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ON THE MEASURABILITY OF PLEASURE AND PAIN

A Dissertation Presented

by

JUSTIN ALLEN KLOCKSIEM

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
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Philosophy

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DEDICATION

To Caroline, my wife and closest friend.

ACKNOWLEDGEMENTS

There are many people without whom I could not have completed this dissertation—many people whose help and assistance made this work possible. Although I cannot possibly thank all of them, I will try to thank as many of them as I can.

I thank my advisor, the director of this dissertation, Fred Feldman. His impact on my work should be obvious to anyone familiar with him. I have used his writing as a model of philosophical clarity and rigor, relied on his ability to spot areas that are unclear, vague, or imprecise, and on his capacity to provide deep and penetrating criticisms both of my own work and those whose work I discuss in this dissertation. His comments and criticisms have had a dramatic impact on the quality of every facet of this work—deciding on a topic, settling on an overall strategy, and on executing it, section by section. I am deeply grateful for all of his advice and guidance over the past seven years.

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graduate students, and from the graduate-student speaker series—this last both as an audience member and a participant. I am proud to join the ranks of the UMass-trained philosophers.

Additionally, I would like to thank the many friends and colleagues I've had during my time in college and graduate school. It is often said that you learn as much from your friends in graduate school as you do your teachers, and I have greatly benefited from having conversations with and receiving commentary and criticism from many of my fellow students, from my days at Western Washington and Arizona State, up to and through my time at UMass. The following deserve special mention: Jacob Bridge, Kingston Cassidy, Jeremy Cushing, Daniel Doviak, Christopher Heathwood, Charles Kurth, Shawn Larsen-Bright, Kristopher McDaniel, Jason Raibley, Philip Robichaud, Michael Rubin, Alexander Sarch, Michael Valle, Jean-Paul Vessel, and Ryan Wasserman.

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I thank my parents, Stuart and Mary Klocksiam, for their love and support. They have always been behind me, and have always been ready to help me achieve my goal of earning a Ph.D. in philosophy. They've encouraged me throughout this process, including

helping me move across the country to graduate school twice, helping me fly home for the holidays innumerable times, and offering words of support whenever they were needed. I am grateful for everything they've done.

Material from this dissertation was presented at a meeting of the Midsouth Philosophy Conference at the University of Memphis, and at an invited colloquium at Western Washington University. I thank each of my audiences for helpful comments and criticism. Material from chapter 6 appeared in *The Journal of Value Inquiry* as "The Problem of Interpersonal Comparisons of Pleasure and Pain." I thank the editor, Tom Magnell, and Kluwer Academic Publishers for permission to reprint it here.

Finally, I reserve my deepest thanks for my wife and closest friend, Caroline Klocksien. I could never have completed this project without her love, patience, and support. In addition to providing an environment in which this work could be completed, Caroline often listened to me think through the arguments it contains, and served as an excellent sounding board, helping me to know when and where there were unclear or half-baked ideas. Furthermore, she has uprooted her life and moved across the country two different times (and counting) so that we might remain together, which means more to me than I could ever express. Thank you, Caroline.

...What measure is there of the relations of pleasure to pain other than excess and defect, which means that they become greater and smaller, and more and fewer, and differ in degree? For if one says: "Yes, Socrates, but immediate pleasure differs widely from future pleasure and pain"—to that I should reply: And do they differ in anything but pleasure and pain? There can be no other measure of them. And do you, like a skillful weigher, put into the balance of the pleasures and the pains, and their nearness and distance, and weigh them, and then say which outweighs the other. If you weigh pleasures against pleasures, you of course take the more and the greater; or if you weigh pains, then you take the fewer and the less; or if pleasures against pains, then you choose that course of action in which the painful is exceeded by the pleasant, whether the distant by the near or the near by the distant; and you avoid that course of action in which the pleasant is exceeded by the painful. Would you not admit, my friends, that this is true?

—Socrates

When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge of it is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced it to the stage of science.

—Sir William Thompson, Lord Kelvin

ABSTRACT

ON THE MEASURABILITY OF PLEASURE AND PAIN

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The topic of my dissertation is the hedonic calculus. The hedonic calculus presupposes that pleasure and pain come in amounts amenable to addition, subtraction, and aggregation operations. These operations are ones that utilitarianism and related normative ethical theories treat as central to moral phenomena. The first chapter is an introduction to the problem—in it, I explain what the hedonic calculus is, why it is important, and why it has recently come under disfavor.

The second chapter explores the nature of hedonic phenomena, arguing that pleasure and pain are propositional attitudes; they are not feelings or feeling-tones, nor are they fundamentally a matter of desire or motivation.

The third and fourth chapters concern the nature of quantitative phenomena. I argue that quantities are determinate properties whose determinables enter into *greater-than*, *less-than*, or *equal-to* relationships that are homomorphic with the structure of the real number line. These structures include the presence of a unique order; the possibility of equal intervals; and a natural, non-arbitrary zero point. The fifth chapter is a defense of the thesis that there are exactly three relations of quantitative comparison from a recent attack. I argue that

apparent instances of *being on a par* are in fact instances of vagueness or complexity and do not threaten the truth of the trichotomy thesis.

The sixth chapter addresses arguments that pleasure and pain fail to meet these formal conditions. One argument stems from the observation that pleasures and pains are essentially transient and ephemeral. Another argument proceeds from the observation that interpersonal comparisons of pleasure and pain appear to be impossible. A third, closely related to the first two, argues that pleasure and pain are too heterogeneous to be quantitative. A final argument holds that, for a variety of reasons, the various mathematical operations constitutive of quantitativity are not applicable to pleasure or pain. I argue that each argument suffers from at least one fatal flaw. Some arguments crucially involve a failure to distinguish between the existence of a quantity and our ability to perform reliable measurements of it. Others involve false analogies between hedonic and other sorts of phenomena.

The seventh chapter addresses arguments in favor of the legitimacy of the calculus. Many philosophers, such as Bentham, Mill, Ross, and Plato, seem to assume, without any serious argument, that pleasure and pain are quantitative. Others attempt to argue that, for example, two people enjoying something must involve more pleasure than if just one person were enjoying it. A third type of argument rests on the claim that it is sometimes rational to be indifferent between a longer lasting, less intense episode of pleasure and a more intense but shorter episode. This suggests that since *duration* is clearly quantitative, *intensity* must be, too, because if it were not, there could be no equivalence between the brief but intense and the lengthy but mellow episodes. Several of these arguments are unsound or question-begging. Finally, I present an argument in favor of the hedonic calculus that I endorse, along with possible objections and my replies. I begin by acknowledging the central point of the

“hedonic trade-offs” argument, and then proceed, via *reductio*, by pointing out the various absurd or unpalatable consequences of the denial of the thesis that pleasure and pain are quantitative.

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CHAPTER I

INTRODUCTION

1. The Hedonic Calculus

The topic of this dissertation is the hedonic calculus. The traditional debate concerning the hedonic calculus concerns whether or not pleasure and pain are susceptible to various mathematical functions, such as addition and subtraction. Although the idea is very old—in the *Protagoras*, Plato has Socrates propose something very much like it—the contemporary discussion can be traced to Bentham’s *Principles of Morals and Legislation*. In it, Bentham devotes considerable space to the question of how the value of “a lot” of pleasure and pain is to be measured. This is the project of this dissertation.

This project is philosophically important for a variety of reasons. Perhaps the most prominent reason is that the thesis that pleasure and pain are quantitative is at the foundation of one of the most significant moral theories in the history of philosophy: utilitarianism. The precise formulation of the theory is a matter of some controversy, but all versions of utilitarianism combine the following two insights: a) that the sole criterion for moral evaluation is the goodness and badness of consequences in comparison to the relevant alternatives;¹ and b) that the sole basis for the evaluation of a consequence is the amount of pleasure and pain it contains. This second prong of the utilitarian insight clearly presupposes that pleasure and pain are quantitative.

¹ This way of putting it leaves open what, precisely, is to be evaluated. The best-known forms of utilitarianism evaluate actions in terms of permissibility, but other forms, such as rule utilitarianism, take rules as their primary object of evaluation and evaluate actions only derivatively. What is unique to all forms of utilitarianism is that consequentialism is combined with hedonism.

However, as we will see in later chapters, a wide variety of non-utilitarian theories about right and wrong presuppose that pleasure and pain are quantitative. According to several prominent moral philosophers, every plausible theory of ethics entails that the promotion of pleasure and diminution of pain are at least *prima facie* duties, and this presupposes that pleasure and pain have a quantitative structure. So the hedonic calculus is important not just according to utilitarianism; the bulk of viable normative ethical theories presuppose it.

Furthermore, pleasure and pain have been thought to be tied closely to motivation. The thesis that pleasure and pain are the only things that affect motivation is, of course, deeply controversial and is probably false; however, it seems plausible and intuitive to think that pleasure and pain are at least relevant to motivation in typical cases. And since it is also plausible and intuitive to think that greater quantities of pleasure or pain carry greater motivational force, the hedonic calculus is important in the context of the study of motivation, as well.

2: Overview of the Chapters

The second chapter concerns the nature of pleasure and pain—we cannot determine whether there is a hedonic calculus without first determining what such a calculus would be a calculus *of*. That is, in order to determine whether pleasure and pain are legitimate, measurable quantities, we must first what pleasure and pain are. In this chapter, I consider a variety of influential theories about the nature of pleasure and pain, including the *distinct feeling view*, according to which pleasure and pain are distinct, individual sensations, the *hedonic tone view*, according to which pleasure and pain are features of sensations and not sensations themselves, the *desire-based view*, according to which pleasure and pain are fundamentally a

matter of intrinsic desire and aversion, and the *propositional attitude* view, according to which pleasure and pain are *sui generis* propositional attitudes and do not depend in any essential or fundamental way on desires. I reject the distinct feeling and hedonic-tone views for two reasons. First, the phenomenology of pleasure and pain are inconsistent with these views: there is no distinctive feeling or feeling-tone common to all pleasant sensations. Second, some pleasures and pains are not sensory in nature. Some pleasures or pains are emotional, or intellectual, or aesthetic in nature, and therefore have nothing to do with sensations *per se*.

My reasons for rejecting the desire-based view are more complicated, but rest on the contention that pleasure and pain vary in a manner independent of desire and aversion. Even controlling for the various caveats and restrictions placed on the relevant desires and aversions, I contend that there exist pleasures we do not desire; pains to which we are not averse; objects of desire we do not enjoy; and objects of aversion we are not pained by. This is enough to show that the desire-based theory of pleasure is false.

I endorse the propositional attitude-based theory of pleasure and pain. It is consistent with hedonic phenomenology, as well as the independence of pleasure and desire. Although there are problems with the theory—it leaves the fact that pleasure and pain are diametric opposites unexplained, for example—these problems should not compel us to reject the theory in favor of one of its competitors.

The third chapter proposes a metaphysical theory of quantitative properties. According to the theory I endorse, quantities are properties, conceived of as universals that fit into a version of the determinate/determinable structure according to which something has a determinable (e.g.) volume by having some particular determinate volume (e.g. 4 ml), and these determinate properties are arranged into a structure that is isomorphic in various ways to the structure of the number line. The details of this numerical structure are

presented in chapter four. The quantitatively important structures of the number line include ordinality, the presence of intervals, and the presence of a natural, non-arbitrary zero point. When there exists a suitably structured network of determinate properties under the appropriate determinable, I say that the relevant property is *quantitative*.

The fifth chapter is a defense of the trichotomy thesis—the thesis that there are three mutually exclusive and exhaustive relations of quantitative comparison: *greater than*, *less than*, and *equal to*. Although this thesis is intuitively plausible and philosophically orthodox, it has come under attack, most notably in a series of articles by Ruth Chang. According to Chang, there are cases according to which there are two objects that are quantitatively related but not by any of the standard trichotomy of relations. On her view, a fourth *sui generis* relation, *being on a par*, holds in such situations. I argue that the trichotomy thesis is true, and that the apparent plausibility of Chang’s argument is an illusion, caused by vagueness and complexity in the cases that motivate her argument.

In the sixth chapter I consider several popular or influential arguments for the conclusion that pleasure and pain are not quantitative. I criticize several of these arguments for drawing a theoretical conclusion—that there is no relevant quantitative structure with respect to pleasure and pain—from practical premises. Several such arguments are based on the fact that pleasures are difficult to focus on or attend to; or our inability to compare one person’s pleasures with those of another; or our inability to perform the relevant calculations; or our inability to construct a non-arbitrary scale for the measurement of pleasures and pains.

Another argument for the conclusion that pleasure and pain are not quantitative is based on their apparent heterogeneity. The idea is that some pleasures are different enough from some other pleasures that no legitimate comparison can be made between them. This

line of argument is specious: however different in character two episodes of pleasure may be, as long as they are pleasures, and not something else, then they must *ipso facto* be similar enough to guarantee that some quantitative comparison with respect to amount of pleasure is at least logically possible. If no such comparison were possible, then at least one of the episodes would have to be non-hedonic in nature.

Finally, I discuss several arguments for the conclusion that the relevant mathematical and statistical operations are not applicable in the right ways to pleasure and pain. In many cases, this type of argument proceeds by analogy, drawing a comparison between pleasure and pain on the one hand, and some allegedly analogous phenomenon that is not amenable to the relevant operations, on the other. In each case, I show that the putative analogy fails and that there is reason to believe that the relevant operations do, indeed, apply to pleasure and pain.

The seventh and final chapter concerns positive arguments for the thesis that pleasure and pain are quantitative. The oldest such argument is based on the remarks of Socrates during his discussion with Protagoras in the dialogue that bears his name. According to Socrates, everyone is always motivated so as to maximize pleasure and minimize pain; since maximization and minimization are quantitative concepts and only make sense to apply to quantitative properties, pleasure and pain must be quantitative. In a similar vein, Sidgwick remarks that the thesis that pleasure and pain are quantitative is an *a priori* assumption that is uncontradicted by all our experiences, even though he can give no positive argument that it is true. And Ross argues that the fact that pleasure and pain are subject to varying degrees of intensity entails that there exist precise degrees of varying intensity. I conclude that each of these arguments begs the question.

A second class of arguments I discuss in this chapter is defensive in nature. According to arguments of this type, the fact that we lack some apparently important ability to quantify pleasure and pain is not a threat to the thesis that pleasure and pain are quantitative. Although I agree that there are serious practical difficulties surrounding the taking of measurements of pleasure, I deny that this has any direct bearing on the thesis that pleasure is a measurable quantity, in a certain sense of that term.

Finally, I present and defend a sound argument for the conclusion that pleasure and pain are quantitative. This argument is based on the idea that intensity and duration of pleasure and pain interact in such a way that it is possible to set up a hypothetical scale for intensity in terms of duration. Since intensity can be expressed by reference to duration, and duration is a paradigm example of a ratio-measurable quantity, intensity is therefore measurable on a ratio scale, too. I then argue that there is a natural, non-arbitrary hedonic zero point.

3. An Approach to the History of Philosophy

Several sections of this dissertation make reference to historical sources—indeed, we consult some of the oldest surviving philosophical writings. Most of the philosophers whose writings predate the contemporary era endorse, either explicitly or implicitly, some version of the sensory- or feeling-tone views of pleasure, views which I explicitly reject in the next chapter. This presents an interpretational problem: a desire for fidelity to source material pulls us in one direction; a desire to understand how these historical texts figure into the contemporary debate surrounding the hedonic calculus pulls us in another.

In the end, I have decided to sacrifice fidelity to historical accuracy in favor of contemporary relevance in several places. This means that I have recast several arguments

for or against the thesis that sensory pleasure and pain are quantitative as arguments concerning the quantitateness of attitudinal pleasure and pain. When this happens, it is the result not of misunderstanding, nor of lack of respect for the historical context in which this debate takes place. Rather, it is simply because this is a dissertation in ethics, not in the history of philosophy. Although we are aware of the history of our discipline and have attempted to learn as much as possible from it, our focus remains on the present.

CHAPTER II

THEORIES OF PLEASURE AND PAIN

1. Introductory Remarks

Philosophically speaking, what is the nature of pleasure, and of pain? What kind of phenomena are they? Which properties are *pleasantness* and *painfulness*? What conditions must an event or object satisfy in order to deserve to be called “a pleasure” or “a pain”? The purpose of this section is to catalog the three major philosophical theories of pleasure and pain, and the arguments in favor and against each of them. I am not interested in psychological or neurological questions concerning pleasure and pain or their effects or natures. I am not interested in whether or not rational people always seek pleasure or avoid pain in themselves. I am interested in what pleasure and pain are. I am not interested in what any particular neural correlate to pleasure and pain might be. I am interested in what the phenomena that would be correlated to neural activity if that neuro-scientific project were complete.

In order to be complete, a theory of hedonic phenomena would have to meet certain conditions. First, and most obviously, it would have to give an account of the nature of pleasure. It should attempt to explain, at the most fundamental level, what pleasure is. But just as importantly, a complete hedonic theory would have to give an account of the nature of pain, too. Many authors, however, completely omit all discussion of pain. When this occurs, I assume that what is said about pleasure applies, *mutatis mutandis*, to pain.

Second, the theory must explain what it is for someone to “get” pleasure and pain. That is, it must explain what features a person must have at a time in order to undergo

pleasure or pain at that time. Does he have to be experiencing sensations with certain features? Or does it have to do with his attitude toward what is going on? If so, which attitude? Which things?

Third, the theory must explain what it takes for something to be pleasant or painful. That is, it must explain what features must an object have to be an instance of the property *pleasantness*. It must explain what it takes for something to be “a pleasure.” But it is important to distinguish between two possible interpretations of ‘being pleasant.’ On the one hand, something can be pleasant by causing or leading to pleasure. A long, moderately strenuous bike ride through smooth, empty, rural roads, teeming with birds and wildlife, on a cool summer morning is pleasant in this way. This type of pleasantness is derivative, and is therefore not philosophically interesting in a fundamental way.

On the other hand, something can be pleasant “in itself,” or be “intrinsically pleasant.” These things are not pleasant because they cause pleasure, or because of any extrinsic, relational factors. They are pleasant because of how they are “in themselves”; because of how they are intrinsically. This second, more fundamental, way of being pleasant is the one we are interested in. The actual experiences a bike rider has on his long, bucolic ride are more likely candidates for being intrinsically pleasant. The feeling of the cool breeze; the visual experiences of the barns, hayfields, and fieldstone walls zooming by; the thrill of the descent; the sense of accomplishment accompanying a tough climb. The theory of hedonic phenomena must explain what it is for an object to be intrinsically pleasant. It should say something about which ontological category the objects fall into. It should also do this for *painfulness*.

Third, a complete theory of hedonic phenomena should explain what it takes for one thing to be more pleasant (or painful) than another. It should explain what it takes for a

person to be getting “more pleasure” at one time than another, or for one person to be getting more pleasure than another.² We often make offhanded remarks that entail that one thing is more pleasant or less painful than some other thing. A theory of hedonic phenomena should explain how we can make these judgments, and why they sometimes seem to be true.

So, the theory should tell us what it takes for someone to take pleasure in something; what property “pleasantness” is; what things “pleasures” are; and what features of the property or objects determine which quantitative relationships hold between the instances (or the things). It should also adequately explain any necessary technical terms, such as ‘hedonic tone.’

The most basic of the philosophical theories of pleasure and pain is the “distinctive feeling” view, which is closely related to the “hedonic tone” theory. Because they are so closely related, I will consider these two theories as though they were the same theory. This kind of theory claims that there is a particular, distinctive feeling and that this feeling is the feeling of pleasure. Presumably, they stand or fall together. The second is the “intrinsic desire” theory. This theory claims that although there is no particular feeling of pleasure, a pleasure is a feeling that is desired for its own sake by the person who feels it. The third is the propositional attitude theory. This theory says that pleasure is a propositional attitude, akin to *being pleased* or *enjoyment*. An individual pleasure is a state of affairs consisting in someone taking propositional pleasure in some propositional object.

² I don’t want to beg any questions at this early date. However, it seems that our everyday thought about pleasure and pain makes reference to this type of quantitative relationship, and a complete theory of hedonic phenomena should make some attempt to explain the underlying nature of these relationships. It’s possible, however, that there is no theory such that this portion of it is true, or that these relationships are necessarily imprecise.

2. Hedonic Tone and The Distinctive Feeling Theory

The most prominent adherents of the Hedonic Tone view are C. D. Broad and Moritz Schlick.³ In his *Five Types of Ethical Theory*, Broad writes:

It seems to me that there is a quality, which we cannot define but are perfectly well acquainted with, which may be called “Hedonic Tone”. It has two determinate forms of Pleasantness and Unpleasantness... “A Pleasure” then is simply any mental event which has the pleasant form of hedonic tone, and “a pain” is simply any kind of mental event which has the unpleasant form of hedonic tone. There is not a special *kind* of mental events, called “pleasures and pains”; and to think that there is as if one should solemnly divide human beings into men, women, and blondes. (Broad, 1930, p. 229-30)

According to Broad, pleasantness and unpleasantness are features of experience.

Although they are not themselves sensations, they are particular features of sensations.

Pleasantness, on Broad’s view, is a distinctive “tone” common to all pleasant experiences or feelings. *Painfulness* is its opposite. Broad claims that the feature or tone is indefinable, but that we are familiar enough with it to know what he’s talking about and to know when it’s there and when it’s not. He thinks that the non-hedonic features of the relevant mental event can play a role in its hedonic features. For example, the specific emotional character of remorse is sufficient to ensure that experiences of remorse are painful experiences. Similarly, the specific emotional character of hope is sufficient for the pleasantness of mental events characterized by hoping.⁴ Presumably, we are able to detect these forms of hedonic tone by introspection.

³ See Broad and Schlick. G. E. Moore presents a theory of pleasure according to which it is a “certain definite feeling” in section 12 of Moore 1903. According to Broad and Schlick, pleasure is not *itself* a feeling, but is a *feature* of other feelings.

⁴ Broad, p. 230. Broad doesn’t speculate about whether the sufficiency is necessary or merely contingent, or whether the necessity would have to be merely causal in nature, or if it could be logical in nature.

Broad claims that hedonic tone is normally taken to be a determinable property with two distinct determinate forms, just as *being colored* is a determinable property with a much wider variety of determinate forms—such as *being red*, or *being blue*, or *being yellow*. Broad wonders, without coming to a conclusion, whether “there may be several different determinate forms pleasantness and unpleasantness, just as there are several different shades of redness and several different shades of blueness”.⁵

Finally, Broad claims that “it is logically impossible that an experience should have no characteristic except hedonic quality. It is as clear that no experience could be *merely* pleasant or painful as that nothing could be black or white without also having some shape and some size.”⁶ Without being too specific about which non-hedonic features he means, Broad’s point is that a mental event’s having some non-hedonic features is a necessary condition for the mental event’s having hedonic features.

Moritz Schlick briefly presents a similar theory:

Every idea, every content of our consciousness, as we learn from experience, possesses a certain *tone*. And this has the consequence that the content in question is not something completely neutral, or indifferent, but is somehow characterized as agreeable or disagreeable, attractive or repellant, joyful or painful, pleasant or unpleasant. ...every experience has an emotional tone that is either pleasant or unpleasant... ...the essence of these feelings is of course indescribable—every simple experience is beyond description—and one can only make clear what is meant by appropriate indications.

Of course I have very different experiences when I stroke soft silk, when I attend a performance of *Midsummer Night’s Dream*, when I admire a heroic act, when the proximity of a beloved person makes me happy; but in a certain respect there is undoubtedly a similarity in the mental descriptions in all these cases, and we express

⁵ Broad, p. 233. Broad raises the possibility that Mill might have had this type of view in mind when he claimed that pleasures differ in “quality” as well as intensity and duration. The idea would be that different “shades” of pleasure would have different intrinsic values, other things being equal. Broad doesn’t pursue this line of inquiry.

⁶ Broad, p. 235.

this when we say that all of them have *pleasant* emotional tones, or that all of them are *joyful*.⁷

Schlick clearly has in mind a distinctive-feeling view. Like Broad, his idea is that *pleasantness* and *painfulness* are features of our experiences—“tones”—and are the features in virtue of which those experiences to count as pleasures and pains. He mentions several experiences, each of which is so different from the others that it is hard to see any similarities between them. But, according to Schlick, each of them is similar to all the others in just this way: each of them is pleasant.

Schlick goes on to remark that “no definite emotional tone belongs to a specific experience as such; it depends on the whole situation, just as a white object can appear any color, depending on the lighting.”⁸ To take (a version of) his example, a violinist hitting a sour note may be painful or pleasant, depending on whether or not the violinist is performing one of Bach’s solo violin concertos at Carnegie hall, or merely missed the note for comedic effect. The specific hedonic tone had by a particular mental event can depend on extrinsic and relational features of the event.

Karl Duncker also presents a hedonic tone theory of pleasure.⁹ Duncker claims that the feeling of pleasure is dependent upon and inseparable from the experience that is its source. It is impossible to consider the pleasure in isolation from the qualities of the experience.¹⁰ He goes on:

Pleasure is an essentially incomplete experience. It exists only as a “side” or “property,” as an “abstract part” of a more comprehensive experience. It is

⁷ Schlick, pp. 37-8.

⁸ Schlick, p. 38.

⁹ Duncker, pp. 398-412.

¹⁰ Duncker, p. 399.

pleasantness of something, more precisely: a *tone of pleasantness* or *hedonic tone pervading an experience*. The flavor of the wine is, as it were, “aglow with pleasantness.”¹¹

But the pleasantness is not an “attribute” of the experience in the way that its intensity, duration, and qualitative character are. Each of these attributes, unlike pleasure, is an essential constituent of the experience—to annihilate any of them would annihilate the experience.¹² The hedonic tone is a subjective, inessential, perhaps relational, feature of the experience. He goes on: “...the pleasantness of an experience does not indicate a feature of the external object, but a way in which it *affects* me, i.e., a way I “feel.” In other words: pleasure is a *feeling tone*.”¹³ But, “although it pervades, or issues from, this or that experience, it also seems, in a singular fashion, to extend to and to affect the very center of the field of experience, the self.”¹⁴

Duncker’s idea seems to be that although pleasant hedonic tone (and presumably painful hedonic tone, as well) is inessential to the experience that has it and does not represent any intrinsic features of the object of the experience, the hedonic tone pervades, saturates, and suffuses the experience. The experience is “tinged” with emotion. Like Schlick, Duncker notes that either type of hedonic tone may be possessed by any type of experience.¹⁵

Duncker goes on to say that

...the feeling-tone of pleasantness shares the quality, depth, and dignity of its immediate objective correlate. Being merely the tone of something, it has no properties of its own aside from its “algedonic” character and its intensity ranging from extreme pleasantness through indifference to extreme unpleasantness. The degrees of intensity are often more accurately described as degrees of saturation (of

¹¹ Duncker, pp. 399-400.

¹² Duncker, p. 400.

¹³ Duncker, P. 400.

¹⁴ Duncker, p. 400.

¹⁵ Duncker, p. 401.

an experience with pleasantness) that are characteristic of the experience in question.¹⁶

Again, Duncker claims that pleasure and pain are merely “tones” or inessential features of other, more complete experiences, and are not experiences in and of themselves. They may, however, saturate and pervade the experiences that have them.

We may now state the hedonic tone theory, based on the remarks of Broad, Schlick, and Duncker:

- 1) A mental event, *e*, is a pleasure (or “is pleasant”) iff *e* has or instantiates the pleasant determinate form of hedonic tone.

- 2) A mental event, *e*, is a pain (or “is painful”) iff *e* has or instantiates the unpleasant determinate form of hedonic tone.

- 3) *F* is the pleasant form of hedonic tone iff:
 - a) *F* is a feature of mental events such as experience, emotion, or desire.
 - b) For any mental event, *e*, if *e* has *F*, then *e* also has some other features $G_1 - G_n$, such that none of the *G*s are hedonic in nature.
 - c) For any mental event, *e*, if *e* has *F*, then there is some degree to which *e* is “saturated” with *F*-ness; *F*-ness comes in degrees of intensity.¹⁷

¹⁶ Duncker, p. 408.

¹⁷ Following Duncker, the “saturation” clause and the “intensity” clause of (3c) are meant to be equivalent.

- d) For any mental event, e_1 , if e_1 has F, then it is possible that there exists some other mental event, e_2 , such that e_1 and e_2 are qualitatively identical and it is not the case that e_2 has F.
- e) F is the determinate form of hedonic tone that is the opposite of the painful form of hedonic tone (i.e. painfulness).
- f) For any pleasant mental event, e, F is the specific feature of e in virtue of which e is pleasant.
- g) The above list exhausts the features of F.

4) F is the painful form of hedonic tone iff

- a) F is a feature of mental events such as experience, emotion, or desire.
- b) For any mental event, e, if e has F, then e also has some other features $G_1 - G_n$, such that none of the Gs are hedonic in nature.
- c) For any mental event, e, if e has F, then there is some degree to which e is “saturated” with F-ness; F-ness comes in degrees of intensity.¹⁸
- d) For any mental event, e_1 , if e_1 has F, then it is possible that there exists some other mental event, e_2 , such that e_1 and e_2 are qualitatively identical and it is not the case that e_2 has F.
- e) F is the determinate form of hedonic tone that is the opposite of the pleasant form of hedonic tone (i.e. pleasantness).
- f) For any painful mental event, e, F is the specific feature of e in virtue of which e is painful.

¹⁸ Following Duncker, the “saturation” clause and the “intensity” clause of (3c) are meant to be equivalent.

g) The above list exhausts the features of F.

5) x is an episode of pleasure =df x is an event consisting of some subject S experiencing a sensation that has or instantiates the pleasant form of hedonic tone.

6) x is an episode of pain =df x is an event consisting of some subject S experiencing a sensation that has or instantiates the pleasant form of hedonic tone.

7) x is more pleasant than y at t iff the pleasant form of the hedonic tone of x is more intense or is saturated to a greater degree than the hedonic tone of y at t.

8) x is more painful than y at t iff the painful form of the hedonic tone of x is more intense or is saturated to a greater degree than the hedonic tone of y at t.

The “hedonic tone” theory of pleasure (HTTP) is the theory that has (1), (2), (3), (4), (5), (6), (7), and (8) as its components. According to the HTTP, pleasures—that is, things that are genuinely pleasant in themselves, or are intrinsically pleasant—are sensations. Someone is experiencing pleasure at a time if and only if he is having a pleasant sensation at that time. One sensation is more pleasant than another at a time if and only if its hedonic tone is more intense than that of the other at that time, or, if you prefer, if and only if it is saturated to a greater degree with the pleasant form of the hedonic tone than its competitor at that time.

3. Problems for the Hedonic Tone Theory

Several apparently decisive arguments against HTTP have been discussed in the literature. The current consensus is that the HTTP is hopelessly misguided and wrong. The first objection concerns the implausibility of there being a single, unified hedonic type of experience. The second concerns the implausibility of hedonic phenomena being exclusively sensory in nature. Another, less pressing objection concerns the fact that pleasure and pain are opposites, a fact which the HTTP leaves unexplained.

3.1. Heterogeneity

Henry Sidgwick was among the earliest critics of the HTTP.¹⁹ His criticism is simple, devastating, and has been endorsed by many of the philosophers who have been interested in the nature of pleasure since his time.²⁰ Sometimes called the “heterogeneity problem,” it says that there is no single feature possessed by all pleasant mental events. Some pairs of pleasures are so dissimilar to one another that there are no features that they share. *Ipsa facto*, there is no hedonic tone shared by all pleasant sensations. Similarly, there are some pairs of pains so dissimilar that they share no features. Sidgwick writes:

...for my own part, when I reflect on the notion of pleasure,—using the term in the comprehensive sense which I have adopted, to include the most refined and subtle intellectual and emotional gratifications, no less than the coarser and more definite sensual enjoyments,—the only common quality that I can find in the feelings so designated seems to be that relation to desire and volition expressed by the general term “desirable” in the sense previously explained.²¹

For example, as I write this, I am drinking a cup of strong, hot coffee. I am also sitting in the air stream of my electric fan. The coffee is producing a warm, bold and assertive, slightly

¹⁹ Sidgwick 1907, pp. 125-31.

²⁰ See, for example, Brandt, Heathwood, Feldman 2004, and Perry.

²¹ Sidgwick 1907, p. 127.

bitter, full-bodied sensation (or set of sensations). The stream of air from the fan, on the other hand, is creating a cool, refreshing, breezy sensation (or set of sensations). Both sensations are remarkably pleasant. Sidgwick's claim is that this pair of sensations are so different from one another that they share no features in common, qualitative or otherwise. There's no detectable-yet-indefinable hedonic tone shared by the feelings. Or compare the olfactory sensations involved in the way coffee smells to the auditory sensations involved in listening to Muddy Waters play the guitar. Or compare the tactile sensations involved with petting a soft, purring kitten to the enjoyment of finishing a satisfying novel. Or compare the pleasure of winning a big hand at the poker table with the pleasure of being startled, scared, or horrified by a scary movie. Each of these sources of pleasure is so different from its counterpart (indeed, from any of the others mentioned) as to cast doubt on the hedonic tone theory of pleasure.

The heterogeneity objection is suggested by Fred Feldman in the following passages:

One thing to notice about pleasure is its apparent heterogeneity. The man on the beach enjoys some pleasurable smells as well as some pleasurable feelings of warmth. Each of these sensations is pleasant, pleasurable, 'pleasure-giving'... Nevertheless, from the strictly phenomenological perspective, they seem to have very little in common. One is an olfactory sensation—it is the smell of fresh, salty air. The other is an all-over bodily feeling of warmth. Aside from the fact that they are experienced simultaneously and by the same person in the example, they seem to be utterly unlike.²²

It must be admitted that the [hedonic tone] view is suggested by a number of ordinary language expressions... [but] ...the [hedonic tone] view is not popular. The central difficulty is straightforwardly phenomenological. The alleged sensation of pleasure itself has proven extremely elusive. No matter how carefully they scrutinize their feelings, phenomenological researchers fail to locate the indefinable feeling [supporters of the view] attempted to indicate.²³

²² Feldman 1988, p. 83.

²³ Feldman 1988, p. 87. Feldman is concerned in these passages with the particular version of the "distinctive feeling view" formulated and endorsed by G. E. Moore.

When we look for the relevant pleasant feeling-tone, we do not seem to find it. It does not seem to be there. If I feel some sensation and know that I find it to be pleasant, it is hard to understand why I would have trouble attending to the feeling-tone with which its pleasantness is supposed to be identified. If the pleasantness of some sensation just is its pleasant feeling-tone, then we should be able to identify this feeling tone whenever we are experiencing something pleasant.²⁴ If clauses (1) through (4) of the HTTP were true, then there would be some feature that all pleasures share in common. But none of the pleasures mentioned seems to have any sensory quality, or “tone,” in common with any of the others. This objection seems to be fatal to the hedonic tone theory of pleasure.

3.2. Non-Sensory Pleasures

Another problem for the hedonic tone theory is that there exist pleasures that are non-sensory in nature. This problem was suggested by a type of example that arose in the discussion of the heterogeneity phenomenon: the enjoyment of finishing a satisfying novel; the pleasure of winning a big hand at the poker table; the amusement that accompanies a good scare at a horror film. Each of these examples involves pleasure or enjoyment, but none of them seem to involve *pleasant sensations, per se*. The pleasures involved with finishing a good novel seem to be related to the contemplation of certain propositions or states of affairs suggested by the text of the novel. Though there are certain sensations involved—the way the letters look on the page; their shapes; the whiteness of the paper; the blackness of the ink—the sensations are not particularly pleasant in themselves. It is the contemplation of the propositions that the letters collectively express that gives rise to the pleasure and enjoyment.

²⁴ Pains are similarly heterogeneous.

Similarly, the pleasure of winning at the poker table does not seem to be sensory in nature. The player is pleased that he won, but it's not as though there is some pleasant sensation that is involved with winning. He might even say that it "feels good" to win, but it seems clear that this is not meant to be taken as talk about actual sensory feelings.

A final example concerns a scientist working on a "sensation anesthetic." The drug, if it works, will deprive the recipient of all sensation—but it will not cause the recipient to go to sleep. The scientist administers the chemical to himself. It works; he has no sensations. He is immensely pleased: he's made an outstanding contribution to medical science; he's going to be rich; his in-laws will stop bothering him about his meager ability to support their daughter. In spite of the fact that he has no sensations whatsoever, he is experiencing a lot of pleasure. But suppose that the drug doesn't wear off. In that case, he might start to experience displeasure. If the drug never wears off, he might start to experience outright pain.²⁵ All this is compatible with his not experiencing any *sensations* of any kind.

If any of these examples correctly describes a possible situation, then at least some hedonic phenomena are not identical to sensory phenomena. And if that's right, then there are two serious problems with the hedonic tone theory: that the existence of a distinctively pleasant feeling is dubious; and that some episodes of pleasure do not essentially involve any sensations whatsoever.²⁶ I think that we can conclude that the hedonic tone theory is a dead-end.

²⁵ I owe this example to Fred Feldman.

²⁶ Some philosophers have attempted to explain how non-sensory hedonic phenomena can be analyzed in terms of sensory hedonic phenomena. For a rich discussion of this move and why it fails, see Feldman 1997a, section 7.

3.3. Oppositeness

The HTTP also leaves unexplained the fact that pleasure and pain are opposites. According to HTTP, pleasure and pain are types of sensation. But how could a pair of sensation types be opposites? Many pairs of sensations are quite different from one another without being opposite each other. But if HTTP is true, then at least some sensations are suitably opposite one another. But how could that be? What explains this fact? The phenomenon is left mysterious.²⁷

4. Desire-Based Theories of Pleasure

Like many philosophers,²⁸ Sidgwick responds to the heterogeneity objection by abandoning the hedonic tone theory. According to Sidgwick, the nature of pleasure is intimately connected to desire:

Let, then, pleasure be defined as feeling which the sentient individual at the time of feeling it implicitly or explicitly apprehends to be desirable;—desirable, that is, when considered merely as feeling, and not in respect of its objective conditions or consequences, or of any facts that come directly within the cognizance and judgment of others besides the sentient individual.²⁹

²⁷ For a slightly more developed discussion of this issue, see Heathwood 2007. For what it's worth, I'm unconvinced that the oppositeness phenomenon represents a damaging objection to HTTP. Although Heathwood's example (F# on a banjo and middle C on a piano) is clearly an example of sensation types that are not opposites, it seems to me that there are examples of sensation types that are. Harmony and dischord seem to be opposite sensation types, as do hot and cold. What explains the fact that these pairs are opposites? Presumably the case of hot and cold can be explained by appeal to physiology, though I am in no way qualified to suggest precisely what the explanation would be. The case of harmony and dischord is more mysterious. Though one sounds "good" and the other "bad," it is not easy to why, on any deep level, this should be the case. Perhaps this mysteriousness should cause us to be suspicious of any claim that pairs of sensation types can be opposite one another.

