which are individuals.

I will introduce some modifications to their formal language in light of the things we have discussed earlier.

Unlike the standard set theory, the quasi-set theory divides a domain into two halves in order to handle two kinds of things: the individuals and the non-individuals (i.e., objects vs. quasi-objects). Notice that non-individuals are said to lack individuality not in the sense that all identity claims about them are false. Since there is no fact of the matter about the non-individuals' identities, identity claims about them are not even false; those claims are neither true nor false. To capture the idea that there can be entities with no fact of the matter about their identities, the predicate '=', which stands for identity, is *grammatically* restricted in quasi-set theory. The identity predicate only applies to individuals to form well-formed-formulae. We do not get a well-formed-formula by applying the identity predicate to talk about non-individuals.[70]

To present the axioms that constitute the notion of quasi-cardinality we need for thinking about quasi-objects, we need a basic vocabulary in the formal language in addition to the usual notions in first order predicate logic. Here are the basic terms we need:

Z(x): x is a set;

m(x): x is a quasi-object;

Q(x): x is a set containing quasi-objects (hereafter, I will call such a set a qset);

$\wp$(x): denotes the power set of x;

[70] Since the universal quantifier quantifies over the entire domain of discourse (i.e., individuals and non-individuals alike), (x)(x = x) is not valid in quasi-set theory because 'x = x' would not be well formed for the non-individuals in the domain, let alone being true. Lowe (1996: 71) thinks that we should abandon the meaningfulness of identity claims about quasi-objects *except* for self-identity claims. So for Lowe, (x)(x=x) remains valid. But it is unclear to me how Lowe can have it both ways. And, as we will see, advocates of quasi-set theory have set forth to build a language that can dispose of self-identity in some cases.

[…] denotes a qset with … as members;

$(x)_Q(\ldots)$: For all x such that Q(x), …;

$\exists_Q x(\ldots)$: There is an x such that Q(x), …;

Cd(x): x is a cardinal number;

card(x) denotes the cardinal number of x;

qcard(x) denotes the quasi-cardinal number of x;

Fin(x): x is a finite qset;

With these basic notions, Krause then introduces the new notion of quasi-cardinality (i.e., qcard(x)) into our formal language by the following eight axioms (I keep the labels for the axioms as they are in Krause (1992: 408)):

(A17) $(x)(\sim Q(x) \rightarrow qcard(x) = 0)$

(A18) $(x)_Q \exists !y(Cd(y) \,\&\, y = qcard(x) \,\&\, (Z(x) \rightarrow y = card(x)))$

(A19) $(x)_Q(\sim(x = \{\}) \rightarrow \sim(qcard(x) = 0))$

If α and β are cardinals numbers,

(A20) $(x)_Q(qcard(x) = \alpha \rightarrow (\beta)(\beta \leq \alpha \rightarrow \exists_Q y(y \subseteq x \,\&\, qcard(y) = \beta)$

(A21) $(x)_Q(y)_Q(y \subseteq x \rightarrow qcard(y) \leq qcard(x))$

(A22) $(x)_Q(y)_Q(Fin(x) \,\&\, x \subset y \rightarrow qcard(x) < qcard(y))$

(A23) $(x)_Q(qcard(\wp(x)) = 2^{qcard(x)})$

(A24) $(x)(\sim m(x) \rightarrow qcard([x]) = 1$

Although the identity predicate does occur in these eight axioms, they are all identity claims about *numbers*, which are individuated objects.[71] So, the notion of quasi-cardinality is a primitive notion of enumeration that does not logically entail claims about the identities *of the enumerated*, exactly what we need. Once the notion of quasi-cardinality is introduced as primitive and independent of the identities of the enumerated, we have the conceptual resources to accommodate counting with real numbers (instead of natural numbers) and counting quasi-objects.

Krause's quasi-set theoretic language is a good starting point. But some amendments are needed. Let us consider Krause's axioms (A17) and (A18). (A17) says that if x does not contain any quasi-objects, the quasi-cardinality of x is 0. For example, a set that contains nothing but two ping-pong balls has the quasi-cardinal number 0. (A18) basically says that for any x that contains some quasi-objects, the quasi-cardinal number for x is the cardinal number of x.[72] Suppose x is a set that contains two ping-pong balls and an electron. The cardinal number of x is identical to the quasi-cardinal number of x, which is 3. What are these two axioms for?

By including (A17) and (A18), what Krause is trying to do is not to *replace* the standard cardinal number with a new notion. Instead, he is trying to have both notions of enumeration in his formal system and model our enumerative practice in a disjunctive manner. On the one hand, when we are counting individuals alone, the standard cardinality is the relevant notion. In such a case, the cardinal number of the set of things we are counting is *not* identical to the set's quasi-cardinal number, which is 0 because of (A17). Instead, the cardinal number is given in the standard way — in terms of the identities of the things enumerated. On the other hand, whenever quasi-objects are included in what

[71] Or at least we lack reason to think that numbers are not individuated.

[72] The way I see it, the 'Z(x)' in (A18) is redundant, because the statement is completely under the scope of the universal quantifier '$(x)_Q$' restricted to qsets — which are by definition sets. Krause does not offer any explanation of this redundant addition.

we are counting, quasi-cardinality is the relevant notion as it is stated by (A18): card(x) is identical with qcard(x) in those cases.

These two axioms have to be abandoned. Remember that part of *our* motivation to acknowledge the intelligibility of a primitive notion of enumeration (and hence the idea of quasi-objects) is Liebesmann's argument, which shows that the standard conception of cardinality is problematic rather generally (e.g., even for bagels, which are not quasi-objects). To satisfy that motivation, it is not enough that we add a new notion of enumeration for quasi-objects. We should *replace* the standard notion with the notion of quasi-cardinality.

First of all, (A17) has to be discarded because quasi-cardinality is also going to be the relevant notion for counting individuals like bagels and there can certainly be a non-zero number of bagels. Secondly, since we take quasi-cardinality as the notion for enumeration generally, we do not need (A18) to specify that quasi-cardinality is relevant when we are counting non-individuals. So, (A18) should be discarded too.

The axioms (A19) - (A24) make the inferential behaviors of the new primitive notion of quasi-cardinality more or less like that of the old notion. That kind of continuity allows us to plausibly claim that the new notion is not a completely unrelated one, but an improved or refined version of the old notion, like how the physicists' refined notion of velocity replaced the folks' notion of velocity.

Finally, it is important to emphasize that, using the new primitive notion quasi-cardinality to capture enumeration does not mean we can no longer draw inferences about the identities of the enumerated from count claims. Such kind of inferences is undoubtedly a signature of the concept of enumeration. For example, from the claim that there are 2 ping-pong balls, *it is rational* to infer that there is an x and a y such that x is a ping-pong ball and y is a ping-pong ball and x is *not identical to* y. But such an inference should no longer to be considered *purely* logical and should not be understood

as strictly universally applicable. Instead, the inference is reasonable partly on the basis of a further *substantive metaphysical premise* about ping-pong balls — that they are individuals. Purely logically speaking, enumeration of things says nothing about the identities of those things.

As long as we can build a language in which enumeration can be spoken of as a primitive notion without appealing to the identities of the enumerated objects, we have secured an intelligible notion of quasi-object.

4 Skepticism

Quasi-object skeptics might protest that all I have done is offer a system with (weird) notions that I labeled by fancy names like 'quasi-cardinality'. Building a game of symbols does not give us an intelligible notion of quasi-object. But what does it take to really demonstrate that it makes sense to speak about certain things? Smith, who questions the intelligibility of the notion of vague identity, says:

> I claim that a necessary condition for making clear sense of a phenomenon is showing how the phenomenon may be modeled using standard set-theoretic tools. For example, Kripke did this for possible worlds when he presented a set-theoretic model theory for modal languages which employed such worlds, and Tarski and others did this for semantic notions such as truth and reference when they developed classical model theory. Many philosophers would demand more than this before they would agree that clear sense had been made of a phenomenon: for them, to make clear sense of something is to give a naturalistic (or perhaps physicalistic) account of it. From this point of view, Kripke did not make sense of possible worlds (to do that would be to see how they might be constructed out of naturalistically acceptable materials such as, say, sentences) and Tarski did not make sense of

> semantic notions (to do that would be to see how they might be reduced to naturalistically acceptable materials such as, say, causal chains). (2008: 2)

In the quote, Smith begins stating that a proper set-theoretic characterization of a phenomenon is *necessary* for showing the phenomenon's intelligibility (i.e., the relevant notion is 'making clear sense'). Then, he rightly points out that people who asks for more are asking for too much. Largely due to Tarski's work on set-theoretic definitions of semantic notions like truth, it has been an established practice that to articulate the intelligibility/meaningfulness of a certain kind of claim is to construct the set-theoretic models for those claims. By doing so, we show how those claims depict the world to be, i.e., how the world would be structured for those claims to be true, whether or not the world is actually that way. This was how Kripkean semantics convinced (most of) us that talk of metaphysical modality makes sense. More recently, Barnes (2010) and Barnes & Williams (2011) try to demonstrate the intelligibility of ontic vagueness in a similar way — by developing a formal language similar to the one endorsed by supervaluationists to model the phenomenon of ontic vagueness. So, it is my contention that a set-theoretical characterization of a phenomenon, which provides a standardized description of the phenomenon's defining features, should also be *sufficient* for showing the intelligibility of the phenomenon.

That is exactly what French and Krause do for the idea of a quasi-object by offering a novel set-theoretic language: the quasi-set theory. As a result, one would have thought the intelligibility of a quasi-object should be in the clear by Smith's standard, just like the notion of truth, modality, and ontic vagueness. But Smith is not convinced.