²⁸ For example, see Brandt 1979, Carson 2000, Heathwood 2007, and Parfit 1984.

²⁹ Sidgwick 1907, p. 131.

Sidgwick seems to be expressing a view according to which for any sensory pleasure, it is a pleasure in virtue of its being “apprehended to be desirable in itself” apart from its consequences or extrinsic connections by the person who feels it. Its “objective conditions and consequences” are irrelevant, as are the opinions and judgments of persons other than the subject of the feeling. Whether or not the feeling of pleasure will lead to feelings of pain later is irrelevant, as are questions about what is causing the feeling, as well as questions about the larger context surrounding the sensation.

So, if some sensation, *f*, felt by some person, *S*, is a sensory pleasure at time, *t*, then *S* desires at *t* to be feeling *f* at *t* because of the intrinsic nature of *f*, and not (just) because of any of the extrinsic features of *f*. It is possible that *S* could also desire *f* because of its extrinsic features, but *that* desire would not have anything to do with whether *f* is pleasant. And whether *S* desires at times other than *t* *not* to be feeling *f* at *t* has no effect on whether *f* is pleasant.

Richard Brandt also gives an account of “intrinsic desires.” He claims that a desire for an object *O* is intrinsic at a time if and only if the agent’s central nervous system is such that if he were to judge that some alternative of his was more likely to bring about *O* than any of his other alternatives, then there would be an increase in the probability that the agent would perform that alternative—and this increase in probability is not related to other facts about *O* that are not “part of the concept” of *O*, such as its further effects.³⁰ Couched in quasi-behaviorist terms, Brandt’s idea is that if the agent has an intrinsic desire, rather than an extrinsic one, then he is more likely to behave in ways that are likely to bring it about that *O* obtains, and this increase in probability is the result of how *O* is in itself, not because of its relations to other states of affairs.

³⁰ Brandt 1979, p. 32. I’ve removed references to ‘valences’ and other stylistic variations in the text.

Chris Heathwood gives a similar account. He writes that “you have an intrinsic desire for something [at a time] when you just want it—when there is no reason you can give for wanting it, no further thing you want that you think it will bring you, no end for which it is a means. You just want it—for its own sake.”³¹ To illustrate the point, he gives an example about a young man who wants to go into a bar. But he doesn’t want to go into the bar just for the sake of going into the bar. He wants to go into the bar so that he can order a beer. But he doesn’t want to order the beer just for the sake of ordering the beer, either. There’s something that he thinks ordering the beer will lead to, and that’s why he wants to order the beer. He wants to order the beer, that is, so that he can drink it. But he only wants to drink the beer so that he can taste the beer. So his desire to drink the beer is still not intrinsic. He wants to drink it so that he can taste the flavor of the beer. But this time his desire is intrinsic. There’s no further thing he wants such that tasting the flavor of the beer is a means to that end. (In particular, in this example, the young man is not after the feeling of drunkenness.) He wants to taste the beer for the sake of tasting the beer.³²

Based on these remarks, we can introduce a definition of ‘intrinsic desire’:

S’s desire for x is *intrinsic* at t =df S desires x at t, and S’s desire for x at t depends on what x is like in itself, because of the intrinsic nature of x, and does not depend on any features extrinsic to x, nor on any of x’s merely relational features at t.

S’s desire for x is *extrinsic* at t =df it is not the case that S’s desire for x is intrinsic at t.

³¹ Heathwood 2007, p. 30.

³² Heathwood 2007, p. 30.

Are some pleasures more intense than others? Although he clearly thinks that some pleasures are more or less intense than others, and that it is possible for one pleasure to be equal in intensity to another,³³ Sidgwick does not directly discuss the nature of these intensity ratings. It is natural, given his approach, to suppose that the intensity of a pleasure or pleasant experience is determined by the strength of the relevant desire for the relevant experience.³⁴

Like Sidgwick, Brandt takes pleasantness of an experience to be a matter of the subject's desire for the experience. Brandt disagrees with Sidgwick about which is the relevant desire:

... we have the following definition of 'the experience *E* of the person *P* is pleasant for *P* at *t*': 'an experience of the kind *E* is going on in the person *P* at *t*; and the experience *E* is the differential cause at *t* of an increment in the positive valence of the continuation of *E* beyond *t*, or at the neonate level, of the occurrence of tendencies to act in a way likely to result in the continuation of *E*.' In short, an experience is pleasant if and only if it makes its continuation more wanted. The transposition for being unpleasant will be obvious.³⁵

Brandt's idea is that the pleasantness of an experience is analyzable in terms of the subject's desire for the experience to continue.³⁶ Brandt claims that something, *O*, is positively valenced for someone (that is, someone has an intrinsic desire for something) when his central motivational state is such that if he were to realize that behaving in a certain way

³³ Sidgwick 1907, p. 131.

³⁴ In a trilogy of articles, Wayne Davis takes a similar approach. In his 1981a, he claims that occurrent happiness at a time is a function of the subject's belief that he is getting what he wants at that time. In 1981b and 1982, Davis identifies occurrent happiness with pleasure. Davis does not appear to have understood the importance of the restriction to intrinsic desires. Parfit takes a similar approach to pain which suffers from a similar problem. See Parfit 1984, pp. 493-4, and Feldman 1997a for criticism.

³⁵ Brandt 1979, pp. 40-1.

³⁶ Psychologist Daniel Kahneman endorses a similar picture in his 2003b. On page 6 he says, "When I say 'pleasant,' it doesn't mean anything more than I would smell it more if I could."

would bring it about that O, the probability of his so behaving is increased.³⁷ This tendency to behave can be overridden, and must somehow be psychologically “lawlike”. He says that this positive valence involves a disposition to refrain from behavior that would extinguish the relevant experience, and to engage in behavior that would prolong it. These dispositions to prolong the experience must be caused by the experience itself. Saying that an experience is a differential cause of an increased valence means that it plus certain background conditions are sufficient for the increase in valence; it is not to say that the experience by itself is either necessary or sufficient.³⁸ And according to Brandt, the intensity of the pleasantness of a pleasure to be a function of the intensity of the subject’s desire for the object of his pleasure.³⁹

Brandt also relies on the distinction between intrinsic and extrinsic desires. He is careful to stress the importance of the distinction between something being valenced “in itself” and being valenced because of its relationship to something else that is valenced in itself. His use of the expression ‘valence’ should be understood to indicate intrinsic desire unless otherwise noted.

Based on the remarks of these philosophers, we can formulate the desire-based (or “motivational”) theory of pleasure in the following way:

- 1) A person, S, experiences pleasure at t iff there is some experience, e, such that S is experiencing e at t, S believes himself to be experiencing e at t, and S intrinsically desires to be experiencing e at t.

³⁷ Brandt 1979, p. 26.

³⁸ Brandt 1979, p. 40 n.

³⁹ Brandt 1979, p 253.

2) A person, S, experiences pain at t iff there is some experience, e, such that S is experiencing e at t, S believes himself to be experiencing e at t, and S intrinsically desires not to be experiencing e at t.

3) An experience, e, had by a person, S, is a pleasure (or is pleasant) at t iff S is experiencing e at t, S believes himself to be experiencing e at t, and S intrinsically desires to be experiencing e at t.

4) An experience, e, had by a person, S, is a pain (or is painful, or unpleasant) at t iff S is experiencing e at t, S believes himself to be experiencing e at t, and S intrinsically desires not to be experiencing e at t.

5) The intensity of the pleasantness of a pleasant experience, e, experienced by person S at t is a function of the intensity of S's intrinsic desire to be experiencing e at t.

6) The intensity of the painfulness of a painful or unpleasant experience, e, experienced by person S at t is a function of the intensity of S's intrinsic desire not to be experiencing e at t.

The desire theory of pleasure (DTP) is the theory that has (1), (2), (3), (4), (5), and (6) as its components. According to it, the things that are capable of being genuine pleasures or are capable of being intrinsically pleasant are “experiences.” A person is getting or undergoing pleasure at a time if and only if he has an intrinsic, *de re* desire to have a certain experience,

and believes that he is experiencing it, and he is actually experiencing it at that time. A pleasant experience is more pleasant than some other experience at a time if and only if its subject's intrinsic desire for it is stronger or more intense than that of its competitor at that time.

The DTP is clearly superior to the HTTP. It has the resources to solve both the heterogeneity problem and the problem of non-sensory pleasures. First, according to the DTP, there is no intrinsic, unifying feature shared by all sensory pleasures. Sensory pleasures are pleasant because they are desired by their subjects, not because of some indefinable "feeling-tone" they all share. Similarly, the possibility of non-sensory hedonic phenomena pose no special difficulty for the DTP. Although the theory concerns experiences as it is written, potentially any state of affairs, whether it consists of some person experiencing some sensation or not, could count as a pleasure (or as "pleasant," or as an object of pleasure) as long as someone has an intrinsic, *de re* desire for it. The DTP also solves the oppositeness problem: the fact that pleasure and pain are opposites is explained by the fact that desire and aversion are opposites. Taking pleasure in a state of affairs is equivalent to having an intrinsic, *de re* desire for it to be true and believing that it is true; taking pain in a state of affairs is having an intrinsic *de re* desire for it to be false and believing that it is true. It is easy to see why the two desire-states are opposites. The fact that the hedonic states are opposites is explained in terms of the oppositeness of the relevant desire states.

5. Problems for Desire Theories of Pleasure

The DTP has had its detractors, however. I will survey some of the main problems for it that have been mentioned in the literature, as well as a new problem that seems to have gone unnoticed.

5.1. Undesired Pleasures

One problem for DTP concerns the possibility of desired non-pleasures and undesired pleasures. Because DTP says that facts about pleasure and pain are fundamentally facts about desire and aversion, if DTP is true, then certain facts about what things are pleasant entail facts about what things are desired. If it could be shown that a person enjoys or takes pleasure in something without having a corresponding desire for it, there would be trouble for DTP. Several examples of this kind of hedonic phenomena are proposed by Feldman.⁴⁰

In Feldman's first example, a scientist is researching feelings of dizziness. He spins himself around on purpose so as to induce the sensation of being dizzy. At first his desire to become dizzy and to experience the related sensations is merely extrinsic: he's interested in them because of his research. Soon, however, he becomes interested in the sensations for themselves, for their own sake. He continues to cause himself to be dizzy long after his research project has concluded. He may not find the sensations to be particularly pleasant, though. He may not find them to be pleasant at all, even though he has an intrinsic desire to be having them at times when he does have them.

Another example proposed by Feldman is about a devoted, fully indoctrinated ascetic.⁴¹ The ascetic is so thoroughly devoted to his asceticism that he is convinced that pleasure is worthless and has managed to divest himself of all desire for it. When he feels some pleasant sensation, he has an intrinsic desire not to be feeling it. That is, considered in itself, in isolation from its effects and causes and relationships to other objects, the ascetic is averse to the pleasant sensation. This is not merely a second-order desire about his first-

⁴⁰ Feldman 1997a, p.

⁴¹ Also, see Perry, p. 200.

order desire for the object of his pleasure; it is a first-order desire not to be feeling the sensation in which he takes pleasure. He desires (intrinsically and *de re*)⁴² not to be feeling the pleasant sensation. He has no desire for the sensation in itself. In spite of all this, it is pleasant.

If either of these examples correctly describes a possible situation, then the DTP is in trouble. If the first example is possible, then it is possible to intrinsically desire a sensation when that sensation is not pleasant. And if the second example is possible, then it is possible to take pleasure in a sensation without any intrinsic, *de re* desire for it.

Heathwood has proposed an answer to this type of objection to the DTP. Heathwood claims that the dizziness researcher would have to enjoy or like the sensation of dizziness in order to be willing to agree that he had an intrinsic desire for it. He puts the following words in the mouth of the researcher:

I think I must say that I liked it. After all, I was in favor of it, I would give it a thumbs up, I was attracted to it. Does it make any sense to accept all of this but then to deny that I liked feeling the sensation (for its own sake)?... doesn't that just mean the same as that I took pleasure in it?⁴³

Heathwood's claim is that there is a "conceptual slide" (as he puts it) from desire to pleasure. That I have an intrinsic desire for a sensation entails that I am attracted to the sensation. That I am attracted to the sensation entails that I like it. That I like the sensation entails that I take pleasure in it. By a succession of hypothetical syllogisms, we get that the fact that I have an intrinsic desire for a sensation entails that I take pleasure in it.⁴⁴ Therefore, the

⁴² According to Heathwood 2007, it is important to include the "*de re*" clause because it is important that the subject desire the object of his pleasure in particular; it is not enough that I desire some sweet-flavor-sensation or other, I must desire the particular sensation I'm getting. See pp. 31

⁴³ Heathwood 2007, p. 35.

⁴⁴ Heathwood 2007, p. 35.

researcher's sensation of dizziness is pleasant. There's no reason why it *couldn't* be pleasant, after all. There is a wide diversity from person to person concerning what sensation types are thought to be pleasant. For example, I do not like the taste of coconut. Many people seem to find this hard to believe. One colleague has suggested that I must not get the same sort of sensation he does when he eats coconut, otherwise I would like it. But this is an unnecessary inference. It's equally possible that we get the identical sensation type, and that I just don't enjoy it. Similarly, perhaps the researcher's tastes are just as bizarre as mine. Perhaps the researcher likes sensations that other people dislike, such as dizziness.

However, it seems that Heathwood is overplaying his hand. Although the possibility that the researcher enjoys the sensation isn't *ruled out* by anything Feldman says in his description of the story, but it certainly is not entailed by any details of the story, either. The researcher might like the dizziness sensations, sure. But he might also have an intrinsic desire without really liking it. Why should he have to like it? "Liking" something is not identical to or entailed by being attracted to it. A person could be attracted to something or someone without thereby liking it. Sometimes, for example, I get very tired when I should be working. I am attracted to a state of affairs that involves me sleeping for a few hours, but I don't like that state of affairs. I would much rather be working than napping, but I can't help but be attracted to the state of affairs in which I nap.

5.2. Are Pleasures Desired Because They Are Pleasant?

Another problem for DTP is patterned after the Euthyphro problem for the divine command theory: just as Socrates asked Euthyphro whether an act is pious because it is loved by the Gods or loved by the Gods because it is pious, we might ask the friend of DTP whether e is pleasant because it is wanted, or is e wanted because it is pleasant. If for any

pleasant experience *e*, *e* is desired in virtue of its pleasantness, then it can't be the case that *e* is pleasant in virtue of its being desired. Such a circularity would be fatal to the DTP.

Heathwood attempts to respond to this objection by pointing out an ambiguity in the way the objection was expressed. His claim is that *e* is pleasant because it is desired, because that's what the theory reveals about the nature of pleasure. And he claims that in many cases *e* is desired because it is pleasant, because it is desired "in advance" because its subject knows that he will desire it when he is experiencing it, and this concurrent, *de re* desire for *e* is what makes *e* a pleasure, not the other way around. This second sort of desire, however, is inessential. Some pleasures are desired in this way, but others are not. It is a merely contingent feature of any pleasure that has it.

Heathwood acknowledges that this seems less plausible than the alternative, according to which we desire pleasure because it is pleasant, but argues that the theoretical utility of the DTP mitigates the implausibility. This does not seem to me to be the case. Particularly in light of the plausibility the DTP's main alternative—the attitudinal view, which we will discuss shortly—this reply to the Euthyphro-type objection seems to be inadequate.

5.3. A Problem Concerning Intrinsic Desires

Finally, there is a problem for DTP that concerns the existence of the correct intrinsic desires at the right times. The reason is that the friend of DTP is committed to an incorrect taxonomy of the desires associated with hedonic phenomena. The friend of DTP has noticed that many of our actual, immediate desires are extrinsic in nature: we only desire this because we need it to get that, and that's what we really want. But although many of our actual, all-things-considered desires are undergirded in a straightforward way by a set of intrinsic desires, many of our intrinsic desires are not actual and many do not support our

actual desires in any straightforward way. Some of our intrinsic desires are merely counterfactual in nature, so a person may have an intrinsic desire for a state of affairs without having any actual desire for that state of affairs. It's not just that the intrinsic desire is present but overridden by a competing desire, rather, the intrinsic desire is not present. If things were different, perhaps it would be, but they're not. There may be no particularly close possible world in which the agent has the relevant intrinsic desire.

The following example illustrates the point: on Christmas day I was having a big dinner with my family. I was eating the green bean casserole that my mom always makes. It's very good. I was really enjoying myself. My desire to be eating the casserole during the casserole-eating period was quite strong; by anyone's lights, my pleasure was quite intense. Then my mom brought out the cornbread stuffing I learned how to make from my wife's grandmother, who is from Manning, South Carolina, where they know how to make good stuffing. I like the flavor of that stuffing even more than I like the flavor of the green bean casserole. Though I continued to enjoy the flavor of that last bite of casserole, my desire for my the then-current experience fell to zero, as did my desire to continue it, and my desire to interrupt the experience in favor of another became quite strong. It is not that I stopped enjoying my food and started feeling displeasure or pain; rather, there was simply something else I knew I would enjoy more. And that is compatible with continuing to enjoy myself.

At this point, the friend of the DTP might attempt to exploit the distinction between intrinsic and extrinsic desires. He might reply that his theory doesn't have the consequence that my enjoyment stopped as soon as the stuffing emerged from the kitchen because my desire to discontinue the casserole experience was merely extrinsic, and according to clause (1) of the DTP, the pleasantness of an experience depends on the subject's *intrinsic* desires concerning it. He could ask me a series of questions designed to elicit my intrinsic desires at

the appropriate moment (call it time *t*): considered in isolation, apart from its contingent features, its causes and effects, and other extraneous facts, do you want to keep experiencing your current experiences? And since my desire to discontinue the casserole-related experience was caused by the fact that there was some other experience for which I had a stronger desire, I would have to answer that the desire to discontinue the casserole-related experience at *t* was not intrinsic. According to the friend of DTP, my *intrinsic* desire concerning the casserole-related experience at *t* was for it to continue. He might ask me to notice that I do not abruptly spit the casserole out. That fact is evidence that, on some basic level, I desire the casserole-related experience.⁴⁵

I argue that this type of reply will not work. The way I describe the case entails that I have two desires at *t*: 1. a desire for a cornbread-stuffing-related experience; and 2. a desire to not to continue a green-bean-casserole-related experience. Desire (1) is intrinsic; desire (2) is merely extrinsic. Desire (1) is intrinsic because my desire for the stuffing-related experience is based on its intrinsic character, and is not based on any extrinsic factors. Desire (2) is extrinsic because I only desire to discontinue the green-bean-casserole-related experiences because I know that there is an alternative that I prefer, which explains why I still enjoy the experiences associated with my last bite of green bean casserole. The friend of the DTP claims that at *t* I still have an intrinsic desire for the casserole-related experience, and that's why I continue to enjoy it at *t*. I have no all-things-considered desire for the casserole-related experience at *t*. But that's not all: I don't think that I have *any desire at all* for the casserole-related experience. Though my desire to discontinue it is extrinsic, it is also complete. It does not merely "cover up" my desire for the experience, it replaces it. So, although I *like* the casserole-related experiences at *t*, I do not *desire* them at *t*. I'm not *averse* to

⁴⁵ For ease of exposition, I have couched the reply in the terms of the Brandtian DTP. The reply is available to the Sidgwickian, and can easily be restated in those terms.

the casserole-related experience, so I don't spit the casserole out,⁴⁶ but I attempt to finish as quickly as possible. I'm not tempted to take another bite of the casserole. All I want is to start eating the stuffing.

If, at *t*, you were to ask me a series of questions designed to elicit my intrinsic desires, I'd answer in the way described by the friend of the DTP. But I don't think that the truth of this answer has any implications for my actual desires. That is, the fact that at *t*, if some special counterfactual conditions were satisfied, I would have some desire for some casserole has no implications for my actual desires. Given this "intrinsic desire," I might have an actual desire for the casserole, but I might not. I might be averse to the casserole. So if DTP is true, then my enjoyment of the casserole necessarily depends on my intrinsic desire for the associated experiences. I *would* have such a desire if certain conditions were met, but those conditions are not satisfied, and I have no such desire.

It seems to me that the concept of "intrinsic desires" is somewhat tricky—trickier than the friends of DTP seem to have acknowledged. If DTP is true, then the underlying system of desires on which hedonic phenomena are based would have to be more complicated than its advocates appear to have spelled out in detail, and are essentially counterfactual in nature. A person may "have" an intrinsic desire without having any corresponding actual desire. Whether I am undergoing pleasure in this world, then, depends on what intrinsic desires I have at some other, non-actual world. I think that this has implications for the plausibility of the view, especially in relation to its main competitor—the attitudinal view. I discuss this theory in the following section.

⁴⁶ Besides, spitting the casserole out would be deeply insulting to my mother, who has been serving that casserole for thirty-five years.

6. The Propositional Attitude View

In *The Concept of Pleasure*, David Perry attempts to state and to argue for a theory according to which a set of propositional attitudes are at the heart of hedonic phenomena. He begins his project by distinguishing *enjoyment* from *being pleased*.⁴⁷ Perry states his account of *enjoyment* as follows:

S enjoys x at t =df *S* bears an intrinsic, non-evaluative, non-desiring or striving, pro-attitude toward *x*, and *x* is something *S* does, undergoes, or experiences at *t*, or is intimately connected with something that *S* does, undergoes, or experiences at *t*.⁴⁸

Enjoyment, according to Perry, is an intrinsic pro-attitude. A person enjoys something for what it is in itself, not for its effects or other contingent connections. It is not a desire, and does not involve “striving” or “attempting to acquire” in any essential way. It is non-evaluative because it is compatible with positive, negative, or neutral evaluations, and does not entail any particular evaluation. For example, I can enjoy a cheesy B-movie without thinking that the movie is good—I can enjoy it without thinking that the world is better with the movie in it, or that watching it has increased my welfare, or that it has increased anyone’s welfare, or that it ought to have been made. Similarly, I can enjoy the misfortunes of others while thinking that their misfortunes are bad. It is a synchronous relation; a person can’t enjoy an activity after it is over (one is restricted to enjoying the memory of the activity). The subject must also be aware of what you’re enjoying.⁴⁹

Perry’s account of *being pleased* is as follows:

⁴⁷ Perry, p. 192.

⁴⁸ Perry, p. 214.

⁴⁹ Perry, p. 215.

S is *pleased* about x at t =df S bears a non-desiring or striving, positively evaluative pro attitude toward x at t, and x is a matter of S's recent knowledge or belief at t, and x is of personal interest to S at t.⁵⁰

Though S might have a desire for x in addition to being pleased about it, to be pleased is not in itself to have a desire. Being pleased is evaluative, unlike enjoyment. If S is pleased about x, then S must be favorably disposed to x, “not as the lesser of two evils, but as a positive good.”⁵¹ The state of affairs does not have to be actual or true, but it does have to be something that S knows or believes. Perry's remarks leave it unclear what the ontological category of the objects of pleasure is supposed to be. The best candidate category is probably that of states of affairs. Perry also does not directly address the topic of pain. He presumably intends his remarks to imply that pain is also a propositional attitude and is opposed to pleasure in the appropriate way. Perhaps he would claim that there are both evaluative and non-evaluative painful attitudes.

Feldman has also proposed an attitude-based theory of the nature of pleasure. According to Feldman, like Perry, there is no distinct feeling of pleasure, nor can the full range of hedonic phenomena be explained in terms of desire. Unlike Perry, however, Feldman does not see a reason to distinguish sharply between the attitudes of *enjoyment* and *being pleased*. In one example, Feldman asks us to suppose that he is reading an insightful philosophy paper:

Suppose I find the paper to be enlightening and entertaining. In such a case, it makes sense to say that I am enjoying various facts about the paper. More ponderously, we might say that as I read the paper, I take attitudinal pleasure in the fact that the paper is so well written, or in the fact that it is filled with such

⁵⁰ Perry, p. 216.

⁵¹ Perry, p. 219.

interesting arguments and insights. Perhaps I take pleasure in the fact that the examples are so apt. To enjoy some state of affairs is to take attitudinal pleasure in this way in it.⁵²

Attitudinal pleasure is, then, a propositional attitude. It is a relation of enjoyment that holds between a person (whom we'll call the "agent") and a state of affairs (which we'll call the "object"). Instances of this relation have intensity and duration. The object may or may not actually obtain. A person who mistakenly thinks she has won an election could enjoy the fact that she won, even though she hasn't really won.⁵³

Echoing Ryle and Williams, who argue that *pleasure* or *enjoyment* is a way of being aware of something,⁵⁴ Feldman goes on to say that

Attitudinal pleasure is a mode of consciousness. It is a way of being aware of a state of affairs. It takes its place among such attitudes as hope and fear, belief and doubt, and recollection and anticipation. In order to take up any of these attitudes toward some state of affairs, one must be able to conceive that state of affairs. This is not to suggest that one must be able to express the state in words – even an inarticulate person can hope for a drink of water, or fear that there might be something under the bed. As I see it, it does not take tremendous intellectual sophistication to have such attitudes. By the wagging of her little tail, my dog Pippin indicates that she takes pleasure in the fact that we are about to take a ride in the truck.⁵⁵

In *Pleasure and the Good Life*, Feldman says more:

A person takes attitudinal pleasure in some state of affairs if he enjoys it, is pleased about it, is glad that it is happening, is delighted by it... Attitudinal pleasures are always directed onto objects, just as beliefs and hopes and fears are directed onto objects. This is one respect in which they are different from sensory pleasures. Another difference is that attitudinal pleasures need not have any "feel". We know we have them not by the sensation, but in the same way (whatever that may be) that we know when we believe something or hope for it, or fear that it might happen.⁵⁶

⁵² Feldman 2002, p. 607.

⁵³ Feldman 2002, p. 608. See Chisholm.

⁵⁴ See Ryle, and Williams.

⁵⁵ Feldman 2002, p. 607.

⁵⁶ Feldman 2004, p. 56.

Feldman's claim is that pleasure is a particular type of propositional attitude, of a kind with, but distinct from, belief, hope, fear, and desire. Unlike Perry, Feldman claims that there is just one relevant attitude. Though there are many names for it, *enjoyment*, *being glad about*, *taking pleasure*, *being pleased*, etc, all name the same attitude according to Feldman.⁵⁷ Although Feldman also does not directly address the topic of pain, he claims in a footnote that pain is also a propositional attitude, and that whatever he says about pleasure applies, *mutatis mutandis*, to pain.⁵⁸

Christine Korsgaard endorses an attitudinal theory of pain, according to which the horribleness of apparently intrinsically horrible sensations is actually a function of our attitudes toward them. She writes,

You may want to ask: why are we inclined to fight [painful sensations] if they are not horrible in themselves? In some cases we are biologically wired this way; pain could not do its biological job if we are not inclined to fight it. When nature equipped us with pain she was giving us a *way* of taking care of ourselves, not a *reason* to take care of ourselves... Pain really is less horrible if you can curb your inclination to fight it. This is why it helps, in dealing with pain, to take a tranquilizer or to lie down. Ask yourself how, if the painfulness of pain rested just in the character of the sensations, it could help to lie down? The sensations do not change. Pain wouldn't hurt if you could just relax and enjoy it.

If the painfulness of pain rested in the character of the sensations rather than in our tendency to revolt against them, our belief that physical pain had something in common with grief, rage, and disappointment would be inexplicable. For that matter, what physical pains have in common with each other would be inexplicable, for the sensations are of many different kinds. What do nausea, migraine, menstrual cramps, pinpricks, and pinches have in common, that makes us call them all pains? (Don't say they're all horrible; that's just repeating yourself.) What emotional pains have in common with physical ones is that in these cases too we are in the grip of an

⁵⁷ Perhaps some of these words require special conditions to be met in order for it to be appropriate to use it. For example, perhaps 'enjoyment' is only appropriate if the subject of the pleasure is sufficiently involved in the object of the pleasure, and the object of the pleasure is occurring at the same time as the attitude. That is, you can't enjoy something that you're not directly acquainted with, and you can't enjoy something if it's not going on as you're enjoying it. Merely "taking pleasure" does not have either of these restrictions. But these conditions do not affect the fact that the basic attitude is the same in both cases.

⁵⁸ Feldman 2004, p. 55.

overwhelming urge to do battle, not now against our sensations, but against the world.⁵⁹

Drawing from the remarks of Perry, Feldman, and Korsgaard, we might formulate the attitudinal theory of pleasure (ATP) as follows:

1) A person, S, takes pleasure in P at t iff P is a proposition such that S bears the attitude of enjoyment (or, “taking pleasure in”) toward P at t.

2) A person, S, takes pain in P at t iff P is a proposition such that S bears the attitude of pain (or, “taking displeasure in”) toward P at t.

3) An experience, e, had by a person, S, is a pleasure (or is pleasant) at t iff S is experiencing e at t and S takes intrinsic attitudinal pleasure in the proposition that he is experiencing e at t.

4) An experience, e, had by a person, S, is a pain (or is painful, or unpleasant) at t iff S is experiencing e at t, and S takes intrinsic attitudinal pain in the proposition that he is experiencing e at t.

5) The intensity of the pleasantness of a pleasant experience, e, experienced by person S at t is a function of the intensity of S’s intrinsic attitudinal pleasure in P at t.

⁵⁹ Korsgaard 1996, pp. 147 – 148.

6) The intensity of the painfulness of a painful or unpleasant experience, e , experienced by person S at t is a function of the intensity of S 's intrinsic desire not to be experiencing e at t .

ATP is the theory that has items (1) through (6) as its components. According to it, the things that are capable of being pleasant in themselves are states of affairs. Some state of affairs is pleasant at a time if and only if some person bears the propositional attitude of enjoyment toward it at the time. A person is getting pleasure at a time if and only if he bears the attitude of enjoyment toward some state of affairs at that time. One pleasure is more pleasant than another at a time if and only if its subject's attitude of enjoyment is more intense or longer lasting than that of its competitor at that time.

ATP is not vulnerable to the heterogeneity problem. Although hedonic phenomena are fundamentally a matter of just a few propositional attitudes, the objects of those attitudes may be as varied as you wish. You might take pleasure in the sounds of a Bob Dylan record. Or you may take pleasure in the smells of a tulip farm. Or you take pleasure in the sensations of drunkenness. Or you may take pain in any of these phenomena. One's capacity for pleasure and pain are limited only by one's capacity to be aware of or consider propositions.

ATP is also not vulnerable to the problem of non-sensory pleasures. Although propositions that involve the relevant person experiencing some sensation at a time are often the objects of the attitude of enjoyment, they are far from the only ones. ATP is therefore compatible with the anesthesiologist taking pleasure in the fact that his anesthetic works, and then pain in the fact that it will not wear off. Again, one's capacity for pleasure and pain are limited only by one's capacity to consider or be aware of propositions.

ATP is also not vulnerable to the problems of undesired pleasures and of desired non-pleasures. Because ATP says that pleasure and desire are distinct attitudes that are not closely related, the theory is compatible with the dizziness researcher desiring the dizziness sensations without enjoying them; it is also compatible with the ascetic taking pain in his sensory pleasures: whenever the ascetic experiences a sensation that he enjoys, he takes pain in the fact that he is enjoying that sensation.

Finally, ATP is not vulnerable to the objection based on the case of the Thanksgiving dinner. Because there is no close conceptual relationship between pleasure and desire, I can continue to enjoy the casserole-related sensations even after I cease to desire those sensations. According to ATP, the attitudes relevant to my enjoyment of the casserole-related experiences are intrinsic, but are not counterfactual. The relevant attitudes are my actual attitudes of pleasure and pain. I may or may not have any actual or counterfactual intrinsic or extrinsic desires for the experiences.

7. Problems for the Propositional Attitude View

ATP is vulnerable to the oppositeness problem. According to ATP, the fact that pleasure and pain are opposites is explained by the fact that there are two relevant hedonic attitudes, *taking pleasure* and *taking pain*. The fact that *taking pleasure* and *taking pain* are opposites is not explained by the theory. It's part of the theory's conceptual bedrock. One could claim that taking pain in a proposition is somehow related to taking pleasure in its negation. I'm not sure how this would work, because, at least in a central range of cases, taking either hedonic attitude in some state of affairs involves believing that the state of affairs is true. This isn't always the case. For example, I can take pleasure in the fact that Cool Hand Luke managed to eat all fifty eggs in the allotted time without believing that any

such thing ever happened. However, this is not a significant criticism. I am inclined to suspect that, all things considered, the attitudinal view is the strongest of the three main theories of pleasure and pain, and it what follows, I will largely presuppose it. However, nothing I say will hinge on any of the details of the attitudinal view, and so neither will my conclusions regarding the quantitative nature of pleasure and pain.

CHAPTER III

THE METAPHYSICS OF QUANTITY AND COMPARISON

1. Introductory Remarks; Examples of Quantitative Phenomena

The following list is an example of what has been called “nominal” measurement:

46: Ellsbury.

15: Pedroia.

34: Ortiz.

24: Ramírez.

25: Lowell

7: Drew.

20: Youkilis.

33: Varitek.

23: Lugo.

In this example, the numbers are being used as identifying marks—the actual numerical value of each number is irrelevant for this purpose. Their order does not matter. Intervals are irrelevant—the distances between the numbers does not matter. The ratios between the numbers do not matter. The numbers here function in much the same way names do, which is why it is called a “nominal” scale. Other nominal-type scales include the

assignment of numbers to individuals based on their political or religious affiliation, or marital status, etc. This type of scale measures equality and difference—items receive the same number if they are the same with respect to the relevant property and receive different numbers if they are different. In the above example, a player receives number 46 if and only if he is Ellsbury. On another scale, a person might receive the number 1 if he is married, 2 if divorced, 3 if widowed, and so on.

The following two lists are examples of “ordinal” measurement:

2: Gypsum.

3: Calcite.

7: Quartz.

8: Topaz.

1: Alberto Contador.

2: Cadel Evans.

3: Levi Leipheimer.

4: Carlos Sastre.

5: Haimar Zubeldia.

6: Alejandro Valverde.

The first example consists of minerals according to their rank on the Mohs hardness scale.

This scale ranks minerals in order of hardness, as determined by which mineral can scratch

the other: if A scratches B, then $A > B$ on the scale. The second example consists of (the first several entries in) the overall final results of the 2007 Tour de France. This list ranks cyclists in order of their adjusted total accumulated time from least to greatest. If A had more adjusted total accumulated time than B, then $A > B$.

In these examples, the numbers are being used to express the order of the objects listed, with respect to some way of ranking them. In particular, nothing can be inferred from the “distances” between the numbers. The difference in hardness between quartz and topaz is much greater than that between gypsum and calcite, though the Mohs scale does not represent these facts. For all the information contained in the results as expressed above, the difference in adjusted accumulated time between first-place Contador and second-place Evans might be mere seconds, or hours. This ordering does entail that there is no person with an adjusted accumulated time between Contador and Evans. However, this is inessential; the Mohs scale does not share this feature. There might well be minerals in between e.g. gypsum and calcite with respect to hardness. The essential feature of the ordinal scale is that it ranks the relevant items in the relevant order. We could express the results of the Tour de France just as well substituting [4; 4.45; 5.1; 6; 271; 1,000] for [1; 2; 3; 4; 5; 6], since the new numbers preserve the order.

The following list is an example of “interval” measurement:

0: the temperature at which water freezes at sea level.

36: the temperature of a normal, healthy, living human body.

39: the temperature of the body of a normal, healthy, living house cat.

100: the temperature at which water boils at sea level.

These numbers are on the Celsius scale of temperature, according to which $A > B$ if and only if A has a higher temperature than B. This way of ranking temperatures—assigning numbers to them—makes use not only of the ordinal properties of the numbers, but also of the relative distances between them. That is, these numbers are to be thought of not just of spots on an order, but as endpoints of intervals. The temperature of the body of a house cat is three intervals higher than that of a human body; the boiling temperature of water is 64 intervals above that of a human body. The distance of each interval is constant up and down the scale. On this type of scale, the size of the unit and the location of the zero point are arbitrary, as is evidenced by the fact that the Fahrenheit scale conveys the same information equally well with a smaller unit and a different zero point.

Finally, the following list is an example of “ratio” measurement:

1: a paperclip.

5: an 8-by-10 sheet of paper.

200: a cup of flour.

484: an unopened box of Raisin Nut Bran.

In this example, the numbers are being used to rank the items according to their mass, according to which $A > B$ if and only if A has more mass than B. In addition to determining an order and constant intervals, the SI scale, which measures mass in grams, determines mass-ratios between objects, such that the paperclip has one fifth the mass of the sheet of paper and the sheet of paper has one fortieth the mass of the cup of flour. These ratios are possible because although the unit is arbitrary, the zero point is not—zero grams corresponds to no mass.

Each of these examples is an instance of quantitative comparison; that is, they are examples of the comparison on the basis of various quantities.⁶⁰ The topic of this chapter is the nature of quantities and the comparisons that are based on them. After a brief introduction in which I state my views and explain the vocabulary I will use to express them, I will present and explain my reasons for holding them.

In this chapter I will articulate and defend the view that quantities are determinable properties (or “families” in Swoyer’s parlance), which (according to Bigelow and Pargetter—there’s a dispute in the literature concerning how best to understand the relationship between determinates and determinables) are second-order properties—properties of properties. So, for example, *being a color* is a determinable property, because it is a feature of other individual properties, not of concrete objects. It is shared by redness and blueness. Redness (or, being a shade of red) is also a determinable property family, since UMass Maroon and Harvard Crimson are both red, by being particular shades of red. (So, at least sometimes, a determinate can be a determinable. Or, alternatively, some property names are ambiguous between determinate and determinable. Or, alternatively, some property names are shorthand for a range of related determinate properties.) On this view, an object has mass by having some particular determinate mass property; the property *having mass* is therefore a derivative property and is distinct from the determinable property *being a mass property*. The determinable property families that count as quantities are ones whose first-order determinate properties are related to each other in a manner such that they exhibit a structure homomorphic (i.e. identical in structure) in certain respects to the real number line. As we will see in section four, the degree of homomorphism determines which type of scale is most appropriate or best represents the structure of the quantity, and this, in turn,

⁶⁰ Not quite, actually. As we will see, nominal measurement is clearly not quantitative. There is controversy as to whether ordinal measurement is quantitative.

determines which types of mathematical or statistical operation can sensibly be applied to numbers representing the quantity. We will say that *quantity* is a determinable property whose instances exhibit this structure. When some determinable property (family) exhibits this structure, we will say it is *quantitative*.

Unfortunately, the term ‘quantity’ is somewhat ambiguous in actual usage. Although it can be used as a predicate to express the property of being quantitative, as in “mass is a quantity,” sometimes it is used as a noun to refer to a determinate property, as in “a quantity of mass,” or in “the gravitational attraction between an object and the earth depends upon the quantity of mass present.” This seems coherent, if a little unnatural, and seems to make reference to a specific determinate mass property.

We will assume a moderate platonic realism about properties, according to which properties are universals—multiply-instantiable entities wholly located at each of their instances—and that genuine similarity relations are explained by the sharing of a universal. I assume that properties are abundant. I assume that there are uninstantiated properties. (I will not assume that there are “levels” of reality, or that properties are “more real” than concrete objects, or that properties are “ontologically more basic” than concrete objects.)

What are the objects of quantitative comparison—the relata of the relations of quantitative comparison? This is more complicated. Sometimes people talk in a way that suggests that these relations hold between determinate properties. Stevens writes that, “there is a certain isomorphism between what we can do with the aspects of objects and the properties of the numeral series.”⁶¹ His use of the term ‘aspects’ here strongly suggests that he takes the objects of quantitative comparison to be properties of objects, not the objects themselves. For example, people will often talk in the following manner: 6 grams > 5 grams.

⁶¹ Stevens, p. 677.

Sometimes people talk as though the relata are the concrete objects that instantiate the properties, which leads them to say things such as, for some particular bowling ball and some particular basketball, ‘the bowling ball is greater than the basketball.’ But any such expression is incomplete, because it fails to specify, either explicitly or implicitly, a basis for comparison. Although bowling balls are typically greater in mass than basketballs, they also tend to be smaller in volume. The greater-than claim is true when interpreted as making reference to mass, but false when interpreted as making reference to volume.

So object-wise, quantitative comparison is a three-place relation holding between the two objects being compared and a determinable property that serves as the basis for the relevant comparison. But property-wise, quantitative comparison is just a two-place relation between two determinate properties within the relevant determinable, and any reference to the basis for comparison is redundant. The basis for comparison is determined by the fact that each determinate property is an element or instance of just one quantitative determinable property.

I will make use of both types of locution. When the objects of comparison are things that instantiate the relevant determinate properties, I will include a reference to the determinable property that serves as the basis for comparison—the “covering value,” in Ruth Chang’s parlance.⁶² When the objects of comparison are the determinate properties themselves, we will omit reference to the covering value, since it will be clear from the context what the basis for comparison is.

The properties of the real number line homomorphic to quantitative structure are a) ordinality (“sameness of order”), b) the presence of interval (“sameness of interval”), and c) the presence of ratios (“sameness of ratio”). These are the properties in virtue of which it is

⁶² See her “Introduction” in Chang 1997b.

particularly useful to use numbers to represent quantities.⁶³ Each of these properties is independent of its successors but dependent of its predecessors. Each of these properties corresponds to a type of scale: property (a) corresponds to the ordinal scale; properties (a) and (b) together correspond to the interval scale; all three are necessary to generate the structure of the ratio scale. This explains why numbers on an ordinal scale just carry information about ordering relationships, but not intervals or ratios; numbers on an interval scale carry information about ordering relationships and interval relationships, but not ratios; numbers on a ratio scale carry information about ordering relationships, interval relationships, and ratios.

Scales of measurement are ways of assigning numbers to represent quantitative structure. Each such scale is a function from “objects” to numbers. ‘Objects’ is in scare quotes because of the above-mentioned ambiguity in the literature: sometimes people seem to mean that a scale is a function from determinate properties to numbers, but sometimes they seem to mean that the function takes us from the bearers of those properties to numbers. So according to one way of speaking, the bowling ball gets a rating of 7kg, but on the other the bowling ball’s mass property is assigned a rating of 7kg. These are different but equivalent ways of talking—a bowling ball is 7 kg if and only if it is an instance of the property *being 7kg in mass*.

There can be more than one scale per quantity, but typically not more than one quantity per scale.⁶⁴ For example, the Celsius, Fahrenheit, and Kelvin scales are three distinct

⁶³ Although numbers are useful for the representation of sameness and difference, as in nominal scales, they are not *particularly* useful for that application. They are no more useful than non-numeric names.

⁶⁴ In baseball, there is a statistic called “on-base plus slugging,” or “OPS,” which is the sum of on-base percentage, which measures the frequency with which a batter reaches first base or farther without being responsible for an out, and slugging percentage, which measures the batter’s ability to hit for extra bases. To calculate a hitter’s OPS, determine his on-base and

scales for temperature. There are very few legitimate scales that simultaneously measure two independent quantities however, for the simple reason that when it makes sense to think that there exists a unique ordering relation satisfying the relevant formal constraints, it typically also makes sense to think that there exists a determinable property family that corresponds to and determines the order.

2. The Nature of Quantities

In an important book on the topic of measurement, Brian Ellis distinguishes between two types of property: qualities and quantities.⁶⁵ He claims that properties that have an “all-or-none” character are qualities, whereas properties that admit of degrees are quantities. Redness, for example, seems to be quantitative: it makes sense to claim that *fire engine red* is very red, or that *nantucket red* is red, but not as red as fire engine red. However, it is not always so easy. It is hard to say which degree-admitting property is instantiated by wine, for example, in virtue of which there is such-and-such an amount of it in some bottle. It seems that in some cases it is a substance itself, and not any particular property of the substance, that is the relevant quantity. Although this idea is tempting, I think it is ultimately incorrect. One preliminary suggestion might be that *volume* is the relevant property, but suppose that wine, like water, is subject to thermal expansion, in which it increases in volume with increases in temperature and shrinks with decreases in temperature. Although we can increase the volume of wine by heating it, we do not thereby make more wine—we

slugging percentages and then add them together. This means that, in effect, OPS is a scale that simultaneously measures two independent quantities: the frequency with which the hitter gets on base, and his ability to hit for power. That said, the meaningfulness of the statistic has been called into question for this very reason; rather than really measuring any one thing, it is just a “quick and dirty” way of collectively representing two very different aspects of offensive productivity in baseball.

⁶⁵ Ellis 1966, p. 24.

merely make the same amount of wine take up more space. So volume is not the relevant property. The relevant property, rather, is *mass*. An object's mass tells us how much matter it contains—that is, how much of it there is; how substantial it is—and mass is undeniably a property. And the fact that the wine's mass stays the same throughout the thermal expansions and contractions is what leads us to believe that the quantity of wine remains constant.

There are other quantitative properties that seem problematic. Since motion is relative, objects have velocity only with reference to some other objects with respect to which an appropriate frame of reference may be established.⁶⁶ However, it is not clear that velocity is particularly unusual in this regard. The property *tallness* comes in degrees, and a person's tallness makes reference to the average height of the relevant population—perhaps even to the person's gender. Five-foot-eleven is tall for an American woman, but not a Dutch man.

3. Operationalism

Herbert Dingle and P. W. Bridgman have advocated an “operationalist” theory of measurement, which is an extreme form of nominalism about quantities, and is based on an empiricist, positivist philosophical outlook.⁶⁷ Dingle questions the assumption that quantities exist independent of measurements, and proposes a view according to which measurement processes are conceptually and ontologically prior to the quantities they are alleged to be measurements of.⁶⁸ According to Dingle, we should begin with the specific operation of measurement and its result and define the quantity in terms of them. The result of each

⁶⁶ Ellis 1966, p. 24.

⁶⁷ See Dingle; Bridgman.

⁶⁸ Dingle, pp. 7 – 10.

operation should have its own quantity name. In the event that the results of certain operations are correlated to a high degree with one another, we may decide to give them a common quantity name, but this should be thought of as purely motivated by convenience, and not a tacit or explicit acknowledgement of any underlying property possessed by the relevant objects in themselves. The measurement operations are conceptually basic on Dingle's view, and the "quantities" are not inherent in the objects said to possess them.

He writes,

Instead of supposing a pre-existing 'property' which our operation measures, we should begin with the operation and its result and then, if we wish to speak of a property (which I do not think we shall do), define it in terms of that. The result of each operation should initially have its own name, and if we find that different operations yield approximately the same result, then we have made the empirical discovery that the quantities represented by the different names are approximately equal. It may then be convenient to give them a common name, but it would be understood that it was merely for convenience and that it had an empirical and not a logical foundation which further experience might cause us to modify.⁶⁹

In perhaps the most significant and thoroughgoing defense of realism about measurement, Chris Swoyer writes of operationalism that "[t]he idea here is that terms like 'intelligence', 'length', and 'temperature' do not stand for objective things in the world, but derive their meaning entirely from our measurement practices."⁷⁰ Dingle's argument in favor of his operationalist approach is two-pronged: on the one hand, the traditional view results in confusion and ambiguity; on the other, operationalism is simpler and more elegant than the traditional view.⁷¹ He writes that the view is "forced up on us if we wish to give the simplest description of what we do, and not weave a fairy tale around it."⁷² For example, suppose we employ a particular measurement procedure to a particular rod, AB, at a

⁶⁹ Dingle, p. 7.

⁷⁰ Swoyer, p. 236.

⁷¹ Dingle, pp. 8 – 9.

⁷² Dingle, p. 8.

particular time, and obtain a result of 3. Then suppose we employ the same procedure to the same rod, but this time obtain a different result, say, 4. “On the operational view,” Dingle writes, “what we have learnt is unambiguous. The length of the rod has changed, because ‘the length of the rod’ is the name we give to the result of performing that particular operation, and this result has changed from 3 to 4.”⁷³ Since the operation of measurement is conceptually prior to the quantity measured, and the rods “length” is not an intrinsic property of the object at all, but is rather just a name for the result of the particular measurement procedure we’re employing, operationalism clearly leaves room for just one understanding of the phenomenon: that the rod got longer.

Dingle goes on to say that “on the traditional view... we are in a dilemma, because we do not know which has changed, the rod measured or the standard unit; a change in the length of either would give the observed result.”⁷⁴ So, in addition to the fact that operationalism gives an unambiguous, unmysterious explanation of this sort of case, the traditional view results in confusion, since that view allows two possible but inconsistent interpretations of the data, with no way of determining which is the more correct (given the facts of the case). According to Dingle, we should therefore accept operationalism.

However, it seems to me that Dingle is wrong about this. The case, as Dingle has described it, is genuinely ambiguous. If all we know about the case is that a particular measurement procedure was performed on a particular rod at a particular time, yielding a result of “3”, and then the same procedure was performed on the same rod at a later time and that this measurement yielded a different, higher, result, nothing in particular follows.

⁷³ Dingle, pp. 8 – 9.

⁷⁴ Dingle, p. 9. Dingle goes on to consider a more complicated case concerning a standard length-measuring rod, a nebula in another galaxy, and whether certain observations would entail that the universe is expanding or that the standard is shrinking. This case is more complicated and does not improve upon the first case, described in the text, in a way that justifies introducing it here.

Perhaps the original rod got longer, but perhaps the measuring device got shorter, or perhaps the discrepancy is due to operator error. Furthermore, there are steps we could take in order to discover which it was. If repeated applications of the same procedure tended to produce the original result, “3”, and not the second result, “4”, this would support the hypothesis that the inconsistent result was due to operator error. If the measurement procedure tended to consistently overvalue the lengths of other objects whose lengths were known, this would tend to support the hypothesis that the measuring device itself had been altered. And if other, independent procedures for the measurement of length tended to produce a result of “4” when applied to the original rod AB, this would tend to support the hypothesis that the rod had elongated. But the fact that operationalism directly entails that the rod has elongated with respect to the quantity defined in terms of the particular measuring procedure (though not necessarily in terms of “related” procedures) is in fact a count against it. It is not a useful, simplifying consequence; it is, rather, deeply implausible and introduces unnecessary complexity.

Byerly and Lazara also take issue with Dingle’s form of operationalism. They argue that Dingle’s suggestion that we take each measurement procedure to define a logically and conceptually independent quantity is untenable. So, for example, according to operationalism, if we determine length using a yardstick then we are dealing with “yardstick length”; whereas if we determine length using optical triangulation then we are dealing with “optical length,” and there are no logical or conceptual relationships between the two quantities. Any similarities, including use of the word ‘length’ to describe both quantities is purely a matter of convenience and is not evidence that there is some property, *length*, such that there are at least two logically independent ways of measuring it.

Byerly and Lazara write that

the position remains untenable because of the proliferation of concepts it spawns. A fragmentation of the concepts of length, mass, temperature, etc., would defeat one of the principal aims of science, namely, attaining unified theories of wide scope. Consider, for example, a law such as Newton's second law in the simple form: $F = ma$. For the operationist, who entertains as many concepts of mass as there are significantly different procedures to measure mass, there are as many laws as there are kinds of mass, and each must be verified in its own right.⁷⁵

According to Byerly and Lazara, operationalism goes wrong in that it results in an unacceptable splintering of science and scientific concepts. Since one of the fundamental projects of science is the attempt to unify our understanding of the world, and since operationalism makes this impossible, operationalism is false. Similarly, Chris Swoyer writes,

The use of different procedures to measure what we take to be the same magnitude is not a practical contrivance to avoid more magnitudes—ruler length, sonar length, etc.—then we can keep straight. It plays an important methodological and epistemological role in science, enabling us to obtain a general and unified picture of nature that minimizes the number of unrelated, brute facts by displaying the same laws and causal mechanisms at work behind apparently unrelated phenomena.⁷⁶

The idea is that operationalism robs us of two things: an important explanatory power in cases where different techniques for measuring the same magnitude yield relevantly similar results, leaving us with what must be thought of, at best, as stable coincidences; and an explanatory chore when different techniques for measuring the same magnitude yield conflicting results. Operationalism says that there is nothing to explain, since there's no common quantity that both operations measure, but intuitively when we find ourselves in situations in which independent measurements agree, we take them to be mutually confirming, and we take conflicting measurements to be a sign that something has gone wrong in at least one of the procedures.

⁷⁵ Byerly and Lazara, p. 12.

⁷⁶ Swoyer, p. 238.

For example, suppose I am taking the internal temperature of a tenderloin on the grill using two devices: an electronic “instant-read” thermometer (which functions via a fuse, the element of which has different electrical resistances at different temperatures, and a computer that can accurately detect the electrical resistance of the fuse) and an old-fashioned meat thermometer (which functions via a metal spring that elongates when it heats up, turning an arrow relative to a dial face with calibrations drawn on it). If the two thermometers yield approximately similar results, we would take them to confirm each other, which only makes sense if the two operations measure the same quantity. And if the two thermometers yield inconsistent results, we take this to be a sign that one or the other device is broken or has malfunctioned, or that one or the other measurement was conducted improperly. Again, this only makes sense if there is a common magnitude that the two measurements are supposed to be measurements of.

4. Formalism

Ellis argues for a theory of measurement called “formalism,” according to which a scale of measurement is an interpretation or semantics of pure arithmetic. That is, measurement gives a way of interpreting numbers and the various mathematical functions that apply to them. This view is intended to provide a middle ground between the austere nominalism of Dingle and the less parsimonious realism of Byerly and Lazara, Mundy, and Swoyer. He writes that “arithmetic becomes applied by the recognition of similarities, and involves the substitution or use of arithmetical terms in place of terms designating physical objects or relationships.”⁷⁷

⁷⁷ Ellis 1966, p. 12.

According to Ellis, quantities have an essentially relational character. A property, Q, is quantitative if and only if for any two of its instances, A and B, either i) A is greater than B with respect to Q, ii) B is greater than A with respect to Q, or iii) A is equal to B with respect to Q.⁷⁸ He claims that these three relationships form an exhaustive group of mutually exclusive alternatives: if one holds, none of the others can in fact hold, but if one holds, it must be logically possible for the others to hold.⁷⁹ The slogan for the formalist view might be stated as “only relations; not properties” or “merely relations, not universals,” because according to formalism quantities are dependent for their existence upon the ordering relations they are constituted by. According to Ellis, then, quantitative properties make essential reference to other instances of the same quantity. Mass, for example, is quantitative in virtue of the fact that instances of mass can be arranged in a linear order from least to greatest on the basis of their massiveness. If this were not possible, for example, if there were only one massive object in the universe, mass would not be a quantity.

On Ellis’s view, the set of relationships is characteristic and constitutive of quantities. The relationships have primary ontological status.⁸⁰ A property is quantitative if and only if its instances enter into some particular set of these relationships, each particular set of which identifies a particular quantity. This set of relationships determines a linear ordering, because it is always possible to arrange the objects connected by them in a linear order so that the

⁷⁸ Ellis 1966, p. 25. This way of understanding quantitativeness, in terms of the Trichotomy Thesis, rules out the sort of “roughly equal” parity that Chang, Parfit, Griffin, and Raz argue for; according to this understanding, the Trichotomy Thesis is analytically true. Chang et al. attempt to argue (e.g. Chang 2002, pp. 661 – 4) that this would be a mistake, and that there is room for a fourth quantitatively comparative relation. Although I do not wish to beg the question against these philosophers, I do want to emphasize the intuitive pull of the Trichotomy Thesis. Perhaps we should think of Ellis as proposing a substantive theory of quantitativeness that includes the Trichotomy Thesis, while acknowledging that there is conceptual room for a competing theory that recognized four exhaustive and mutually exclusive relations of quantitative comparison.

⁷⁹ Ellis 1966, p. 26.

⁸⁰ Ellis 1992, p. 169.

actual relationships can be read off from their position in the order.⁸¹ Just as we think of the extension of a property as the set of its instances, we think of the extension of a quantity as an ordered set of its instances. Every relationship of quantitative equality is transitive, symmetrical, and reflexive. Quantitative inequality is non-transitive, symmetrical, and irreflexive. Greater-than and less-than relations are transitive, asymmetric, and irreflexive.⁸²

So, the existence of a quantity is logically dependent on the existence of a set of linear ordering relationships.⁸³

Q is a quantity =df Q admits of degrees; Q is inherent in its instances; Q has an essentially relational character in that for any two instances of Q, either one is greater than the other or they are equal with respect to Q; Q is logically dependent on the existence of a set of linear ordering relationships.

If there exists a quantity then a corresponding set of quantitative relationships exists, and an object is an instance of the relevant a quantity if and only if it enters into the relevant set of quantitative relationships.⁸⁴ This set of relationships is such that it is always possible to arrange the objects or property instances connected by them in a linear order, so that the actual relationships that they bear can be read off from their position in the order. (So the magnitudes of earthquakes, which are ranked on a nonlinear scale, satisfy the condition and related by a linear ordering relationship because it is possible to arrange them in a linear

⁸¹ A proponent of the “tetrachotomy theory” of quantitativity must deny this principle. And although this denial provides a certain flexibility concerning which substances and properties may count as quantities, the corresponding scales and units of measurements are limited in their usefulness and in the amount of information they may provide.

⁸² Ellis 1966, p. 26.

⁸³ Ellis 1966, p. 38.

⁸⁴ Ellis 1966, p. 26.

order, regardless of the fact that the units of the scale not proportional to one another in a linear way, since it is a logarithmic scale.)

A formal system, such as arithmetic, has the following characteristics:

- a) There is an initial set of undefined terms. These terms have meaning only in the sense that they play a role in the formal system.
- b) There are rules for combining or arranging the terms into well-formed formulae.
- c) There are initial formulae that are considered to be the axioms of the system.
- d) There are rules for the derivation of new formulae from the axioms.
- e) There are rules for determining when one formula contradicts or is inconsistent with another.⁸⁵

According to Ellis, the following rules constrain the applications of arithmetic that can be considered measurement:⁸⁶

- a) The application of arithmetic must be an interpretation of one or more formally defined classes of arithmetical propositions.
- b) The individual terms of a formula in the given class of formulae must have a fixed interpretation, so that the interpretation of a formula can be predicted from the interpretations of the terms it contains.
- c) Different terms should always be interpreted differently and same terms interpreted the same.

⁸⁵ Ellis 1966, p. 13. This last condition, (e), is not strictly a member of the set of conditions constitutive of a formal system; it is nevertheless necessary to include it because systems of arithmetic clearly do contain rules of contradiction and consistency.

⁸⁶ Ellis 1966, p. 15.

- d) Numerical terms should always be interpreted in the same way (for example, if the numeral 4 is interpreted as “a two-by-four four feet in length” then the numeral 7 should be interpreted as “a two-by-four seven feet in length.”
- e) The numerical terms should always be interpreted as the number of things in a group or as the measure of something in some respect.
- f) An interpreted formula is true if and only if its corresponding pure (that is, “unapplied”) formula is an arithmetical theorem.⁸⁷

When these conditions are met, there will be an isomorphism between various “pure” mathematical operations that are applicable to the numerals and various physical operations applicable to the individuals to which the numerals are assigned. So, for example, measuring electrical resistance in ohms gives us a way of interpreting, e.g., the numbers ‘3’ and ‘4’ as amounts of electrical resistance. It also gives us a way of interpreting the mathematical function denoted by ‘+’ as the splicing together of objects with the property of being resistant to electrical current to some degree. In this way, measuring electrical resistance in ohms gives us a way of interpreting ‘ $3 + 4 = 7$ ’ in terms of amounts of resistance and perfect splicing operations: splicing a wire with three ohms of resistance, end-to-end with a wire with four ohms of resistance yields a wire with seven ohms of resistance.⁸⁸

The conditions for the existence of a quantity are not identity conditions for quantities. There can be more than one set of linear ordering relationships for a quantity. It is the actual order that determines the identity of a quantity, not the ordering relationships. If two logically independent sets of ordering relationships always generate the same order

⁸⁷ Ellis attributes the distinction between pure and applied arithmetic to Plato, and to J. S. Mill. He does not cite any particular passages.

⁸⁸ Ellis 1966, pp. 14 – 5.

under the same conditions, then they are ordering relationships of the same quantity. For example, suppose I have two thermometers, each of which works perfectly, but such that one is calibrated on the Fahrenheit scale and the other is calibrated on the Celsius scale. The two thermometers are not logically dependent on one another and may generate different numbers at any given time (overlooking the special case of -40 degrees). But since the two thermometers would always generate the same order, we can infer that they measure the same quantity: temperature.

According to Ellis, this account of measurement has several virtues. For one, it explains the apparent incorrigibility of pure arithmetic while accounting for its usefulness in describing the physical world. For another, it explains why pure arithmetic is so useful: any given arithmetical formula can be interpreted in an enormous variety of ways, each of which is (possibly) true and interesting. Furthermore, these interpretations of arithmetic permit us to make testable predictions and thereby help us to further our understanding of the empirical world.⁸⁹ This last feature gives a certain amount of sense to the project of this dissertation. Our topic is to determine whether or not pleasure and pain are legitimate, measurable quantities. This is, at bottom, an attempt to discover whether or not, and to what degree, pleasure, pain and phenomena surrounding them are amenable to being interpreted as a semantics of arithmetic—to what degree do certain key arithmetical formulas make sense when interpreted as making reference to amounts of pleasure or pain. That is, which arithmetical and statistical operations can be sensibly applied to numbers that are interpreted as representing amounts of pleasure and pain?

⁸⁹ Ellis 1966, p. 16.

5. Problems for Ellis's Formalism

A preliminary problem with Ellis's view, mentioned by Ellis himself, is that one can generate a linear ordering of persons by height, and of persons by age, and that seems to be acceptable, but it is also possible to generate a linear ordering of persons by (height \times age), and that seems strange.⁹⁰ However, it is clear that we should not be bothered by this.

Believing in odd, disjunctive properties such as *being an atmosphere or a coffee drinker*, and in "Cambridge" properties, such as the property my computer has when I have brown hair are part of philosophical orthodoxy. That (height \times age) turns out to be a quantity isn't so strange in comparison, and should not be thought of as a serious problem for Ellis's view. The fact that it permits the construction of such quantities is, in fact, a virtue of the view; if it lacked the resources necessary for the construction of the quantity *bage*, it is unclear how it could permit the construction of such paradigmatically real quantities as *miles per hour* for speed, *miles per hour per hour* for acceleration, or *watts* for energy.⁹¹

Another problem for the formalist account of measurement is that arithmetic, even in its most pure form, is not a purely formal system. Criterion (a) is violated by the fact that arithmetical terms have meanings independent of their roles in the system. As Ellis says, "the numerical sequence is not a sequence of meaningless terms, or terms whose only meaning is given by the part they play in a formal system. We can be taught to use correctly such sentences as 'here are 7 apples' without knowing any formal arithmetic."⁹² This is undoubtedly correct: the fact that children often learn the rules of arithmetic by counting on

⁹⁰ Ellis 1966, p. 31.

⁹¹ Although I have used scale names as though they were the names of quantities, this use is innocent and should not be taken to indicate an identity between the quantity and the scale used to make measurements of it. In several instances, however, the scale name brings out the close relationship between the one quantity and its constituents.

⁹² Ellis 1966, p. 18.

their fingers—and understand the formal rules in terms of their empirical application—strongly suggests that arithmetical terms are not purely formal in their meanings. However, it is unclear just how damaging this fact is to the formalist position. Even if arithmetic is not a purely formal system, it is clearly at least semi-formal, as it satisfies criteria (b) through (e) for formality. The fact, if it's a fact, that it is impossible for us to consider arithmetical concepts apart from their various applications does not detract from its status as a formal system with rules for combining its terms into well-formed formulae; initial axioms; rules for deriving theorems from the axioms; rules for determining when one formula is inconsistent with another; and amenable to a variety of interpretations.

Forge considers and responds to several objections on Ellis's behalf. One objection concerns the fact that if, as Ellis suggests, the mere presence of an order were sufficient for the existence of a quantity, then there would exist far more quantities than we might have pre-theoretically supposed. Forge considers and rejects a response to this criticism according to which only those orderings that exhibit an extensive structure should be recognized as legitimate quantities. Although it is not perfectly clear what Forge has in mind, a standard picture of extensive magnitudes could be stated in the following manner:

Q is an extensive magnitude =df there exists a scale, S, for the measurement of Q and a concatenation relation that satisfy the following criteria:

a) $a \prec b$ iff $S(a) < S(b)$

b) $S(a \circ b)$ iff $S(a) + S(b)$ ⁹³

This is perhaps best explained in terms of an example. Length is an extensive magnitude because, roughly speaking, for any two lengths, there is an addition operation on them such that it makes sense to claim that the value of their combined lengths is identical to a third length. In general, quantities that are subject to this sort of summation, such as length, volume, and mass, are extensive; quantities that do not, such as temperature and density, are not. Forge rejects this proposal because there are several legitimate quantities that fail to exhibit extensive characteristics, such as temperature and density. Forge is clearly correct about this. Any attempt to restrict or confine quantitative phenomena to those quantities with an extensive structure is *ad hoc* and is subject to counterexample.

The response Forge endorses makes appeal to laws of nature. According to this response, laws of nature are correspondences between quantities, and only those orderings embedded in this network of correspondences should be recognized by the theory as defining legitimate quantities. That is, an ordering, O , is a quantity only if O is mentioned in some law of nature, L . As Armstrong puts it, “the orders that are quantities are constituted quantities by being embedded a systematic network of correlations and correspondences with other orders. These correlations are what we call laws of nature.”⁹⁴ So, for example, Newton’s Second Law says that force is equal to mass times acceleration. This lawlike relationship between these three quantities confers legitimacy on all three of the corresponding orderings. As Forge notes, it is these correlations that make measurement

⁹³ Krantz, et al. (1971), pp. 1 – 5, 71 – 135. ‘ \prec ’ should be interpreted as a physical or empirical “less than” relation, ‘ $<$ ’ as its numerical analogue, ‘ \circ ’ as a physical or empirical “concatenation” relation, and ‘ $+$ ’ as its numerical analogue. See also Mundy, pp 30 – 1 and Swoyer, p. 246.

⁹⁴ Armstrong 1987, p. 311. He does not endorse the point.

possible, and the fact that there exist effective measurement procedures is at the center of our justification for believing in quantities. According to this view, it is not just the relationships instances of a quantity have to one another that is constitutive of quantities, but the relationships quantities have to other quantities. This view has its roots in what has been called Alexander's Dictum, according to which there can be "no reality without causality."⁹⁵ This view also seems to tie quantities, by their nature, to measurement, though not in such a naïve or primitive manner as the operationalist.

However, it is unclear, on the face of it, why the presence or absence of a suitable law of nature should have such a profound effect on whether or not an ordering counts or functions as a quantity. Why should this network of relationships between various quantities be constitutive of quantitateness? Suppose, for example, that there was an ordering of objects or property instances, O_1 , that satisfied all the formal criteria for quantitateness, but which was causally isolated. Would we deny that O_1 represents a quantity based only on the purely extrinsic fact that it bears no causal relationships to other quantities? Such an ordering would be immeasurable and epistemically inaccessible to us, but these seem to be merely extrinsic features as well. Moreover, in a later article, Ellis himself points out that there are many quantitative concepts that occur in statements of laws of nature that clearly do not refer to real quantities, such as *distance from Pittsburgh*.⁹⁶ I propose that we should think of quantitateness as an intrinsic feature of an ordering: if the ordering in question satisfies the relevant formal constraints, it is a quantity; if not, not. The upshot of this, then, is that the orderings corresponding to "hage" and Social Security Numbers count as quantities.⁹⁷

⁹⁵ See Kim. This way of understanding the dictum presupposes that the laws of nature determine the counterfactual-supporting causal relationships that hold in a given world.

⁹⁶ Ellis 1987, p. 320.

⁹⁷ Perhaps the friend of formalism could object that the ordering corresponding to Social Security Numbers is arbitrary, and that this arbitrariness explains why there is no quantity

Another problem with Ellis's view, articulated by Forge, concerns the contention that quantities are essentially relational in character and that the relations between quantity instances are ontologically prior to the quantities themselves. The objection concerns a universe containing only one object, a round ball three feet in diameter, made of steel, colored yellow, and having a mass of five grams. Forge writes:

Give [the ball] the name c ... it would appear that c cannot possess quantities because there are no other objects in its universe with which it can stand in a [quantitative] relationship. There is no doubt that Ellis is right in that if x and y have q , then either they have the "same amount" of q or one has "more" q . Hence, if more than one object has q , then necessarily they stand in [quantitative relations]... No values can be assigned to c because there are no resources with which to set up and implement measurement procedures in c 's universe. So, as a matter of fact, 5 grams could not be assigned to c .⁹⁸

Because, according to Ellis, the existence of a quantity is essentially tied to the existence of a set of relations of quantitative comparison, if, as in the case of c , there are no other objects for c to stand in relation to then there can be no quantities. Armstrong argues that the trouble is deeper than Forge would have us believe. According to him, the fact that one thing is more massive than the other is not an arbitrary fact about where they fall with respect to some ordered class somewhere. An object has the mass it has because of its constitution and structure, and it is not clear that Ellis's theory contains the resources necessary to account for this fact.⁹⁹

One possible response would be to employ objects in non-actual possible worlds to stand in the appropriate relations of quantitative comparison to c . For example, although there are no 6-gram objects in c 's world, there might have been some, and these objects

associated with it. This response might seem to be more fruitful, but it raises the specter of natural class nominalism. For more about this view, see below.

⁹⁸ Forge 1987b, p. 296.

⁹⁹ Armstrong 1987, p. 312.

would have been more massive than c . It is possible that this solution would raise issues concerning how seriously we should take merely possible objects and uninstantiated properties, however, and may fly in the face of the nominalistic spirit in which Ellis's formalism was proposed. So it is not clear that Ellis could help himself to this solution.

To see the force of this objection, it is helpful to draw an analogy to c 's non-quantitative properties, such as its steeliness. The fact that there are no other steel objects in c 's universe causes no analogous problems with the claim that c is made of steel, so why should the fact that there are no other massive objects in c 's universe cause a problem with the claim that c has a mass of five grams? It shouldn't; even on the hypothesis that c is alone in its universe, there is no problem with the claim that c is an instance of the determinate property *being five grams in mass*. The problem is specifically with mass's status as a quantitative property—with its status as a determinable property family with a quantitative structure. This exposes a serious flaw in the formalist framework: mass is a determinable property family irrespective of its actual instances, and this structure—this relationship between mass in general and individual, particular masses—is important not just because actual objects have different masses, each of which is still its *mass*, but also because there are lots of merely possible facts about objects and their masses, and each of these facts is a fact about *mass*. Without acknowledging this quantitative structure, independent of but consistent with the actual facts about which objects have which mass in the actual world, we are forced, as Ellis is, into saying that mass is quantitative only because there are actual objects standing in various relations of quantitative comparison with respect to mass. But, of course, this is only possible because of the property *mass*'s quantitative structure, not the other way around.

Another interesting objection concerns the possibility that a quantity might have different extensions at different times. Take, for example, the ordered set that corresponds

to mass at a particular time, t . This set is the set of all massive objects at t ordered from least massive to most. But suppose that at t_1 , one of the objects breaks in half. If that happens, then the set of all the massive objects at t_1 is not identical the set of all massive objects at t , because sets have their members essentially. This is a problem for Ellis's view because he takes quantities to be defined by their extensions. So on Ellis's view, mass is one quantity at time t , and another, distinct quantity at t_1 . This is counterintuitive.

Forge attempts to solve this difficulty by appeal to sequences of ordered classes. In essence, we are to identify each quantity with an ordered set of ordered sets, one ordered set for each moment in time.¹⁰⁰ So long as each set in the sequence is connected to its predecessors and successors in the appropriate way, it will make sense to claim that the quantity remains identifiably the same from moment to moment. In typical cases, the make-up of successive sets from moment to moment will remain largely identical, for example. If no new objects are created and each existing object retains its precise mass over the interval t_1 to t_3 , then the ordered set corresponding to the extension of mass will not change over that interval. Even if there are some changes in the extension of mass over an interval, there is likely to be substantial overlap between the ordered set that corresponds to the extension of mass at t_1 and the set that corresponds to its extension at t_3 . Perhaps the difference is caused by some object breaking in two, or by two objects combining to form a larger composite object at t_2 . If either of those were the case, it would be clear how the successive ordered sets were related to one another, what justifies our thinking that the sets ought to be different, and why we should regard the sets as representing the same quantity at different times.

¹⁰⁰ Or, rather, one set for each moment t such that the extension of the quantity at t is not identical to its extension at the moment immediately preceding it.

However, it is not clear that this is completely innocent; it might be thought that this way of identifying sequences of ordered sets with quantities begs the question, because it makes implicit appeal to facts independent of the sets themselves to determine which set identifies a quantity at a time. This is a problem because Ellis does not endorse a “promiscuous” view of quantities, according to which there exists a quantity corresponding to every sequence of ordered sets. On the promiscuous view, the number of distinct quantitative properties is vast, but most of them are uninteresting to us. On Ellis’s view, however, there are not so many quantities, and each quantity that exists is of interest to us—as is evidenced by his reluctance to admit “hage” or the Social Security numerical order as legitimate quantities. But without reference to some feature, logically independent of the sequence of ordered sets itself, with reference to which we can identify the sequence that correctly identifies our quantity *mass*, it is unclear how a theory like Ellis’s has the necessary machinery to direct us to the correct sequence, unless the fact that one sequence and not another identifies mass is an unexplained brute fact according to the theory. This step brings formalism perilously close to what has been called “natural class” nominalism, which is out of step with the parsimonious general philosophical program accepted by the proponents of formalism.¹⁰¹

Another objection Forge considers is based on the possibility that there might be two distinct quantities that correspond to the same ordering. Forge doesn’t see this objection as being particularly serious, since he does not believe that there exist any two quantities that

¹⁰¹ Natural class nominalism is a view according to which sameness of type is explicable in terms of sameness of class, but since there are indefinitely many classes not all of which suffice to explain sameness of type, a primitive, unexplained distinction according to which some classes are more “natural” than others is evoked. The more natural the class, the greater the degree to which membership in the class is an explanation of genuine similarity. Several commentators have found the appeal to primitive naturalness to be unpalatable. See, for example, Armstrong 1978a, Armstrong 1987b, Armstrong 1989, and Lewis 1983.

place all the same objects in the same order, although he admits that such a coincidence is possible. For example, in a world where everything is made of copper tubing of a certain diameter, “mass, length, resistance, conductivity, specific heat, volume, and much else besides, would be the same.”¹⁰² However, Forge claims that the mere possibility of the copper-tubing world is no threat to *our* theory of quantities, because this theory concerns this world and need not concern itself with other worlds. Furthermore, since no intelligent beings could be composed only of copper tubing, the massive quantitative coincidence at that world would go unnoticed by its inhabitants. This leads Forge to conclude that the objection is inconsequential.¹⁰³

Forge appears not to appreciate the value of ensuring that our theory of quantitative comparison be as broad in scope as possible, and that the goings-on in the copper-tubing world are therefore of great consequence to any such theory. He also places far too much emphasis on the actual capacities and procedures of measurement. The fact that nobody at the copper tubing world would notice that the ordering associated with mass is identical to that associated with electrical resistance is of no consequence—the force of the objection is that although these orderings coincide at that world, the quantities themselves remain distinct. The actual capacity of any inhabitants of the copper-tubing world to take the actual measurements is irrelevant, since the objection is metaphysical in nature, not epistemological. The fact that the theory conflates the two quantities in the world in question is of significance, not the beliefs of the world’s inhabitants.

Furthermore, this failure to grasp the trans-world significance of the theory of quantities robs Forge of a plausible response: that although mass and electrical resistance coincide at the copper-tubing world, they nevertheless diverge in other possible worlds. The

¹⁰² Forge, p. 306.

¹⁰³ Forge, p. 306.

possibility of such divergence is what makes mass a different quantity from electrical resistance, even in worlds where they coincide, there is no metaphysical significance to the coincidence. It is, in every sense of the word, just a coincidence.

However, Forge and Ellis will not escape from this difficulty so easily, because there are, in fact, necessarily coextensive but distinct quantities. Just as triangularity and trilaterality are necessarily coextensive but distinct properties, n-angluarity and n-laterality with respect to closed regular polygons are necessarily coextensive but distinct, which Ellis's formalist view therefore conflates. This conflation represents a devastating defect in the formalist position. The ontology of the realist is necessary to solve the difficulty.

6. Realism About Quantities

Byerly and Lazara, Chris Swoyer, and Brent Mundy have advocated broadly “realist” theories of quantitative phenomena. According to them, the properties measured are conceptually prior to any procedures or techniques of measurement. There are real, mind-independent properties that are the objects of our measurements. This theory of quantitative phenomena is inspired by, consistent with, and draws much of its support from the now dominant set of realist theories about properties whose chief proponent has been D. M. Armstrong.¹⁰⁴ On this view, quantitative comparisons take place between determinate members of a determinable property family. Mass is an example of one such determinable property family; *1 gram* is a determinate member of that family; *1 kilogram* is another. In general, an object has mass by having some particular mass or other. An object may

¹⁰⁴ The classic work in this tradition is Armstrong's two-volume *Universals and Scientific Realism*, Armstrong 1978a and 1978b. Mundy, Swoyer, and the later Ellis all cite Armstrong's work as being a pivotal influence on their own commitments to realism. (Byerly and Lazara, of course, were writing prior to the appearance of the Armstrong volumes.) See Ellis 1987, pp. 322 – 23; Ellis 1992, pp. 168 – 70; Mundy, pp. 46 – 7; Swoyer, pp. 236 –46.

instantiate different determinate properties within a determinable family at different times, though it may not instantiate more than one such property at a time. A determinable property family, Q , is quantitative if and only if for any two determinate member properties, q_1 and q_2 , either q_1 is greater than q_2 with respect to Q , q_2 is greater than q_1 with respect to Q , or q_1 is equal to q_2 with respect to Q .¹⁰⁵ This set of relationships is characteristic of quantities and forms the theoretical basis for other quantitative concepts, such as comparability and commensurability. This set of relationships determines a linear ordering, because there always exists a linear ordering of the objects connected by them, so that the actual relationships can be read off from their position in the order.¹⁰⁶ So if some property is quantitative then its instances enter into some particular set of these relationships, each particular set of which identifies a particular quantity.¹⁰⁷ Just as we think of the extension of a property as the set of its instances, we think of the extension of a quantity as an ordered set of its instances.