Smith's stated concern is primarily about philosophers who want to introduce a notion of identity that allows *indeterminacy*. As I have argued earlier, what the advocates of quasi-objects really need to say is that there are things that have no fact of the matter about their identities. The notion

of indeterminacy does not have to come up. Given that quasi-set theory tries to capture the lack of individuality in terms of the *meaninglessness* of identity claims about quasi-objects, and we presumably do not want to say that a meaningless claim's lack of truth value is a case of indeterminacy, I do not see any compelling reason to portray the doctrine of quasi-object as a view about *indeterminate* identity.[73] With that being said, Smith's objection can easily translate to challenge French and Krause's attempt to replace the standard notion of identity with a more restricted notion of identity that does not meaningfully apply to all objects. So, we have to deal with his objection:

> The problem is that we only understand the model theory for vague identity in the first place if we take it to be a piece of standard mathematics—a set-theoretic construction of the standard sort. So if the friend of vague identity turns around at the end of her presentation of this model theory and tells us that the language in which she made her presentation was governed by the very semantics she just presented, then we have to conclude that we did not understand the presentation at all. We are back at square one: we thought she was presenting a piece of standard mathematics, and we know how to understand that sort of thing; but if she was not, then unless some other way to understand the presentation is explained to us from the ground up, we do not understand it at all. (Ibid: 14)

[73] Not only Lowe, French also characterizes his project as having something to do with indeterminate identity. But I hope it is clear that in the quasi-set theory that French and Krause develop, there is no mentioning of certain identity claims being indeterminate in truth value. There are only ungrammatical applications of the identity predicate. That does not give us anything interestingly indeterminate. It is quite unfortunate that words like 'indeterminate', 'vague', 'borderline', etc. are used without much care in the literature.

One way to articulate Smith's worry is that, by building the quasi-set theory as a purely syntactic axiomatic system, we face a dilemma. A proper formal language needs both a syntax and a semantics to be meaningful, that is, to be about something, or to be eligible of being true. We have been offered the syntax of the quasi-set theory in an axiomatic fashion. How are we supposed to spell out the semantics of the formal language so that things like 'm(x)' and 'qcard(x)' are not just meaningless marks on papers but symbols *about* quasi-objects and the enumeration of (quasi-)objects? The semantics has to be formulated either in terms of a standard set-theoretic language or in terms of the new quasi-set-theoretic language. But either way appears to be a dead end.

Obviously, friends of quasi-objects cannot accept the former route, for that renders the quasi-set theory just a fancy way to talk about ordinary objects, leaving no room for genuine quasi-objects after all. Contrary to Smith's opinion that 'we only understand the model theory for vague identity in the first place if we take it to be a […] set-theoretic construction of the standard sort', the quasi-set theorists are very well aware that they need to use quasi-set theory to articulate the set-theoretic models for the axiomatic system of quasi-set theory itself (see Arenhart & Krause 2009). So, clearly they are going to take the second route. Smith argues that, if we decide to spell out the semantics for quasi-set theory in terms of quasi-set theory, we would fail to show that the quasi-set theory is intelligible in the first place. He suggests that there is some kind of objectionable circularity in using quasi-set theory to give a semantics for the quasi-set theoretic language.

I am not convinced that there is any objectionable circularity. To begin with, notice that the standard set theory is also a formal language introduced axiomatically. If we need set-theoretic semantics to interpret an axiomatic system, the axiomatic systems of standard set theory need something similar. As Arenhart & Krause (2009) point out:

> Now, Tarskian semantics is generally stated using informal set theory, and if pressed to make our assumptions clear, we say that we are relying on ZF [i.e., the Zermelo-Fraenkel set theory], the same ZF which is being taken here as our case study, whose underlying logic is […] exactly the first-order logic whose semantical understanding is in question! (253)

If it is not problematic for the standard set theories, I fail to see how it is a fatal obstacle for using the quasi-set theory to construct models for the quasi-set theory.

But perhaps Smith's circularity complaint is primarily about the dialectic. Smith writes: '*the burden of proof* lies firmly with the friends of vague identity to actually produce a framework in which we can clearly think about vague identity.' (Ibid: 10; my italic) The idea is perhaps this:

> It is fine in principle to use quasi-set theory to make sense of quasi-set theory. The same in fact is true for the standard set theory. The key difference between the formal semantics for the standard theory and the one for the quasi-set theory is that, in the case of the standard set theory, formal semantics is not invoked to *prove* the intelligibility of the standard set theory, whose intelligibility is never in question. But in the case of the quasi-set theory, the point is to *prove* intelligibility. So, the quasi-set theorists have the burden of proof to illustrate the meaningfulness of a quasi-set and, together with it, the non-standard notion of identity, without speaking under the assumption that quasi-set theory is intelligible. And to *use* the quasi-set theoretic language is to speak under the assumption that the theory is intelligible. Giving a quasi-set theoretic semantics for quasi-set axiomatic theory is not problematic per se. But that is dialectically questionable for the very task at hand — namely to *prove* that the notion of quasi-object is intelligible.

If this is Smith's concern, then I fear it stems from a subtle ambiguity of the word 'prove'. If, by 'prove', we mean offering an argument with premises supporting a conclusion, then it does seem dialectically bad that the premises only seem plausible if we *already* find the conclusion plausible. That argument would not be a piece of compelling evidence for us. But 'prove' can mean something else. For example, someone may try to *prove* that he can score directly from a corner kick by actually doing so. No one would say the person has failed to respect his burden of proof by going ahead to do something (and hence assuming that it can be done) that he is supposed to prove do-able. This is a case of proving something in the sense of ***demonstrating*** it, instead of arguing for it.

Offering a semantics to prove intelligibility is a case of proving by demonstration. I demonstrate how a notion ***can be made sense of*** by demonstrating how to use it and how to interpret it by constructing set-theoretic truth-conditions for sentences that contain the notion. Proving the intelligibility of a notion is not primarily to *argue that* the notion is intelligible; instead it is to demonstrate an ability to employ and interpret the notion systematically. Just as there is nothing wrong with acting on the assumption that scoring from a corner is do-able while demonstrating that it can be done, there is nothing wrong with acting on the assumption that the quasi-set theoretic language is intelligible (namely, by using the quasi-set theoretic language) while demonstrating its intelligibility.

Finally, perhaps the spirit of Smith's complaint can be developed in a different way — without the assumption that establishing intelligibility of a notion is all about developing a formal semantics. The objection might simply be that one just does not *understand* the technical notions of restricted identity and quasi-cardinality introduced, despite knowing all the formal axioms that govern them. It might be argued, whereas a formal semantics can help provide a refined and standardized presentation of our (rough) understanding of a term, it won't help if we do not already have an informal understanding of a notion to begin with.

A straightforward potential answer to this kind of skepticism is, as Barnes & Williams (2009) point out, to offer 'a constitutive account of a contentious notion in independently understood terms […] that […] provides one's audience with a unproblematic route to understanding what is being said' (108). But this easy way out is not available to us just as it is not available to Barnes and Williams because we are trying to introduce a primitive notion of enumeration to replace the one that is analyzed in terms of identity. Since the new notion is meant to be primitive, '[w]e can't point to a reductive definition to force our audience to admit they understand our starting point' (Ibid: 108).[74]

In response, here is a reason to think that the claim of unintelligibility is overstated. Consider Liebesmann's case of two and a half bagels. Let's agree that it is prima facie plausible to say that I am counting one kind of thing (namely, bagels) when I say there are two and a half bagels. And also notice that the traditional analysis of enumeration in terms of identity does not work *if* I am indeed counting one kind of thing in the bagel case (instead of two kinds, namely, bagels and half-bagels). Then, it makes sense to say one actually makes an explicit *theoretical choice* when one analyzes enumeration in terms of identity. That choice may very well be right all things considered (I happen to disagree). But given the bagel case, we should at least acknowledge that our pre-theoretic conception of enumeration does not fit perfectly with the standard analysis in terms of identity — hence leaving us a substantive choice to make. There is something odd with both the standard analysis that takes identity as central to the enumeration and the non-standard approach that takes enumeration as primitive.

The fact that analyzing enumeration in terms of identity is a conscious theoretical choice means it simply can't be the case that we cannot even fathom the idea of the alternative, namely,

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[74] This is perhaps a way to understand Husserl's claim in *Crisis* that natural scientific and mathematical notions have to, in the end, find their roots of intelligibility in notions about the 'life-world'.

enumeration independent of the identities of the enumerated. If we can understand enumeration independent of identity, there is little ground to deny at least the intelligibility of quasi-objects. And the claim of unintelligibility is perhaps more suitably described as a rhetorical way to state one's resolution to stick to the standard analysis of enumeration.

So, we do have a rudimentary conception of enumeration that isn't analyzed in terms of the identities of the enumerated. We are not dealing with a case where we don't have any understanding of a notion at all. The formal semantics of the axiomatic quasi-set-theory is not to be understood as an attempt to bring in a notion of enumeration completely *ex nihilo*. Instead, it is an attempt to offer a standardized and refined presentation of a notion that we already have some rough grasp of.

5 New Metaphysical Questions

If I have succeeded in showing that we should acknowledge at least the intelligibility of the idea of objects that can be counted but have no fact of the matter about their identities, i.e., quasi-objects, then there is a whole new kind of metaphysical question open to us. Given *any* kind of things, it is now intelligible to ask whether they are objects or quasi-objects. Not only can we press that question for concrete entities like persons, tables, money, etc., that question can be raised for things that are, arguably, abstract, e.g., propositions, numbers, *properties*, fictional objects, etc.

In the rest of this chapter, I will focus on the following question: Are *magnitudes* quasi-objects (a reminder: magnitudes are properties that are the maximally determinate way to instantiate a quantity)? I will defend a positive answer to this question and defend a metaphysics of quantity which says that magnitudes are metaphysically like dollars and electrons, instead of ping-pong balls. I will call this thesis **Magnitude Non-Individualism**.