Ellis, writing in 1987, articulates in an eloquent manner the main argument in support of this kind of view. He writes:

¹⁰⁵ Ellis, p. 25; Swoyer, p. 266. This way of understanding quantitativity, in terms of the Trichotomy Thesis, rules out the sort of “roughly equal” parity that Chang, Parfit, Griffin, and Raz argue for; according to this understanding, the Trichotomy Thesis analytically true. Chang attempts to argue (pp. 661 – 4) that this would be a mistake, and that there is room for a fourth quantitatively comparative relation. Although I do not wish to beg the question against Chang, et al., I do want to emphasize the intuitive pull of the Trichotomy Thesis. Perhaps we should think of Ellis, Krantz, et al. and Swoyer as proposing substantive theories of quantitativity that include the Trichotomy Thesis, while acknowledging that there is conceptual room for a competing theory that recognized four exhaustive and mutually exclusive relations of quantitative comparison.

¹⁰⁶ A proponent of the “tetrachotomy theory” of quantitativity must deny this thesis. Although this denial provides a certain flexibility concerning which substances and properties may count as quantities, the corresponding scales and units of measurements are limited in their usefulness and in the amount of information they may provide.

¹⁰⁷ Ellis makes this claim, but it is not clearly an essential element of the correct theory of quantities. If it is possible for there to be distinct but necessarily coextensive quantities, such as *n-angularity* and *n-laterality*, then this claim is false.

The main argument for [this kind of] realism is an argument from the best explanation. Scientific realists make the reasonable assumption that the best explanations we have of why things behave as they do are the accepted scientific ones. These explanations normally purport to refer to theoretical entities of some kinds. Therefore, they argue, it is at least the case that the world behaves *as if* things of these kinds existed. Yet the best explanation of why this should be so is that things like these *really do exist*... Now the most striking thing about the fundamental properties of nature is that they are nearly all quantitative. That is, they come in degrees. Therefore, any adequate ontology for science must recognize the fundamental existence of quantitative universals (i.e. universals like mass, charge, spin, color, flavor, strangeness, and so on) that may be variously instantiated.¹⁰⁸

Ellis goes on to point out that such properties as electromagnetic charge seem to be both quantitative and intrinsic to the things that have them (intrinsic because of their relative stability; quantitative because of their potential to be greater or less than they actually are), and concludes that “the main argument for scientific realism, thus, comes out decisively in favor of the existence of some intrinsic quantitative properties.”¹⁰⁹ Swoyer echoes this idea, claiming that realism about science and measurement requires us to avail ourselves of properties. He writes that

Writers like Feyerabend and Kuhn maintain that theoretical terms draw their meaning from the theories in which they occur, so that a change in a theory causes a shift in the meanings of all its constituent terms... The common, and I believe correct, realist response to such versions of semantic holism is to argue that the denotations of terms can remain constant through some changes in a theory and, indeed, that different theories may contain terms that denote the same thing. Since denotation is what determines truth value, one theory may make a claim about a given sort of thing, e.g. rest mass, which a competing theory denies... But this response cuts little ice unless there are things that the terms of a theory can have as denotations, and since most terms in theories are predicates and function symbols, the only very obvious candidates for their denotations are things like properties.¹¹⁰

¹⁰⁸ Ellis 1992, pp. 175 – 6.

¹⁰⁹ Ellis 1992, p. 176.

¹¹⁰ Swoyer, pp. 242 – 3.

So, on this view, the objects of measurement—quantitative properties—are seen as ontologically and conceptually prior to the techniques, procedures, and results of measurement. As Forge puts it, “realists of all persuasions will maintain, contrary to the operationalist, that order is discovered, not created, by the application of measurement procedures.”¹¹¹ Quantities are independent of our minds and our activities. This is the sense in which the view is “realism.” It is not a strictly Platonic realism, however. Plato believed that the forms are real, but he believed that reality comes in degrees and that the forms are more real than the concrete objects that are their instances.¹¹²

This idea has struck many critics as ontologically unparsimonious and backward. But a moderate realism, beginning with D. M. Armstrong’s *Universals and Scientific Realism*, has been the dominant viewpoint for several decades; as Mundy points out, the dominance of the positivist, nominalist viewpoint is an odd feature of the literature on measurement theory. He writes,

Indeed, even the name ‘theory of measurement’ replacing the older ‘theory of quantity’ suggests an empiricist, reductionist, or nominalist approach, focusing on the medium rather than the object of quantitative knowledge... It must be regarded as something of an anomaly that the theory of quantity has been studied almost exclusively from those viewpoints. The only exception known to me is an article of Byerly and Lazara, who observe that quantitative reasoning may equally well be interpreted from the contrary viewpoints of scientific realism as opposed to positivism and Platonism as opposed to nominalism, and who advocate such interpretations on philosophical grounds.¹¹³

Furthermore, Mundy points out that realism about quantities can be thought of as an *a posteriori* or naturalistic version of realism, since belief in the relevant universals and their second-order quantitative structure are supported by “reference to their observable

¹¹¹ Forge 1995, p. 595.

¹¹² Plato, *The Republic*, pp. 514a – 517c, 532b.

¹¹³ Mundy, p. 35.

consequences, using the hypothetico-deductive method of natural science. Such a view has been maintained by Armstrong concerning properties and relations, and by Quine concerning sets.”¹¹⁴ Mundy also suggests that rather than taking their appearance in statements of laws of nature to be constitutive of quantities, we should take laws of nature to be constituted by second-order relations between various quantities. So, in effect, laws of nature are defined in terms of quantities, not the other way around.¹¹⁵

Swoyer points out that realism plays an important role in the unity of science, noting that “the use of different procedures to measure what we take to be the same magnitude is not a practical contrivance to avoid more magnitudes... than we can keep straight.” Rather, it enables us “to obtain a general and unified picture of nature that minimizes the number of unrelated, brute facts by displaying the same laws and causal mechanisms at work behind apparently unrelated phenomena.”¹¹⁶ Swoyer thinks we have good reason to believe in properties and relations as genuine entities (that is, as multiply-instantiable universals¹¹⁷) because of their explanatory value, and that, furthermore, these particular kinds of properties—the quantitative kinds—play an important explanatory role that more ordinary properties and relations are not well-equipped to play.¹¹⁸

¹¹⁴ Mundy, p. 46. He cites Armstrong 1978a and 1978b, and Quine 1960. Although Mundy argues that realism is better supported empirically than is nominalism, it is possible that he has overstated his case.

¹¹⁵ Mundy, p. 48 – 9.

¹¹⁶ Swoyer, p. 238.

¹¹⁷ As it happens, all of the proponents of realism about quantities do so from the perspective of multiply-instantiable universals, so I will proceed in this dissertation as though that is what they are. However, many philosophers with realist tendencies have nevertheless found universals to be problematic or incoherent. This is not a serious problem for realism about quantities because it is possible to formulate a trope-theoretic version of realism about quantities.

¹¹⁸ This account of quantities in terms of properties is incomplete because it lacks an explanation of the quantitative structure of the properties—it fails to explain what it is about the quantities that is uniquely quantitative. I delay this discussion until the end of Chapter IV, following the discussion of measurement and scales. I hope that the reasons for this delay will become clear.

CHAPTER IV

MEASUREMENT AND NUMERICAL STRUCTURE

1. Measurement

In a landmark paper on the topic, S. S. Stevens argues that measurement is “the assignment of numerals to objects or events according to rules,” claiming that any rule will do.¹¹⁹ The assignment of numbers to individual baseball players is a kind of measurement according to Stevens, as is the assignment of numbers to temperatures, as per the Celsius scale. But according to Ellis, not just any rule (or set of rules) will work. For example, there might have been a rule in place according to which Paul Revere would climb into the tower of the Old North Church and hang a sign reading “2,” and according to which “2” should be interpreted as “The British are approaching tonight by land.” This assignment of a numeral to an event is a code, not a measurement.

The process of measurement, according to Ellis, is the process of assigning numbers to represent quantities;¹²⁰ a scale of measurement, according to Ellis, gives an interpretation or semantics to pure arithmetic.¹²¹ That is, measurement gives a way of interpreting numbers and the various mathematical functions that apply to them. So, for example, measuring electrical resistance in ohms gives us a way of interpreting, e.g., the numbers ‘3’ and ‘4’ as amounts of electrical resistance. It also gives us a way of interpreting the mathematical

¹¹⁹ Stevens, p. 677.

¹²⁰ Ellis 1966, p. 24.

¹²¹ Ellis 1966, p. 14. Ellis argues that a way of assigning numbers to objects must satisfy several conditions if it is to count as genuine measurement. The details of these conditions are not of paramount importance for our purposes.

function denoted by ‘+’ as the splicing together of objects with the property of being resistant to electrical current to some degree. In this way, measuring electrical resistance in ohms gives us a way of interpreting ‘ $3 + 4 = 7$ ’ in terms of amounts of resistance and perfect splicing operations: splicing a wire with three ohms of resistance, end-to-end with a wire with four ohms of resistance yields a wire with seven ohms of resistance.¹²² Ellis says that a linear scale is one in which the numerical assignments are proportional to the quantities themselves; a nonlinear scale is one in which the numerical assignments are not proportional to the quantities.¹²³

The fact that numbers can be assigned to objects in different ways and according to different sets of rules gives rise to different scales of measurement. A scale is way of ranking objects with respect to a quantity—a function from objects to numbers. Two scales, A and B, measure the same quantity if and only if scale A contains all and only the same items in the same order as scale B. Scale A is identical to scale B if and only if the assignment of numerals to objects according to scale A is identical to the assignment of numerals to objects according to scale B.¹²⁴ The controversy between operationalists and realists rears its head here. Proponents of these theories disagree concerning whether it is proper to regard scales as functions from objects to numerals, as I have said, or as functions from objects to numbers, as the operationalists say. According to operationalism, measurement operations are ontologically prior to the quantities measured. This leads them to regard the numbers that result from measurement operations as not representing the objects measured as they are independent of our activities, and this leads them to be cautious about taking the numbers at face value. See, for example, Dingle. I regard this caution as unwarranted,

¹²² Ellis 1966, pp. 14 – 5.

¹²³ Ellis 1966, p. 3.

¹²⁴ Ellis 1966, p. 38, Stevens, p. 677.

however, and regard the ontological cost as being worth the explanatory value of realism about quantities.

According to Krantz et al., measurement exploits an identity of structure—a homomorphism—between some empirical phenomenon and the real numbers.¹²⁵ They write that

The conclusion aimed for is not that a certain procedure is possible, but rather that a numerical function ϕ satisfying certain properties exists. The procedure to be used in assigning numbers (constructing ϕ) is not specified in posing the problem; thus, quite distinct axiomatizations, which operate through different procedures—say, counting units and solving inequalities—may be used.

The next step, a small but important one, recognizes that the numerical assignment ϕ , satisfying [certain conditions to be explained in subsequent sections], is a homomorphism of an empirical relational structure into a numerical relational structure...

From this standpoint, measurement may be regarded as the construction of homomorphisms (scales) from empirical relational structures of interest into numerical relational structures that are useful.¹²⁶

According to Krantz, et al., that is, a scale of measurement is a function from empirical phenomena to the real numbers that satisfies certain conditions. Which particular conditions must be satisfied is determined by the type of scale it is, as classified by Stevens's statistical method (which is discussed in detail below in 3.2). Measurement in this sense is possible because certain empirical phenomena—certain properties, that is—exhibit structure isomorphic to that of the real number line. Their idea is that there exist sets of empirical phenomena, \mathcal{A} , a binary ordering relation on \mathcal{A} , \succ , and a three-place concatenation relation on \mathcal{A} , \circ , holding among a , b , and c in \mathcal{A} , such that $(c = a \circ b)$, such that there is a function ϕ from $\langle \mathcal{A}, \succ, \circ \rangle$ to $\langle Re, >, + \rangle$, where Re is the set of real numbers, ' $>$ ' is the familiar relation of

¹²⁵ Krantz, et al. pp. 8 – 9.

¹²⁶ Krantz, et al. pp. 8 – 9.

greater than on the reals, and ‘+’ is the familiar relation of addition on the reals.¹²⁷ ϕ is a homomorphism because the relations $>$ and $+$ preserve the relational structure of $>$ and $+$.

Stevens seems to agree. He writes that

Scales are possible in the first place only because there is a certain isomorphism between what we can do with the aspects of objects and the properties of the numeral series. In dealing with the aspects of objects we invoke empirical operations for determining equality (classifying), for rank-ordering, and for determining when differences and when ratios between the aspects of objects are equal. ... The isomorphism between these properties of the numeral series and certain empirical operations which we perform with objects permits the use of the series as a model to represent aspects of the empirical world.¹²⁸

Stevens’s idea is that objects have certain “aspects,” or features, or properties that have a structure identical to corresponding structures and properties of the real numbers. This isomorphism allows us to use the real number line to represent “aspects of the empirical world.” And this amenability of some empirical phenomena to being modeled by numbers is what makes measurement possible and useful.

Swyer echoes this account of measurement. According to Swyer,

The *best explanation* why a mathematical theory applies to certain concrete phenomena—when it does—is that the theory involves some of the same structural features as the phenomena. On this account, when we establish a measurement scale, for example one for measuring lengths in meters, we set up a *correspondence* between the lengths of objects and the positive real numbers. Each length is paired with a corresponding *numerical counterpart* or *representative*... and fundamental qualitative relational properties of lengths like *being longer than* are correlated with *corresponding numerical relations* like $>$. Roughly speaking, we can say that the representing numerical system has the same structure as a set of objects of varying lengths if certain concrete objects stand in the corresponding numerical relation; for example, it might be that the number representing object *a* is less than the number representing *b* just in case *a* is shorter than *b*.¹²⁹

¹²⁷ Krantz, et al., p. 8.

¹²⁸ Stevens, p. 677.

¹²⁹ Swyer, pp. 247 – 8.

Swoyer goes on to claim that the key fact is that some empirical phenomena have structure isomorphic to that of the real numbers, not that there exist operations that reveal this structure.¹³⁰ Ellis disagrees; his account of measurement ties the existence of scales to the availability of measurement procedures that generate the desired numbers.¹³¹ However, it is clear that this is unnecessary. We might have a merely hypothetical scale, in the absence of a practical way to take measurements, but this is impossible according to Ellis's view. The crucial factor is the existence of a function from objects or determinate properties to numbers meeting the relevant formal constraints. That there should be properties and relations like this is an interesting and substantive claim about the world, and is best understood in terms of a scientific realism, not a nominalistic or operationalistic metaphysical framework.

2. Scales of Measurement

As we just saw, the fact that numbers can be assigned to objects in different ways and according to different sets of rules leads to different scales of measurement.¹³² As we saw in the previous section, a scale is way of ranking objects with respect to a quantity—a function from objects to numbers. Although Stevens claims that measurement is simply the assignment of numbers to objects according to rules, Ellis points out that there must be some restrictions on which rules are admissible. These restrictions are necessary to guarantee that the numerical assignments carry information—the point of measurement, after all, is to use numbers to represent facts about the world.¹³³ Two scales measure the same quantity if

¹³⁰ Swoyer, p. 251.

¹³¹ Ellis 1966, p. 43.

¹³² See Campbell, Ellis 1966, Krantz, et al., Mundy, Swoyer, and Stevens.

¹³³ Ellis 1966, pp. 39 – 40. More to come in this and the following section about what this means and how it is accomplished.

and only if scale A contains all and only the same items in the same order as scale B, where the objects of measurement are conceived as being determinate properties, not the objects that instantiate them—otherwise n-angularity and n-laterality for regular polygons would end up being identical quantities. Scale A is identical to scale B if and only if the assignment of numerals to objects according to scale A is identical to the assignment of numerals to objects according to scale B.¹³⁴

Any complete description of quantitative phenomena makes ineliminable reference to a set of relations of quantitative comparison, and the process of measurement is the process of assigning numbers to represent quantities.¹³⁵ The idea here is that since scales are functions from objects (or properties) to numbers, if any two scales, A and B, are such that A assigns all the same objects (or properties) to all the same numbers as B, then A and B are identical. Since every measurement must be made on some scale, if we have a rule for making numerical assignments, we have a scale of measurement, since each such rule defines a function from a set of objects to the real numbers.¹³⁶ To have a scale is just to have such a function.

This has some interesting consequences. According to Ellis, it is possible to discover and identify a quantity without also discovering a means of measuring it.¹³⁷ But apparently you do need a means of measuring the quantity to have a scale, and if the means of measuring is limited, so is the scale. For example, it used to be the case that our procedures for measuring temperature were unable to measure down to absolute zero. When that was the case, there were some objects in the temperature ordering that we couldn't actually go out and measure. Those objects were not on the Fahrenheit scale at that time, then.

¹³⁴ Ellis 1966, p. 38, Stevens, p. 677.

¹³⁵ Ellis 1966, p. 24.

¹³⁶ Ellis 1966, p. 39.

¹³⁷ Ellis 1966, p. 37.

Ellis questions whether this view is really true. His counterexample involves several items on his desk: a child's toy tractor, a coffee cup, an ink bottle, and a packet of cigarettes. He assigns them numbers according to some rule, and the numbers are 2, 2, 2, 3. He doubts whether he's measured the objects. He seems to be correct about this, because this assignment of numbers does not represent an isomorphism between empirical phenomena and the structure of the real number line. Although there technically exists a rule that describes his application of the numbers to the relevant objects—"apply '2' to the toy, the coffee cup, and the ink bottle; apply '3' to the pack of cigarettes"—he nevertheless applies the numbers in an arbitrary manner, and there is no structure being represented as homomorphic to that of the number line. The numbers are not being used to sort, categorize, or even name the objects. So although Ellis's counterexample may show that Stevens's account is naïve and inadequate, it does not present a genuine difficulty for the richer, function-based theory of scales proposed by Krantz, et al.

2.1. Types of Scales: Stevens's Statistical Classification

As we have seen, a scale of measurement is a function from objects to real numbers, and the point of this is that it provides a way of ranking items in order with respect to their relative places in the relevant set of quantitative relationships while representing certain structural features of the ordering. Different types of scales have different properties; some types of scale have more restrictions on the acceptability of the ordering, and therefore carry more information than others. According to Stevens,¹³⁸ the different types of scales are defined by the statistical or mathematical operations that leave the scale form-invariant. That is, by which mathematical operations do not alter the relevant properties of the relationships

¹³⁸ Stevens, p. 678.

that hold between the items ranked on it. This also determines the amount of information yielded by the ordering. Ellis calls this type of classification of scales “mathematical.”¹³⁹

The weakest type of scale considered by Stevens is the nominal scale. This scale imposes the fewest restrictions on the way the numbers can be assigned. The basic operation of this type of scale is determination of equality or inequality. On this type of scale the numbers function as names for objects—this way of ranking objects is homomorphic to none of the relational features of the real number line. Ellis writes that “even the numbering of football players is a rudimentary form of measurement. The rule is that each player in a given team must be assigned one and only one numeral, but no two players may be assigned the same numeral.”¹⁴⁰ A scale which assigned ‘1’ to Democrats, ‘2’ to Republicans, and ‘3’ to independents would satisfy the requirements for being a nominal scale, as well. The nominal scale measures sameness and difference, and nothing else. The numbers on such a scale carry no information about whether something is bigger, smaller, better, worse, greater or less than anything else. Measurability on a nominal scale is consistent with the relevant set of objects being unordered; with there being no greater than, less than, or equality relations among the objects measured.¹⁴¹ This strongly suggests that if nominal measurement is the highest level of measurement some determinable property is subject to, then that determinable property does not exhibit a quantitative structure.

The next type of scale in Stevens’s classification is the ordinal scale, which is much richer than the nominal. This type of scale carries information about the *greater than*, *less than*, or *equal to* relations with respect to the relevant quantity. The objects ranked by this type of

¹³⁹ Stevens’s presentation of this material, though seminal, is both brief and undetailed. Ellis devotes considerably more space to Stevens’s ideas, and Krantz, et al. contains an extremely rich and thorough discussion of this material.

¹⁴⁰ Ellis 1966, p. 59.

¹⁴¹ Although there is a clear sense in which Democrats are “better” than Republicans, this fact is not contained in or represented by this way of measuring political alliances.

scale are ranked in order. As Ellis says, “the numerals not only serve as distinguishing marks, they indicate an order.”¹⁴² A paradigm example of this type of scale cited by Stevens and Ellis is Mohs’ scale of the hardness of minerals as determined by which mineral scratches which. If mineral A scratches mineral B, then A is harder than B.¹⁴³ That scale ranks the hardness of minerals in order from softest to hardest, such that if minerals are arranged in order of their hardness, they are also arranged in order of the numbers assigned by the scale. However, it is not the case that numbers on the Mohs scale are “equally spaced.” For example, on that scale quartz ranks 7 and topaz 8, separated by one unit, and corundum ranks 9 and diamond 10, also separated by one unit. However, it is not the case that the interval between 7 and 8 is identical in magnitude to the interval between 9 and 10—topaz is two times harder than quartz, while diamond is 3.75 times harder than corundum. The defining characteristic of scales of this type is that they may be transformed by any order-preserving function, that is, any monotonic increasing¹⁴⁴ function, without loss or distortion of information.

Mathematical operations for discovering the median make sense when applied to ordinal measurements, because the median simply forms the border between the upper and lower halves of the relevant sample. Although it is important for this purpose to know the correct ordering of the sample, since this is necessary to establish which half is which, information about intervals is not important. Procedures for finding the arithmetic mean and standard deviation yield nonsensical results when applied to measurements on an ordinal scale, because each of these procedures relies on the interval properties of numbers. This can be seen by reflecting on the fact that the arithmetic mean of a sample can be drastically

¹⁴² Ellis 1966, pp. 59 – 60.

¹⁴³ Ellis 1966, p. 59, and Stevens, p. 679.

¹⁴⁴ A monotonic increasing function is simply an order-preserving function. A monotonic *decreasing* function reverses the order. See Krantz et al. vol. 1.

affected by outlying, atypical members of the sample, and the standard deviation tells us what the typical interval between a random element of the sample and the arithmetic mean will be.

There is a difference of opinion between Stevens and Ellis concerning whether ordinal measurement is sufficient for quantitativity. According to Ellis, a property must meet the conditions for measurability on an ordinal scale to count as a quantity.¹⁴⁵ According to Stevens, a property must be measurable on an interval scale to count as a quantity. He writes that “[w]ith the interval scale we come to a form that is “quantitative” in the ordinary sense of the word.”¹⁴⁶ I suspect that Stevens’s is the more intuitive conception, since quantities are things that come in amounts of some kind, and the mere presence of an order is not sufficient.

The next type of scale discussed by Stevens is the interval scale. The relative positions on this type of scale contain information about the relative sizes of intervals or of differences; interval scales tell us about the relative sizes of the items ranked on them.¹⁴⁷ The objects ranked by this type of scale are ranked in order and the units of the scale are equal (or proportional somehow) to one another in size—numbers on an interval scale represent endpoints of intervals, not just spots in an order. The unit—the size of the interval—and the zero point are each arbitrary on an interval scale. An example of this type of scale is the Celsius scale of temperature: although the zero point on the scale is arbitrary, each successive point on the scale is warmer than the next, and a difference of one unit near the “bottom” of the scale is equal in size to a difference of one unit near the “top.” This type of scale tells us not only whether A is warmer than B, for example, it also tells us how much warmer. The

¹⁴⁵ Ellis 1966, p. 25 – 32.

¹⁴⁶ Stevens, p. 679.

¹⁴⁷ Stevens, pp. 678-9.

Gregorian calendar is also an interval scale. Its units are of equal size, and it has an arbitrary zero point.¹⁴⁸ Almost all statistical operations are applicable to this type of scale, unless the operation implies the existence of a non-arbitrary zero point. This type of scale supports the use of arithmetic mean functions, standard deviations, rank-order correlations, and product-moment correlations.¹⁴⁹ The defining characteristic of scales of this type is that they may be transformed by any interval-preserving transformation; that is, by any transformation of the form $y = mx + b$ —any linear transformation.

There is a slight complication here concerning linear interval scales and logarithmic scales. An interval scale is linear if the intervals are equal in size; a nonlinear interval scale is one in which the numerical assignments are not equal in size. Logarithmic scales, such as the Richter scale of earthquake magnitude, are nonlinear, because, in the case of the Richter scale, each interval is smaller than the one that comes after it. So, for example, an earthquake of magnitude 5 on the Richter scale releases 33.6 times the energy of an earthquake of magnitude 4, but a magnitude 6 earthquake releases 1,000 times the energy of a magnitude 4 earthquake. Although there are intervals on such a scale, the intervals are not equal in size. Differences of interval on a logarithmic scales do carry information about the relative size of the interval, but the intervals are not equal in size to one another. Logarithmic scales are useful principally in applications in which proportionally very large or very small values must be represented.

Because of the existence of useful logarithmic scales, Ellis does not agree that this criterion of sameness of interval is important.¹⁵⁰ But although the units of a logarithmic scale are not equal in size, they are unequal in a systematic way. For example, although the Richter

¹⁴⁸ Periods of time can be measured on a ratio scale, however.

¹⁴⁹ Stevens, p. 678.

¹⁵⁰ Ellis 1966, p. 60 – 2.

scale is not a linear interval scale, does give us information about how much greater in magnitude a 7.5 earthquake is than a 6.5 earthquake. Using the ranking provided by the Richter scale we could determine the average magnitude of earthquakes. So although the *sameness* of intervals may not be of particular importance, the presence of intervals is. Furthermore, interval scales that represent intervals as being the same are often far more useful than those that do not.

If interval measurement is possible, then equations of the following forms can be true, where the variables stand for number assignments made on the relevant scale, and where (i), (ii), and (iii) represent a mutually exclusive and exhaustive set of possibilities (again, assuming the equal spacing of a linear interval scale):

$$\text{i) } |A - B| > |C - D|$$

$$\text{ii) } |A - B| < |C - D|$$

$$\text{iii) } |A - B| = |C - D|$$

This is because the absolute value of the result of subtracting B from A is identical the interval between them; it is determined by the distance or space between the two points on the scale. As long as the relevant variables represent numbers from the same interval scale, it the above equations will yield meaningful results.

But if the numbers in the equation are on an ordinal scale, subtraction equations such as the ones contained in (i), (ii), and (iii) will not yield coherent results. For example, the result of a race, in which each racer is assigned a number representing the order of his finish, is an example of a merely ordinal scale. The “units” of a race result are just spots in the order. They don’t represent intervals, so one cannot meaningfully subtract numbers

representing spots in finishing order from one another and compare the results, so there are no genuine intervals on the scale. A mapping of the variables of the above equation onto spots in a race-finishing order yields nonsense:

$$\text{a) } | 2^{\text{nd}} - 1^{\text{st}} | = | 4^{\text{th}} - 3^{\text{rd}} |$$

It doesn't make sense to subtract numbers representing positions in an order from one another and compare the magnitudes of the results, since the results do not represent true intervals. "Second place minus first place" is not equal (or equivalent) to fifth place minus fourth place.¹⁵¹ It does, however, make sense to subtract numbers representing intervals from one another and then to compare the magnitudes of the results.

Another example of a purely ordinal scale is the scale that measures degrees of consanguinity. x is a cousin of y if and only if x and y share a common ancestor, but neither is a descendant of the other. The ordinal degree of the cousinhood relationships is derived from the smallest number of generations separating the cousins from their common ancestor. So if my grandparents are your grandparents, then we're first cousins. And if my grandparents are your great-grandparents (and I'm not your dad), then we're first cousins, once removed. And if my great-grandparents are your great grandparents (and we're not first cousins), then we're second cousins.¹⁵² But again, it does not make sense to add or subtract

¹⁵¹ This should not be confused with what happens when a first-place finisher is disqualified on a doping violation. Second, moved up one spot, is first. Moving up one spot is not the same thing as subtracting the first position from the second.

¹⁵² Although we do not use the term in this way, this definition of 'cousin' entails that my brother and I are cousins. There is some historical antecedent for this use, although it has been completely replaced by other, more precise terminology. Presumably siblings would count as zero-level cousins.

degrees of consanguinity from one another. Equations like (i) are nonsensical when the ordinal numbers are interpreted as degrees of consanguinity.

The Celsius scale of temperature is an example of a genuine interval scale. A mapping of the variables in the above equation onto numbers representing degrees Celsius is well-formed:

$$\text{b) } |34^{\circ} - 33^{\circ}| = |44^{\circ} - 43^{\circ}|$$

$$\text{c) } |30^{\circ} - 20^{\circ}| > |30^{\circ} - 25^{\circ}|$$

The result of the left-hand side of equation (b) is 1 degree; subtracting the interval whose endpoint is 33 from the interval whose endpoint is 34 yields an interval equivalent to the interval whose endpoint is 1, as does subtracting the interval whose endpoint is 43 from the interval whose endpoint is 44. On the Celsius scale of temperature, one degree is equal to one degree. The result of the left-hand side of equation (c) is ten degrees. The right hand side has a different result: five degrees. Equation (c) says that the difference between thirty degrees and twenty is greater than the difference between thirty and twenty-five. This sort of manipulation is possible if the scale in question is an interval scale, and is the defining characteristic of this type of scale. Among the statistical operations applicable to numbers on an interval scale are the arithmetic mean, the standard deviation, and various types of correlation.

The strongest type of scale discussed by Stevens is the ratio scale. This type of scale imposes the largest set of restrictions on the way the numbers can be assigned to the objects ranked. The objects ranked on a ratio scale are ranked in order, the units represent genuine

intervals, and there is a non-arbitrary, natural, or “true” zero point. Scales of this form are therefore homomorphic to the real number line in every important way. The basic operation of this type of scale is the determination of equality of ratios, and the defining characteristic of scales of this type is that they may be transformed by any ratio-preserving transformation—any transformation of the form $y = mx$. Stevens claims that the scales for mass, absolute temperature, and length, among others, are ratio scales.¹⁵³ Swoyer elaborates, writing that “Length can be measured on a ratio scale, and this means that once a unit (e.g. the meter) is conventionally selected, there will be an objective fact as to how many meters long any given object is (since this will just be a fact about the ratio of its length to that of the meter bar).”¹⁵⁴ Ellis disagrees; he argues that these scales are at best logarithmic interval scales, and at worst ordinal scales.¹⁵⁵

All types of statistical operations are applicable to this type of scale. So something is measurable on a ratio scale if it is a quantity; the objects ranked (whatever they are) are of determinate size; when one item is greater than or less than another item with respect to the quantity, it is greater than or less than by some determinate amount; and there is a natural, non-arbitrary zero point.¹⁵⁶

2.2. Theory of Measurement

How are scales for quantities related to the quantities themselves? According to Krantz, et al., measurement begins with the recognition of the existence of an empirical ordering relation. This relation, which we symbolize using ‘ \succsim ’, is an ordering on a non-numerical set, A , and is isomorphic to the ordering relation expressed by ‘ \geq ’ on the real

¹⁵³Stevens, pp. 679 – 80.

¹⁵⁴Swoyer, p. 237.

¹⁵⁵Ellis 1966, p. 61.

¹⁵⁶Ellis 1966, pp. 61-2.

numbers. We should think of A as being the set of all determinates of a particular determinable Q , and when there exists an ordering relation \succeq on A , then Q is a quantity. A is ordered by \succeq if and only if for any not necessarily distinct elements of A , a and b , either $a \succeq b$ or $b \succeq a$. We can define an equality relation on A , ' \sim ', in the following manner: $a \sim b$ if and only if $a \succeq b$ and $b \succeq a$.¹⁵⁷ So, for example, let Q be the determinable property *mass*, and let A be the set of all determinate mass properties. \succeq is an order on the set of determinate mass properties if and only if for any determinate mass properties q_1 and q_2 , either $q_1 \succeq q_2$ or $q_2 \succeq q_1$. And if that is the case, then mass is a quantity.

On this kind of picture, a scale for a quantity, ϕ , is a function from A to the set of real numbers such that $\phi(a) \geq \phi(b)$ if and only if $a \succeq b$. We also say that $\phi(a) = \phi(b)$ if and only if $\phi(a) \geq \phi(b)$ and $\phi(b) \geq \phi(a)$, and it follows that $\phi(a) = \phi(b)$ if and only if $a \succeq b$ and $b \succeq a$. The degree of isomorphism between set A and the set of real numbers depends on the characteristics of ϕ . If ϕ is a nominal scale, then it preserves only sameness and difference and is isomorphic to the set of the reals only in that each real number is identical to itself and no distinct real numbers are identical to each other. If ϕ is an ordinal scale, then A is isomorphic to the set of the reals at least in that each element of A has either a predecessor, or a successor, or both. if that's the case, then all monotonic increasing transformations $\phi \rightarrow \psi$ are permissible and leave the scale form-invariant, since any such transformation is order preserving. If ϕ is an interval scale, then A is isomorphic the set of the reals in that it contains intervals and it makes sense to think of the elements of A as being "equally

¹⁵⁷ Krantz, et al. pp 1 – 21.

spaced.” In this case, the unit of ϕ is arbitrary, as is its origin—its zero point.¹⁵⁸ And if that’s the case, then all transformations $\phi \rightarrow \psi$ of the form $\psi = m\phi + b$ are permissible and leave the scale form-invariant, since these transformations are interval preserving.¹⁵⁹ Finally, if ϕ is a ratio scale, then although its unit may be arbitrary, its zero-point is not. If this is the case, then A is isomorphic to the set of the reals in the strongest possible sense: in addition to sameness and difference, the presence of an order, and the existence of intervals, there exist ratios between its elements. And if that’s the case, all transformations $\phi \rightarrow \psi$ of the form $\psi = m\phi$ are permissible and leave the scale form-invariant, this type of transformation is ratio preserving.¹⁶⁰

A scale of measurement, ϕ , represents a way of assigning numbers to determinate properties; it is a function that assigns a number to each determinate property of the relevant determinable. This is useful when the determinable is a quantity because if that’s the case, then the determinates are related to one another in a way that is isomorphic to the relationships between the numbers themselves. In the case of the SI (or “gram”) scale for mass, for example, the numerical assignments might be made in the following way: choose an arbitrary unit—some exemplar of the determinate mass property that will serve as the basis for comparison—and use an equal-arm balance to determine how many copies of the arbitrary unit balanced against the item being weighed cause the arm to remain level.¹⁶¹ So if

¹⁵⁸ Krantz, et al. p. 10.

¹⁵⁹ Krantz, et al. p. 11; Stevens p. 679.

¹⁶⁰ Krantz, et al. pp. 11 – 12; Stevens p. 679.

¹⁶¹ There are, of course, practical problems with this procedure. For one thing, there is a limit to the number of grams any practically-sized balance may hold. For another thing, friction between the arm and the fulcrum causes the measurements to be imprecise in a way that can be minimized but not eliminated. Krantz, et al. point out that for this reason the relation expressed by ‘ \sim ’ is not necessarily transitive—there exists an a , b , and c such that $a \sim b$, and $b \sim c$, but it is not the case that $a \sim c$. It is unclear how severe this problem is; in a central range of cases, it is plausible to regard this phenomenon as a practical difficulty stemming

an object x is placed in one pan of an equal-arm balance, the arm of the balance is level, and there are n copies of the arbitrary gram standard in the balance's other pan, then x is assigned a mass n in grams. This procedure, while crude, satisfies the criteria necessary and sufficient for being a scale of measurement. For example, where ' \succeq ' is the ordering on the set A of mass properties from greatest mass to least, $a \succeq b$ if and only if a 's weight in grams is at least that of b (that is, if $\phi(a) \geq \phi(b)$); $b \succeq a$ if and only if b 's weight in grams is at least that of a (that is, if $\phi(b) \geq \phi(a)$); $a \succeq b$ and $b \succeq a$ if and only if a 's weight in grams is equal to that of b (that is, if $\phi(a) = \phi(b)$).

from imperfections in the procedures and technology that produce the numerical assignments, and does not reflect any in-principle trouble with those assignments.

CHAPTER V

IN DEFENSE OF THE TRICHOTOMY THESIS

1. Introductory Remarks

According to a standard picture, there is an exhaustive set of three mutually exclusive relations of quantitative comparison: *greater than*, *less than*, and *equal to*. This picture has been called the Trichotomy Thesis, and although it is intuitive and plausible, it has been called into question by such philosophers as Derek Parfit, James Griffin, Joseph Raz, and Ruth Chang. Chang's discussion is particularly rich, for she proposes and provides a detailed account of a possible fourth relation that, she argues, provides a satisfying explanation of hard cases of comparison. In this paper, I will examine a version of the main argument against the Trichotomy Thesis, and attempt to show that it is unsound.

2. A Series of Cases

The idea that there is an exhaustive trichotomy of mutually exclusive quantitative relationships has been called the "Trichotomy Thesis,"¹⁶² and is a piece of philosophical orthodoxy. It is assumed by all the major writers on the topic of measurement,¹⁶³ decision and game theory,¹⁶⁴ and appears to be analytic.¹⁶⁵ However, according to several prominent

¹⁶² See Chang 1997, Chang 2002, pp. 659 – 88, and Chang 2005, pp. 331 – 50.

¹⁶³ See Ellis 1966, Krantz, et al. 1971, Mundy, pp. 29 – 54, and Stevens, pp. 677 – 80.

¹⁶⁴ See, e.g., von Neumann and Morgenstern, Luce and Raiffa, and Resnik.

¹⁶⁵ Wasserman, p. 392.

philosophers,¹⁶⁶ there are situations in which the precision necessary to determine which of the three possible relations holds is unavailable, and this imprecision is not epistemic, but is intrinsic to the cases. Parfit's argument concerns the relative merits of three candidates for a literary prize: Poet₁, Poet₂, and Novelist. Poet₁ is neither better nor worse than Novelist with respect to literary merit, and Poet₂ is slightly better than Poet₁. Parfit claims that this relationship of equality violates an intuitively plausible principle of transitivity: that Poet₂ is slightly better than Poet₁ while Poet₁ is neither better nor worse than Novelist seems as though it would entail that Poet₂ is slightly better than Novelist, but it does not, because judgments of literary merit are insufficiently precise. "Must it be true of Proust and Keats," he writes, "either that one was the greater writer, or that both were exactly equally great? There could not be, even in principle, such precision."¹⁶⁷ Griffin writes, "Some values are only roughly equal, and the roughness is not in our understanding but ineradicably in the values themselves."¹⁶⁸ Although it is not completely clear, his remarks suggest that he intends to call the Trichotomy Thesis into question.

Another case, due to Joseph Raz, concerns a choice between two careers: being a lawyer, and being a professional hang-glider.¹⁶⁹ The law career would be more financially rewarding, but at the cost of long hours, lots of schooling, and many dull days spent poring over law books. The hang-gliding career would contain more excitement, a more flexible schedule, and would permit more time for extracurricular pursuits, but at the cost of financial security and risk to life and limb. Although the hang-gliding career is better in certain respects than the career in law, and the career in law may be better in other respects,

¹⁶⁶ See Parfit, p 431, Griffin 1986, pp. 81 – 92, Raz 1985-86, pp. 117 – 134, and Raz 1997, pp. 110 – 28.

¹⁶⁷ Parfit, p. 431.

¹⁶⁸ Griffin 1986 pp. 80 – 1.

¹⁶⁹ In Raz 1985-86.

but perhaps neither is better than the other *simpliciter*, and we are asked to fill in the details in such a way as to make it as plausible as possible that this is the case. Raz argues that it nevertheless seems that the two careers could not be precisely equally good. There is a similar failure of transitivity: adding \$1,000 to the annual salary of the hang-gliding career seems to be sufficient to make it better as a career than it previously was, but insufficient to make it better than the career in law.¹⁷⁰

Ruth Chang presents another influential case: between Michelangelo and Mozart, who is the more creative?¹⁷¹ According to Chang, they are both creative, so they are comparable respect to creativity. But she maintains that no member of the trichotomy holds: Michelangelo is not more creative than Mozart (Michelangelo wasn't composing any operatic masterpieces) Mozart is not more creative than Michelangelo (Mozart wasn't designing any domes) and Michelangelo and Mozart are not equally creative, because such precision is impossible. Furthermore, a slightly improved version of Michelangelo would clearly be more creative than Michelangelo but would not clearly be more creative than Mozart. According to Chang, this strongly suggests that the Trichotomy Thesis is false and that there is a fourth, *sui generis*, relation of quantitative comparison, "parity."

According to Chang, *parity* is a three-place relation of quantitative comparison that relates two objects with respect to a quantity. A and B are on a par with respect to Q if and only if A and B are comparable with respect to Q, but neither is greater than the other, nor are they equal. Furthermore, when parity holds, it is not the result of ignorance about how A compares with B, nor is it the result of semantic or ontological indeterminacy, nor is it a

¹⁷⁰ Raz 1985-86, p. 325.

¹⁷¹ Chang 1997, Chang 2002, and Chang 2005. Chang argues that the three traditional quantitative comparisons are not exhaustive, and that they must be supplemented with a fourth relation, which she names "parity." Her critics include Espinoza, Gert, Hsieh, and Wasserman.

result of A and B being incomparable.¹⁷² On this picture, if two items are comparable, then either one is greater than the other, they are equal, or they are on a par. Parity's primary logical property is that it, unlike equality, is non-transitive. That is, if A is on a par with B and B is on a par with C, nothing follows about A's parity with C.

The examples used to motivate denial of the Trichotomy Thesis are all similar in structure, exploiting intransitive apparent instances of equality that satisfy the following schema: where Q is a quantity and A and B are comparable with respect to Q, A is equal to B; there exists a slightly improved version of A, A+, such that it is greater than A; but A+ is still equal to B. Given the transitivity of equality, the trio of relations is inconsistent: if $(A = B)$ and $(B = A+)$, it follows that $(A = A+)$, so it follows that $\sim(A+ > A)$. These philosophers reject the supposition that $(A = B)$. Chang proposes instead that parity holds; the non-transitivity of parity allows her to claim that $(A+ > A)$ is compatible with $(A \approx B)$ ¹⁷³ and $(B \approx A+)$, and suggests that this will help us solve some problems with the sort of utility functions used in decision theory, but does not spell out how this will be accomplished.¹⁷⁴ Parity is a fully determinate relation, and not merely an indeterminate version of some member or members of the traditional trichotomy.

3. The Small Improvement Argument

The Small Improvement Argument¹⁷⁵ can be thought of as a *reductio* against the Trichotomy Thesis. Suppose the Trichotomy thesis is true. If, for example, Michelangelo is neither more nor less creative than Mozart, we may conclude that they are equally creative.

¹⁷² Chang 2002, pp. 660 – 2.

¹⁷³ Where 'x \approx y' means "x is on a par with y."

¹⁷⁴ For his part, Griffin is not convinced. See his 1986, p. 81 and 4 of this chapter.

¹⁷⁵ See de Sousa, p. 545, Parfit, p. 431, Griffin 1986, p. 81, Raz 1985 – 86, p. 325, and Sinnott-Armstrong 1988, p. 67.

Now consider a slightly improved version of Michelangelo, Michelangelo+; imagine that Michelangelo+ painted one extra minor fresco—though small, it is a difference.¹⁷⁶ However, because the improvement is so slight, it is unclear that it is enough to cause Michelangelo+ to be more creative than Mozart. How can one fresco make the difference when both artists were so creative? It can't, so it is not the case that Michelangelo+ is greater than Mozart with respect to creativity. This, in conjunction with some auxiliary inferences, entails that the Trichotomy Thesis is false—in particular, it would seem that the quantitative trichotomy is not exhaustive.¹⁷⁷

The Small Improvement Argument

1. Trichotomy Thesis	Suppose for <i>reductio</i>
2. $\sim(A > B) \ \& \ \sim(A < B)$	
3. $A+ > A$	
4. $\sim(A+ > B)$	
5. $A = B$	1, 2
6. $A+ > B$	3, 5, Quantitative Transitivity
7. $(A+ > B) \ \& \ \sim(A+ > B)$	4, 6, Conjunction
<hr/>	
8. $\therefore \sim TT$	<i>Reductio ad Absurdum</i>

¹⁷⁶ The thesis that creativity is affected in a straightforward manner by the number of creations the artist has produced is dubious. Although I have produced thousands of drawings, I can only draw one thing and almost all of my drawings are of that one thing. I am not very creative with respect to drawing, even though I am very productive. In general, increasing productivity does not directly increase creativity.

¹⁷⁷ Chang 2002, pp. 687 – 8.

The phenomenon is widespread. Other examples include the philosophy department hiring committee who is trying to assess the relative potential for future research of two applicants, or the more impressive of two structures: Stonehenge or Salisbury Cathedral.¹⁷⁸ In each case, we are unwilling to claim that either item is better or worse than its competitor with respect to the relevant value, though we conceive of a slightly improved version of the first item that is legitimately better, but in which the improvement is so slight that it fails to render the object superior to its competitor. Chang defends the premise by reference to two theses concerning the magnitude of difference a small-unidimensional change can cause. She writes:

The Small-Improvement Argument holds that a small improvement in one of two items, neither of which is better than the other, does not necessarily make the improved item better.¹⁷⁹

And,

The thought is this: between two evaluatively very different items, a small unidimensional difference cannot trigger incomparability where before there was comparability. In other words, for items that bear very different respects of the covering consideration, incomparability between them cannot be a matter of some small difference in one of the respects borne such that without this small difference the items would be comparable. A small unidimensional difference just does not seem powerful enough to effect a switch from two such items being comparable to their being incomparable. Call this the “Small Unidimensional Difference Principle.”¹⁸⁰

Small-improvement cases are examples of this sort of phenomenon: if Michelangelo is (roughly) equal to Mozart with respect to creativity, then a small improvement to one of Michelangelo’s relevant features is insufficient to bring it about that Michelangelo+ is greater

¹⁷⁸ Broome 1997, p. 68.

¹⁷⁹ Chang 2002, p. 668.

¹⁸⁰ Chang 2002, p. 674.

than Mozart with respect to creativity. So, according to Chang, for any two items and any complex quantity, if the items are comparable with respect to the quantity, then a sufficiently small change along a single dimension relevant to the quantity that affects one of the items of comparison cannot be sufficient to change which relation of quantitative comparison holds, nor whether the items are comparable with respect to the quantity at all.

Line (5), the lemma that A and B are equal, follows from the Trichotomy Thesis and line (2). Line (6) follows from the transitivity of *greater than or equal to*.¹⁸¹ If A+ is greater than A, and B not greater than A, then A+ must be greater than B, as well. But this conflicts with the intuition that the improvement was insufficient to render A+ superior to B. Something must give; according to these philosophers, the best candidate is the Trichotomy Thesis.

4. The Structure of Parity

These philosophers argue that the data are inconsistent with the Trichotomy Thesis because it and the structure at its foundation are too narrow. It cannot account for the behavior of covering values (the value with respect to which the comparison is carried out), such as creativity; literary merit; and goodness as a career, and objects of comparison, such as Michelangelo and Mozart; poets and novelists; and careers in law and hang-gliding, where the relevant relation of equality (or rather, *greater-than-or-equal-to*) is non-transitive. To illustrate, equality interacts with *greater than* as follows:

$$[(A = B) \ \& \ (A+ > A)] \Rightarrow (A+ > B)$$

¹⁸¹ In particular, the transitivity rule is as follows: $\{ [(A \geq B) \ \& \ (B \geq C)] \Rightarrow (A \geq C) \}$. It follows that $\{ [(A+ > A) \ \& \ (A = B)] \Rightarrow (A+ > B) \}$. *Being on a par*, by contrast, is not transitive, nor is *greater than or on a par with*.

Whereas Chang's parity relation does not support the entailment:

$$[(A \approx B) \ \& \ (A+ > A)] \not\Rightarrow (A+ > B)$$

The structure of the quantitative trichotomy is based the real the number line: '(A > B)' is true if and only if A occupies a point farther to the right on the number line than the point occupied by B; '(A = B)' is true if and only if A occupies the point on the number line that is occupied by B. Measurement can be thought of as the arrangement of the instances of the relevant quantity along a number line. A scale of measurement is just a particular way of positioning items in relation to the numbers on the number line; the different properties of the different types of scales, such as ordinality, intervals, and ratios, are based on and isomorphic with various properties of points on the real number line.¹⁸² For example, the point represented by "four" is less than five, greater than three, and equal to four. Is there a point on the number line that is "on par" with the point represented by the number four? Every possible point must be either greater than, less than, or equal to it. There is not any room in the number line, or in a theory of quantities based on it, for parity, so it is hard to understand what numerical basis the relation of parity might have. Griffin raises a similar point, suggesting that "rough equality," as he calls it, creates a difficulty for finding a mathematical structure that mirrors the structure of prudential values, observing that the concept of "vague ordering" is poorly understood.¹⁸³

¹⁸² See Ellis, Krantz, et al., and Stevens.

¹⁸³ Griffin 1986, p. 81.

Furthermore, even Chang admits that parity is sometimes superfluous; it is necessary to explain the relationships between instances of some, but not all, quantities. She argues that the trichotomy is not always exhaustive, but she admits that it sometimes is. But why would one set of quantitative relationships be adequate in some situations but not others? This is a clue that the problems are not due to the trichotomy of quantitative relationships. Since some but not all of the values and quantities we are interested in fit into the framework of the standard trichotomy of relations, we should suspect that there is something wrong in the outliers:

5. Problems Concerning Small-Improvement Phenomena

The Small Improvement Argument is based on a series of examples according to which two items appear to be comparable even though no member of the standard trichotomy holds. But one significant problem with these examples, and therefore with the argument that relies on them, is that they are all poorly described. In the career case, for example, we are told only which fields the careers are in and that they are “successful.” There are, however, many potentially relevant factors. What, exactly, are their salaries? What, specifically, are their hours? How long is a typical work week? Is there a lot of travel? Are the coworkers nice? Will there be time for family? One thing that makes it difficult to compare the careers is that we have insufficient information. We are simply asked to “fill out the details of each career so that it is as plausible as possible that neither career is better than the other with respect to goodness as a career.”¹⁸⁴ But, of course, it is impossible to give a description of the alternatives that would contain even a small fraction of the facts relevant to their values. We are forced to compare them in a state of near total ignorance, in which

¹⁸⁴ Chang 2002, p. 668.

almost everything that could possibly be relevant is unspecified. Similarly, most of us have only a passing familiarity with the works of Mozart and Michelangelo. Perhaps someone with the relevant expertise would find that one was clearly more creative than the other. These values, “creativity” and “goodness as a career,” are complex in a way that is completely out of step with the meager level of detail with which the alternatives are described.

Also, the difference between the first item and its improved counterpart is always extremely slight in comparison to their overall value. In the career case, we are supposed to imagine that \$1,000 is added to the salary of one career, when a typical salary is many thousands of dollars, and salary is just one consideration among many. We add one extra work to Michelangelo’s creative output, but Michelangelo created hundreds of sculptures, paintings, frescoes, drawings, and works of architecture in a career that lasted nearly seventy-five years.

The incongruence between the overall size and complexity of the objects of comparison and the relative minuteness of the small improvement causes problems with our intuitions about the cases. Imagine, for example, driving across North Dakota via Interstate 94 and across Kansas via Interstate 70. Without consulting the odometer, it would be difficult to determine which was the longer drive—each is very long, and they are close to the same length. We might be tempted to claim that the drives are on a par with respect to length. We might bolster this intuition by appeal to North Dakota+, a drive exactly like the drive across North Dakota but two miles longer. Since North Dakota+ seems longer than North Dakota, but not clearly longer than Kansas, there is a failure of transitivity similar to that which is diagnostic of small-improvement cases. This intuition is caused not by intrinsic imprecision, but by an epistemically disadvantaged context that cripples our ability to make

precise judgments. And, of course, lengths of drives are not subject to any *sui generis* relation of parity. Lengths of drives are measured in miles, which are fully precise. This seems to be an instance of the small-improvement phenomenon because the objects measured are extremely large and complex, which robs us of our ability to make accurate “eyeball” measurements. If that is the case, then the Small Improvement Argument is unsound: in reality, Kansas is seventy miles longer than North Dakota, and so the small improvement is too small to make a difference.

Additionally, there is no reason to presume that small, unidimensional improvements convert directly to overall improvements in the manner proposed by proponents of the Small Improvement Argument. Although adding \$1,000 to the hang-gliding career improves it in some respects, perhaps this meager monetary improvement is insufficient to improve it *as a career*. The fact that we improved the salary of the career in a minor way does not entail that we have improved the career with respect to its overall value. Perhaps there is a threshold at work, and the addition of a slight amount of extra money is insufficient to increase the overall goodness of the career, even when a larger increase would have a correspondingly large effect. Perhaps this is an instance of Kagan’s additive fallacy¹⁸⁵ or Moore’s Principle of Organic Unities.¹⁸⁶ Small-improvement phenomena rely on an unwarranted assumption regarding the computation of overall value.

This is likely to occur in cases in which the covering value supervenes upon a complex of constituent factors. Just as the overall creativity of an artist depends on a multitude of features, so does the “goodness” of a career. There is no reason to think that merely making one minute improvement to just one of the many relevant factors would necessarily have any, even correspondingly minute, effect on the overall value of the relevant

¹⁸⁵ Kagan, pp. 16 – 31.

¹⁸⁶ Moore, p. 96.

object. Although the assumption that varying one relevant factor independently of the others must make an overall difference is attractive, it is just one hypothesis among many. Line (3) of the argument is therefore false, because A and A+ are equal with respect to the relevant covering value. The “small improvement” was too small to affect the item’s value with respect to the quantity under consideration.

6. Vagueness and Complexity

Despite arguments to the contrary, some small-improvement cases are instances of vagueness. Chang worries that if hard cases of comparability are due to vagueness then the Small Improvement Argument would hinge on a Sorites-type fallacy.¹⁸⁷ Her counter-argument proceeds by pointing out that in certain contexts we are inclined to behave in certain ways when we encounter paradigm cases of vagueness, and that we are disinclined to behave in these ways with respect to paradigm cases of parity.¹⁸⁸ Paradigm cases of vagueness are such that, in neutral, consequence-free contexts, we are disposed to resolve indeterminacy in arbitrary ways, and we would be unwilling to enter a dispute over a disagreement.

Chang claims that small-improvement cases are different. She mentions a case concerning an academic hiring committee: were they forced to classify one of two candidates as the better, they would be unwilling to flip a coin, and they would defend their eventual choice from objections.¹⁸⁹ This pattern of behaviors extends to other cases: Mozart versus Michelangelo; hard cases of moral comparison; and others.¹⁹⁰

¹⁸⁷ Chang 2002, pp. 672, 679 – 80.

¹⁸⁸ Chang 2002, pp. 680 – 5.

¹⁸⁹ Chang 2002, p. 682.

¹⁹⁰ Chang 2002, p. 685.

However, several small-improvement cases are impossible to consider in a properly arbitrary context, so this strategy fails to apply to several key cases. For example, the hiring committee's decision is neither neutral nor consequence-free, and this explains their behavior. The career, literary prize, and moral cases are similarly important, so Chang's analogy breaks down in a central range of cases and so is silent as to whether the difficulties are due to vagueness.

Some small-improvement cases can be suitably arbitrary; what should we make of them? Our intuitions about the Michelangelo case are corrupted by the fact that creativity is a complex and confusing value. Specific instances of creativity might be related to any number of skills or attributes: the ability to generate innovative or novel solutions to problems; the ability to find unnoticed connections between objects or ideas; the ability to find new or unnoticed uses for things; et cetera. It is possible for each attribute to vary independently of the others and there is no clear way of assessing how or to what degree each one is relevant to overall creativity. If that is the case, then the predicate 'is creative' has no unique extension because there is no unique set of its instances, let alone an ordered set satisfying the relevant formal constraints. In this way, 'creative' has more in common with paradigmatically vague terms such as 'bald' and paradigmatically complex properties such as *physical fitness* than it has with precise terms expressing simple quantities, such as 'mass'. There are several equally eligible candidate extensions, with no non-arbitrary way to determine which is correct. But if that is the case, there can be no single basis for quantitative comparison because it is too complex and its components relate to each other in too imprecise a manner.

For example, consider the set of quantitative relations associated with *baldness*. Imagine two moderately bald heads. Fill in the details of each head in such a way that it is

plausible to regard them as equally bald—although such precision is impossible in practice. Now imagine a small enhancement to the baldness of one of the heads: two hairs fall out. If it is plausible to regard the heads as being equally bald prior to the hairs falling out, it is not plausible to regard the slightly improved head as being the more bald afterwards—this is clearly a borderline case. So head A is neither more nor less bald than head B, and it would be incredible if the heads were precisely equally bald. But a small enhancement did not suffice to render head A more bald than head B. But these problems, such as they are, are straightforwardly caused by the vagueness of ‘is bald.’

Physical fitness is an irreducibly complex quantity, related to a variety of qualities: upper body strength; lower body strength; core strength; cardiovascular endurance; etc. Other things being equal, the person with the greater level of upper-body strength is the more physically fit. But cases in which other things are not equal are much more difficult to evaluate. If A can do many more pushups than B but B can run the marathon much faster than A, there may be no fact of the matter as to who is the more fit, because physical fitness is a jumbled mass of several related quantities. These examples are analogous to Small Improvement cases, but the problems are clearly due, not to the quantitative relations in themselves, but to the fact that the covering values are paradigmatically vague and multi-dimensional.

Creativity is very similar to baldness and physical fitness. Sentence schemas such as ‘x is very creative’ or ‘x is more creative than y’ cannot be used to make any but the most vague pronouncements of merit or relative quality. If, for example, the most precise thing I knew about Michelangelo was that he was very creative, it is hard to see why I should be regarded as knowing anything at all about him. Similar things might be said about the other superhard cases: ‘literary merit’ tracks another extraordinarily complicated complex of

features such that it clearly has no precise meaning, as does ‘goodness as a career.’ Although it may be the case that equality with respect to each of these covering values fails to be transitive, it is clear that this failure is the result of the imprecision involved in the covering value itself, and not the relationship of equality. Items of comparison may be just sufficiently similar that they lie within the relevant vague boundaries—that they are borderline cases of equality—and in such cases, transitivity of equality may fail. In cases such as these, we may rightly doubt whether we are dealing with a single genuine quantity.

It is also worth noting that the kind of imprecision that can potentially lead to failures of transitivity of equality is ineliminable from practical, empirical measurement.

Krantz, et al. write that

Whenever physical differences become sufficiently small, any method for observing them ultimately deteriorates. In some cases, and perhaps in all, observations of two sufficiently similar entities are inconsistent when the same comparison is repeated several times. And when inconsistencies can occur, violations of transitivity may arise. But the ideal case... can still be achieved if copies are prepared by [idealized] “standard” methods that are much more sensitive than the “working” methods used to establish [the relevant empirical ordering relation.]¹⁹¹

Small-improvement cases exploit practical problems that plague all forms of empirical measurement in order to draw an illegitimate theoretical point—that the intransitivity is somehow intrinsic, and is not an artifact of vague predicates, complex, jumbled properties, or inadequate tools of measurement. This allows us to see why the Small Improvement Argument is unsound. Although there is an agglomeration of loosely related properties we can express by using the predicate ‘is creative,’ and that some creative things are more creative than others, this predicate nevertheless has no precise meaning. This is why Mozart and Michelangelo seem to be incommensurable with respect to creativity: each artist seems

¹⁹¹ Krantz, et al. p. 3.

to be creative, but ‘creativity’ is so nebulous that this fact does not entail that they actually share any features, and there is no fact of the matter concerning how their relevant features relate to their overall creativity levels.

Our intuitions are corrupted by the fact that when we compare Michelangelo with Michelangelo+ we hold all relevant features constant except one, so it is clear how Michelangelo compares to Michelangelo+, in spite of the fact that the boost is only very slight. Creativity is a multi-dimensional quantity, and the comparison of Michelangelo+ with Michelangelo holds constant all factors save one; the comparisons between Mozart and the Michelangeloes hold nothing constant whatsoever. This causes the tiny boost to Michelangelo+’s output to seem significant when placed next to the real Michelangelo, but insignificant when compared to Mozart. The apparent intransitivity of equality that is diagnostic of small improvement cases is an illusion caused in part by the fact that, in general, A+ is more similar to A than he is to B. This interferes with our ability to carry out the comparison. We are able to make more fine-grained comparisons between very similar things than we are able to make between very dissimilar things, and this explains a key detail of small-improvement cases. We should therefore be very careful about using creativity as the centerpiece of an argument that the standard trichotomy of qualitative comparisons is inadequate. It is more likely that it is whatever is meant by ‘creativity’ that is inadequate; it is not a unique, determinate quantity.

Furthermore, transitivity could be restored in each case if some more precise or otherwise suitable value or measurement were substituted for the relevant covering value. Some predicates that apparently express quantities are not precise enough to generate a single linear order of their instances, although the comparative relations, *greater than*, *less than*, and *equal to*, are fully precise in virtue of the fact that they are homomorphic with the

corresponding relationships between numbers.¹⁹² If imprecision, ambiguity, or vagueness are introduced via the quantitative predicate, we might reject the claim that the relevant, small-improvement-friendly value is really a quantity and attempt to replace it with something better, rather than reject the trichotomy.

For example, in an important range of cases, it is not possible to determine which of two athletes is the more physically fit—physical fitness is too vague and complex. But when we focus instead on more precise features closely related to physical fitness, such as one’s best time at the marathon; one’s best time at the 200 meter dash; one’s maximum bench-press weight; the maximum number of push-ups one is capable of; etc., our ability to make quantitative comparisons improves dramatically. Furthermore, these comparisons are directly relevant to physical fitness, and they provide much more information about the individual athletes than simple attributions of various degrees of the property *being physically fit* would. We could then design a formula that would produce a “fitness quotient” as a function of these factors, and which would yield a precise result in every case. Perhaps we would have to make some arbitrary choices concerning how to weight some of the factors against some of the others, and perhaps we would end up with several equally adequate equations, but this exercise would help us to be clear about which factors are relevant to this new fitness quotient and how. Once this is accomplished, we no longer see any need for parity. The quantitative trichotomy is exhaustive with respect to suitably precise quantitative predicates.

So, rather than focus on “creativity,” we could instead focus on such qualities as originality of new ideas; depth of insight; sheer productivity (e.g. the number of creative works produced); the degree to which the creative products may be applied to real-life

¹⁹² Stevens, p. 677, Ellis, pp. 14 – 7, Krantz, et al., pp. 2 – 20.

situations; etc. Perhaps we will have to impose a somewhat artificial restriction on which of all the possible factors are relevant in a particular case, but insofar as such restrictions make it possible to isolate and clarify the various effects and interactions of the various relevant features, they will play a role in furthering our understanding of the phenomena at hand. For example, rather than just saying that Michelangelo was creative, we will be forced to be specific about what makes him so creative. And if we are just as specific about Mozart, the exercise will illuminate a relationship of quantitative comparison that had been obfuscated by nebulous complexity. Small-improvement cases arise only with respect to covering values that are so complex or vague that we cannot tell what the basis for comparison is supposed to be; by precisifying the relevant concepts, the small-improvement phenomenon and the accompanying need for parity evaporates.

This allows us to see how we might learn from small-improvement cases. The Small Improvement Argument does not show that the trichotomy thesis is false, rather, it shows that there are vague, defective covering values—due to problems with the language we use or with our epistemic relationship with them—and that these defects are serious enough to cause normally unproblematic applications of transitivity of equality to fail. So it is not that parity is the most precise manner in which Michelangelo compares to Mozart with respect to creativity; it is that it is unclear precisely which property ‘creativity’ picks out, and we therefore lack the information necessary to determine which comparison holds. When we encounter an apparently legitimate basis for quantitative comparison that, upon closer inspection, is inconsistent with the orthodox theory of quantities, we ought to wonder whether it is a legitimate basis for comparison; we should be especially suspicious of such vague and nebulous bases for comparison as *creativity*, *goodness as a career*, *literary merit*, and *baldness*, among others.

CHAPTER VI

ARGUMENTS AGAINST THE THESIS THAT PLEASURE AND PAIN ARE QUANTITATIVE

1. Introductory Remarks

The thesis that pleasure and pain are measurable quantities (or constitute a single measurable quantity) has seemed preposterous to many philosophers. These philosophers have found a variety of reasons for objecting to this thesis. The purpose of this chapter is to survey and rebut each of the main arguments for the conclusion that pleasure and pain are not legitimate, measurable quantities.

The first main argument I will discuss is based on the observation that pleasures and pains are essentially transient. Each pleasure is over before the next begins; memories of pleasures and pains fade and die. This fact is alleged to cause problems for the measurability thesis: pleasures go by too fast for you to “get a handle” on them. If you can’t get a handle on the pleasure as you’re experiencing it, how can you measure it? The proponent of this sort of argument claims that you cannot.

In the second section I will discuss an argument based on difficulties surrounding interpersonal comparisons of pleasure and pain. The argument from transient pleasures can be seen as a difficulty based on the comparison of pleasures within the same mind; this argument is based on difficulties involved in comparing pleasures not all of which are in the same mind. As difficult as it is for me to assess my own pleasures as they happen, or to recall

them as they happened in the past, it is much more difficult for me to assess *your* pleasures, and still more difficult to compare them to those of someone else.

The third section is devoted to the “different types” argument. Proponents of this sort of argument attempt to exploit the relative dissimilarity of various pleasures to show that there is no legitimate way to compare them. Intellectual pleasures are contrasted with sensory ones. Visual pleasures are contrasted with olfactory or gastronomic ones. Sexual pleasures are contrasted with nonsexual ones. Intense but brief pleasures are contrasted with mellow but lengthy ones. Similar observations hold with respect to pains: emotional pains are contrasted with physical pains. There is also a “different types” problem with generating a pair of hedon and dolor scales whose units would be commensurate: how much pain is identical in absolute hedonic value with some particular quantity of pleasure? These difficulties form the basis of an argument designed to show that pleasure and pain are not quantities.

A final section is devoted to problems surrounding the application of mathematics to numbers representing quantities of pleasure. According to proponents of this argument, it is not the case that the pain of having a toothache in four teeth is four-fifths as bad as the pain of having a toothache in five teeth—such assertions make no sense. You can't add another toothache to the four-tooth toothache and arrive at the amount of pain in a five-tooth toothache, and you can't divide the toothaches in order to generate the result that the five-tooth toothache is 20% worse than the four-tooth. Furthermore, even granting for the sake of argument that numbers can be used to represent amounts of pleasure and pain, there is no reason to suppose that these numbers would behave, mathematically speaking, in the manner predicted by classical hedonic utilitarians. These facts are supposed to cast further doubt on the thesis that pleasure and pain are legitimate quantities.

The “different types” argument is the most commonly raised by philosophers who discuss this and surrounding issues. It's also very weak and generally isn't endorsed by the philosophers who raise it. The “transience” argument is mentioned only by Sidgwick, who doesn't endorse it. The “problems with applied mathematics” argument is mentioned only by Hall, who doesn't endorse it. I think it's potentially the strongest and most interesting--it seems to confront the issue of measurability and of quantativity head-on in a way the others do not.

2. Pleasures are Ephemeral

2.1. The Problem of Transient Pleasures

Several philosophers argue that the fact that pleasures are ephemeral poses a problem for the measurability of pleasure and pain. T. H Green, in his introduction to volume II of Hume's *Treatise on Human Nature*, argues that “pleasant feelings are not quantities that can be added,” because “each is over before the other begins.”¹⁹³ Green seems to think that this causes a problem for hedonism. Since one pleasure is over before the next begins, there is no physical way to add or splice them together.¹⁹⁴ There is no physical analog of addition that can be performed on pleasures or pains. According to Green, this suggests that expressions such as “greatest happiness” and, presumably, “hedonic utility” are meaningless.

John MacKenzie seems to concur. He claims that

I may be aware at each of two successive moments I have a pleasure of approximately the same degree [of intensity]; and I may thus be entitled to say that the pleasures of these two moments taken together are twice as great as the pleasure as one of them alone would have been. Surely $1 + 1 = 2$... but it is also true that $1 +$

¹⁹³ Green, p. lc. He is quoted in Sidgwick. p. 133.

¹⁹⁴ As there is with lengths of rope, etc.

1 – 1 = 1. When a second pleasure is added the first is taken away, and there is only one left. If I have only one pleasure now, I am none the richer for the fact that I had another before.¹⁹⁵

MacKenzie goes on to claim that “Every moment stands on its own basis; and the number of moments makes no difference to the happiness of life as a whole, because... life is *not* a whole.”¹⁹⁶ It’s not entirely clear what MacKenzie is getting at, but he seems to think that since each momentary pleasure is over before the next momentary pleasure begins, they do not “add up” or aggregate in the way required by standard versions of the hedonic calculus. He claims that the happiness of one moment does not run into another.¹⁹⁷

Hastings Rashdall considers a similar objection,¹⁹⁸ as does W. D. Ross. Rashdall discusses an objection based on “the very simple fact that we cannot enjoy a sum of pleasures all at once—that a sum of pleasures is not capable of existing altogether at a given moment of time.” For any two distinct pleasures, that is, there is no way to bring them together. They must remain essentially separate. Ross mentions that the time interval between the experience of pleasure and the act of comparison can affect the accuracy of the comparison. This is because our ability to remember pleasures and pains is unreliable.¹⁹⁹ Since we cannot reliably recall the precise durations and intensities of past pleasures and pains, we cannot reliably compare past pleasures and pains to one another, nor to present episodes.

John C. Hall also considers a similar point. He writes that

...fundamental measurement begins with an arbitrary choice of a single standard, with which other objects can be subsequently compared as being equal in the

¹⁹⁵ MacKenzie 1890, pp. 206-7.

¹⁹⁶ MacKenzie 1890, p. 208.

¹⁹⁷ MacKenzie 1890, pp.. 208-9.

¹⁹⁸ Rashdall, p. 367.

¹⁹⁹ Ross, p. 142.

magnitude in question. Now to perform this function the initial standard must be permanent: otherwise no successive matchings could take place. ... But there could be no such permanently available standard pleasant experience, since experiences are essentially transient.²⁰⁰

The claim Hall is considering here is that since a permanent standard is necessary for measurement, and their ephemeral transience rules out the possibility of a permanent standard pleasant experience, measurement of pleasures is impossible.

2.2. The “Ephemeral Pleasures” Argument

These remarks suggest the following argument:

The Ephemeral Pleasures Argument

1. Pleasures are essentially transient and ephemeral.
2. If pleasures are essentially transient and ephemeral, then pleasure is not a measurable quantity.
3. Therefore, pleasure is not a quantity.

Line 1 seems to be true. Pleasures are often brief and transitory. As Green puts it, “each is over before the other begins.”²⁰¹ There is no physical way to splice them together, or to hold one pleasure up next to another to see which is bigger. Green argues that this precludes adding them together, even in the abstract. There is no way to generate a permanent standard on the order of the International Prototype Meter Bar that served as the

²⁰⁰ Hall, p. 43.

²⁰¹ Green, p. lc.

definition of the meter between 1889 and 1960.²⁰² The relevant experiences are “essentially transient,”²⁰³ in Hall’s words. And Rashdall points out that we can’t “enjoy a sum of pleasures all at once,” and that there is no way to collect any non-contemporaneous group of pleasures together at a single time.²⁰⁴ This apparently rules out coherently desiring a sum of pleasures, as well as the enjoyment of such a sum.

Ross points out that memories of pain begin to fade and lose their vividness almost immediately. It is difficult to know the magnitudes of pleasures and pains past.²⁰⁵ For example, I remember being confident, when I was 16 and recovering from surgery to remove a portion of my skull that had become infected (due to mastoiditis), that I was undergoing the most intense pain I had ever experienced. I also remember being confident, when I was 22 and recovering from a difficult quadruple-wisdom-tooth extraction, involving four stubbornly impacted molars, that I was *then* experiencing the most intense pain I had ever undergone. Now that I am over thirty I am not sure which really was the more intense pain. I remember what I was thinking at each of those times, but I can’t recall the pain itself, so I can’t recall which pain was the more intense. I also have trouble remembering which was the longer-lasting, so I have no idea which pain was “larger.”

Since I’m not sure about the relative magnitude of these two pains, I’m doubly unsure of their *absolute* magnitude. As difficult as it is to determine which pain was worse, it is even more difficult to determine precisely how bad each one was, relative to a non-arbitrary zero point. It is possible that I could give a ballpark estimate, but there is no way I could produce a precise number for either one.

²⁰² Nor is there a way to generate a standard pleasant experience based on time and the speed of light, as the meter is currently defined.

²⁰³ Hall, p. 43.

²⁰⁴ Rashdall, p. 367.

²⁰⁵ Ross, p. 142. The point is also made by Hall, p. 38.

Line 2 seems to be true, as well. Pleasures go by too fast; you can't get a grip on them. There *is* no way to collect any non-contemporaneous group of pleasures together at a single time. There *is* no way to generate a permanent standard, and the existence of a standard is thought to be essential to genuine measurement.²⁰⁶ If there is no way to generate a standard of measurement, then there is no way to measure the pleasantness of pleasures. And if there is no way to do any of those things, if there's no way to measure pleasantness, then pleasantness is not a measurable quantity.

2.3. Problems for the “Ephemeral Pleasures” Argument

The argument is valid and in Modus Ponens. It is not sound because line 2 is obviously false. Henry Sidgwick points out that although Green argues that pleasures cannot be physically compared, they can be *mentally* compared. This mental comparability is sufficient for the meaningfulness of the relevant comparative expressions.²⁰⁷

Rashdall points out that “transience argument” would rule out the coherent enjoyment of or desire for even an individual pleasure. Each pleasure exists in time, he argues, and there is no moment so brief that it cannot be subdivided further. “If, therefore, I cannot [enjoy or] desire anything I cannot have all at once, I could not desire either pleasant consciousness in general or any particular state of consciousness which is pleasant.”²⁰⁸ But since we obviously can do this, line 2 is false.

Hall argues that line 2 depends upon an impossibly strong standard of measureability. It cannot be necessary to generate a permanent standard of comparison for each measurable quantity, because if it were, then time would fail the test. It is impossible to

²⁰⁶ See Hall's discussion of the problem in Hall, p. 43. The other philosophers who consider this argument do not defend premise 2, apparently taking it to be obvious.

²⁰⁷ Sidgwick, p. 134.

²⁰⁸ Rashdall, p. 367.

generate a permanent standard chunk of time. Nothing, after all, is more transient and ephemeral than time. “In this case,” he writes, “the initial standard is not a permanent particular, but an infinitely recurring series of particulars guaranteed to be equal in duration by physical hypothesis.”²⁰⁹ If it were possible to generate a similarly repeatable standard for the measurement of pleasure and pain, it would be possible to show that the transience of pleasant experiences is not a threat to the measurability of pleasure and pain.²¹⁰

3. Interpersonal Comparisons

3.1. Introductory Remarks

Several philosophers have claimed that interpersonal comparisons of utility are problematic or even impossible, and that this poses a problem for the thesis that pleasure is a legitimate, measurable quantity. Philosophers who have considered this line of argument include Lars Bergström, Richard Brandt, John Hall, R. M. Hare, Richard Jeffery, Stuart Rachels, and Ilmar Waldner. Its proponents begin by noticing that interpersonal comparisons of pleasure and pain are impossible in some relevant sense. This impossibility has been exploited by different philosophers for different purposes, but it is clear that the main target in each instance is the thesis that pleasure and pain can be measured in an interesting and meaningful way.

3.2. The Problem of Interpersonal Comparisons

Several philosophers have noticed that interpersonal comparisons of pleasure and pain are problematic. Richard Brandt mentions the problem in *A Theory of the Good and the Right*. Although Brandt doesn’t devote much space explicitly discussing the problem, a

²⁰⁹ Hall, p. 43.

²¹⁰ I discuss Hall’s proposal in detail in sections 3.5 and 3.6 of this chapter.

number of his remarks clearly hint at it.²¹¹ As he sees, it, the problem is fundamentally a problem concerning our ability to know about the states of other minds.²¹² According to Brandt, there is only one way for a person to know the intensity of a pleasure, and that is to be directly introspectively aware of it. We can observe our own conscious states, and perhaps also the properties and behavior of physical objects, but we cannot observe the conscious states of others. So how can we hope to determine whether some event has given more happiness to one than to another?²¹³ Since no person can introspect the contents of any mind that is not his, the pleasures and pains experienced by those other minds are unknowable to him.

R. M. Hare also discusses the problem, and conceives of it in a similar way.²¹⁴ He devotes considerable space to the topic in *Moral Thinking*. He takes care to distinguish this problem of interpersonal comparison from the more general skeptical problem of other minds. The problem of other minds is deep and intractable, and it is illegitimate to use it as a weapon in this context.²¹⁵ It is also not a problem according to which an alleged essentialism or haecceitism prevents me from fully putting myself in another's place.²¹⁶ As Hare sees it, the problem concerns having a sufficient quantity of empirical data about other people to give *sense* to statements about the preferences of others,²¹⁷ and arises from the principle of verification, according to Hare. If we do not know the truth-conditions of sentences expressing interpersonal comparisons of pleasure and pain, then we do not know what the sentences express at all.