To use temperature as an example to illustrate the idea, Magnitude Non-Individualism implies that there are facts about *a degree* of temperature, but no facts about *this* or *that* particular degree of

temperature. There are non-individuating enumerative facts about whether the two glasses of water instantiate 1 or 2 temperatures, but magnitudes have no identities; that is, there are no individuating facts about *which* particular temperatures the water instantiates. And this is true not only for temperature, but for the magnitudes of all quantities like mass, duration, length, etc. The fact that Matthew is taller than Nick is *not* based on the fact that ***this*** particular magnitude of height that Matthew instantiates stands in a taller-than-relation with ***that*** particular magnitude of height that Nick instantiates. Instead, very roughly put, the fact that Matthew is taller than Nick just boils down to the *structural* fact that Matthew and Nick instantiate 2 magnitudes that stand in a taller-than-relation with each other with no fact of the matter about the identities of those magnitudes involved in the structural fact.

There are many interesting philosophical consequences for accepting this metaphysical view about quantity. Most of them have to be left for another occasion. In this chapter, I will focus on offering a good reason for accepting Magnitude Non-Individualism based on the resources we have obtained from Chapter One and Chapter Two.

6 Transcendental Reason

As we have seen in section 1 - 4, advocates of quasi-objects or non-individuals are motivated almost solely by quantum physics. But once we have established the intelligibility of the object vs quasi-object distinction, it is open to us to wonder whether that is the only way to justify classifying something as quasi-object. I believe we have a good *transcendental* reason to treat magnitudes as quasi-objects. Such a transcendental reason has nothing to do with quantum physics.

Historically, a trademark of transcendental philosophy is the attempt to form justified beliefs about something based on certain limits of our mental or linguistic representations of that thing. Certainly, one can find philosophers engaging in such a kind of project before Kant (for example,

Descartes' Cogito Argument, construed in a certain way),[75] but Kant was the one who first pursued such a kind of investigation as a unique strategy self-consciously and employed the term 'transcendental' to group such kind of philosophical efforts together.[76]

Inspired either by Kant directly, or indirectly via Strawson (1959; 1975), contemporary philosophers have developed an interest in something they called the *transcendental arguments*. By that, they mean something quite specific — an argument with the following form (based on Stern's (2000) characterization):

(TA_1) X is a necessary condition for our (linguistic or mental) representation of Y.

(TA_2) We have representations of Y.

Therefore,

(TA_3) X.

In addition to this general inference template (TA_1) - (TA_3), Stern observes that there are other *typical* characteristics to be found among the contemporary transcendental arguments. For example,

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[75] As far as I can tell, Stroud (1968) is the first to characterize the Cogito Argument as a transcendental argument.

[76] Kant has a more specific and technical definition for the adjective 'transcendental'. By transcendental, he means whatever is related to the necessary condition of experience (the full-blown and conceptually structured everyday experience, not just the sensory aspect of it). In my opinion, even Kant scholars fail to be consistently faithful to Kant's explicit definition of 'transcendental' when they interpret his work. This leads to some heavily metaphysical-ized (mis-)reading of Kant's project. For the non-historical purpose of this essay, however, I am not adhering to Kant's technical definition; I only intend to allude to certain style of argumentation.

the kind of necessity mentioned in (TA_1) is *usually* a kind of necessity which we have *a priori* access to. Historically, philosophers offering transcendental arguments usually take it to be knowable a priori that the X is necessary for our representation (about Y). Take Putnam's (1982a) transcendental argument against external world skepticism as an example. His semantic externalism, which provides the modal basis for the transcendental argument, was not meant to be obtained a posteriori. Furthermore, Stern points out that transcendental arguments have been typically employed for various anti-skeptical purposes. Whereas Strawson and Putnam used transcendental argument to resist external world skepticism, Davidson (1977) used transcendental argument to resist skepticism about other minds.

Transcendental arguments as they are narrowly construed in the form of (TA_1) - (TA_3) do not exhaust all possibilities of transcendental reasoning. I will reserve the phrase 'transcendental argument' strictly for arguments with the form (TA_1) - (TA_3), as the phrase is most commonly used in contemporary analytic philosophy. And the phrase 'transcendental reasoning' will be used in a more inclusive fashion, covering any attempt to draw metaphysical conclusion about X based on the limits of our (mental or linguistic) representations about X.[77] Transcendental effort to establish metaphysical conclusions about reality based on premises about the limits of our linguistic or mental representations can take forms other than (TA_1) - (TA_3). I will use the result we get from Chapter One and Chapter Two to provide a transcendental reason for Magnitude Non-Individualism. And the transcendental reasoning I employ will take the following form:

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[77] Stroud (1968, 2003) famously argues that the premise TA_1 of transcendental arguments are unmotivated unless we make further assumptions that would render the transcendental arguments unnecessary. Hence, Stroud argues that transcendental arguments are dialectically moot. His objection against transcendental arguments, however, does not affect the transcendental reasoning in this more general sense, especially not the kind of transcendental reasoning I am going to present in this chapter.

(TR_1) We cannot conceive that p even if we try.

(TR_2) If we try and fail to conceive that p, we have pro tanto justification for believing that it is metaphysically impossible that p.

(TR_3) There is no proper defeater against the pro tanto justification mentioned in (TR_2).

Therefore,

(TR_4) We should accept that it is metaphysically impossible that p.

7 Mentally Representing the Individuated

Since we aim to use a transcendental reason to defend Magnitude Non-Individualism, let us first take a step back from the things themselves and redirect our attention to the way we represent things to our mind. What does it take to mentally represent a group of things as having the feature of individuality?

Suppose E is a type of thing. To mentally represent E as slimy things (or: to mentally represent that E are slimy), one has to be at least capable of mentally representing a slimy instance of E.[78] By parity of reasoning: To represent E as individuals (instead of quasi-objects), one has to be at least capable of mentally representing an individual E, i.e., representing an instance of E in a way that its identity matters.

To mentally represent ping-pong balls as objects and not quasi-objects, I must be capable of mentally representing a ping-pong ball as something individuated, having its own identity — as *this*

[78] Note that I am not saying that mentally representing E as slimy things requires one to mentally represent slimy instance(s) of E. I am just stating that doing the former requires the *capacity* of doing the latter.

ping-pong ball, such that, for any ping-pong ball x, there is a matter of fact about whether x is identical to *this* pong-pong ball. And I can represent a ping-pong ball this way. On the contrary, as I have tried to make the case in the opening section of this chapter, the same cannot be said about money. Surely, I can *figuratively* think about money by thinking about some individual things. For example, I can think about and count individual seashells or individual metal coins, and act *as if* I am dealing with money as individuals. But that is not to think about money as individuals literally as if there is a fact of the matter about their identities.

In Chapter Two, I have argued that we lack mental resources to single out any particular magnitude, i.e., Representational Humility. Just like Dretske's 4-output system does not have fine-grained enough outputs to represent any particular speed, our mental representations are too coarse-grained for the degrees of quantities in the world. We lack the kind of picky mental representation that specifies a magnitude in a way that its identity matters. So, we are not capable of mentally representing a magnitude as individuated. As a result, we lack the mental resources to represent magnitudes as individuals.

We postulate mental representations to analyze intentional states like perception, memory, belief, and *conceiving*. The mental representations we have at our disposal determine the range of conceivings we can have in the same way they determine the range of beliefs we can have. If we cannot mentally represent magnitudes as individuals, we cannot conceive that magnitudes are individuals.

8 The Epistemic Status of Inconceivability

Individuated magnitudes are inconceivable. One may *say* otherwise; one may *think* that individuated magnitudes are conceivable; one may even *declare* to be *conceiving* them as individuals as we speak. But with Representational Humility in play, none of these can be literally true. Conceiving

individuated magnitudes is beyond our finite mind and we *should* believe that they are inconceivable due to the cognitive psychological reason I offered in Chapter Two.

This conclusion about inconceivability and the way I defend it do not sit too well with a quite common opinion about inconceivability. The boundary of conceivability is usually considered, at least implicitly, *knowable a priori*. Contrary to this common opinion, the kind of inconceivability that I defend is not knowable a priori. This is because that kind of inconceivability is defended by appealing to Representational Humility, which is not and probably cannot be justified a priori. So, before moving on to discuss the metaphysical implication of my inconceivability claim, I want to explain why I see no reason to be worried by the idea that the inconceivability of certain things can only be discovered a posteriori.

8.1 Inconceivability A Priori

In the relevant literature, conceivability is sometimes *defined* in the following way: a statement S is conceivable if and only if not-S is not knowable a priori (Gendler & Hawthorne (eds.)(2002)). Chalmers (2002) calls this kind of conceivability *negative conceivability*. This definition (together with some plausible auxiliary assumptions) implies that whether a statement is (negatively) conceivable is knowable a priori.

There are two principles that I find fairly intuitive to assume. Principle 1: For any p, whether or not p is knowable a priori is knowable a priori. Principle 2: for any p and q, if it is knowable a priori that *p if and only if q*, then if it is knowable a priori whether p, it is knowable a priori whether q.[79] Based on Principle 1, it is knowable a priori whether not-S is knowable a priori. Given the definition

[79] Notice that Principle 1 has nothing to do with the internalist principle *knowing that p implies knowing that knowing that p*. And one does not need to endorse a full-blown closure principle about knowledge to accept Principle 2.

of (negative) conceivability (assuming that a definition is meant to be knowable a priori), and based on Principle 2, whether S is (negatively) conceivable is always knowable a priori.

In contrast to negative conceivability, Chalmers defines a positive conception of conceivability as well.