²¹¹ Brandt, pp. 257-65.

²¹² Brandt, pp. 259-65.

²¹³ Brandt, p. 258.

²¹⁴ Hare, pp. 127-8.

²¹⁵ Hare, p. 118.

²¹⁶ Hare, p. 119.

²¹⁷ Hare, p. 122.

Waldner also sees a problem. His discussion shares several features with those of Brandt and Hare—that there are empirical problems surrounding the interpersonal comparison of pleasure and pain. According to Waldner,²¹⁸ there’s no way to compare the “feelings” in one mind to the “feelings” of another. There’s no physical test, such as a blood test, that one could perform that would yield any relevant information. Although statements of interpersonal comparison are well-established in everyday discourse, there is no way to discover on empirical grounds whether the statements are true or false. This empirical vacuum leads opponents²¹⁹ to doubt the meaningfulness of interpersonal comparisons.²²⁰

...what is being compared are the intensities of certain [attitudes] of which different persons are conscious, and if one further assumes that the only acceptable empirical basis for comparing the intensities of such [attitudes] is for one person to be simultaneously conscious of both and directly judge their comparative intensity, then clearly no interpersonal comparisons are possible.²²¹

Waldner goes on to consider the possibility that we can collect enough information through the observation of behavior to license the sort of interpersonal comparisons that seem to be necessary. He concludes, however, that these sorts of observations are not enough. He claims that developments in economics have provided grounds for the development of interval scales of preferences, but that ratio scales are necessary for the interpersonal comparison of utilities. Also, this suggestion does not properly take into account the distinction between pleasure and desire. He goes on:

It is the inability of the outcomes of choice situations of these kinds to provide evidence for interpersonal comparisons, together with the impossibility of relevant

²¹⁸ Waldner, pp. 90-1.

²¹⁹ Waldner cites Arrow as a prime example. See Arrow, p. 9.

²²⁰ Waldner, p. 89.

²²¹ Waldner, p. 93.

introspective evidence that seems to have been a major factor in leading people to conclude that such comparisons are not empirically justified.²²²

Rawls finds the prospect of interpersonal comparisons similarly dubious, and objects to utilitarianism on this basis:

It is clear that utilitarianism assumes some fairly accurate measure of these expectations. Not only is it necessary to have a cardinal measure for each representative individual but these measures must make sense in interpersonal comparisons. Some method of correlating the scales of different persons is presupposed if we are to say that the gains of some are to outweigh the losses of others.²²³

...Simply because we do in fact make what we call interpersonal comparisons of well-being does not mean that we understand the basis of these comparisons or that we should accept them as sound. ...we should try to find some objective grounds for these comparisons... At the present time, there appears to be no satisfactory answer to these difficulties from a utilitarian point of view.²²⁴

Bergström, in his survey of the problem, takes notice of the fact that

No one believes that it is easy to find out, in practice, whether a given action would produce a maximum of pleasure... But it is not merely this point that is being made by those who claim that interpersonal comparisons are “impossible.” Rather, what is being claimed is that such comparisons are “unscientific” or “meaningless.” As we have seen, Neurath holds that they do not always “make sense” and he seems to mean by this that a maximum of pleasure does not always “exist.” One way of putting Neurath’s claim is, I think, this:

Sceptical claim I: Statements to the effect that one situation *X* involves more happiness or well being than another situation *Y* are often *neither true nor false*.²²⁵

²²² Waldner, p. 95.

²²³ Rawls, p. 90.

²²⁴ Rawls, p. 90-1.

²²⁵ Bergström, p. 288. Bergström mentions Neurath, Arrow, and Jevons as paradigm instances of this sort of claim. Neurath’s claim about whether interpersonal comparisons “make sense” can be found in Neurath, p. 115, and his claim about existence can be found in Neurath, p. 114.

Bergström claims that the fact that it is difficult to make measurements of pleasure and pain in practice is well-known. He attributes to Otto Neurath, the arch-positivist, the view that this poses a serious problem. The problem, according to Neurath, is that this practical, empirical difficulty casts doubt on the very truth-aptness of the propositions involved. Take, for example, the claim that I would enjoy a cup of coffee a little more than my brother would. According to Neurath,²²⁶ since there is no practical way to determine just what the “amount” of enjoyment I would get is, and there’s no way to determine what amount of enjoyment my brother would get, and there’s no way to compare the two amounts, either directly or indirectly, it is unclear why we should regard the sentence as making an assertion that can be either true or false.

According to Goldstick,²²⁷ it is a “common objection” to the thesis that pleasure and pain are quantities is that no meaning can be attached to “maximizing utility” because it presupposes comparisons of utility and no such comparison is in principle possible. Presumably, since “maximizing utility” presupposes that at least interval measurement is possible, the interpersonal incomparability of pleasure and pain entails that they are not interval measurable. Hall²²⁸ claims that it has been argued that ordinal incomparability of pleasures is generated by cases in which the two experiences of pleasures being compared are experiences of different persons (among others). If that were correct, then pleasure and pain would not be quantities; they would be only nominally measurable.

²²⁶ Neurath, p. 119.

²²⁷ Goldstick, p. 531.

²²⁸ Hall, p. 38.

3.3. The Argument from Interpersonal Comparisons

These remarks suggest that interpersonal comparisons of utility are impossible, and that this causes a range of problems for a variety of familiar ethical views. This problem is supposed to arise on the basis of a difficulty for the thesis that pleasure is a measurable quantity. Some of the philosophers I've consulted think that the truth of traditional hedonistic versions of utilitarianism depends crucially on the measurability of pleasure and pain. Some think that hedonism as a theory of value is put into difficulty. Others point out that other, non-hedonistic theories do not remain unscathed: any plausible view in ethics, they suggest, must presuppose that pleasure and pain are legitimate, measurable quantities. Though none of these philosophers put the point in precisely this way, the critical point can be interpreted as an argument designed to show that there is something seriously wrong with the thesis that pleasure and pain are quantitative:

The Interpersonal Comparisons Argument

1. It is impossible to make reliable, accurate, and precise interpersonal comparisons of pleasure and pain.
2. If it is impossible to make reliable, accurate, and precise interpersonal comparisons of pleasure and pain, then pleasure and pain are not measurable quantities.
3. Therefore, pleasure and pain are not measurable quantities.

Why should we believe line 1? Brandt points to the difficulty of knowing the mental goings-on of minds other than one's own. Pleasure and pain are, at bottom, mental phenomena, and a person's mental states are private. Hare seems to agree, as do Rawls and Waldner. Waldner

claims that it is impossible to know the feelings in another mind. According to these philosophers, although we often make just this sort of interpersonal comparison, the actual empirical basis for such claims is completely inadequate.

Brandt, Waldner, and Rawls argue that in order to know how intense some pleasure is, you must have introspective access to it. But we have introspective access only to our own pleasures and pains; we don't have that kind of access to the minds of others. We can therefore have no way of comparing our pleasures to those enjoyed by others.

It seems clear that whatever knowledge we can have of the intensities of the pleasures and pains experienced by others, this knowledge is indeed limited by the privacy of other minds, difficulties associated with the collecting enough relevant evidence, and with drawing inductive inferences from behavior.

Why should we believe line 2? Although none of the philosophers who consider this argument devotes space to defending the second premise, the reasoning behind it appears to be something like this: our inability to make interpersonal comparisons is evidence that pleasure and pain are not genuinely quantitative. The most direct evidence that we can have in favor of something's being a measurable quantity involves going out and taking reliable measurements. Why do I think that length is a genuine, measurable quantity? Because I have a device that measures length. Why do I think that mass is a quantity? Because we have balances and scales that make measurements of mass. In these cases, we can also simply see that they are quantities—we can easily make reliable judgments of length and massiveness. Even more “abstract” quantities like electrical charge and electrical resistivity are measurable.²²⁹ If it were impossible to take reliable, accurate measurements of electrical

²²⁹ The electrical resistivity of a material is its tendency to resist electrical current. It is measured in resistance times length. Resistance itself is measured in terms of lost current. So

resistivity it is unclear how we could be justified in believing that there was such a quantity. And we can't do that in the case of pleasure and pain. We can't take reliable, accurate measurements. This undercuts the only evidence we could possibly have in favor of this claim. In the absence of evidence in favor of it, we should reject the claim that pleasure and pain are measurable.

3.4. Some Unsuccessful Responses

Brandt rejects line 1 of the “interpersonal comparisons” argument. He argues that we can make the cardinal measurements that the measurability of pleasure requires. According to him, these measurements take the form of inferences to the best explanation of behavior. He invites us to suppose that, for example, your friend comes to your house on successive occasions after tennis. On the first, you serve cold soft drinks. On the second, you serve tepid water. You notice that your friend drank three times as much of the soft drink as he did of the water. The friend smiled as he took sips of the soft drink, but did not smile as he took sips of the water. In the past, we have observed the friend paying for the soft drink but never paying for water. Why? What explains this? The best explanation of the observed phenomena is obviously that the friend enjoyed the soft drink much more than he enjoyed the water.²³⁰ Along this line, Richard Jeffery points out that people are often willing work harder for the things they like more, and work less hard for things they like less.²³¹ According to these philosophers, we make inferences of this type on a constant basis, with a high level of justification.

if a two-foot length of wire has a resistance of 14 ohms, the resistivity of the material the wire is made of is 7 ohms per foot.

²³⁰ Brandt, pp. 258-61.

²³¹ Jeffery, p. 652.

Brandt's solution is inadequate. He has failed to appreciate how difficult it is (or can be) to determine accurately and precisely how much pleasure or pain some other person is experiencing. Brandt assumes that "likes and dislikes are fairly constant."²³² While this principle may be innocent enough for us to use in typical practical circumstances, taken in its full generality, it is false. A person's tendency to enjoy various experience types may change frequently and without notice. I, for example, enjoy eating my favorite dishes and drinking my favorite drinks much more when I am ravenously hungry and thirsty than I do when I am satiated. I also sometimes enjoy eating things when ravenous that I dislike entirely in more ordinary circumstances. Dinty Moore Beef Stew is an example. As a child, I disliked guacamole and loved Froot Loops. Now I dislike Froot Loops and love guacamole. When I was in college my favorite TV show was *Northern Exposure*. Now (I am sad to say) I find it poorly written and boring. These are just a few of the many ways in which my likes and dislikes—my tendencies towards pleasure and pain—have changed and continue to change.

Brandt also assumes that people tend to drink more of what they like, and less of what they don't. Again, the assumption is unwarranted. Perhaps your guest drinks less of what he likes out of a sense of consideration: he knows that his preferred beverage is expensive, so he declines in favor of something more affordable but which he likes less. Perhaps the guest was merely less thirsty on the day when he was offered his preferred drink. As a general rule of thumb, it may be true that people drink more of what they like and less of what they don't, but this is of no significant help with respect to the problem of interpersonal comparisons. There are too many other possibilities that can't be adequately ruled out. Brandt's willingness to make these assumptions indicates that either he has not

²³² Brandt, p. 259.

taken the problem of interpersonal comparisons seriously or has failed to confront it head-on.

Furthermore, Brandt's attempted response to the problem of interpersonal comparisons does not involve any comparisons that are legitimately interpersonal. The case involves him attempting to compare two different enjoyments experienced by just one person. He does not attempt to compare the enjoyments of one friend with those of another, nor does he attempt to compare the enjoyments of the friend with his own. Comparisons of the sort Brandt makes are *intrapersonal*, not interpersonal. In light of all this, it is hard to see how Brandt's response is helpful.

Waldner, like Brandt, responds to the argument by rejecting line 1.²³³ He claims that it is possible to make reliable interpersonal comparisons. He argues that there are other ways besides direct awareness to judge relative strength of sensations or feelings, and that because pleasures are really dispositional states, like desires, indirect observation is possible. Waldner thinks you can make indirect observations that permit knowledge. We observe behavior and make inferences concerning amounts of pleasure and pain on the basis of the observations. "Other things being equal," he writes, "we generally suppose that the person who makes a firm and quick decision between two items has a stronger preference than the one who finds it very hard to make the decision."²³⁴ Waldner then introduces a formal way of representing the relative strengths of these preferences.²³⁵ This formal system is based on the assumption that behavior mirrors the relevant underlying mental states in a fairly straightforward and predictable way. He argues that the fact that this method of making comparisons often works is evidence that it is fundamentally sound.

²³³ Waldner, p. 96.

²³⁴ Waldner, p. 96.

²³⁵ Waldner, pp. 97-100. The actual details of the system would take too much space to reproduce.

Waldner, like Brandt, has overestimated our practical abilities with respect to the measurement of pleasure and pain. Our indirect observations of behavior are useless because each behavior is compatible with a wide, potentially infinite variety of mental states. Waldner's principle, that other things being equal, the person whose decisions are firm and quick has a stronger preference, is of no practical value because we can never know whether other things are really equal. When we assume that the other things are equal, for the purposes of convenience or of conversation, we merely ignore the fact that we don't or can't know that they are. Waldner, like Brandt, has failed to confront the problem of interpersonal comparisons head-on.

My view is that line 2 is false. I draw a distinction between practical measurability and measurability in theory. Practical measurability is sufficient, but not necessary, for theoretical measurability. That is, although it is true that if reliable interpersonal comparisons are possible in practice, then pleasure and pain are measurable quantities, it is not the case that if pleasure and pain are quantitative then it is possible to make reliable interpersonal comparisons. The practical difficulties surrounding interpersonal comparisons of utility are no reason to suppose that interpersonal comparisons of utility are nonsensical, meaningless, or theoretically impossible. Sometimes a philosopher will introduce the hedonic calculus or a related concept by telling a story about a procedure for figuring out the net quantity of pleasure in a state of affairs. When this happens, the story is intended as a way to introduce or explain what the calculus is. The "calculus" is not the procedure; it is the underlying set of facts that would have to be true if the procedure itself is coherent, and the procedure does not have to be implementable for these facts to be true.

4. Heterogeneous Pleasures

This argument is related to, but distinct from, the interpersonal comparisons argument. Interpersonal comparison raises a unique difficulty due to the privacy of mental states. The comparisons referenced by this argument may be interpersonal, but may also be intrapersonal. The difficulties arise not because of problems with access, but because the various pleasures and pains are so different from one another that accurate comparison becomes impossible.

4.1. The Problem of the Heterogeneity of Pleasures

The most significant discussion of the heterogeneity problem is found in Ross's *The Right and the Good*. He claims that "any denial that pleasures are comparable proceeds in the following way: imagine two extremely disparate pleasures and tell me which is the greater."²³⁶ Hall mentions the problem and provides a list of several problematic features with respect to which pleasures can differ.²³⁷ These differences include sensory vs. intellectual pleasures; visual vs. tactile pleasures; feelings of pleasure that result from an actual increase in pleasantness vs. feelings of pleasure that result merely from a decrease in painfulness; intense pleasures vs. long-lasting pleasures.²³⁸ Rashdall writes that "...every comparison between very heterogeneous pleasures simply in respect of their pleasantness is a very difficult and delicate proceeding."²³⁹

Christine Korsgaard discusses the heterogeneity of pain, in an attempt to show that pain is not, at bottom, as sensory phenomenon. She writes,

²³⁶ Ross, p. 142.

²³⁷ Hall and Rashdall follow Mill in acknowledging the distinction between "higher" and "lower" pleasures, but they seem unwilling to attach the moral significance to the distinction that Mill does.

²³⁸ Hall, p. 38.

²³⁹ Rashdall, p. 380.

What do nausea, migraine, menstrual cramps, pinpricks, and pinches have in common, that makes us call them all pains? (Don't say they're all horrible; that's just repeating yourself.) What emotional pains have in common with physical ones is that in these cases too we are in the grip of an overwhelming urge to do battle, not now against our sensations, but against the world.²⁴⁰

Korsgaard argues that in physical and emotional cases alike, the “horribleness” of pain is a result of our attitude toward the relevant state of affairs, and not in the intrinsic character of the state itself, for the states may be so different from one another that they do not share any common features. She does not attempt to show that this fact creates a problem for the hedonic calculus.

Fred Feldman, in a discussion of the relationship between sensory and intellectual pleasure, asks us to imagine a man lying on the beach on a sunny tropical island, remarking:

One thing to notice about sensory pleasure is its apparent heterogeneity. The man on the beach enjoys some pleasurable smells as well as some pleasurable feelings of warmth. Each of these sensations is pleasant, pleasurable, “pleasure giving.” Some would find nothing odd in saying that each of these sensations “is a pleasure.” Nevertheless, from a strictly phenomenological perspective, they seem to have very little in common. One is an olfactory sensation—it is the smell of the fresh, salty air. The other is an all-over bodily feeling of warmth. Aside from the fact that they are experienced simultaneously and by the same person in the example, they seem to be utterly unlike.

In order to see the heterogeneity of sensory pleasures even more clearly, consider the pleasurable sensations you get when you eat delicious, salty peanuts and drink sparkling, cold beer. The taste of the peanuts is a pleasure. The taste of the beer is a pleasure. Yet, unless your taste sensations are profoundly unlike mine, the taste of the peanuts has little in common with the taste of the beer.²⁴¹

Feldman points out that these types of sensation—the smell of fresh, salty air; the warmth of the sun and the breeze; the flavor of sparkling cold beer; the salty, crunchy flavor of

²⁴⁰ Korsgaard 1996, pp. 147 – 148.

²⁴¹ Feldman 1988, p. 83.

peanuts—have little common in themselves, other than the facts that they are sensations and they are (or tend to be) pleasant.

Franz Brentano presents several cases that can be interpreted as instances of the heterogeneity problem, and it is clear that Brentano intends to call the hedonic calculus into doubt. He writes,

A foot is divisible into twelve inches; but an intense joy is not divisible in the same sense into twelve less intense joys. Consider how ridiculous it would be if someone said that the amount of pleasure he has in smoking a good cigar is such that, if it were multiplied by 127, or say by 1,077, it would be precisely equal to the amount of pleasure he has in listening to a symphony of Beethoven or in viewing one of Raphael's madonnas. This is enough, I think, to suggest the further difficulties in trying to compare the intensity of pleasure with that of pain.²⁴²

Brentano's idea is that pleasure does not satisfy the conditions necessary for measurability. He regards as absurd the claim that units of pleasure are divisible into equal subdivisions, as feet are into inches, as well as the idea that an episode of pleasure, such as ones associated with listening to a symphony or viewing a sculpture, could be 127 times greater than another, such as one associated with smoking a cigar. Brentano is not mocking the idea that the symphonic pleasure would be 127 times greater than the cigar-related pleasure, nor the idea that we could come up with a number as precise as 127. Rather, Brentano's target is the claim that the relevant intensities are comparable at all.

Similarly, John Rawls has pointed to the heterogeneity of pleasure and pain in an attempt to cast doubt on the thesis that pleasure is measurable. He writes that

...there is the fact that there are different sorts of agreeable feelings themselves incomparable, as well as the quantitative dimensions of pleasure, intensity and duration. How are we to balance these when they conflict? Are we to choose a brief but intense pleasant experience of one kind of feeling over a less intense but longer pleasant experience of another? Aristotle says that a good man if necessary lays

²⁴² Brentano, p. 30 – 1.

down his life for his friends, since he prefers a short period of intense pleasure to a long one of mild enjoyment, a twelvemonth of noble life to many years of humdrum existence. But how does he decide this? Further, as Santayana observes, we must settle the relative worth of pleasure and pain. When Petrarch says that a thousand pleasures are not worth one pain, he adopts a standard for comparing them that is more basic than either.²⁴³

Rawls makes the point that pleasant feelings can be different from one another in ways that make it difficult or impossible to determine which is the greater—which contains more pleasure. Episodes of pleasure vary in their length and in their intensity. Certainly we are able to measure the relative pleasantness of pairs of pleasure when one attribute is held constant: between two equally intense pleasures, the longer contains the more pleasure; between two equally long pleasures, the more intense is the greater. But how are we to determine between an episode of brief but intense pleasure and a longer but more mellow episode? Perhaps Rawls intends this to be a merely practical problem. Perhaps it's just that there's no way to tell which of the two episodes contains the greater amount of pleasure. But the difficulty might be more serious than that. The difficulty might be that there is really no fact of the matter as to which is the greater. Perhaps Rawls's point is that although there are two separate dimensions along which episodes of pleasure may be compared with one another—intensity and duration—there is no single authoritative way to combine these two factors that reveals the true “amount” of pleasure.

Rawls goes on to question the assumption, central to orthodox utilitarianism, that pleasure and pain are commensurable. As we saw in chapters 3 and 4, for any two determinate properties A and B, A and B are commensurable if they are elements of the same determinable and it is possible for amounts of A and of B to be equal to one another with respect to that determinable. So, for example, assets and debts are commensurable,

²⁴³ Rawls, p. 557.

since for any amount of assets, it is possible for there to be a debt that would be equal in magnitude but opposite in sign. Rawls's idea, which he attributes to Petrarch, is that pleasure and pain are incommensurable in this sense—amounts of pleasure are never equal in magnitude to amounts of pain. Furthermore, this idea, while at odds with a long tradition in utilitarian ethics, is not so counterintuitive. Pleasure and pain are phenomenologically very different, and elicit different psychological and physiological responses. Perhaps the hedonist will claim that there exists for each amount of pleasure a corresponding amount of pain such that it is rational to be indifferent between experiencing them both or experiencing nothing at all. But it's not clear that this is really right; someone who is sufficiently pain-averse, rather than choose to enjoy even vast amounts of pleasure along with miniscule quantities of pain, might always just prefer to have nothing at all.

Perhaps it will be helpful to consider some concrete examples. Each of the following pairs of episodes of pleasure represents a manner in which they may differ that causes a problem concerning measurement:

A₁: Justin taking pleasure in reading *Slaughterhouse-Five* at t.

A₂: Justin taking pleasure in a back massage at t.

B₁: Justin taking pleasure in listening to the song *Like a Rolling Stone* by Bob Dylan at t.

B₂: Justin taking pleasure in watching the sun set over the Pacific Ocean at t.

C₁: Justin taking pleasure of increasing intensity in a back massage of increasing intensity over the interval t₁ to t₂.

C₂: Justin taking pain of decreasing intensity in the sensation generated by a thumbscrew as the thumbscrew is loosened over the interval t₁ to t₂.

D₁: Justin taking pleasure in the sensations generated by drinking a delicious, well-brewed cup of espresso during the interval t₁ to t₂.

D₂: Justin taking pleasure in the sensations generated by resting comfortably near a warm fire in a recliner with his feet up during the interval t₁ to t₂.

E₁: Justin taking pleasure in the flavors and textures of a bite of well-prepared spaghetti at t.

E₂: Justin taking pain in the flavors and textures of a bite of undercooked and over-salted spaghetti at t.

Pleasure episode A₁ is supposed to be an intellectual pleasure. What's enjoyable about reading *Slaughterhouse-Five* is not the pleasing way the letters are arranged and lined up on the page; it has to do with an appreciative understanding of the story, in conjunction with an appreciation for the way Vonnegut tells it, in conjunction, perhaps, with an appreciation of Vonnegut's way with words, et cetera. The pleasure associated with reading the book is not sensory in nature. It's not that something *looks nice*. It is intellectual in nature. In contrast,

the pleasures associated with A_2 , getting a back massage, *are* sensory in nature. Back massages cause pleasant-feeling sensations, and that is why back massages are pleasant. There is no distinctively intellectual component to the pleasure associated with receiving a back massage. The pleasantness generated by the back massage seems to me to be exhausted by the pleasure generated by the sensations involved.²⁴⁴

Although episodes of pleasure B_1 and B_2 are both “sensory” pleasures—pleasures derived from sensations—they are derived from different sorts of sensation. B_1 is auditory in nature, whereas B_2 is visual. This difference in source material seems to generate a difficulty in the determination of which pleasure is more pleasant. It is relatively easy for me to tell that I get more pleasure from listening to *Like a Rolling Stone* than I do from listening to *Knocking on Heaven’s Door*. I find *Knocking on Heaven’s Door*’s melody to be inferior and repetitive. So, for any two moments, t_1 and t_2 , such that I’m listening to *Like a Rolling Stone* at t_1 and listening to *Knocking on Heaven’s Door* at t_2 , I take more pleasure at t_1 in listening to *Like a Rolling Stone* than I do at t_2 in listening to *Knocking on Heaven’s Door* over the interval.

It also seems reasonably easy, in some cases, to determine which of two visual experiences I take more pleasure in. If one thing “looks better” to me than something else, I can usually tell. That is, between two objects of pleasure, both of which are visual experiences, I can usually tell which of the two I take more pleasure in. But if I’m asked to determine whether or not B_2 “looks better” than B_1 sounds, my level of confidence in my judgment drops. It is difficult for me to determine whether I take more pleasure in B_1 or in B_2 . This difficulty seems to be generated by the fact that the two objects of pleasure are so

²⁴⁴ This doesn’t *have* to be true, of course. Sometimes people are pleased about who, in particular, it is who’s giving the back massage. Sometimes people are pleased about getting a back massage because they think the massage might lead to some other pleasant experience. We should understand the pleasure from the back massage in A_2 to be intrinsic; it is pleasure only in the physical sensations of the back massage.

different. This qualitative difference between the objects of pleasure generates a difficulty with respect to the judgment of quantity. The aural object of pleasure is so different from the visual object of pleasure that it is difficult to determine which quantitative relationship holds between the two pleasures.

The pair C_1 and C_2 each represent an increase in overall hedonic levels over an interval of time, but C_1 is an increase in pleasure over the interval whereas C_2 is a decrease in pain over the interval. If pleasures and pains quantities on the same hedonic scale, then they are commensurable. That is, for any amount of pleasure, n , there is some amount of pain, m , such that the absolute value of n is equal to the absolute value of m . If that's the case, then n plus m is hedonically equivalent to zero. This is an important feature of interval- and ratio-measurement. The equivalence not just of spots in the order, but of intervals, is what determines whether some property or feature is quantitative or not.²⁴⁵

But cases like C_1 and C_2 are meant to cast doubt on the commensurability of pleasure and pain. If pleasure and pain are quantities of the appropriate sort, then the overall hedonic increase in C_1 is comparable to the overall hedonic increase in C_2 . That is, either the absolute value of increase in pleasure in C_1 is greater than that of the decrease in pain in C_2 , or the decrease in pain is greater in absolute value than that of the increase in pleasure in C_1 , or their absolute values are equal. But it's not easy to see how such a comparison could be carried out—it's difficult to see how such a determination could be made. It's very difficult to imagine, after having had a thumbscrew removed, being able to determine the precise size of the quantity of hedonic change over the interval of time, and being able to know whether the quantity was greater than, less than, or equal to the size of some other hedonic change.

²⁴⁵ See chapter 4.

This casts doubt on a central portion of the thesis that pleasure and pain are legitimate, measurable quantities.

The pleasure of D_1 is brief but intense, whereas the pleasure of D_2 is not very intense but lasts much longer. This represents a final difficulty caused by the heterogeneity of pleasures and pains. Although in some cases, in which the pleasures are approximately equal in duration but where one is much more intense than the other, or in which the intensities are approximately the same but where one lasts much longer than the other, determining which is “more pleasant” can be reasonably unproblematic. The problems multiply when neither intensity nor duration is held constant. Reflection on case D shows that it can indeed be very difficult to determine, between a brief but intense pleasure and a long-lasting but mellow one, which contains more pleasure.

4.2. The Argument from Hedonic Heterogeneity

Although they both think that it can ultimately be overcome, Ross²⁴⁶ and Hall,²⁴⁷ claim that the heterogeneity problem is a serious problem for the thesis that pleasure and pain are quantities. The problem might be expressed in terms of the following argument:

The “Heterogeneous Pleasures” Argument

1. It is impossible to determine, for each pair A through D, which of the pair is hedonically greater.
2. If it is impossible to determine, for each pair A through D, which pair is hedonically greater, then each pair, A through D, represents a pair of incomparable pleasures.

²⁴⁶ Ross, p. 142.

²⁴⁷ Hall, p. 38.

3. If each pair, A through D, represents a pair of incomparable pleasures, then pleasure and pain are not quantitative.
4. Therefore, pleasure and pain are not quantitative.

Line 1 seems to be true. It is impossible to determine, based on the given descriptions, for each pair A through D, which member of the pair is hedonically greater than the other, or whether they are hedonically equal. When I reflect on each case as it is described above, I find that I cannot determine which member contains more pleasure than the other, or whether they contain an equal amount of pleasure. Each member of each pair is too different from its counterpart for an accurate comparison to be made.

Line 2 appears to be true because our inability to make comparisons between very heterogeneous pleasures and pains is evidence that there are really no comparisons to be made. The contrast cases represented by pairs A through D are not isolated or rare. They represent many of the most familiar hedonic experiences. Our total inability to determine for each pair which is the “greater” member should strike the friend of the hedonic calculus as deeply troubling. In the absence of even the most rudimentary capability to draw comparisons, the suggestion that pleasure and pain are quantitative may be question-begging.

4.3. Criticisms of the Heterogeneity Argument

Ross claims that line 2 is false.²⁴⁸ the fact that pleasantness and painfulness are measurable quantities does not entail that for any two pleasures or pains, I am able to say which is the greater. The fact that mass is a quantity does not entail that, for any descriptions of any two massive objects, no matter how vague or incomplete the descriptions may be, I

²⁴⁸ Ross, p. 142.

can determine which of the two objects is the more massive. Nor does the fact that temporal duration is a quantity entail that for any two temporal intervals, I am capable of determining which is the longer. Since line 2 is the assertion that pleasantness and painfulness are not quantitative properties in virtue of an inability on our part to make precise determinations of the relevant amounts, the argument relies on an improper inference of a metaphysical conclusion from an epistemological premise.

It is also worth pointing out that the pleasures are under-described. The descriptions are particularly undetailed. One prominent reason I can't tell which is the hedonically greater member of each pair is that I am not given enough information to determine which it is. According to standard versions of the hedonic calculus, the magnitude of a pleasure is equal to its intensity times its duration. Neither piece of information is even hinted at in any of the above descriptions. And it is important to note that this is not a rhetorical trick on the part of the friend of the hedonic calculus; when this sort of argument is presented by philosophers who endorse it, it is presented in this manner, with this defect.²⁴⁹

It is possible that the request for intensity ratings is a question-begging demand. The very issue in discussion, whether pleasantness and painfulness are quantitative, depends crucially on whether the *intensities* of pleasures and pains are quantities, since their duration clearly is. It would clearly be question-begging to ask for *precise* intensity ratings for each pleasure or pain. The existence of precise intensity ratings is controversial; this is the very controversy I am attempting to resolve. But the existence of *imprecise* intensity ratings is not particularly controversial. Not all cases are tough, borderline cases. The pleasure of an orgasm is more intense than the pleasure of a bit of cold pizza. The pain of a hangnail is less intense than the pain of being stabbed in the stomach.

²⁴⁹ See Brentano, Korsgaard, and Rawls.

Perhaps the cases listed above, A through D, are tough, borderline cases. Since it is illegitimate to request impossibly precise information, requests for perfectly precise information about the intensity of each above-mentioned episode of pleasure or pain begs the question. I don't think that's what's going on in these cases, though. In these cases, we are given no information at all about their intensity or their duration. It is not question-begging to ask for the most precise possible information, and it is clear that the descriptions of the intensities of pleasure and pain that cases A through D represent are not as precise as they could possibly be.

There is an additional, verbal, problem here that results from the problem of interpersonal comparisons. Since it is impossible for one person to directly compare the intensities of his pleasures with the intensities of someone else's pleasures, it is impossible for any of us to develop a publicly usable vocabulary that would be of use to describe these intensities. So if the proponent of the heterogeneity argument were to describe A_1 as "Justin reading *Slaughterhouse-Five* at t_1 , while taking pleasure of intensity 8 in doing so," this would still not be particularly helpful to anyone else. Still less helpful would it be to describe the intensity as being "exactly similar to that associated with his watching of the Red Sox game at t_2 ." Although this description does not make an appeal to a mysterious number rating, it nevertheless compares it to an inaccessible standard. If the description were to compare the intensity of A_1 to, say, one of your pleasures, then it is unclear why we should be confident in the correctness of the comparison. Such confidence appears to beg the question.

But this is a deeper problem than the mere heterogeneity of the relevant pairs of hedonic phenomena. The heterogeneity problem is merely the problem that the pleasures are "too different" for accurate quantitative comparisons to be possible. It is not an attack based on the alleged vagueness of intensity itself, nor an attack based on the impossibility of

interpersonal comparisons.²⁵⁰ We might, therefore, wonder whether the argument from heterogeneity represents a genuine theoretical problem, or whether it is another practical objection, like the argument from interpersonal comparisons, and has a similar solution.

The problem of heterogeneity may merely be a practical problem, but I think even its practical force is illusory. I think that as long as the various different types of pleasure are legitimately pleasant, then there is no problem based on their various differences. However different they may be, as long as it makes sense to think of them as all being pleasant somehow, then they are all instances of the same quantitative phenomenon. This is where the attitudinal view of pleasure, which I argued for in chapter 2 can help us.²⁵¹ If we keep in mind that there is a distinction between the attitude of pleasure on one hand, and the *object* of the attitude on the other, we can see that however heterogeneous the objects of pleasure may be, they are nevertheless united insofar as they are the objects of *pleasure*. However various and sundry the objects of pleasure may be, they are all objects of the unitary attitude of pleasure. It's not the objects that are being compared with respect to their intrinsic pleasantness, but instances of the attitude of enjoyment, with respect to their intensity and duration.

5. Pleasure and Pain are not Amenable to Mathematical Operations

As we saw in chapters 3 and 4, if pleasure and pain are legitimate quantities measurable on a ratio scale, then there are a wide variety of mathematical operations applicable to numbers representing amounts of pleasure and pain. A final class of argument

²⁵⁰ Such attacks are legitimate, of course, and constitute the most serious problem for the thesis that pleasure and pain are quantities. I consider such an argument in the following section.

²⁵¹ Certain versions of the desire-based theory of pleasure share the key feature of the attitudinal view, so friends of that theory can help themselves to this solution to the heterogeneity problem.

against this thesis attempts to show that for a variety of reasons, even if there were numbers, these mathematical operations would be inapplicable. Pleasure and pain, therefore, are not quantities.

5.1. The Problem of Mathematical Amenability

The problem of mathematical amenability is this: if pleasure and pain were measurable on a ratio scale, then, by definition, it would be possible to perform various mathematical and statistical operations on numbers representing amounts of pleasure and pain. For example, it would be possible to add them together, and to subtract them from one another. It would also be possible to meaningfully and coherently express relationships between amounts of pleasure and pain in terms of ratios. It would be possible, that is, to say, truly, that one episode of pleasure contained twice as much pleasure as another episode; or that one episode contained a third as much pain as another.

But for a variety of reasons, it has been argued that it is not possible to perform these mathematical and statistical operations. In what follows, I will present a generic version of the argument. I will then explain several distinct reasons for thinking that its key premise is true. I will then explain why none of these purported rationales is a legitimate reason for believing the premise.

Argument from Mathematical Inaptitude:

1. If pleasure and pain are not amenable to the right kinds of mathematical operation, then pleasure and pain are not quantities.
2. Pleasure and pain are not amenable to the right kinds of mathematical operation.

3. Therefore, pleasure and pain are not quantities.

Line (1) is true in virtue of the meaning of the word ‘quantity.’ If some “stuff” is a quantity, then the stuff must come in “amounts” that meet certain formal constraints. The formal constraints are given in terms of the mathematical and statistical operations that can be performed on numbers representing the amounts. First, there must exist an ordering of the relevant items from least to greatest with respect to the quantity. The intervals on the scale must represent genuine intervals. Finally, there must be genuine ratios between the intervals. That is, the “amount” represented by the number ‘6’ must be two times the amount represented by the number ‘3.’ Since whether or not some “stuff” is a quantity is determined by its susceptibility to these sorts of mathematical operations, if some “stuff” is insusceptible to these operations, it is not a quantity. But why should we think that pleasure and pain are not susceptible to such measurement?

5.2. Linear Incomparability

John Hall discusses a pair of cases concerning toothaches:

Even where experiences are admitted to be ordinally comparable in respect to pleasantness... the difference e.g. in pleasantness between pairs of pleasures may be incomparable, so that while it is all right to say that to have two teeth aching is more painful than to have four, and that to have five teeth aching is more painful than to have four, it makes no sense either to assert or deny that it causes a greater lessening of pain to stop one tooth aching in the case of the man with two teeth aching than in the case of the man with five.²⁵²

²⁵² Hall, p. 38.

The point Hall is considering concerns interval measurement. Can units of pleasure and pain represent genuine intervals, or merely places in an order? If interval measurement is possible, then equations of the form can be true, where the variables stand for number assignments made on the relevant scale:

$$\text{i) } |A - B| >, <, = |C - D|$$

As we saw in chapter 3, an example of a merely ordinal scale is a race result. The “units” of the results are just spots in the order. They don’t represent batting *intervals*—there are no half-spots, no genuine intervals. A mapping of the variables of the above equation onto spots in a batting order yields nonsense:

$$\text{ii) } |2^{\text{nd}} - 1^{\text{st}}| = |4^{\text{th}} - 3^{\text{rd}}|$$

It doesn’t make sense to subtract numbers representing positions in an order from one another and compare the magnitudes of the results. “First minus second” is not equal to first. It does, however, make sense to subtract numbers representing intervals from one another and then to compare the magnitudes of the results.

Another example of a purely ordinal scale is the scale that measures degrees of consanguinity. X is a cousin of y if and only if x and y share a common ancestor, but x is not a descendent of y, and y is not a descendent of x. The ordinal degree of the cousinhood relationships is derived from the smallest number of generations separating the cousins from their common ancestor. So if my grandparents are your grandparents, then we’re first cousins. And if my grandparents are your great-grandparents, and I’m not your dad, then

we're first cousins, once removed. And if my great-grandparents are your great grandparents, and we're not first cousins, then we're second cousins. But again, it does not make sense to add or subtract degrees of consanguinity from one another. Equations like (ii) are nonsensical when the ordinal numbers are interpreted as degrees of consanguinity.

The Celsius scale of temperature is an example of a genuine interval scale. A mapping of the variables in the above equation onto numbers representing degrees Celsius is well-formed:

$$|34^{\circ} - 33^{\circ}| = |44^{\circ} - 43^{\circ}|$$

The result of the left-hand side of the equation is 1 degree. The right-hand side has the same result: one degree. One degree is equal to one degree. Degrees Celsius can be subtracted in this manner if and only if the Celsius scale is an interval scale, and when you have an interval scale, the substance it measures is a legitimate quantity.

Our question, then, is whether a hypothetical scale for the measurement of pleasure and pain would be amenable to interval measurement: would numbers taken from the scale and mapped onto the above equation schemas yield sense, or nonsense?

If the suggestion about toothaches is correct, then any attempted mapping of amounts of pleasure and pain into this schema yields nonsense. According to its proponent, "it makes no sense either to assert or deny that it causes a greater lessening of pain to stop one tooth aching in the case of the man with two teeth aching than in the case of the man with five."²⁵³ That is, the claim that the difference in pain represented by subtracting 1 unit of pain from 2 units is less than (or not less than) the difference represented by subtracting 4

²⁵³ Hall, p. 38.

units of pain from five units lacks a truth value, because it is nonsense.²⁵⁴ For example, suppose there are two men waiting in a dentist's office at time t . Adam has a toothache in two teeth, and Burt has a toothache in five teeth. Adam is called back and the dentist is able to cure one of Adam's toothaches, but not the other. Then Burt goes back to see the doctor. The dentist is able to cure four of his toothaches, but not the fifth. So at t_2 , each man has just one toothache.

The proponent of this line of argument is fine with the claim that Burt at t is in more pain than Adam is at t .²⁵⁵ The central claim here is that it makes no sense to compare the "lessening of pain." That is, while Adam is in less pain at t_2 than he was at t , and so is Burt, it makes no sense to say *how much less* each of them is in at t_2 , and to compare those amounts to one another. Suppose that '2' represents the amount of pain Adam is in at t ; that '1' represents the amount of pain Adam is in at t_2 ; that '5' represents the amount of pain Burt is in at t ; and that '1' represents the amount of pain Burt is in at t_2 . Now consider the following equations:

a) $5 > 2$

b) $1 = 1$ ²⁵⁶

²⁵⁴ This remark presumes a controversial view of the relationship between sentences and truth-values. I intend the assumption to be innocent; nothing in what I say here turns on the truth of this view.

²⁵⁵ Hall, p. 38.

²⁵⁶ Perhaps the proponent of this line of argument would argue that (b) isn't really true, on the grounds that it is nonsense to claim that Adam's pain at t_2 is precisely equal to Burt's pain at t_2 . Perhaps the most precise thing that could be said is that Adam's t_2 pain is *roughly equal* to Burt's t_2 pain. If that were the case, then (b) would be false, and (b₁) would be true: b₁) $1 \approx 1$. If (b) is false and (b₁) is true, I think what I have to say about this case will still apply. I discuss rough equality in more detail in section x.

$$c) |2 - 1| < |5 - 1|$$

Equation (a) says that the amount of pain Burt was in at t is greater than the amount of pain Adam was in at t . Equation (b) says that the amount of pain Adam was in at t_2 is equal to the amount of pain Burt was in at t_2 . According to Hall, the proponent of this line of argument believes that equation (a) is true, and Hall's remarks suggest that the proponent would accept equation (b), too (since pains are ordinally comparable, they are therefore able to occupy the same spot in the order). But equation (c) is problematic. It says that over the interval $t - t_2$, Burt had a *greater reduction* in pain than Adam did. According to the story, Adam had two toothaches and one was cured, leaving him with one toothache. Burt had five toothaches and four were cured, also leaving him with one toothache.

According to the proponent of this line of argument, although it makes sense to say that Burt was in more pain than Adam at t , and it makes sense to say that Burt and Adam were in the same amount of pain at t_2 , and it makes sense to say that Burt and Adam were both relieved of some pain, but it does not make sense to say that Burt was relieved of more pain than Adam. That is, equation (d) is nonsense:

$$d) |2 - 1| < |5 - 1|^{257}$$

Hall does not present any particular rationale in favor of this claim. It cannot just be that it is difficult in practice to discover and compare amounts of pain felt by different people, since the problem would be merely practical in nature, and would not threaten the truth-aptness or meaningfulness of claims about measurability of pleasure and pain. It would also reduce

²⁵⁷ $(2 - 1)$ represents the amount of pain of which Adam was relieved, and $(5 - 1)$ represents the amount of pain of which Burt was relieved.

the problem to a variant of the “interpersonal comparisons” problem previously discussed. I think it would be a mistake to suppose that this argument relies crucially on any practical problem.

In any case, it is not at all clear that this story is correct, or even coherent. The facts of the case are these: Burt is in more pain than Adam at t ; Burt and Adam are in equal (or roughly equal) amounts of pain at t_2 ; and Burt and Adam each underwent a reduction in the amount of pain he was experiencing between t and t_2 . These facts seem to me to entail that Burt was relieved of more pain than Adam was; the difference between Burt’s pain at t and his pain at t_2 is greater than the difference between Adam’s pain at t and his pain at t_2 . That is, if you’re willing to admit that Burt was in more pain than Adam at t , and that Burt and Adam were both relieved of some of that pain, and that by t_2 Burt and Adam were in equal (or roughly equal) amounts of pain, I can see no reason to deny that Burt’s relief was greater than Adam’s. So it seems that the truth of equations (a), (b), (c) entails the truth of equation (d).

5.3. Analogies to Temperature

Hall considers another type of rationale for the second line of the argument from mathematical inaptitude, which admits that pleasure and pain are susceptible to ordinal and interval measurement, but according to which addition and subtraction of numbers representing “amounts” of pleasure and pain is nevertheless impossible. This is accomplished by an appeal to an analogy with temperature. Suppose you have two bowls of water. Bowl A contains water at 50° C. Bowl B contains water at 60° C. If you were to mix bowls A and B together in bowl C, you would not end up with a bowl that contained water at 110° C. Moreover, with the information given so far, there is no way to determine just

what the temperature of the water in bowl C would be.²⁵⁸ Similarly, the proponent of this argument claims, even though pleasantness and painfulness can be measured according to an interval scale, it makes no sense to combine, aggregate, or otherwise “add together” the numbers representing the amounts of different pleasures and pains.

Another, similar, rationale for line 2 considered by Hall concerns the prospect of adding together the “feelings” of pleasure felt by two or more people. The proponent of this kind of argument concedes that there is an ordinal scale for the measurement of pleasure and pain, but denies that interval measurement is possible. Hall writes:

Smith might then be said to having or undergoing more pleasure at 3 o'clock than Jones, if he was characterized more strongly by the emotion or feeling which *pleasure* is supposed to denote. But here again we are dealing with a quality: it would still make no sense to add the degrees of emotion (as measured on some scale) characterizing Smith to the degrees characterizing Jones than to add their respective body temperatures as measured in degrees Fahrenheit.²⁵⁹

Suppose Smith is standing by himself in a room, with a body temperature of 98.6° Fahrenheit. Suppose that Jones joins him there, and that Jones's body temperature is also normal, at 98.6° Fahrenheit. It is clear that they do not compose a third object, Smith-and-Jones, whose temperature is 197.2° Fahrenheit.²⁶⁰

According to the proponent of this kind of argument, the supposition that there is a similar aggregation of Smith's pleasure with that of Jones makes equally little sense. Even if it's true that Smith is experiencing more pleasure than Jones, and even if it's true that Smith and Jones are each feeling some determinate amount of pleasure, it is nevertheless not the case that adding the pleasure felt by Smith to the pleasure felt by Jones yields a third, determinate amount of pleasure.

²⁵⁸ Hall, pp. 38-9.

²⁵⁹ Hall, p. 39.

²⁶⁰ For a related argument, see MacKenzie, p. 206.

These analogies are faulty for a variety of reasons. One is that the fact that temperatures cannot be simply added together in the manner described has no bearing on whether other quantities, unrelated to temperature, can be added in this manner. Units of length, mass, volume, electrical resistance, and others can be sensibly added in a straightforward manner. Numbers expressing the temperatures of two bowls of water cannot be added together in this manner because these numbers represent the *average* temperatures of the bowls, not the *magnitude* of the temperatures of the bowls. That is, the temperature of the bowl represents heat divided by the volume of the water, not the total amount of heat contained in the bowl.

Furthermore, although it is not possible to discover the temperature of bowl C, this is only because the information given in the story is insufficient. In order to discover the temperature of bowl C, we need to know the volumes of bowls A and B. Once we know those volumes, it becomes easy to determine the temperature of bowl C. The example simply does not contain the necessary information. The objection, then, is that there *is* a way to determine the temperature of the “combination” of bowls A and B, we just need more information, because temperatures cannot simply be added, because the quantity, temperature, is derived from two other quantities and a mathematical operation: heat energy divided by volume. Bowl C contains the heat energy in bowl A plus the heat energy of bowl B, but it also contains the volume of bowl A plus that of bowl B. So in order to determine the temperature of bowl C, you must add the amounts of heat energy in the two bowls, then add their volumes, and then divide the heat by the volume. That will yield the temperature of bowl C. So although temperature is a quantity, it is a derived quantity. This causes problems

for some straightforward applications of the addition function to numbers representing temperatures.²⁶¹ It does not affect the fact that temperature is a quantity.

These facts provide an important way to resist the analogy of “degrees” of pleasure and pain to degrees of temperature is specious. Temperature in degrees Fahrenheit, whether it is of bowls of water or human bodies, is an average of two factors: heat and volume. Temperature is determined by dividing heat energy by volume.²⁶² Pleasure and pain are not like that. On standard versions of the hedonic calculus, amounts of pleasure and pain are determined by two factors: intensity and duration. But intensity is not divided by duration, it is *multiplied*. It’s not an average, that is, it is a two-dimensional *area*. This fact entails that amounts of pleasure can be sensibly added together, and that the result of such an operation is itself an amount of pleasure.

The second analogy is faulty, as well. Although there is no sense in which Smith and Jones’s combined bodily temperature is 197.2° Fahrenheit, there is a sense in which, if it makes sense to talk about “degrees” or “amounts” of pleasure at all, Smith and Jones taking pleasure in something involves “more pleasure” than if just Smith were pleasure pleasure. As we saw, the temperature of a bowl of water, or of a human body, is an average of heat over volume. Pleasantness and painfulness are not averages. However, there is a clear sense in which the amount of heat energy in the room doubles when Jones walks into it. This is true even if the temperature of the room remains in equilibrium. Jones’s body is a metabolic furnace; it uses fuel and produces energy. Some of that energy is radiated in the form of heat. The amount of heat being radiated in the room doubles when Jones enters, and the fact that

²⁶¹ Not all straightforward applications of addition, though. Adding (or subtracting) heat energy *without* also simultaneously adding volume yields no addition problems.

²⁶² According to a standard reduction, temperature of a sample is its “mean kinetic molecular energy.” That is, it is the average degree to which the molecules of the sample are moving.

the temperature of the room does not rise²⁶³ is irrelevant, because temperature is not equivalent to heat, it is heat divided by volume.

Similarly, suppose you have a basement room with a hot-water heater in it. Suppose the temperature of the room is a constant 50° F. Now suppose you want to increase your hot-water output, so you add another hot-water heater to the room, identical to the first. The temperature of the room will not double. It's possible that the temperature of the room would so negligible as to be undetectable, if the heaters were very well insulated. But just as surely, *something* doubles. The amount of hot water, for one thing. The amount of heat energy will nearly double, as well (accounting for the ambient heat energy in the room, in virtue of which the temperature is 50° F). The friend of the hedonic calculus argues, plausibly, that hedonic phenomena are like the hot water in the scenario. Hedonic phenomena are not like the temperature of the room.

The root of the problem here is the admission by the proponent of the argument that pleasantness and painfulness are measurable on an ordinal scale. Once ordinal degrees of pleasure and pain have been recognized, intervals follow. There is a disanalogy between the cases of pleasure and pain and the paradigm instances of merely ordinal measurement. There are natural "spots," or places, in batting orders and cousin relationships. Batters come up to bat in a particular order; there are no half-spots, quarter-spots, or no continuum. A batting order is made up of discrete places. Degrees of cousinhood are similarly discrete. The degrees depend on the number of generations between the shared ancestor and the nearer of the two cousins to that common ancestor; successive generations are similarly discrete. There are no corresponding natural "spots" or places in the (admittedly) ordinal scale of

²⁶³ Of course, this isn't quite accurate. The temperature of the room would have to rise, at least a little. There are now two furnaces in it, rather than just one. Perhaps the rise would be too slight to register on any but the most sensitive of thermometers.

feelings or attitudes of pleasure and pain. These feelings or attitudes make up a continuum, which entails that the relevant quantity is not merely ordinal in nature, but admits of intervals as well.

5.4. A Problem Concerning Aggregation

Another possible rationale for line 2 begins by conceding the point that pleasure and pain come in determinate degrees; the problem is that these degrees cannot be meaningfully subtracted from one another in the way demanded by, for example, standard hedonic versions of utilitarianism.

Suppose, for example, that I take pleasure to degree 5 in the drinking of a cup of coffee at time t . Suppose further that I take displeasure or pain to degree 3, measured on the same scale, in the dreariness of the day outside my window at t . The proponent of this line of reasoning claims that there is no sense in which my overall hedonic state is “+2” at t , because there is no composite object to which I am taking $(5 - 3)$ degrees of pleasure in at t . Although units of pleasure and pain are supposed to be identical in magnitude but opposite in sign, the proponent of this argument claims that there is no sense in subtracting numbers representing pain from numbers representing pleasure.²⁶⁴

To see why, suppose that I am 5 feet from the door to my office at t . Suppose further that I am 3 feet from the filing cabinet in my office, but in the opposite direction. Although there exists a dimension along which my door is “+5” feet from me and my filing

²⁶⁴ Hall, p. 40. According to Hall, the suggestion that it does make sense to add pleasures and pains in this way is related somehow to the suggestion that pleasure and pain are attitudes, not feelings.

cabinet is “-3” feet from me, there is no composite object, the “door & cabinet” such that I am “+2” feet from the composite object.²⁶⁵

Although spatial length is clearly measurable along a ratio scale, it nevertheless does not have the characteristics necessary to support a spatial analogue of the hedonic calculus. This casts doubt on the claim that if pleasure and pain were ratio measurable, then they would have the necessary characteristics. Perhaps pleasure and pain really are precisely measurable on a ratio scale; even so, perhaps there is no way to give sense to their being amenable to addition to and subtraction from one another.

Although spatial distance is a ratio-measurable quantity, it does not behave in the manner predicted by analogy to a robust hedonic calculus. Although it makes sense to subtract the distance between my body and the door from the distance between my body and the filing cabinet, and it is clear why we would be willing to say that the result of that subtraction operation is “+2 feet,” it is also quite clear that it does not follow that there is any object such that I am 2 feet from it. It does not make sense to conclude that I am 2 feet from the door and cabinet combined. It does not make sense to conclude that there is any object such that I am 2 feet from it.

This line of argument is no better than its predecessors. For one thing, space is three dimensional; the pleasure/pain scale is one-dimensional. This casts doubt on the analogy between spatial distance and the hedonic attitudes because it is impossible to translate the three-dimensional spatial matrix into a two-dimensional “greater/less than” scale without a great deal of distortion or loss of information. Drawing three dimensional graphs, with x, y, and z axes, on a two-dimensional piece of paper always involves distortion of the image, provided that the image is genuinely three-dimensional. There is no reason to suppose that

²⁶⁵ Hall, p. 39.

the one-dimensional hedonic number line would behave in a way analogous to a three-dimensional spatial matrix.

The line of argument also fundamentally mischaracterizes the hedonic calculus. It relies on a confusion concerning how pleasures and pains are to be aggregated. The theory that pleasure and pain are ratio-measurable along a single scale does not have the consequence that, in the scenario described above, there is a single object toward which I take 2 units of pleasure, just as there is no single object I'm 2 feet away from in the spatial case. The essential core of the hedonic calculus, as Bentham first intended it and others improved upon and refined his original idea, is that it makes sense to consider "a lot" of pleasure and pain "en masse." The idea is not that when I take pleasure of intensity n in the taste of coffee but simultaneously take pain of intensity m in the dreariness of the day, there is some third object, an aggregate of the coffee flavor and dreariness, such that I take pleasure-pain of intensity $(n \text{ minus } m)$ in it. The idea is that both my enjoyment of the coffee flavor and my pain in the burning sensation contribute to the overall "enjoyability" of the two things for me. The pleasure I take in the flavor of the coffee is relevant to how much enjoyment I'm getting overall, but so is the pain. And that is so even though there is no single object of my pleasure-and-pain.

Denying this quickly leads to a series of absurdities. For example, recall MacKenzie's denial that duration makes a difference with respect to the quantity of pleasure. It follows, then, that given two pleasures, A and B, such that A and B have intensity n , but where A lasts for 5 minutes and B lasts for 10, it is not the case that B contains or represents a greater amount of pleasure than A. But there is a difference: B contains double the pleasure of A. If I had a choice between A and B, and I wanted to choose whichever I would enjoy most, I should choose B. Given equal intensity, the longer pleasure is the more pleasant.

Similarly, given two pleasures, A and B, such that A and B have a duration of 10 minutes, but where A is more intense than B, a follower of MacKenzie might suggest that that A and B are nevertheless hedonically equivalent. But it is clear that, given a choice between A and B, and given that I want to choose whichever I would enjoy the most, I should choose A. Given equal duration, the more intense pleasure is the more pleasant.

6. Draining Water From the Pool

The spatial-distance analogy suggests another, closely related argument against the hedonic calculus, based on the idea that considering aggregates of pleasures and pains must be based on a mistaken idea about how “adding” pain to a state of affairs affects the amount of pleasure contained in it. In particular, the idea that adding pain is equivalent to *subtracting* pleasure might be thought dubious. Consider, for example, the following states of affairs:

State of affairs A: Justin takes pleasure to degree one for five minutes in drinking coffee.

State of affairs B: Justin takes pleasure to degree one for seven minutes in drinking coffee, and takes pain to degree 2 for one minute in a burning sensation on his tongue.

An argument based on this example could be stated in the following manner:

The Subtraction Argument

1. If what Bentham et al. say about a lot of pleasure is correct, then state of affairs A contains the same amount of pleasure as state of affairs B.
2. It's not the case that state of affairs A contains the same amount of pleasure as state of affairs B.
3. Therefore, it's not the case that what Bentham, et al. say about a lot of pleasure is correct.

Line 1 is supposed to be true because Bentham advocated a hedonic calculus according to which the total amount or “net quantity,” of pleasure in a state of affairs is equal to the sum of the amounts of pleasure contained in each episode of pleasure in the state of affairs, minus the sum of the amounts pain contained in it.²⁶⁶ So to determine the net quantity of pleasure in a state of affairs, take all of the individual pleasures it contains, and add them together. Then take all of the individual pains the state of affairs contains, and add them together. Finally, subtract the total amount of pain in the state of affairs from the total amount of pleasure. Net pleasure is a difference of sums. Adding pain into a state of affairs has an identical net effect to that of subtracting pleasure.

Line 2 is true because of the way the situations are described. According to the story, situation A contains 5 units of pleasure, and situation B contains 7 units of pleasure. In situation B, 2 of the units are “offset” by units of pain. According to the proponent of this argument, the two states of affairs nevertheless contain different amounts of pleasure. It's not the case that the 2 units of pleasure are destroyed or somehow removed from consideration by the pain. Adding some pain to the state of affairs does not reduce the amount of pleasure contained in it. The amounts of pleasure and pain contained in a state of

²⁶⁶ Bentham, pp. 19-22.

affairs are independent of one another. Adding some pain to some pre-existing pleasure is not the hedonic equivalent of draining water out of the pool. That is adding something, not taking anything away. Adding pain does not obliterate pleasure; adding pleasure does not annihilate pain.

The argument is unsound because line 1 is false. It relies on a confusion about the distinction between different ways of calculating the amount of pleasure in a state of affairs. Although situation B contains more gross pleasure than situation A, the two situations contain the same amount of net pleasure. Once this difference is seen, it is clear how state of affairs B contains more pleasure than state of affairs A—more gross pleasure—but is nevertheless is also equal to state of affairs A with respect to pleasure—net pleasure. That is, although B contains more pleasure than A does, that extra pleasure is offset by the presence of the pain that is present in B but not in A.

CHAPTER VII

ARGUMENTS IN FAVOR OF THE THESIS THAT PLEASURE AND PAIN ARE QUANTITATIVE

1. Introductory Remarks

There are three main kinds of arguments in the literature for the thesis that pleasure and pain are quantitative. The first class of arguments are merely question-begging assertions of the controversial contention that pleasure and pain are measurable quantities. Another class of arguments are defensive: they argue that the thesis that pleasure and pain are quantitative is not ruled out by some admitted practical inability on the part of normal humans. A third group of arguments, by contrast, argues that there is some mathematical operation such that it makes sense to apply it to the case of pleasure and pain, and that this could be true only if pleasure and pain are quantitative.

2. Sidgwick: An *A Priori* Assumption

Sidgwick's remarks in his article "Utilitarianism" presume that pleasantness is sensory in nature and is quantitative:

...Pleasure cannot be distinguished from Happiness, except that Happiness is rather used to denote a sum or series of those transitory feelings each of which we call a pleasure... Utilitarians have always treated pain as the negative quantity of pleasure. So that, strictly speaking, Utilitarian right conduct is that which produces not the greatest amount of pleasure on the whole, but the greatest surplus of pleasure over pain, the pain being conceived as balanced against an equal amount of pleasure, so that the two mutually annihilate each other for the purpose of ethical calculation.

...It is assumed that all pleasures are capable of being compared quantitatively with each other and with all pains—that every kind of feeling has a certain intensive quantity, positive or negative (or perhaps zero), in respect of preferableness or desirableness, and that this quantity can be known...²⁶⁷

In this passage, Sidgwick's language indicates that he assumes, without argument, that pleasure and pain are quantities. Expressions such as 'sum,' 'negative quantity,' 'greatest amount,' 'greatest surplus,' 'equal amounts' being 'balanced,' and 'ethical calculation' are clearly quantitative, but Sidgwick does not provide any independent reasons for thinking that pleasure and pain instantiate these quantitative properties.

In *Methods of Ethics*, Sidgwick provides a little more in the way of argument for his views. His claim is that although we cannot empirically verify that pleasures all have a definite degree of intensity, we are justified *a priori* in making the assumption:

...if pleasure only exists as it is felt, the belief that every pleasure and pain has a definite intensive quantity or degree must remain an *a priori* assumption, incapable of positive empirical verification. For the pleasure can only have the degree as compared with other feelings, of the same or some different kind; but, generally speaking, since this comparison can only be made in imagination, it can only yield the hypothetical result that if certain feelings could be felt together precisely as they have been felt separately, one would be found more desirable than the other in some definite ratio. If, then, we are asked what ground we have for regarding this imaginary result as a valid representation of reality, we cannot say more than that the belief in its general validity is irresistibly suggested in reflection on experience, and remains at any rate uncontradicted by experience.²⁶⁸

Sidgwick argues that although we cannot empirically verify that this pleasure is a "5" whereas that one is a "7"—there is no such thing as a hedonometer, unfortunately—nothing in experience contradicts the hypothesis that pleasures and pains are quantitative, and we are justified *a priori* in making the assumption that they are quantitative.

²⁶⁷ Sidgwick 1907, pp. 4 – 5.

²⁶⁸ Sidgwick 2000, p. 146.

3. Socrates: Everyone Wants to Maximize Pleasure

Another early discussion of the quantitative properties of pleasure and pain occurs in Plato's *Protagoras*. Plato's project in the final section of this dialogue is to propose and defend a version of hedonism about welfare value that explains why people sometimes appear to be incontinent, but which is compatible with Socrates's overall position that because incontinent or weak-willed behavior is psychologically impossible, no one is ever actually incontinent.

...the argument becomes ridiculous when you say that a man frequently knows that evils are evils and nonetheless does them when it's possible not to do them, because he's driven and distracted by pleasures...²⁶⁹

He distinguishes intrinsic goodness and badness from extrinsic goodness and badness, and argues that pleasures are good in themselves, apart from their effects, and pains are bad in themselves, apart from their effects. The theory appears to be a version of what Moore called "definism"—that 'pleasant' and 'good' are equivalent in meaning.

That this [the claim that it is possible for an agent to perform an action he knows to be sub-optimal] is ridiculous will be evident if we stop using many names at once—pleasant and painful, good and evil. On the contrary, since they've appeared to be two, let's call them by two names: first, good and evil; alternatively, pleasure and painful...²⁷⁰

...like a man good at weighing, add the pleasures, add the pains, balance also in the scale the near and the far, and state which is more. For if you weigh pleasures against pleasures, the greater and more numerous must always be taken; if pains against pains, the fewer and smaller; if pleasures against pains, then if the pains are exceeded by the pleasures, whether the near by the far or the far by the near, the action in which they're present must be done; if the pleasures are exceeded by the pains, it's not to be done.²⁷¹

²⁶⁹ Plato, *Protagoras*, p. 355b.

²⁷⁰ Plato, *Protagoras*, pp. 355b – c.

²⁷¹ Plato, *Protagoras*, pp. 356b – c.

...Since then the salvation of life has appeared to us to consist in the right choice of pleasure and pain—more and fewer, greater and less, nearer and farther—doesn't it in the first place appear to be an art of measurement, an inquiry into excess and deficiency and equality relative to one another?²⁷²

In the first and second passages, Socrates argues that the claim that people sometimes know that their actions are evil but do them anyway because they are distracted by immediate pleasure is ridiculous. The argument is that people are confused by the use of two sets of names for the same things: pleasantness is just another name for goodness and painfulness is just another name for evilness. Once this is recognized, it is hard to see how the confusion could be sustained, according to Socrates.

In the third passage, Socrates appears to propose an axiological theory: pleasures that are more numerous and greater (in magnitude?) are better than pleasures that are less numerous and smaller. Similarly, pains that are less numerous and smaller are better than pains that are more numerous and greater.

If Socrates's remarks in the fourth passage are true, then pleasure and pain are measurable quantities: he claims that pleasures and pains have relationships of "excess and deficiency and equality relative to one another." That is, there exists between any two pleasures either a greater than relation, a less than relation, or a relation of equality. If that's the case, then pleasure is a quantity. Presumably pain is, too. Socrates's remarks suggest the following argument, though I think it is clear that the argument is not contained in the text.

Everyone Maximizes Pleasure Argument

1. Everyone always tries to maximize pleasure and minimize pain.

²⁷² Plato, *Protagoras*, pp. 357a – b.

2. If (1), then pleasure is a quantity
3. Therefore, pleasure is a quantity

The first premise is supposed to be true because, according to Socrates, ‘pleasure’ and ‘pain’ are synonymous with the evaluative terms ‘good’ and ‘bad,’ respectively.²⁷³ Therefore, it follows that whenever anyone evaluates a possible course of action, he is thereby considering the amount of pleasure and pain it would generate. Socrates appears to take as a datum that everyone always tries to do what is best, all things considered.²⁷⁴ “Like a man good at weighing,” he says, “add the pleasures, add the pains, balance also in the scale the near and the far, and state which is more. If you weigh pleasures against pleasures, the more numerous and the greater must be taken; if pains against pains, the fewer and smaller;” and so on. Protagoras does not deny it.²⁷⁵

The Second premise is supposed to be true because “maximizing” and “minimizing” are quantitative notions. I understand maximization and minimization in the following way:

X *maximizes* F =df no alternative to x is greater with respect to F than x is.

X *minimizes* F =df no alternative to x is less with respect to F than x is.

If something is maximal—if nothing is greater than it—then it must be maximal with respect to some quantity. Similarly, if something is minimal—nothing is less than it—then it must be minimal with respect to some quantity. Both concepts make essential reference to

²⁷³ Plato, *Protagoras*, pp. 355a – c.

²⁷⁴ See Plato, *Protagoras*, pp. 356c – 358d.

²⁷⁵ Plato, *Protagoras*, pp. 356a – c .

quantitative relationships; maximization presupposes ordinal measurement, since, as we saw in chapters 3 and 4, ordinal measurability is a necessary condition for the determining of which of several alternatives is at least tied for first place, which is definitive of maximization. Anything that could possibly deserve to be called “maximization” must make some reference to *being greater than*.²⁷⁶ Though Socrates does not tell us what features of pleasures make them greater or less in size, or what determines their relationships of excess, deficiency, and equality, some of his remarks provide hints. He asks, rhetorically, what inequality in “weight” of pleasure and pain consists of, and answers that “becoming larger and smaller than each other, more numerous and fewer, more frequent and less.”²⁷⁷

As an argument designed to show that pleasure and pain are legitimately quantitative, the EMPA is hopeless. Its first premise is clearly question-begging. In his discussion with Protagoras, Socrates presumes, but does not argue for, the thesis that pleasure and pain are the sorts of things that could sensibly be maximized or minimized. I do not think this is a defect in Socrates’s discussion—Socrates’s aim is to explain what is going on when people appear to display weakness of will. On his view, weakness of will is impossible, but apparent instances of it are not to be explained away by ignorance or a failure to adequately consider the relevant consequences. According to Socrates, apparent instances of incontinence are to be explained in terms of an error in measurement. Objects generally seem larger when they are more near, and smaller when farther away. Pleasures and pains are no different—they loom larger when they are nearer in time, and seem less significant when they are more

²⁷⁶ Furthermore, maximization of *hedonic utility* presupposes interval measurement. This is because hedonic utility is calculated by finding net total pleasure and net total pain, and then subtracting net total pain from net total pleasure. This subtraction operation, as we saw in chapter 2, makes sense only if there are genuine intervals. So although maximization *per se* presupposes ordinal measurement, the calculation of hedonic utility presupposes interval measurement.

²⁷⁷ Plato, p. 355d.

distant. This distorting effect of proximity, and not ignorance or weakness of will, sometimes causes people to make poor decisions.²⁷⁸

While this is interesting, it is not particularly valuable for our purposes, since Socrates's remarks merely beg the question. Socrates provides no independent reason for thinking that pleasure and pain are quantitative—he merely assumes that they are quantitative for the purposes of showing that a certain class of actions are psychologically impossible.

4. Ross: Precise Intensities

According to Ross, pleasures have a precise degree of intensity. If one pleasure is more intense than some other pleasure, then there is some definite, precise amount of intensity such that the first is more intense than the second by that amount.²⁷⁹ This may be exactly equal to the intensity of the second pleasure; if that's the case, then the first is twice as intense as the second. Ross seems to rely on the intuitiveness of this claim for justification. He writes:

...if we compare two comparatively simple and comparatively similar pleasures recently experienced, we may have no difficulty in seeing one to have been more pleasant than the other; and this is enough to show that pleasures have different intensities. If we proceed from these to others that are more complex or less similar or were experienced less recently, it is plain that there is no point at which we can

²⁷⁸ Plato's discussion of this topic is remarkable, if not for the cogency of his solution to the problem of weakness of will, then for the degree to which his solution anticipates the ideas Bentham would articulate over two thousand years later. Although Socrates makes no attempt to link pleasure and pain to moral obligation and permission, and does not attempt to catalog the features that determine the amount of pleasure or pain an episode contains, he comes very close to saying that nature has placed mankind under the governance of two sovereign masters, pain and pleasure. The extent to which he anticipates the central tenets of Bentham's Felicific Calculus is uncanny. Although Socrates has not given us any particularly good reason for thinking that pleasure and pain are quantitative, it is nevertheless worthy of discussion in this context.

²⁷⁹ Ross, p. 143.

stop and say, some pleasures are in their nature comparable and others are not. The truth is that pleasures have the only characteristic on their side that is necessary to comparability, viz. difference of intensity; but that some of the conditions on our side which would enable us to compare them are often lacking.

If this is clear, we may next argue that pleasures are commensurable, i.e. that one pleasure may not only be more intense than another, but may be, say, just twice as intense. This surely follows from our previous conclusion. For if one pleasure is more intense than another, it must have a definite amount of extra intensity. ... the difference between the intensity of two pleasures is an amount of intensity, and of course a definite amount. And this may be exactly equal to the intensity of the less pleasure; and if so, the greater pleasure is just twice as great as the less.²⁸⁰

Ignoring some terminological infelicities, if Ross's remarks are correct, then pleasure and pain are quantitative phenomena, measurable on a ratio scale. He complains that most philosophers who care to argue against the thesis that pleasure and pain are quantitative do so by pointing out that there exist pairs of episodes of pleasure or pains such that it is difficult or impossible in practical situations to determine which is hedonically greater than the other. Ross correctly points out that the thesis that pleasure and pain are quantitative is compatible with the existence of epistemic difficulties involved with making determinations of the actual quantitative relationships. That is, the fact that pleasure and pain are quantitative does not entail that we can discover, for any pair of hedonic episodes, which is hedonically greater. Ross mentions cases in which the relevant episodes are distant in time, or were particularly long-lasting, as examples of especially difficult hedonic comparisons.²⁸¹

Nonetheless, Ross claims that there are clear cases in which it *is* possible to make the relevant quantitative comparisons, and that this is enough to show that pleasure and pain are legitimately quantitative. Once we admit that pleasantness is quantitative in one instance, there is no non-arbitrary place to draw the line—if A and B are both simple and recent enough to be amenable to quantitative comparison, and A is clearly greater than B, then no

²⁸⁰ Ross, pp. 142 – 3.

²⁸¹ See also chapter 3, section 4 for a more detailed treatment of this sort of argument.

amount of added complexity or temporal distance could possibly serve to disrupt the fact that A bears some quantitative relationship to B. If there is no non-arbitrary way to distinguish between those pairs of episodes of pleasure or pain that stand in quantitative relationships to one another and those that stand outside the network of quantitative relations, then every episode of pleasure or pain stands in some quantitative relationship to every other episode. The epistemological fact that we are often not appropriately positioned to carry out the comparisons does not provide evidence in favor of the metaphysical conclusion that there are no facts of the matter.

Furthermore, Ross argues, if A is more pleasant than B—if A is greater than B with respect to pleasantness—then A must be more pleasant than B by some precise amount. “For if one pleasure is more intense than another,” he claims, “it must have a definite amount of extra intensity.”²⁸² Ross denies that pleasure and pain are susceptible to vagueness—that is, that quantitative relationships with respect to hedonic phenomena admit of borderline cases.

Ross’s argument could be stated in the following way:

1. Every instance of pleasantness or painfulness has a precise degree of intensity.
2. If every instance of pleasantness or painfulness has a precise degree of intensity, then pleasure and pain are quantitative.
3. Therefore, pleasure and pain are quantitative.

²⁸² Ross, p. 143.

Line 2 is correct. If every instance of the attitude²⁸³ of pleasure or pain has a precise intensity, then in principle it is possible to compare any pair of them. For any two pleasures, either one would be greater than the other, or they would be precisely equal. As Broome points out, rough equality and incomparability are borne of indeterminacy. If all pleasures have a precise degree of intensity, then there is no indeterminacy. If there's no indeterminacy, then there's no incomparability or rough equality.

But although the second premise is true, the first is basically undefended. One consideration Ross brings to bear is an *ad hominem* against philosophers who deny that pleasure and pain are quantitative, but who believe pleasure to be of even the slightest moral relevance. According to Ross, all plausible moral theories claim that pleasure and pain are of at least some moral relevance.

It is clear, however, that this is not enough. Ross is using the intuitive fact that pleasure and pain have varying degrees of intensity as the sole basis for inferring that these degrees of intensity are *precise*. This clearly does not follow. The existence of a few paradigmatically clear cases in which one episode of pleasure is more intense than the other is clearly consistent with it's being the case that, in general, hedonic intensity is imprecise—too vague for claims of quantitativity to be well supported. Take, for example, the following three episodes of pain:

A: Justin taking pain in being waterboarded over interval t_1 - t_2 .

²⁸³ For reasons I discuss in the introductory chapter, I have set this discussion in the parlance of the attitudinal view of pleasure and pain, in spite of the fact that Ross accepted a view according to which pleasure and pain are sensory in nature. This is because I am interested less in Ross's actual views and more in whether Ross's remarks can be interpreted as a reason to think that the propositional attitudes of pleasure and pain are quantitative.

B: Justin taking pain in his experience of the sensation of having stubbed his toe over interval t_1 - t_2 .

C: Justin taking pain in his experience of the sensation of moderate nausea over interval t_1 - t_2 .

Although I've never been waterboarded, it is clear that the unpleasantness associated with that form of torture is far more intense than that associated with stubbing one's toe, or moderate nausea—unpleasant as they may be. But it is not clear that the unpleasantness associated with stubbing one's toe is more intense than the unpleasantness of moderate nausea, or vice versa. Nor is it clear that the two episodes are of equal intensity. If that were the case, perhaps it is indeterminate which of the three quantitative relationships holds between the pain associated with episodes B and C—whether B is greater than C, C is greater than B, or B is equal to C—and nothing that Ross has said is inconsistent with there being no fact of the matter. Ross's key premise, that there exist cases in which it is obvious that one episode of pleasure is dramatically more intense than another, could be true even if, in more typical cases, there is no fact of the matter which of two episodes of pleasure or pain is the more intense. This could happen in cases in which the two episodes are not so dramatically different and there is some imprecision or vagueness associated with their intensity levels. The fact that each episode has an intensity does not entail that there is a precise degree of intensity that is either greater than, less than, or equal to that of every other episode. If intensity is suitably vague, there may be no fact of the matter as to which episode of pain is more intense in a wide, central range of cases.

This response to Ross's argument raises some questions about the applicability of the standard trio of quantitative relationships to alleged quantities of pleasure and pain.²⁸⁴ The problem is that if there were vagueness or indeterminacy concerning just how intense various episodes of pleasure are, then pleasure and pain would fail to be quantitative. This apparent failure could be the result of vagueness, or of our epistemic limitations. If the indeterminacy is sufficient to bring about failures of the three quantitative relations to hold, this would be a serious problem for the thesis that pleasure and pain are quantitative. If that were the case, then pleasure and pain would not be precise enough to count as legitimate quantities, and Ross has not ruled out this possibility.

5. Rashdall: Heaps of Pleasure And Pain

The arguments of the previous sections leave us with a problem: given admitted difficulties concerning our knowledge of the intensity levels of our own episodes of pleasure and pain, any confidence that there really are such levels is suspect. Given that attitudes of pleasure and pain are mental states, the fact that in a certain range of cases we can't know what the relevant intensity ratings are undermines the thesis that any such ratings exist. That is, our inability to know just how intense the relevant attitudes are, the fact that our knowledge of them seems sketchy and incomplete at best and totally nebulous at worst, suggests that there might not be any such ratings of a sufficient level of precision. Hastings Rashdall addresses this problem, drawing an analogy between the case of pleasantness and the case of grains of sand in a heap. He says that we can certainly know of two heaps of sand which is the larger, even though we can't know by how many grains. "The fact," he says,

²⁸⁴ Or, rather, to quantities of intensity of pleasure and pain. It is clear, however, that if the trio fails to apply to the intensity of pleasure and pain, then *a fortiori*, it fails to apply to pleasure and pain themselves.