> S is positively conceivable when one can *coherently* modally imagine a situation that verifies S. A situation is coherently imagined when it is possible to fill in arbitrary details in the imagined situation such that no contradiction reveals itself. To coherently imagine a situation that verifies S, one must be able to coherently imagine a situation such that reasoning about the imagined situation reveals it as a situation that verifies S. This notion is our core notion of positive conceivability: I will henceforth say that S is positively conceivable when it is coherently modally imaginable. (2002: 153)

Positive conceivability is a complex notion. From the quote above, there are two steps in positively conceiving S. First, one thinks of a situation; Second, one must, through reasoning, 'see' that S is true at the situation imagined a priori. In later works, Chalmers (2012) calls the reasoning part (i.e., the second step) *a priori scrutability*.

As for the first part about imagining situations, Chalmers (2012) further explicates it as the process of giving a full description of a centered world in terms of its fundamental physical facts, phenomenological facts, indexical facts, and a completion claim 'That's all'. Since all it takes for such a centered situation to be imaginable is that 'no contradiction reveals itself', and since whether there

are contradictions in a description is knowable a priori (under cognitively ideal conditions),[80] I believe it is safe to say that, just like negative conceivability, whether S is positively conceivable is also meant to be knowable a priori.

8.2 Inconceivability A Posteriori

Is it really plausible to think that conceivability is a matter that is *always* knowable a priori — as common as the view might be? I believe not. And it is perhaps dialectically useful to begin by showing that the unorthodox view about inconceivability is not without defenders. It is arguably implicit in Kripke's discussion on necessary a posteriori that inconceivability does not have to be knowable a priori.

Kripke takes conceivability to entail possibility. For one thing, despite all the discussion about necessary a posteriori, he never quite said that we can conceive of something impossible. Take Hesperus and Phosphorus as an example. Kripke believes that it is *not really conceivable* that Hesperus is not Phosphorus, although, due to certain modal confusion, it sometimes *seems* to us *as if* it is conceivable. When it *seems* to be conceivable that Hesperus is not Phosphorus, it is in fact *something else* that is conceivable — that *the star we see in the morning* is not the same as *the star we see in the evening*.[81]

The non-identity of Hesperus and Phosphorus is impossible. If conceivability and possibility are logically equivalent, their non-identity is inconceivable. Since the identity of Hesperus and Phosphorus can only be discovered a posteriori, *so is the inconceivability of their non-identity*. Hence, prior

[80] The notion of contradiction is distinct from the notion of necessary falsehood. It is necessarily false that water is not H_2O, but it is not contradictory. Whereas there are necessary a posteriori truths, contradictions are detectable a priori.

[81] See also Kung (2016: footnote 11) and Ichikgawa & Jarvis (2012) about the Kripkean view that we cannot imagine the impossible.

to the astronomical discovery, we just do not know whether it is conceivable that Hesperus is Phosphorus. If what I have offered is a proper interpretation of Kripke, he would be on my side in thinking that whether something is conceivable is not always knowable a priori.

I do not intend to argue that what I have just offered is the best interpretation of Kripke. Nor do I mean to argue that we should *therefore* reject the orthodoxy and think that beliefs about conceivability cannot always be justified a priori because there are necessary a posteriori truths. After all, I have already stated in Chapter One that I do not think conceivability entails possibility. By presenting Kripke's view, my sole intention is to show that I am not alone in being skeptical about the orthodoxy. Hence, it is not idiosyncratic to think that we can discover something to be inconceivable a posteriori that we could not have found out a priori.

Our mind is a piece of furniture in the natural world. Our conceivings are natural events. It seems to me that no one wants to say that a priori investigation can exhaust all that we can learn about any natural object or event. If so, it should not be a matter of controversy that my argument shows that there are limitations to our conceivings that a priori reflection cannot reveal.

9 The Argument for Magnitude Non-Individualism

With the help of the modal epistemological principle Imaginative Conservatism I defended in Chapter One, we are in a position to offer an argument about the metaphysics of quantity:

(1) If we try but fail to conceive of magnitudes as individuals, we have pro tanto justification for believing that it is impossible for magnitudes to be individuals.

(2) We try but fail to conceive of magnitudes as individuals.

(3) We have pro tanto justification for believing that it is impossible for magnitudes to be individuals.

This is a simple modus pollens and hence valid. Premise (1) is an instance of the general principle Imaginative Conservatism. I hope I have defended it properly in Chapter One so that this premise is beyond question.

For premise (2) to be true, all we need is to take a moment and sincerely try to conceive of magnitudes as individuals. Say we all tried; we might even think that we have succeeded in performing the conceiving. But based on what we have learnt earlier about the inconceivability of individual magnitudes, we must have failed (even if it *seems* as if we have succeeded) because our mind does not have the resources to conceive of magnitudes as individuals.

Using the fictionalist resources I have developed in section 6.2 of Chapter Two, the following is *a way* to make sense of what happened: what we do when we try to conceive of the magnitudes as individuals is at best a conceiving *of some other things* (maybe about a system of real numbers) and we pretend that this conceiving is a conceiving of magnitudes as individuals. The detail of such a fictionalistic account does not matter for our purpose; the important point is we have good reason to think that premise (2) is true.

So, we have pro tanto justification for believing that it is metaphysically impossible for magnitudes to be individuals. In a sense, what we get is a *conditional* justification for Magnitude Non-Individualism. *If* there are no proper defeaters, that is what one can reasonably believe. If something is necessary, it is actual. So, if there are no proper defeaters, magnitudes are quasi-objects — metaphysically like money and electrons with respect to individuality. With a modal epistemological premise defended in Chapter One and a cognitive psychological premise defended in Chapter Two, we obtain a substantive metaphysics of quantity — on the condition that there are no proper defeaters. The urgent issue now is to figure out what constitute a *proper* defeater and whether there are any proper defeaters against my pro tanto justification for Magnitude Non-Individualism.

10 Two Necessary Conditions of a Proper Defeater

10.1 No-Defeater-Defeater Condition

I endorse two necessary conditions for *proper* defeaters. Here is the first one: A defeater is proper only if there is no proper defeater to it (i.e., no proper defeater-defeater). The no-defeater-defeater condition for proper defeater may seem questionable for those who think that justification itself does not have a no-defeater condition. For example, Bergmann (2006) defends the following view about epistemic justification:

> J_{PF}: S's belief B is justified iff (i) S does not take B to be defeated and (ii) B is produced by cognitive faculties that are (a) functioning properly, (b) truth-aimed, and (c) reliable in the environments for which they were 'designed'. (2006: 154)

Clearly, given the kind of epistemic conservatism I expressed in Chapter One, I do not accept (ii). But, for our current purpose, let us set issues about our cognitive faculties aside and focus on (i). Bergmann thinks that — suppose the cognitive faculties are fine — S's justification for B is undermined just in case S believes that there is a defeater for B. According to Bergmann, that is just for S to believe that B is epistemically inappropriate:

> BD: S has a believed defeater for her belief B iff S takes B to be epistemically inappropriate. (Ibid: 164)

So justification does not have a no-defeater requirement; it only has a no-believed-defeater requirement.

It would be helpful to introduce the distinction between doxastic and normative defeaters. A doxastic defeater is a proposition that a subject believes and that undermines the justified belief to be defeated. A normative defeater is a proposition that is not actually believed by the subject but *should* be believed by the subject and that undermines the justified belief to be defeated (Benton 2016; Goldberg 2015).[82] What happens, according to Bergmann's view, if there is a proposition Q that S should but does not believe, and Q undermines S's belief B? That is, what if there is a normative defeater? According to J_{PF}, S's justification for B remains intact (we are assuming that S's cognitive faculties work just fine). That is because S does not believe that B is epistemically inappropriate in spite of the presence of Q.

By saying that Q does not defeat S's justified belief B, Bergmann does not deny that there are normative defeaters. He still believes that S *should not* hold B in the presence of Q (whether or not S does not believe that Q). In that sense, Q remains a normative defeater for S's belief B. But as long as S does not have the belief that Q, the justificatory status of B remains intact even though there is a defeater for B. In other words, Bergmann separates the issue about our epistemic duties from the issue about the justificatory status of our beliefs.[83]

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[82] The distinction between doxastic and normative defeaters could be considered parallel to the distinction between doxastic and propositional justification.

[83] Bergmann argues for separating epistemic duties from justification in response to a slightly different issue. He considers the objection that an unjustified, believed defeater should not be able to undermine justification because it is not rational (hence we have no epistemic duty) to give up a belief B for something unjustified. By separating what we should do and what beliefs are justified, Bergmann argues that the fact that we are not rationally obliged to give up a belief based on unjustified information does not entail that the belief's justificatory status cannot be undermined by said information. In that case, we simply have an unjustified belief that we are at least rationally permitted to hold on to — unjustified due to the unjustified doxastic defeater, rationally permitted to hold on to due to the fact that the doxastic defeater is in fact unjustified. (See ibid: 165-6.)

If one shares Bergmann's view that a properly justified belief does not have a no-defeater condition, one might find it peculiar to demand that a proper defeater must have no defeater defeaters. Following how Bergmann thinks about the no-*believed*-defeater condition for justification (i.e., the clause (i) of J_{PF}), one might think that, to have a proper doxastic defeater Q for a justified belief B, one only has to not believe that there is a defeater defeater for Q. Q is a proper defeater even if there is in fact a (normative) defeater defeater that undermines Q. So we have a *Bergmann-inspired* reason against my non-defeater-defeater condition.

Notice that we are not analyzing the notion of epistemic defeat because we are interested in the epistemology per se. Our primary concern is first-order metaphysics. For that purpose, there are two reasons for thinking that this particular suspicion about the no-defeater-defeater requirement for proper epistemic defeat makes no important difference and can be safely set aside.

First of all, ***if*** we follow Bergmann's view to a T by separating our epistemic duties from epistemic justification, we should say the following about the aforementioned case about the normative defeater defeater for Q: One *should* hold on to the belief B due to the presence of a defeater defeater for Q; but, at the same time, one's justification for B is still properly undermined by the doxastic defeater Q (for one does not believe that there is a defeater defeater for Q). So as long as there is a defeater defeater, one *should* hold on to the original belief even though it is no longer epistemically justified.

In section 11, I will show that some of the apparently promising defeaters to the pro tanto justification for Magnitude Non-Individualism fail because there are normative defeater defeaters. As long as that is the case, we *should* hold on to Magnitude Non-Individualism even by the light of the view inspired by Bergmann. That would be good enough for me. Thus, I believe the Bergmann-inspired concern does not really make a difference for first-order metaphysics.

Secondly, suppose we depart from Bergmann and do not divorce epistemic duties and justification, while conceding that justification only requires the absence of *believed* defeaters and a proper defeater only requires the absence of *believed* defeater defeaters. That is, in the previous case about S's belief B, say S *should not* hold on to the belief B in a situation where S believes that there is a defeater for B without believing that there is a defeater defeater even though there in fact is a defeater defeater. Only a believed defeater defeater can restore S's holding on to the justified belief B. Even if I concede all that, I do not lose much.

As I have stated, I will present defeater defeaters for apparent defeaters for my pro tanto justification for Magnitude Non-Individualism. Not everyone accept those propositions that I consider to be defeater defeaters — even though I think they should, as we shall see in section 11. In other words, these defeater defeaters are simply *normative* defeater defeaters and not doxastic defeater defeaters for some. According to the Bergmann-inspired view, such normative defeaters do not undermine my opponents' justification for thinking that those apparent defeaters successfully undermine the pro tanto justification for Magnitude Non-Individualism. So they are not justified in believing Magnitude Non-Individualism. Given that we do not distinguish epistemic duties from justifications now, it is not the case that they should accept Magnitude Non-Individualism.

That being said, by presenting arguments for those normative defeater defeaters to my readers, I will be trying to rationally *induce* those defeater defeaters into my readers' belief system and hence trying to turn those normative defeater defeaters into *doxastic* defeater defeaters that my readers believe in. Once they are converted into doxastic defeater defeaters, those defeater defeaters undermine the apparently promising defeaters even by Bergmann's light.

So, even if I *were* to make all the concessions, I would have only conceded that I cannot make the general claim that no one in fact has a proper defeater against my pro tanto justification for Magnitude Non-Individualism (because it all depends on what people actually believe). But if my

subsequent arguments for the defeater defeaters are any good, I believe I would *still* be entitled to claim that at least those who have read these chapters and are convinced by my arguments have the right doxastic defeater defeaters to nullify the apparent defeaters against the pro tanto justification for Magnitude Non-Individualism. Perhaps that is a less impressive achievement, but I think I can live with that.

Whether a proper defeater has a no-defeater-defeater condition is an important question for understanding the epistemology of defeat. But we are not interested in epistemology per se here. For the limited ambition of trying to obtain a metaphysical conclusion in an epistemologically respectable way, the difference between the requirement of no defeater defeater and the Bergmann-inspired requirement of no *believed* defeater defeater makes no significant difference. Hence, I will stick to the no-defeater-defeater condition for the sake of convenience.[84]

10.2 Scope Condition

[84] In a recent paper 'Defeatism Defeated' (2015), Baker-Hytch and Benton argue that the kind of conservative epistemology like Pryor's dogmatism does not sit well with a no-defeater condition. If their argument works, it would challenge my claim that there is a no-defeater-defeater condition for defeaters, given that I uphold a modal epistemology that is very much like Pryor's dogmatism (i.e., Imaginative Conservatism). Baker-Hytch & Benton believe that conservatism does not have the resources to properly describe the epistemic effect of defeaters in terms of credence (or epistemic probability) because conservatism cannot even offer a proper conception of justification *in terms of credence*. They argue that, if 'Ap' stands for the appearance that p, then it is false that the probability of Ap given p is higher than the probability of Ap given (~p & Ap); hence, Ap actually does not speak in favor of p as opposed to the skepticism about p. Now I think it is undeniable that Ap does not prefer p to (~p & Ap), because, as Baker-Hytch & Benton point out, the probability of Ap given (~p & Ap) is 1 because (~p & Ap) *entails* Ap. And nothing's probability can top that. But Baker-Hytch & Benton's argument rests on an important mistake, I think. It seems false to me that, to justify p, we are supposed to have a piece of evidence E that makes p preferable *to* ***(~p & E)***. Instead, all we need is to have evidence that makes p preferable *to* ***~p***. So, for Ap to be evidence for p, it is only required that the probability of Ap given p is higher than the probability of Ap given ~p.

I accept a second necessary condition for proper defeat. (The two necessary conditions are not meant to be jointly sufficient.) Since my transcendental reason for Magnitude Non-Individualism relies on Imaginative Conservatism, which is modeled after Pryor's dogmatism about perceptual justification, it is useful to start with his verdict on proper defeater against perceptual justification. He writes:

> [O]nly ordinary evidence of the sort employed by the man in the street and by the working scientist counts as defeating your prima facie justification. A priori skeptical arguments do not standardly introduce defeating evidence of that ordinary sort. (2000: 534)

Let us consider the proposition P: *there is an apple on the table*. Suppose I look at the table and see an apple on it; that seems to offer me perceptual justification for accepting P. A skeptical argument about perceptual justification concludes that perceptions do not justify beliefs. One might be inclined to say that the argument, as a defeater, can undercut my perceptual justification for believing P. Pryor disagrees.

Just a quick remark before we examine his claim. In the passage I cited, Pryor characterizes the skeptical arguments as a priori. But I reckon that is peripheral to the point being made. Even if I grant the legitimacy of the a priori vs. a posteriori distinction, it still does not seem obvious to me that all typical skeptical arguments are a priori, i.e., it is far from obvious to me that all the key premises of these skeptical arguments are justifiable a priori.[85] So, I will drop the qualification about apriority in the following discussion.

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[85] Take the premise that our perceptions are fallible as an example. I am inclined to think that the fallibility of perception has to be justified at least partially a posteriori — it is by having perceptions that we get to know

There is something intuitive about Pryor's remark. The protagonist in the following scenario sounds perfectly sensible:

> On reading a skeptical argument about perceptual justification, a person thought to herself, 'the argument is very compelling', while reaching for her cup to have a sip of tea.

Notice that her reaching for the cup is reasonable partly in virtue of her having the belief that there is a cup next to her. And that belief is supposed to be justified by her perception. She does not come off as being irrational or being unjustified in her action at all when she affirms the force of the skeptical argument and relies on perceptual justification to guide her beliefs and actions at the same time. There appears to be some kind of *epistemic compartmentalization* going on. Somehow the skeptical argument does not undermine her perceptual belief, which rationalizes her action.

Now consider the following two cases:

> [1] Seeing that the oven is switched off, Adam reaches into the oven, intending to take the rack out of the oven with his bare hands. Teddy tells him that the oven switch is broken.

> [2] Seeing that the oven is switched off, Adam reaches into the oven, intending to take the rack out of the oven with his bare hands. Teddy presents a skeptical argument to him about perceptual justification.

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what it is like to have perceptions and hence find it conceivable for the perceptions to mismatch what we perceive.

In case [1], given what Teddy says, it is reasonable for Adam to retract his perceptual belief that the oven is turned off and not to reach for the rack with his bare hands. On the contrary, in case [2], despite what Teddy says, there is nothing wrong for Adam to sincerely ponder the plausibility of the skeptical argument while going on with his business as usual and reaching for the rack. The same kind of compartmentalization seems to be at work: skeptical arguments somehow do not work as proper defeaters for perceptual justification.

In a later paper, however, Pryor changes his mind on the issue:

> Before you encountered him [i.e., the skeptic about perceptual justification], you did have [perceptual] justification to believe you have hands and so on, contrary to what he's claiming. But the skeptic is a smooth dialectician. His arguments sound pretty compelling to you. […] [W]e might say *you're justified* in believing its conclusion — at least until further reflection reveals the flaws. If we do say that, then you'll be *justified* in believing what the skeptic tells you. You'll be justified in believing your experiences don't give you any perceptual justification. In my view, that has the result of *undermining* your first-order perceptual justification. Listening to the skeptic will have undermined some prima facie perceptual justification you really have. (2004: 367-8; italic in original)

> In Pryor 2000, I thought that we should not count a priori skeptical arguments as introducing 'defeating evidence'. On the current proposal, though, they do. (Ibid: 368 note 44)

Just as he did not offer any argument for his previous view, Pryor has not offered any explanation for his change of heart. So, what should we make of these remarks?

For Pryor, this is a matter of stipulation. He says:

> On my usage, if you have prima facie justification for believing something, and you have no (ordinary) evidence that defeats or undermines that prima facie justification, then you thereby have all things considered justification for your belief. I don't claim to be tracking ordinary usage perfectly here. This is a partly stipulative use of 'prima facie justification'. (2000: 535)

According to this passage, it simply boils down to the way he *stipulates* the meaning of the term 'prima facie justification' that skeptical arguments do not count as defeaters.[86] He thinks that the dispute is stipulative/verbal because, even back in 2000, he thought that the skeptical arguments, *despite not being proper defeaters*, have rational bearing on the epistemic value of our perception. He says:

> Rather, if we use "*prima facie*" and "defeating evidence" in the way I propose, we ought to say this, instead:
>
> > The skeptic grants that our experiences purport or pre-theoretically seem to give us justification for our perceptual beliefs, but if his philosophical arguments are sound, they show that this is all an illusion. We do not have any justification (even *prima facie* justification) for beliefs about the external world, after all. (ibid: 534)

[86] In the quote, Pryor says 'partly stipulative' instead of just 'stipulative'. It is not clear from the text what he means by the qualification 'partly'.

According to Pryor, although the skeptical arguments cannot act as defeaters that undermine pro tanto justification generated by perceptions, they still purport to undermine any claim of perceptual justification by showing that perceptions do not generate pro tanto justification in the first place. Either way, given the skeptical arguments, perceptions end up failing to justify beliefs — whether or not we decide to call those arguments defeaters. That was why Pryor treated his remark back in 2000 as stipulative and believed that there is no need to justify the claim that skepticism is no defeater.

I, however, do not think this is a verbal issue. Pryor was actually getting onto something about pro tanto justification more important than he thinks. And he is selling himself a bit short by describing his remark in 2000 as stipulative. It was not by chance that he found it natural to 'stipulate' the meaning for 'defeater' the way he did. Earlier, I used the tea-sipping skeptic and Adam reaching in the oven examples to help show the reasonableness of Pryor's early inclination to say that skeptical arguments aren't proper defeaters. Notice that the examples suggest that one's reliance on perceptual information can be rational even as one is sincerely pondering the plausibility of a skeptical argument. The epistemic compartmentalization that separates our perceptual judgments and the skeptical arguments appears to transcend quibbles about the linguistic conventions governing the label 'defeater'.

In the following, I will offer an account for the apparent compartmentalization by defending a second necessary condition of a proper defeater — **the scope condition**. By accounting for the compartmentalization, the scope condition will also shed new light on Pryor's early remark about proper defeaters. As I said, I believe Pryor 2000 was onto something more substantive than he thought. And I want to make a case for the idea that what he was onto is this scope condition for a proper defeater.

Notice that a defeater is a special kind of evidence. As Grundmann (2011: 164) rightly points out, defeaters are inherently **dialectical**.[87] A defeater is essentially a proposition taken as a **response** to a pro tanto justified belief. Because of that, pragmatics matters: dialectical constraints that apply to proper dialogues should also be applicable to evaluate defeaters. The compartmentalization can be explained by appealing to the dialectical constraints of a proper defeater.[88]

Of course, we are not interested in just any dialectical constraints. Not all dialectical constraints translate to requirements for proper defeaters. Generally speaking, there are two kinds of dialectical misconduct, corresponding to two kinds of dialectical constraints. I call them (i) constraints of etiquette, and (ii) constraints of inclusion.

Here is an example of a constraint of etiquette: generally we should not speak too fast or present one's reasoning in too aggressive terms in a conversation. Although we might frown upon such behaviors in conversation, we do not thereby *exclude* or *ignore* the information being presented to the conversation. Since such inappropriateness normally only calls for negative attitudes to be directed towards the *person*, instead of towards the *content* that the person presents to the conversation, this does not affect the appropriateness of a proposition's playing the role of a defeater.

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[87] I have reservation about Grundmann's locution of 'dialectical defeater'. That phrase makes it seem as if he is talking about a special kind of defeater. The dialectical element is a feature about defeaters generally.

[88] I am only saying that Pryor's observation can be defended this way, not that this is the only way. In conversation, Dan Korman suggests that the observation can also be defended simply by appealing to an intellectual seeming of our perception's immunity to skeptical arguments. Since I am a moderate foundationalist about justification already (by accepting Imaginative Conservatism), it is coherent with the spirit of my epistemology to appeal to intellectual seemings. But I prefer not to go that route because, although I accept that there are foundational sources of justification that justify by generating seemings, I believe that it is an intellectual virtue that we try to be parsimonious in postulating foundational sources of justification.

On the contrary, there are dialectical misconducts that lead us to ignore the inappropriate inputs, *setting them aside from a conversation all together*. In such cases, the content being presented is simply excluded from having any rational impact on the conversation. I call those constraints of inclusion. Since the propositions are also being targeted in such cases (and not just the person who brought the propositions up), this is a kind of dialectical constraint that translates into constraints on proper defeaters.

One dialectical factor that is relevant to our purpose is the need for proportionality with respect to the scope/focus of the target conversation. I'll use a story to illustrate the idea. Suppose we are reading on the news about a series of mid-night robberies on the streets in city X. And a group of friends are casually chatting about the spike of robberies over there. One of them suggests that that is due to the fact that there is a new gang in the city. Others suggest that it is due to the poor lighting on the streets of city X at night and people should petition for more streetlights. Susan comes along and says that the robberies are ultimately caused by the fetishism about material wealth that has made people greedy.

What Susan says might be true. Nonetheless, I hope there is a shared intuition that there is something unsatisfactory about her contribution to the conversation in such a way that it would be reasonable for the people in the conversation to just ignore what she says. Why is it so? Is it because we can't do anything about what Susan points out even if she is right? Apparently not.

First of all, there is no reason to think that one cannot have this kind of conversation unless one is invested in doing something about the crime over there in city X. If doing something about the crimes in city X does not concern the conversing parties in the first place, the fact that they cannot act on Susan's suggestion wouldn't explain the apparent inappropriateness of what she says. Secondly, there are a lot of things in the world that we cannot do anything about. It is hard to see how that alone explains why it is inappropriate to point those things out. Even if one wants to doing

something about Y, it would be helpful to know the aspects of Y that one can do nothing about. Finally, notice that it is not as if some random people far away from city X are likely to influence the rise of gangs and the number of streetlights over there after all. For these reasons, I believe the inappropriateness of Susan's remark cannot be explained by the impotence of the participants in the conversation.

Here is my diagnosis instead: Every conversation assumes a proper *scope* of interest, and Susan brings in issues that are indeed related but disproportional to the discussion's scope. On the one hand, the discussion has a relatively narrow focus. It is concerned with the causes of robbery *as a relatively local issue*. Susan, on the other hand, directs the attention to some big picture and *global* issues, which are disproportional to the local interest of the conversation she is trying to participate in. For that very reason, even if what Susan says were true, what she says is dialectically problematic for not being a proportional response to the subject matter at hand.

What further vindicates my diagnosis is that the same reasoning explains why we generally feel that a person is being unreasonable for escalating a casual conversation to the level of general principles. You tell them about being overworked at your day job; they escalate to the woe of capitalism. You wonder whether you should bring your date to an exotic foreign restaurant to impress him/her; they decide that it is a conversation about globalization. You wonder whether the theory of evolution is true; they raise the question of radical skepticism about knowledge. And I reckon that the usual and reasonable practice is that we **disregard** this kind of dialectically disproportional inputs all together. We do not even need to engage them. For example, in the earlier example about city X, we can see ourselves saying 'yeah, right' to Susan and just move on.

The same happens in philosophical discussions. Consider a discussion about whether we can reasonably rely on testimonial justification as an irreducible, sui generis source of justification. Suppose a person comes along and argues that we cannot reasonably rely on testimonial justification

as a sui generis source of justification by defending skepticism about other minds. I hope it is abundantly clear that this would not be a appropriate input to the conversation, in spite of the fact that other mind skepticism does entail that we cannot reasonably rely on testimonial justification as a source of justification, let a lone an irreducible one. Why is it so? Applying my diagnosis to the epistemic compartmentalization: the issue about whether we have knowledge of other minds is too far removed from the local interest about testimonial justification to be a dialectically fitting contribution to the discussion. In such a case, we do not even need to engage the person's argument for skepticism about other minds; it seems reasonable to just ignore the input.

This kind of compartmentalization based on the scope of interest is rather prevalent. And we would be missing out on an important piece of datum about doxastic rationality if we ignore such occurrences simply as abnormalities in our pre-reflective life. To be *included* in a reasonable conversation, a dialectically reasonable contribution has to be sensitive to the background qualification about the scope of interest. That is a constraint of inclusion.

Applying that to thinking about defeaters, I want to argue that a defeater can fail to be proper even if there are no defeater defeaters. That is because a defeater can be improper due to its dialectical shortcomings. One of the dialectical shortcomings a defeater can display is exactly the failure to engage proportionally with *the scope of the targeted belief* that the defeater is supposed to be a response to — in the same way Susan's comment about the robberies is improper. That is the scope condition for a proper defeater. I believe that this is the best way to make sense of the kind of epistemic compartmentalization that Pryor's comment is getting at.

If I have a perceptual experience of an apple, I am pro tanto justified to believe that there is an apple. *A defeater is proper only if it pertains to the particular epistemic situation and the particular subject matter at hand.* Surely, particularity comes in degrees. The more a proposed defeater is removed from the subject matter and epistemic situation of the targeted belief, the less appropriate it is to serve as a

defeater. Borderline cases are certainly possible. But the skeptical arguments are extreme cases. Skeptical arguments are arguments that purport to undermine the ***kind*** of pro tanto justification involved (e.g., perception) ***completely regardless*** of the subject matter or situation of the targeted belief (e.g., the perceptual belief that there is an apple). Hence, the skeptical arguments *definitely* violate the scope condition and can never be proper defeaters of perceptually justified beliefs. Although it can be of intellectual interest to study the skeptical argument for many reasons, when we are *relying on* perceptions to form justified beliefs, it is rational to set aside skeptical arguments that go overboard to put ***all*** perceptual justifications under question.[89]

If my defense of Pryor's remark is applicable to all defeaters — including defeaters for pro tanto modal justification generated by our failed attempt to conceive that P — a proposition Q is then a proper defeater for one's pro tanto modal justification only if Q undermines that justified belief about the impossibility of P *locally*, i.e., having to do either with (a) the particular subject matter of P or (b) the particular instance of failure to conceive in that particular situation. A proper defeater to a modal justification based on failure to conceive must never be a defeater that ends up going overboard to challenge ***all*** modal justification based on failure to conceive.

11 Defeaters

I do not have an argument to show that it is *in principle impossible* to have a proper defeater against the pro tanto justification I presented for Magnitude Non-Individualism in section 6. But we rarely (if ever) have that for the pro tanto justifications we rely on. I perceive a bagel on my plate; so

[89] So it should be noted that the compartmentalization is not related to contextualism about justification. Even in a philosophy seminar room, it is rational to look at the arguments printed on a piece of paper and talk to each other at a table by attending to the premises on the paper. The compartmentalization is due to what is being said, not the context in which it is being said.

I am perceptually justified in believing that I have a bagel on my plate. Perceptual justification is pro tanto justification. I certainly have no argument to show that it is in principle impossible for there to be a proper defeater against this perceptual justification. But for all I can tell, there seem to be no proper defeaters (e.g., it is not a piece of plastic, I'm not dreaming, etc.). The pro tanto lack of defeaters is enough for me to think that I have all things considered justification for believing that I have a bagel on my plate. If that is enough there, by parity of reasoning, it should be enough here. So, I do not think I have to offer an argument to show that it is impossible to have a proper defeater against my pro tanto justification for Magnitude Non-Individualism in order to be in a position to say that we have all things considered justification to accept the thesis.

What I will do is to examine three apparently promising defeaters that I can think of. I will show that they are in fact not proper defeaters either because, on close scrutiny, each of them fail to satisfy both of the necessary conditions for proper defeaters I presented in section 10.[90]

11.1 Defeater #1

An apparent defeater that immediately comes to mind is the proposition that the individuality of magnitudes plays a significant role in some successful (proto-)scientific explanations.[91] For example, the following statement expresses a legitimate case of (proto-)scientific explanation:

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[90] I acknowledge that the scope condition is much more controversial than the no-defeater-defeater condition. I suspect some would remain skeptical of the scope condition despite my argument for it. Fortunately, as we shall see shortly, each of the potential defeaters I am going to examine fails to fulfill the no-defeater-defeater condition. So, it would be a bonus, if my scope condition is right; but I would still have what I want even if only the no-defeater-defeater condition stands.

[91] By adding 'proto-', I am trying to avoid the not-obviously-fruitful debate about what counts as *genuinely scientific*. E.g., perhaps referring to the internal temperature of a piece of meat to explain its culinary state does not count as *scientific* explanation, or perhaps it does count.

[B] The flask of ethanol is bubbling because *it has reached 78.37°C.*

The explanation expressed by B appears to invoke reference, by the phrase '78.37°C', to a particular magnitude that does the explanatory work. The success of such explanations should urge us to accept the individuality of magnitudes.

This is meant to be a rebutting defeater that directly challenges Magnitude Non-Individualism, the *conclusion* of my pro tanto justification.[92]

11.1.1 First Response to Defeater#1

Defeater #1 is not a proper defeater because there is a defeater defeater. Despite appearance, the individuality of magnitudes does not contribute to the explanatory success of statements like B.

I grant that B expresses a successful explanation. But the explanatory success expressed owes nothing to identifying any individual magnitude of temperature in particular. Even if magnitudes were metaphysically individuated, it would be insignificant for B's explanatory success that the ethanol instantiates *this* or *that* particular magnitude of temperature when it bubbles. Note that when the ethanol begins to bubble depends on many factors: the atmospheric pressure, the impurities in the ethanol, etc. Take the atmospheric pressure for example. It fluctuates constantly. Nonetheless, those constant but minute fluctuations do not alter the fact that B expresses a successful

[92] The distinction between rebutting and undercutting defeaters is first introduced by Pollock (1970). A rebutting defeater for a pro tanto justified belief is a defeater that purports to undermine the truth of the belief directly. An undercutting defeater is one that purports to undermine the justificatory link between the targeted belief and its pro tanto justification. See also Pollock (1999).

explanation. That wouldn't have been the case if B's explanatorily success, which I granted, is based on B's singling out a particular magnitude responsible for the bubbling of the ethanol sample.

I do not intend to offer a theory of (scientific) explanation for claims like B. But the argument above shows that, whatever is doing the explanatory work, it's not an appeal to any individual magnitude. If so, such explanatory success gives us no reason to rebut Magnitude Non-Individualism.[93]

11.1.2 Second Response to Defeater #1

There is a second defeater defeater for Defeater#1. It should be noted that successful magnitude-based explanations like B can be used against our pro tanto justification for Magnitude Non-Individualism only if the denial of the individuality of magnitudes ***leads to*** the unavailability of those explanations. For that to be the case, it has to be true that those explanations would be available otherwise. That is, it is right to say that giving up X *leads to* the unavailability of Y only if the following is the case: Y would have been available if we did not give up X.

So, for Defeater#1 to work, we must accept the following counterfactual:

> [*] If magnitudes were individuated, specific-magnitude-based explanations would be available.

[93] Peacocke (2015) argues that the explanatory importance of magnitudes supports non-reductive realism about magnitudes. Magnitude Non-Individualism is a realist position, too. The issue here is in what way magnitudes are real. My stance is, magnitudes do not have to be real *in an individuated way* to realize their explanatory importance.

But we should not accept [*].[94] Thus, *the reason* for accepting that appealing to individual magnitudes contributes to successful explanations like B is false. That is, the reason for accepting Defeater#1 is false. There is a defeater defeater for Defeater#1.[95]

Here is why [*] should not be accepted. At this point of the dialectic, due to Representational Humility, the inconceivability of individual magnitudes is considered settled. Otherwise, there would be no pro tanto justification for us to worry about defeaters in the first place. The transcendental reasoning only uses the modal epistemological principle Imaginative Conservatism to urge us to go one step further from a *psychological* claim to a *metaphysical* conclusion — that individual magnitudes are metaphysically impossible.

Suppose we do not accept the metaphysical move to Magnitude Non-Individualism. All else being equal, we simply fall back onto the weaker psychological claim. Namely the claim about the limitation of our representational capacity (and hence inconceivability). And this psychological claim, again, is considered settled at this point by the arguments in Chapter Two. If we cannot conceive of

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[94] I am not a trivialist about counter-possible conditionals. That is, I do not think that a subjunctive conditional with an impossible antecedent is trivially true. So, Magnitude Non-Individualism does not make [*] trivially true. The standard Lewis-Stalnaker semantics for counterfactuals is trivialist. But the fact that there are non-trivial counterpossibles is so plausible that, even without a theory for non-trivial counterpossible truth at hand, I think it's still fair to say that that is a problem for the Lewis-Stalnaker semantics people to solve. Unless there are independent arguments in favor of treating counterpossibles as trivially true, one should either modify the Lewis-Stalnaker semantics or give it up completely.

[95] Grundmann calls this kind of defeater a *reason-defeating defeater*: 'the justification of a belief can be overridden when there is a *reason-defeating* defeater against the truth of the reason for the belief.' (2011: 158; italic in the original) A reason-defeating defeater is different from both rebutting and undercutting defeaters. A reason-defeating defeater undermines neither the connection between the targeted belief and its justification (undercutting) nor the truth of the targeted belief directly (rebutting). Instead, it undermines the reason behind accepting the proposition that justifies the targeted belief.

magnitudes as individuals, we cannot endorse an explanation that appeals to picking out any individual magnitudes specifically.

It is true that explanations that appeal to the identities of individual magnitudes are not available by the light of Magnitude Non-Individualism. But those explanations are gone long before we even get to the point of the transcendental reasoning. They are given up when we accept Representational Humility, i.e., when we examine the postulation of mental representations according to the norms of theoretical posits and conclude that, despite appearances, we actually have no mental resources to track the identity of any individual magnitude.

When we *put words together* like 'the boiling point of water' or '78.37°C' while expressing statements like B, what we do must be interpreted as something other than picking out a specific magnitude of temperature. (For example, we can interpret ourselves as engaging in some kind of collective make-believe that is pragmatically and technologically useful.) We have to do so whether or not my *metaphysics* of quantity is true.

Defeater #1 overstates the explanatory significance of individual magnitudes. The metaphysical move, i.e., the transcendental reasoning, is not really responsible for taking away any useful scientific explanation that we could have offered otherwise.

11.2 Defeater #2

A second natural defeater that comes to mind is an undercutting defeater which says that the incapability to conceive individual magnitudes is due to our mental limitation and hence tells us nothing about whether magnitudes could be individuals. This defeater does not directly challenge Magnitude Non-Individualism. Instead it attempts to undermine the pro tanto justification by questioning the inferential link between the inconceivability of individual magnitudes and the metaphysical impossibility of them.

Here is how the defeater goes. It is *generally* rational to believe that p is impossible if one believes that p is inconceivable. But when the fact that we fail to conceive of p is based on our cognitive limitations, it is a *special case* where the evidential connection between inconceivability and impossibility breaks down. The evidential connection breaks down in such cases because, when the inconceivability of p is due to our mental limitation, that mental limitation would explain the inconceivability, and as a result, the impossibility of p is *no longer needed* for the explanation of the inconceivability. Thus, the inconceivability no longer provides evidence for the impossibility of p.

11.2.1 First Response to Defeater #2

Defeater #2 fails to satisfy the scope condition. Notice that failures to conceive are always about mental limitations in the sense that *in*-conceiv-*ability* is *by definition* about the lack of ability to conceive. (And conceivability is by definition about being within the bounds of our ability to conceive.) It is incoherent to speak of a case in which a person cannot conceive that p while the person does not have a mental limitation for conceiving that p. Perhaps the mental limitation can be surpassed by some means; but before that happens, the person has a limitation on his ability to conceive if he cannot conceive that p.

According to the defeater, failures to conceive cannot offer pro tanto justification for impossibility if the failures are cases of our mental capacity's limitation. It is supposed to show that our failure to conceive of individual magnitudes is *a special case* of failure to conceive. But if I am right that all claims about inconceivability are by definition claims about our mental capacity's limitation, then we are not really talking about a special case at all. The defeater does not in fact engage with the failure to conceive individual magnitudes, nor does it engage with the situation in which one attempts to conceive of individual magnitudes. When we peel off the appearance,

Defeater#2 is actually a defeater that purports to undermine the modal justificatory relevance of the conceivability per se.

Proper defeaters have a scope condition. A proper defeater needs to be proportional to the scope of the subject matter and the situation of the justified belief targeted. If Defeater#2 in fact purports to undermine *all* modal justification based on the conceivability, it is an extreme case where the defeater is completely removed from the pro tanto justification for Magnitude Non-Individualism. The scope condition is not met. Defeater#2 fails to be a proper defeater.

11.2.2 Second Response to Defeater #2

There is a second reason for thinking that Defeater #2 is not a proper defeater even if we set the dialectical shortcomings aside. There is an undercutting defeater defeater.

If the inconceivability of p is evidence for the impossibility of p *only if* the impossibility of p is required to explain the inconceivability of p, then we might have a proper defeater for the transcendental reasoning I am advocating. But the antecedent of this conditional is not true. That is, for E to be evidence for p, it is not necessary that p is needed to explain the presence of E. Hence, Defeater#2's power to undermine the justification for Magnitude Non-Individualism is undercut.

We should not think that E is evidence for p only if p is *required* to explain E. There are countless counter-examples against the claim that this is required. Suppose my barometer's reading dropped. That is a piece of evidence that a storm is coming. Given the storm, it is more likely for my barometer's reading to drop. But both the drop of my barometer's reading and the approaching storm are adequately explained by the drop of atmospheric pressure. The storm is not needed to explain the drop of my barometer's reading. It is false that if p is not needed to explain E, E is not evidence for p.

11.3 Defeater #3

A third defeater can be viewed as a variation of the second one. With the barometer case, I have shown that E can be evidence for p even if E is not required to explain p. The coming storm is not required to explain the drop of my barometer's reading. But the drop of the barometer reading is still evidence for the coming storm.

The drop of my barometer's reading, however, is *probabilistically connected* to the coming storm for they have a common cause: the drop of atmospheric pressure. If it is more likely that there is a drop in atmospheric pressure given that there is a drop of my barometer's reading, and if it is more likely that a storm is coming given the drop of atmospheric pressure, then it is more likely that a storm is coming given the drop of my barometer's reading. So, even if the storm is not required to explain the drop of my barometer's reading, the latter is still properly related to the storm; and such a relation is *required* for the reading to provide evidence for the coming storm, or so it might be argued.

Here is a proposition that appears to be a proper defeater for Magnitude Non-Individualism: it is not the case that P(individual magnitudes are impossible | failure to conceive of individual magnitudes) > P(individual magnitudes are impossible). That is, it is not more likely that Magnitude Non-Individualism is necessarily true (i.e., it is impossible for magnitudes to be individuals) given that we fail to conceive of magnitudes as individuals. This proposition seems to serve as an undercutting defeater that undermines the evidential connection between the failure to conceive of individual magnitudes and the impossibility of individual magnitudes.

The idea of Defeater#3 is similar to the following case about perceptual justification. Suppose I walk into a room of people and do not hear anything. I am justified to believe that the people are not talking. But then I remember that I had an accident this morning and the doctor told me that I will lose my auditory sense for the rest of the day. The perception of not hearing anything is

defeated as justification for the belief that no one is talking because it is not more likely that people are not talking given that I do not hear anything. That is, given the medical information, it is no longer the case that P(people are not talking | I do not hear anything) > P(people are not talking).

11.3.1 First Response to Defeater#3

Defeater#3 is not a proper defeater because, unlike the example of my losing auditory capacity, Defeater#3 fails to fulfill the scope condition. Let M be a proposition of the following form: *X is impossible*. Since whatever is impossible is necessarily impossible, M is either necessarily true or necessarily false.

Here are two claims that I believe are true. [a] If a proposition is necessarily true, its probability equals 1. [b] If a proposition is necessarily false, its probability equals 0. I find this connection between modal properties and probability highly plausible. Nonetheless, it is not set in stone. For those who endorse Barnes & Williams' (2011) logic of metaphysical indeterminacy, the logic allows the following: for some proposition p, it is indeterminate whether p, p is true, and p is necessarily true if true. If we endorse this logic, it seems that we would have to *either* accept that P(p) = 1 in spite of the fact that p is indeterminate (because p is necessarily true) *or* accept that P(p) < 1 in spite of the fact that p is necessarily true (because it is indeterminate whether p). One might decide to stick to the latter. In that case, one wouldn't accept [a] and [b]. That being said, neither option seems very palatable to me. Fortunately, there is a third option.

Perhaps the pro tanto implausibility of saying either P(p) = 1 or P(p) < 1 is a good reason for thinking that we shouldn't think that there are propositions like p in the first place. That is, we could conclude that there are no propositions that are metaphysically indeterminate, true, and necessarily true. This restriction certainly is not imposed upon us by Barnes & Williams' logic. But there is no reason for thinking that accepting a formal language can give us the modal structure of reality

completely. There is metaphysical work that goes beyond doing logic. To me, this is the most plausible thing to say. [a] and [b] remain true.

Back to the proposition M. Suppose I am right about [a] and [b]. P(M) is then either 1 or 0. There is no proposition N such that P(M|N) > P(M). In fact, P(M|N) can only be equal to P(M) — either 1 or 0. As a result, if Y could not be evidence for M unless P(M|Y) > P(M), there could be no evidence for M. Needless to say, if so, no failures of conceiving could ever be evidence for anything's impossibility. Thus, Defeater#3 turns out to be a skeptical proposition that undermines *all* justification for impossibility by failure to conceive. That goes against the scope condition for proper defeaters.

Notice that the same does not happen in the case of lost auditory capacity because P(people are talking) lies between 0 and 1. Therefore, this kind of defeater works for perceptual justification but not for modal justification.

11.3.2 Second Response to Defeater#3

My second response draws resources from my argument against radical modal skepticism in Chapter One. Defeater#3 does not only fail to be a proper defeater because of its dialectical shortcoming, but also because there is a defeater defeater for it (a reason-defeating defeater defeater, to be specific).

Defeater#3 relies on the premise that says: X provides evidence for Y *only if* Y is more likely given X. I find the converse of this premise intuitive: X provides evidence for Y *if* Y is more likely given X. That is, I find it plausible to say that boosting likelihood is *sufficient* for evidence. But it is not obvious that boosting likelihood is generally *necessary* for evidence, given that we appeal to so many different things to make theory choices and not all of them are self-evidently boosting the likelihood of what the recommended theory says (e.g., mathematical elegance).

Is there any good reason to think that this crucial premise underlying Defeater#3 is true? As far as I can tell, the only way that may be motivated is by endorsing the instrument-for-truth conception of epistemic justification (i.e., that justification is an instrument that guides us to truth by recommending/demanding certain beliefs).

However, I argued in Chapter One that the instrument-for-truth conception of epistemic justification and a proper understanding of what it means for an instrument to be good jointly entail infallibilism about epistemic justification. Given the implausibility of infallibilism, this leaves the grounds for accepting Defeater#3 very shaky. Since there is a defeater that undermines the truth of the reason for accepting Defeater#3, Defeater#3 is not a proper defeater.

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I have examined three trains of thought that *seem* to offer proper defeaters to the pro tanto reason that supports Magnitude Non-Individualism. I hope I have shown that there are multiple reasons for thinking that none of them are proper defeaters: either there are defeater defeaters, or the defeater turns out to be dialectically defective. Thus, given everything we have seen, it is reasonable to conclude that we have all things considered justification for believing that magnitudes lack individuality:

(4) We have pro tanto justification for believing that it is impossible for magnitudes to be individuals.

(5) There are no proper defeaters against the pro tanto justification for the conclusion that it is impossible that magnitudes have individuality.

(6) Conclusion: Necessarily, magnitudes are non-individuals.

Obviously, if (6) is true, Magnitude Non-Individualism is.

12 A Bonus for the Metaphysical Move

Representational Humility implies that we cannot pick out any particular magnitude via mental descriptions. In section 5 of Chapter Two, I faced the question of *how it is possible* that we cannot entertain a mental description about particular magnitudes. There, I admit that there is nothing more I can say with respect to the how-possible question. I argue that having nothing to say in response to a how-possible question is not a good reason against a top-down project. But with Magnitude Non-Individualism and quasi-set theory in play, we actually can have a bit more to say to address the how-possible question.

Consider the description 'the Queen of England'. Let Qx denote the property of *being the Queen of England*. 'The Queen of England ...' is standardly analyzed as $\exists x(Qx \,\&\, (y)(Qy \rightarrow x = y) \,\&\, ...)$. Note that the analysis essentially contains an identity claim about whatever the definite description is about. Given that there are no meaningful identity claims about things that are not metaphysically individuated, it means there are no meaningful definite descriptions about things that are not metaphysically individuated as well. For example, when we utter words like 'the speed of my car', it might be for the best to interpret what we do as an act of pretense, as I have argued in Chapter Two. Those words are *only figuratively* meaningful. They do not express any literally meaningful thought, according to Representational Humility.

This response to the how-possible question shifts the focus of the question from the features of our mental representation to features of those non-individuated things that are the objects of our mental representation. The response explains how it is possible that we cannot form mental descriptions for X not by appealing to the underlying mechanism of our mental representation but

by appealing to the metaphysical nature of X itself — and this response is not available before endorsing my metaphysics of quantity, Magnitude Non-Individualism. That we can have something more substantive to say to address the how-possible question is a bonus for moving from the psychological claim Representational Humility to the metaphysical claim Magnitude Non-Individualism.

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