“that we can have a very decided and well-grounded opinion that one total is larger than the other total, while any attempt to express our comparative estimate by numbers would be the wildest and most unprofitable guess-work, does not affect the question. The difficulties in the way of the exact mensuration of pleasures seems to be more to be practical rather than theoretical.”²⁸⁵

1. There is a precise quantity of grains in any given heap of sand, whether or not we know what the quantity is.
2. If (1), then it is possible for there to be a precise quantity of pleasantness in any given episode of pleasure, whether or not we know what the quantity is.
3. Therefore, it is possible for there to be a precise quantity of pleasantness in any given episode of pleasure, whether or not we know what the quantity is.

The idea here is that precise quantities might exist in the world even if we can't know precisely what they are. The argument is really that our inability to have precise knowledge of the quantity of pleasantness in a pleasure is not an argument that there are no precise quantities of pleasantness. Rashdall illustrates this idea with an analogy between amounts of pleasure and the amount of sand in a heap—our inability to know the number of grains of sand, even after undertaking as complete an inspection as is practically possible, is not evidence that there is no precise number of grains, therefore we should not take our inability to determine the precise amount of pleasure in an episode as evidence that there is no precise amount.

²⁸⁵ Rashdall, p. 376.

However, line 2 is clearly false, because the analogy is suspect. Heaps of sand are clearly mind-independent; episodes of pleasure and pain are obviously not. We have introspective access to our own attitudes of pleasure and pain in a way that we have no access to the amount of sand in any heap. Although there are controversies concerning the nature, scope, and justificatory status of our knowledge of our mental states, all orthodox self-epistemological theories hold that our knowledge of our own mental states is privileged and authoritative, though not infallible. Although difficulties surrounding our knowing precisely how intense our episodes of pleasure are may not be fatal, this response is completely inadequate—Rashdall merely points to the obvious fact that there are things we can't know, and leaves it at that. But we're supposed to be able to know about our own mental states; we're supposed to be uniquely epistemically situated to know about them. That we find it difficult to ascertain the intensity ratings of various pleasures and pains is puzzling, given these epistemic facts, and must be explained.

One possible explanation is that the relevant intensity ratings exist, but we lack an adequate vocabulary and requisite knowledge of other minds necessary to express them. There are several potential reasons for lack of self-knowledge of the precise intensities of pleasure and pain that are consistent with there being precise intensities. For one, as we saw in the previous chapter, there is a significant practical problem surrounding interpersonal comparisons of pleasure and pain. Though this problem does not have a direct impact on the theoretical thesis that pleasure and pain are quantitative, it nevertheless creates a serious obstacle to the development of a vocabulary that could be used to describe episodes of pleasure or pain in any precise or useful way. But it is worth emphasizing that this problem is practical in nature, not theoretical. It is a problem for those who would attempt to precisely

characterize episodes of pleasure and pain; it does not suggest that there are no relevantly precise facts of the matter.

Secondly, pleasure and pain are genuinely ephemeral. As Sidgwick points out, and we discussed in the previous chapter, it is hard to “get a grip” on them. Furthermore, pleasure and pain are distracting. It is easy to forget to think about precisely how intense some episode of pleasure or pain is, in the heat of the moment, while one is undergoing it. This imposes a further difficulty on determining precise intensity ratings, since the having of the attitude of enjoyment itself interferes with our ability to assess its intensity, and this interference is in direct proportion to the intensity of the pleasure or pain.

For example, I enjoy cycling. One of my favorite things to do is to go for a long bike ride on twisty, rolling New England backcountry roads. I take pleasure in a wide variety of propositions on a typical bike ride, many of which fall in to several common classes: I take pleasure in the fact that I am seeing the beautiful New England scenery as I go by; that I am experiencing the fluid feeling of speed; in the effortless way a bike can be steered by merely leaning in the desired direction; in the effort required to go fast downhill or climb slowly uphill; in the sound of the wind and of the birds in the trees; in the fact that I am faster than my friends; in the very fact that I am enjoying myself so much; the list goes on and on. Sometimes when I’m riding I think about how much I am enjoying the particular propositions I am taking pleasure in at the moment, but I generally cannot focus on the enjoyment itself for very long—something more enjoyable always distracts me. There is simply too much enjoyment going on for me to think about how much I am enjoying any of it very carefully or for very long.

On the other hand, one thing I cannot stand is riding into a headwind. I hate it—I hate everything about it: feeling like I’m killing myself to go fourteen miles per hour; the low,

low riding position required to minimize wind resistance; the noise of the wind; the feeling of slowness. (Interestingly, these are all things I enjoy or at least do not mind in other contexts: I don't mind going slow uphill—I kind of like it; I don't mind the feeling of the wind going downhill—I kind of like it; I don't mind the low, flat-backed, wind-minimizing posture on flat ground, either. But I detest all these things when they are caused by headwinds.) Sometimes, as I am riding into a headwind, it occurs to me how much I hate riding into headwinds. But, as before, I am always quickly distracted by the actual things I do not like and am unable to spend much time thinking carefully about precisely how intense my net displeasure is. Furthermore, each of these cases is complicated by the sheer number and volume of objects of pleasure or pain present. In each case, I take pleasure or pain in such a wide variety of simultaneously occurring, related, but nevertheless distinct propositions that it is impossible for me to individuate them in order to isolate their individual effects on my overall hedonic state. My efforts are further hampered by the fact that I am distracted by the actual pleasure or pain itself. This is not unique to these particular examples; the phenomenon is typical. On the contrary, cases in which a person takes pleasure in just one single proposition at a time are more rare.

Finally, this failure of self-knowledge is not an isolated or unique phenomenon. Cases in which rational agents are unaware of the relevant details of their own mental lives are commonplace. For example, Crispin Wright asks us to consider the following excerpt from Jane Austen's *Emma*:

Emma's eyes were instantly withdrawn; and she sat silently meditating, in a fixed attitude, for a few minutes. A few minutes were sufficient for making her acquainted with her own heart. A mind like hers, once opening to suspicion, made rapid progress. She touched-- she admitted--she acknowledged the whole truth. Why was it so much worse that Harriet should be in love with Mr. Knightley, than with Frank Churchill? Why was the evil so dreadfully increased by Harriet's having some hope of

a return? It darted through her, with the speed of an arrow, that Mr. Knightley must marry no one but herself!²⁸⁶

Of this passage, Wright writes:

Here Emma has just been told of the love of her protégé, Harriet, for her—Emma's—bachelor brother-in-law, a decade older than Emma, a frequent guest of her fathers', and hitherto a stable, somewhat avuncular part of the background of her life. She has entertained no thought of him as a possible husband. But now she realizes that she strongly desires that he marry no one but her, and she arrives at the discovery by way of surprise at the strength and colour of her reaction to Harriet's declaration, and by way of a few minutes' reflection on that reaction. She is, precisely, not moved to the realization immediately; it dawns on her as something she first suspects and *then* recognizes as true. It *explains* her reaction to Harriet.²⁸⁷

What should we make of all this? Even in typical cases, we often lack adequate knowledge of our own mental states. I suggest that although the analogy from heaps of sand to amounts of pleasure and pain is deeply flawed and provides no reason to believe that pleasure and pain are quantitative, it is nevertheless a successful defensive project. That is, it shows that the apparent inability of normal human beings in normal everyday situations to make accurate or reliable judgments of any level of precision of the intensities of their attitudes of pleasure and pain is not evidence that there are no such intensities. In this respect, pleasure and pain are not unlike other kinds of genuinely quantitative mental phenomena. The problems are exacerbated by the lack of a publicly available rating system and by the fact that pleasure and pain themselves interfere with our judgments of hedonic intensity. It would be nice to have a practical way of using numbers to represent amounts of pleasure and pain; however, in light of the above-mentioned facts, it is clear that this is not possible. In particular, in the absence of any practical way to perform interpersonal comparisons or to compare individual episodes of pleasure or pain to a repeatable standard

²⁸⁶ Austen, chapter 47. Quoted in Wright, p. 15.

²⁸⁷ Wright, pp. 15 – 6.

episode, there is no scale for the measurement of pleasure and pain—no acceptable function from hedonic episodes to numbers. Problems concerning self-knowledge are relatively minor.

6. A Moral Argument: Two Pleasures Are Better Than One

Another interesting argument presented by Rashdall rests on the claim that the pleasure involved with two people enjoying some state of affairs must be greater than the pleasure involved with just one of the persons enjoying it, because the extra pleasure has extra moral significance, and this extra moral significance is evidence that the extra pleasure exists. He argues that the state of affairs involving two persons taking pleasure in some proposition is morally better than a similar state of affairs involving just one person taking that amount of pleasure in the proposition, and that this is evidenced by our moral duty to bring about the first state of affairs rather than the second if it is in our power. He writes:

The question whether two people's pleasure is not twice the like pleasure in one persons' consciousness must depend on the purpose for which the addition is to be used. The meaning I attach to the assertion is that I regard a certain amount of pleasure in two persons as twice as important as the same amount in one; and *ceteris paribus* I regard it as a duty to promote more pleasure than less pleasure. If this last proposition is to be denied, we have arrived at an ultimate difference of ethical ideal: if it is admitted, I do not see how duty is to be fulfilled without mentally adding together, multiplying, the amount of pleasure by the number of persons enjoying that pleasure or (to avoid cavil) enjoying a like amount of pleasure. If this is admitted, where is the objection to the phrase "a sum of pleasure"?²⁸⁸

Hare seems to agree, suggesting a type of *tu quoque* defense against an objection to hedonic versions of utilitarianism. In *Moral Thinking*, He writes:

Those who think it [the immeasurability of pleasure and pain] is an easy objection to utilitarianism have not examined their own consciences. Any method of moral

²⁸⁸ Rashdall, p. 379.

reasoning which gives any weight whatever to beneficence or non-maleficence has to cope with this problem.

Hare mentions Ross, in particular, as a philosopher who is not a utilitarian but whose theory of morally right action includes *prima facie* duties of beneficence and non-maleficence.

These remarks suggest the following argument:

1. If the pleasure of two persons considered together involves more pleasure than just the pleasure of one of the persons considered in isolation, then pleasure is a quantity.
2. The pleasure of two persons considered together involves more pleasure than just the pleasure of one of the persons considered in isolation.
3. Therefore, pleasure is a quantity.

The first premise is analytically true. As we saw in chapters 3 and 4, for some substance or property to be a quantity is for its instances to satisfy certain formal conditions. These conditions include the presence of an order, of intervals, and ratios; the necessary conditions for amenability to just these sorts of addition and multiplication functions. In particular, if there exist genuine ratios between episodes of pleasure—if, for example, it is possible for one state of affairs to contain twice the pleasure of another—then pleasantness is a quantity.

Line two is more controversial. Rashdall defends it on the ground that amounts of pleasure and pain vary in their moral “importance” according to their relative sizes. He regards a certain amount of pleasure felt or taken by two people as being twice as important as that amount of pleasure taken by just one person. Like Ross, he takes beneficence to be a *prima facie* duty. This duty, to increase pleasure when possible, is incoherent unless pleasure is

quantitative. According to Rashdall, that there is such a duty is a moral datum—a piece of moral bedrock. This greater importance of a “like amount” of pleasure taken by two people compared to that same amount of pleasure taken by just one, is evidence that pleasure and pain come in amounts: if they did not, there would be no way of making sense of this greater importance.

Unfortunately, this is also clearly question-begging. Rashdall’s rationale for line two presupposes that there are amounts of pleasure. The problem is in the description of the pleasures experienced by the two people as “a like amount of pleasure.” The “amounts” could be “alike” only if pleasure and pain are quantitative—but whether or not pleasure and pain are quantitative is precisely the contentious issue. Rashdall’s argument is that there are quantities of pleasure because larger quantities of pleasure are more morally important than smaller quantities; but the thesis that larger quantities of pleasure are more morally important than smaller quantities presupposes that there are quantities of pleasure. Although we clearly value this extra pleasure, this attitude might be based on the false assumption that pleasure is quantitative. For him to bring the moral importance or quantities of pleasure to bear as evidence that there exist quantities of pleasure therefore begs the question, and even if pleasure and pain are quantitative, this argument does not provide a convincing reason for thinking so.

7. Hall’s “Bull’s Eye” Argument

Hall attempts to generate a standard against which we could measure pleasures. His example concerns a boy named John who likes bull’s eye candies.²⁸⁹ John can eat one bull’s eye per hour with unwavering enjoyment.

²⁸⁹ See also Goldstick, p. 535.

Suppose a boy, John, to have a taste for bull's eyes that is constant throughout the time we are concerned with, suppose one bull's eye of a given make of constant size to be available to him each hour from 8 a.m. to 8 p.m., and suppose he is able, when they are so spaced, to eat up to twelve bull's eyes in a day without satiety setting in to any appreciable degree. These conditions presuppose that the ordering relations, including equality, are applicable to John's pleasure, at different times, in eating bull's eyes; otherwise one could not say his taste was constant or when satiety set in...

If we could find an operation analogous to addition, whereby the pleasure obtainable from two members of this class could be combined, we could use any member of this class as a standard unit applicable to the measurement in terms of pleasure of as many of John's experiences... as could be compared as being equal in pleasure to, or greater or less in pleasure than the eating of one bull's eye under the spacing conditions laid down.²⁹⁰

Though there is no suitable physical operation, Hall's strategy here is to appeal to a repeatable pleasure-generating experience that can be compared to other pleasure-generating experiences, which he intends to serve as a benchmark for the quantitative comparisons required by the thesis that pleasure is a measurable quantity. It serves as a pleasant experience of a standard intensity and duration that can be compared to other, less standard experiences. These comparisons are not done by laying out the pleasures and pains on a physical measuring board; they are done by forming rational preferences for one object of pleasure or pain over another. A unit of pleasure on the scale is the amount of pleasure John gets in an hour from eating a bull's eye during the hour. Comparisons to other pleasures can be done by determining how many bull's eyes John would exchange for the other pleasure. Presumably, we could also define a unit of pain as the amount that would cause John to be indifferent between getting both the pain and the bull's eye, and getting nothing at all. Comparisons to other episodes of pleasure can be done by determining how many bull's eyes John would exchange for the other episode.

²⁹⁰ Hall, p. 44.

...the comparisons on which the making of rational choices depends on demonstrate the sense of talking of combining two units of pleasure. To return to our example, John might be willing to forgo one bull's eye for the sake of some other enjoyment, but not to forgo three, and he might find it difficult to decide whether it was worth forgoing two... Two experiences can be combined in thought for the purpose of making rational comparisons with other experiences in respect of pleasure, whether or not there is any other sense in which the experiences could be said to be combined.²⁹¹

This process is sufficient to render pleasantness and painfulness susceptible to fundamental measurement as long as the quantity resulting satisfies the conditions necessary and sufficient for quantitativeness: there would exist a genuine order, based on the number of bull's eyes John would be willing to exchange for the episode; there would be legitimate intervals, because it would make sense to claim, for example, that the difference between a 5-unit episode of pleasure and a 2-unit episode is three units of pleasure; and there would be a non-arbitrary, natural zero point: the point at which John would be willing to trade zero bull's eyes in exchange for the episode.

Hall claims that as long as little John is being rational with respect to his preferences, the conditions are satisfied. He says:

Anyone adopting a method, such as the one we have been supposing John to use, for working out which sets of experiences are worth forgoing for the sake of others, would regard it as irrational to allow the conclusion for his deliberation to be determined by the order in which he took the various experiences into consideration or the order in which he carried out his mental operations, since this ordering is arbitrary, whereas the deliberation is supposed to yield valid conclusions about the relative suitability of choice (from a rational point of view) of the experiences themselves.

I conclude that there is an operation of combination of the kind needed to construct and operate with a scale of fundamental measurement of the pleasure derived from eating bull's eyes and from comparable experiences under the conditions given. All that is needed now before we actually have a system of measurement is that numerical values should be assigned by some rule to the quantities of pleasure that

²⁹¹ Hall, pp. 44 – 5.

we are comparing. The simplest rule would be to assign the number n to the pleasure derived from eating n bull's eyes under the conditions given.²⁹²

Hall then attempts to extend the scale to cases in which the pleasures or pains of more than just one person are to be compared. He claims that it is absurd to deny that interpersonal comparisons are at least sometimes possible: if they are impossible, then “there is no sense in saying that [John] suffers more from being tortured by the Gestapo than [Robert] suffers from a momentary pin-prick...”²⁹³ He likens this claim to a total skepticism about the existence of other minds—both claims, he says, are absurd. Hall thinks that the bull's eye scale can be unproblematically extended to cases of interpersonal comparison. The hard work, on his view, is getting the scale going at all; it can then be easily extended in a variety of ways.²⁹⁴

Hall's argument, then, could be stated in the following way:

1. Pleasantness and painfulness are fundamentally measurable.
2. If pleasantness and painfulness are fundamentally measurable., then pleasantness and painfulness are quantitative.
3. therefore pleasantness and painfulness are quantitative.

Line 1 is supposed to be true in light of Hall's bull's eye example, which enabled him to construct a pleasantness-scale that satisfied the conditions for fundamental measurement.

²⁹² Hall, p. 48.

²⁹³ Hall, p. 51.

²⁹⁴ Hall, p. 49 – 51.

Line 2 is supposed to be true because being an extensive magnitude is a necessary condition for fundamental measurement. A quantity is fundamentally measurable when either (i) it is possible to generate an arbitrary standard, copy it, and compare it to various magnitudes of the quantity, or (ii) it is possible to derive measurements of the quantity from other measurements that are made in the way described under (i). If it is possible to generate a standard, then it is possible to double the size of the standard, or to halve it. If that's possible, then the quantity is an extensive magnitude.

Line 3 is true because if something is an extensive magnitude, it must satisfy the conditions necessary for measurement on an interval scale. Anything measurable on an interval scale is a quantity.

7.1. Practical Problems for Hall's Argument

One problem for Hall's scale is its imprecision. The units of pleasure are big and unwieldy. Each graduation on the scale corresponds to a relatively intense pleasure and a fairly big chunk of time. Such an imprecise scale will be useless to make very fine-grained hedonic discriminations. For example, the bull's eye scale might well supply the vocabulary we need to understand how much somebody likes a movie. It cannot, however, supply a comprehensible vocabulary necessary to understand how much he likes some sufficiently small, brief experience.

It's also unclear why we should think that we (in general, or little John in particular) are particularly good at gaining accurate knowledge of the magnitudes of our own pleasures, or the magnitudes of merely potential or hypothetical pleasures, or whether some as-yet-unrealized possibility would yield more pleasure than some other one, even in terms of a coarse-grained scale such as the one Hall recommends. Hall might claim that at the very

least, we are good at comparing the pleasantness-levels of actual experiences. But it's not clear that he would be right about that, either. Sidgwick²⁹⁵ makes the point that pleasures are essentially transient: they pass before we can get a mental "grip" on them. Memories of pain begin to fade and lose their vividness almost immediately. It is difficult to know the magnitudes of pleasures and pains past. Ross writes that "undoubtedly memory of the intensity of pleasures is treacherous when it has to cover any long span of time."²⁹⁶

For example, as was mentioned in chapter 6, I remember being confident, when I was 16 and recovering from surgery to remove a portion of my skull that had become infected (I had mastoiditis), that I was undergoing the most intense pain I had ever experienced. I also remember being confident, when I was 22 and recovering from a difficult quadruple-wisdom-tooth extraction, involving stubbornly impacted molars, that I was *then* experiencing the most intense pain I had ever undergone. Now that I am getting older I am not sure which really was the more intense pain. I remember what I was thinking at each of those times, but I can't recall the pain itself, so I can't recall which pain was the more intense. I also have trouble remembering which was the longer-lasting, so I have no idea which pain was "larger."

Since I'm not sure about the relative magnitude of these two pains, I'm doubly unsure of their *absolute* magnitude. Not only am I unsure which episode I would give up more bull's eyes in order to avoid, I'm not sure exactly how many bull's eyes I would give up in order to avoid each one. As difficult as it is to determine which pain was worse, it is even more difficult to determine precisely how bad each one was in terms of bull's eyes. It is

²⁹⁵ Sidgwick 1907, p. 133. He attributes the point to Prof. Green. Sidgwick apparently thinks that this poses a practical problem for the measurement of utility.

²⁹⁶ Ross, p. 142.

possible that I could give a ballpark figure, but there is no way I could produce a precise number for either one.

Furthermore, if we have no good reason for thinking that we are reliable judges of the absolute magnitudes of our own pleasures and pains, we have even less reason to suppose that we can make reliable judgments concerning the magnitudes of the pleasures and pains of others. If I am unsure whether or not my wisdom tooth extraction was more painful than my mastoidectomy, and I am unsure how many bull's eyes each pain is worth, then how can I determine how many bull's eyes *your* tonsillectomy, toothache, or stubbed toe would merit?

The interpersonal case presents another problem. Suppose that Smith, like little John, enjoys bull's eyes and can eat one per hour without getting tired of them. Smith also likes coffee, and would be willing to trade three Bull's eyes for one cup of Seattle's Best Coffee. This allows us to assign a rating of "3" to the intensity of Smith's enjoyment of a cup of SBC. In addition, suppose that Jones also likes Bull's eyes and can also eat one per hour without getting tired of them. Further suppose that Jones also likes coffee, but unlike Smith, Jones would be willing to trade four Bull's eyes for one cup of Seattle's Best Coffee. This allows us to assign a rating of "4" to the intensity of Jones's enjoyment of a cup of SBC coffee:

Smith's pleasure = 3

Jones's pleasure = 4

However, in order to apply the same scale to both Smith and Jones, we have to know that Smith enjoys one Bull's eye exactly as much as Jones does. But does Smith like

Bull's eyes more than Jones, or Jones like coffee more than Smith? Based only on the information we have, we can't tell. Although we presumably can fix one common point on the scale, zero,²⁹⁷ we need to be able to fix at least two common points in order to know that the two scales are identical. But it is impossible to do this without more information.

7.2. The Scale Begs the Question

Hall is willing to concede the empirical point. "I freely admit," he writes, "...that [Bentham] was grossly optimistic about the practicability of using such a calculus with any approach to accuracy."²⁹⁸ He's clearly correct about this: the bull's eye scale of pleasure and pain is of no practical value whatsoever for the making of interpersonal comparisons of utility. Hall claims that the real value of the scale is not practical; it is theoretical. He claims that it is not necessary to actually be able perform these measurements, because what is important is that they be possible in theory, not that they be practically possible. He argues only that the scale, and therefore the facts that it would quantify and information that it would reveal, is logically coherent.²⁹⁹

But it is hard to see how the bull's eye scale could be of any genuine theoretical value, either, because it is clearly question-begging. Hall's claim that little John takes the same amount of pleasure in the eating of each bull's eye entails, without argument, that pleasure comes in suitable amounts. If each of little John's bull's eye eating experience generates the same quantity of pleasure as all of his other bull's eye eating experiences, then there are legitimate quantities of pleasure. This begs the question because the issue is whether or not pleasure comes in amounts. Hall doesn't argue for this claim, he assumes it

²⁹⁷ More on this in section 9.

²⁹⁸ Hall, p. 51 – 2.

²⁹⁹ Hall, p. 51.

when he sets up the scale. So the scale itself begs the question. These considerations show that Hall's proposal is hopeless as a reason for taking pleasure and pain to be quantitative.

8. Trade-Offs Between Intensity And Duration

By far the most popular sort of argument in favor of the conclusion that pleasure and pain are quantitative trades on the idea that there exist certain equivalences between the intensity of an episode of pleasure or pain and its duration. Although different authors express it and defend its key premise in different ways, the central idea is that for any episode of pleasure or pain, e_1 , there exists another episode, e_2 , such that e_2 's intensity is one half that of e_1 , but such that its duration is double. According to the proponents of this type of argument, e_2 contains the same amount of pleasure (or pain) as e_1 .

One prominent proponent of this argument is Brandt, who makes the following remarks:

...it is clear that the benevolent person will act so as to produce an increment of enjoyment level of two units for ten minutes rather than just for one. But will he be indifferent as between adding one moment of a 2-unit increment and two moments of a 1-level increment? The proper answer to this question seems affirmative. For if we know that the second increment of the 2-unit increment is really identical in magnitude to the first one, what difference would it make whether we add it at the first moment of time, or the second?³⁰⁰

James Griffin's *Well-Being* contains a related point. He presents an account of strength of desires according to which desire strengths can be put into terms of leisure time. His idea is that if one desires something to degree 4, for example, one would be willing to give up 4 hours of leisure time in order to satisfy the desire. Griffin writes,

³⁰⁰ Brandt 1979, p. 256.

Suppose, for example, that the County Council decides to change the layout of a road I use, threatening various things along the way that I find very beautiful. I decide that I am willing to give up five hours of my leisure time campaigning to save the chestnut tree, ten hours to save the stone wall, and twenty hours to save the copse... We could say that I value the copse about twice as much as the stone wall, and the stone wall twice as much as the chestnut. And we could say that the combined value to me of the wall and the chestnut is still well short of the value of the copse...

We have concentrated on the marginal rate of substitution between two goods. We can define a unit of well-being on a unit of leisure time.³⁰¹

It is easy to see how this discussion might be applied to the case of pleasure. The pleasure I get from the copse while driving past it (let's suppose) one morning is worth exchanging twenty hours of the lesser pleasures that occupy my leisure time. To determine how much some pleasure is worth to me, we ask how much leisure time I would give up in order to preserve it. By repeatedly applying this procedure, we can introduce a unit of intensity in terms of duration.

Rashdall makes some similar remarks:

The briefest pleasure occupies a sensible time: and there is no time that cannot conceivably be subdivided into two halves. If, therefore, I cannot desire anything which I cannot have all at once, I could not desire either pleasant consciousness in general or any particular state of consciousness which is pleasant.

...And in so far as we are taking account of the duration of pleasures merely, the units of time are applicable also in the case of pleasures; there is nothing essentially unmeaning in applying these units to the measurement of pleasures, and saying that a pleasure that lasts an hour is four times as great as one that lasts only for fifteen minutes.³⁰²

Rashdall's idea is that since time is divisible, so are events that occur in time, including events that consist of some person enjoying something. So every pleasure is

³⁰¹ Griffin 1986, p. x – y. Griffin 1977 contains an early version of this discussion. See pp. 50 – 1.

³⁰² Rashdall, p. 376.

divisible in time into (e.g.) two halves—a first half and a second half—each of which contains some pleasantness. If each half contains some quantity of pleasantness, so does the state of affairs that consists of both halves taken together. Time is infinitely divisible, and therefore so are episodes of pleasure: “Assuming that there is such a thing as pleasure, it must be in time: and the time or the temporal state that is incapable of division is not time or in time at all.”³⁰³

The passage that suggests the main argument reads as follows:

We certainly say: “this is *more* pleasant than that”. The position that the word more does not involve the idea of quantity is so startling that I must excuse myself from further discussion of it... It is enough for my present purpose if it be admitted that one whole state of consciousness is pronounced more pleasant than another, provided it be conceded also: (a) that the total pleasure in each cases is made up of a number of successive moments; (b) that a certain degree of intensity is actually judged to be equivalent of—and may influence desire as the equivalent of—a certain degree of duration: in other words, that a man in pursuit of pleasure may choose a less [intense] pleasure for a longer time rather than an intense pleasure for a shorter time; (c) that a whole pleasant state may be analyzed into various distinguishable elements.³⁰⁴

Proposition (b) is the most directly relevant for our purposes: that for any episode of pleasure, there exists a less-intense but longer-lasting alternative such that it is hedonically equal to the more intense but more brief episode in spite of the fact that it is not as intense. Indeed, according to Griffin, the less intense episode might even contain more pleasure overall than the more intense episode. This suggests at least two different types of scenario. In scenarios of the first type, for any episode of pleasure, call it A, where A has a certain intensity and duration, there exists another episode of pleasure, B, where B is of lower intensity and longer in duration in such a way as to guarantee that B contains more pleasure

³⁰³ Rashdall, p. 368.

³⁰⁴ Rashdall, p. 369.

than A does, overall. Rashdall and others appear to have in mind situations in which episode B is half as intense as A, but more than twice as long as A, which, in light of a standard version of the hedonic calculus according to which net pleasure is determined by multiplying intensity by duration, results in B's containing more pleasure than A contains.

In scenarios of the second type, for any episode of pleasure, A, there exists some other episode, B, where B is of lower intensity and longer in duration in just such a way as to bring it about that episodes A and B are equal with respect to their net total amount of pleasure. If these scenarios are possible, then intensity must admit of degrees because increasing or decreasing the degree of intensity of a pleasure can affect the quantity of pleasantness in it in a way that is equivalent to the way that increasing or decreasing its duration affects the quantity of pleasure contained in the episode. Intensity and duration are independent factors, and that modulation of either one affects the overall amount of pleasure in the same way.

Rashdall reminds us also of the parallel case of pain: in cases of torture, for example, the duration of the torture matters as much as the intensity. When undergoing severe pain, whether the pain lasts for a week or for 1/100 of a second is of the utmost importance—the sooner it is over, the better. He continues:

In the first place, it appears to me self-evident that the value of a pleasure is dependent upon its duration, and that two minutes of a given pleasure may be fairly said to be twice as pleasant as one minute of it—if it is really the same pleasure as is not diminished by satiety. Further, believing that we are in the habit of equating the intensity of pleasure with a certain duration of it, I hold that it is possible to indicate our sense of the comparative intensity of two pleasures by expressing them (so to speak) in terms of duration. If it is a matter of indifference to me whether I enjoy one minute of one pleasure or two minutes of another, I may reasonably be said to regard the one pleasure as twice as pleasant [intense] as the other.³⁰⁵

³⁰⁵ Rashdall, p. 373.

Rashdall argues that the value or magnitude or quantity of pleasure depends (in part) on its duration, and duration is a paradigm case of a cardinally measurable quantity, and intensity is expressible in terms of duration. The two features can be traded for one another without loss of pleasantness, which results in its being possible to construct a unit of intensity in terms of duration. Intensity, therefore, is measurable on a ratio scale, just as time is.

The argument, then, might be interpreted in the following way:

The Hedonic Trade-Off Argument

1. For any episode of pleasure (or pain), A, there exists another episode of pleasure (or pain) B, such that B is less with respect to intensity than A, and B is greater with respect to duration than A, and B is equal to A with respect to the total amount of pleasure (or pain) contained; and there exists another episode of pleasure (or pain), C, such that C is less with respect to intensity than A, and C is greater with respect to duration than A, and C is greater than A with respect to the total amount of pleasure (or pain) contained.
2. If (1), then pleasure and pain are quantitative.
3. Therefore, pleasure and pain are quantitative.

Proponents of this type of argument defend line 1 by appeal to our intuitions about cases. If a gain in intensity can be offset in a perfect way by a loss in duration, and a gain in duration can be perfectly offset by a loss in intensity, then there exist amounts of intensity that are hedonically equivalent to amounts of duration. And since duration is a paradigm

case of a quantity measurable on a ratio scale,³⁰⁶ and intensity is hedonically equivalent to duration, then intensity is measurable on a ratio scale as well. If this were true, it would indeed be a powerful reason for thinking that pleasure and pain were quantitative.

An obvious but ultimately misguided objection to the argument would argue that if line 1 were true, then, for example, a six-hour baseball game should be twice as much fun as a more standard three-hour game, since line 1 clearly suggests that a game that lasts twice as long should be twice as enjoyable. But, the proponent of this kind of objection claims, six-hour baseball games are awful—to sit through one is unbearably boring. Therefore, there is no stable relationship between intensity and duration, contrary to what Rashdall, Brandt, and Griffin would have us believe.

The problem with this kind of objection is that it fails to control for variations in intensity over time. Six-hour baseball games are not preferable, hedonically speaking, to three-hour games precisely because even the most die-hard baseball fans are incapable of sustaining the level of enjoyment taken in the watching of a game for six hours. Like a lot of genuine objects of pleasure, baseball eventually begins to cloy; we get sick of it after a while. If, however, we stipulated that no such cloying effect would occur and that the level of intensity of the pleasure would remain constant, it would be much harder to argue that the six-hour game would not generate twice as much pleasure as the three-hour game.³⁰⁷

Of course, it's silly to suggest that the pleasure taken in watching a baseball game remains constant over the full duration of the game even in the best of circumstances. In

³⁰⁶ Krantz, et al. 1971, p. 89.

³⁰⁷ For example, on August 1, 2000, I attended a 5 hour, 34 minute, 19-inning game at Safeco Field in Seattle between the Mariners and the Red Sox. It was, at the time, the longest game in Safeco Field's history. It was also an extremely intense and interesting game from start to finish—the score was tied for 14 innings, between the bottom of the fifth and the bottom of the 19th. For the casual fan, perhaps this would be too much baseball, but I had a terrific time.

typical cases, fans watch games out of an interest not only in baseball itself, but in particular teams, and the fan's pleasure increases when the fan's favorite team does well and decreases when the opposing team does well. Even in cases in which the fan has no particular interest in one team or the other, her pleasure might increase in intensity during a particularly brilliant defensive play and decrease in intensity during a particularly inept comment by one of the broadcasters. Situations in which a person's attitude of enjoyment remains constant and unwavering in its intensity are decidedly not the norm, and it is unclear whether they ever arise in natural, uncontrived circumstances. On the other hand, however, it is just as clear that insofar as discussion of "wavering" or "variable" levels of intensity, discussion of "constant" or "unwavering" levels of intensity also makes sense. The central problem is not one of constancy or variability, which presuppose quantitative relationships, but on the existence of the quantitative relationships at all.

The opponent of the Hedonic Trade-Offs Argument might then argue that any talk of "constant intensity" of pleasure is question-begging, since such language assumes that hedonic intensity is quantitative on the outset, because it depends on there being various levels of intensity of which some are less than, equal to, or greater than others, is absurd. But, of course, the denial that there are various levels of intensity and that some of them are greater than others is absurd. Some episodes of pleasure are more intense than others; some episodes of pain are less intense than others. For example, on the evening of May 19, 2008, I watched the Red Sox play a baseball game against the Kansas City Royals. In the top of the fourth inning, rookie center fielder Jacoby Ellsbury made a fairly spectacular diving catch of a fly ball hit by Jose Guillen. The pleasure I took in the catch was fairly intense.

It was not as intense, however, as the pleasure I began to take during the top of the fifth inning as pitcher Jon Lester struck out the first two batters he faced, Bill Butler and

Miguel Olivo, and then induced a ground ball to second base Matt Teahen to end the half-inning. The intensity of the pleasure I took in Lester's performance during that half-inning began to escalate because I began to realize that he was getting deep into the game and had not yet allowed a hit—that he was working on a no-hitter. With each successive inning, the pleasure I was taking in the events of the game grew more intense, as Lester retired each batter he faced without giving up a hit. What's more, Lester's performance became more dominant as it went on. He struck out just two batters prior to Ellsbury's catch to end the fourth inning and seven batters after it. Another thing that heightened the intensity of the pleasure I took in watching the game was that pitchers who take no-hitters into the sixth, seventh, eighth, and ninth innings almost never succeed. There are so many things that can go wrong—a bloop over the shortstop's head; a close play at first base that could go for an error but is scored as a single instead; a home run to ruin it—but Lester really seemed like he might actually do it. And when he struck out the last batter, Alberto Callaspo, completing the no-hitter, the pleasure I was taking in the game was really quite intense. It's a rare thing—happening only once or twice a year in either major league—and was accomplished by a pitcher on the team I like, and who is a cancer survivor—a chronic backache during August of 2006 turned out to be caused by lymphoma—who beat it, came back, and then managed to throw a no-hitter. It was really outstanding, and it is no doubt evident that I continue to take pleasure in contemplating the relevant propositions.

I admit that I am not in possession of a reliable procedure for assigning numbers to intensity levels of pleasure—there is no function from episodes of pleasure to numbers satisfying the relevant constraints. It nevertheless is obvious to me that the pleasure I took in Lester's first out—a fly ball to left field hit by David DeJesus—was much less intense than the pleasure I took in his strikeout of Callaspo to end the game. It is also obvious to me that

I enjoyed Lester's first out much more than I enjoyed my most recent trip to the dentist, which did not really *hurt* (thanks to Novocain) but in which I nevertheless took displeasure. And it is obvious that the displeasure I took in that trip to the dentist was much less intense than the displeasure I took in the sensations associated with the removal of my wisdom teeth, which I discussed earlier in this chapter, and in chapter 6.

The foregoing examples all involve somewhat coarse-grained judgments. It is easy for me to determine that I enjoyed the first out of Lester's no-hitter is less than the last out of that game because the differential is so great. The same thing is true of the other examples. It is clear, however, that fine-grained determinations are also possible. For example, a few minutes ago I had a brief sip of cold, sweetened sun-tea, followed by a brief sip of Coke Zero. I took pleasure in each sip. Although neither episode of pleasure was particularly intense, and their intensity levels were quite close, I enjoyed the sip of sweet tea a little more—not by much, but a little. Furthermore, this kind of situation is not unique. It seems to me that the typical case is one in which the person taking pleasure in some proposition or another can tell how intense her pleasure is and is capable of making fairly fine-grained determinations concerning intensity.

However, the key premise hedonic trade-offs argument goes further than the mere claim that some episodes of pleasure or pain are more intense than others. That premise is the claim that for every episode of pleasure (or pain) of a given intensity and duration, there (possibly) exists a hedonically equivalent episode of the appropriate attitude which is less with respect to intensity and greater with respect to duration. This assertion is what the opponent of the hedonic trade-offs argument will find dubious, regardless of our ability to make fine-grained hedonic discriminations. The opponent of this argument may not find it significant that I took higher intensity pleasure in Lester's final out of the no-hitter than I

took in the fact that Ellsbury made the diving catch during the fourth inning; rather, he will want to know how much longer the episode of pleasure consisting of my enjoyment of the catch would have to last in order to be hedonically equivalent to the episode of pleasure consisting of my enjoyment of the final out.

This is a fair question, and it is not easy to answer. One source of difficulty is the fact that the pleasure I took in the final out was far and away more intense than the pleasure I took in Ellsbury's catch. Another problem has to do with the fact that the proposition I took pleasure in during the second episode is substantially more complex than the proposition I took pleasure in during the first. During the first episode, I took pleasure in the fact that the hitter, José Guillen, didn't get on base; that the score was still tied at zero; that Lester seemed to be pitching well; that Ellsbury had made a difficult diving play; that he hadn't injured himself in the process; and that is all. During the second episode I took pleasure in the fact that Lester got the final out; that Lester had pitched a rare complete game; that the Red Sox had won the game; that the game was a no-hitter; that the opposing team (not the team I like) was the team without a hit; that the guy who pitched the no-hitter was a cancer survivor; that the no-hitter had been accomplished at Fenway Park; that the broadcasters had taken great pains throughout the game to indicate that the no-hitter had been in progress without directly saying the word 'no-hitter,' which may have put a jinx on it (I thought that they were cute); that it had been the first no-hitter I'd ever seen live (I've never seen one in person, and on TV I'd only seen one on a replay—I'd never watched one live from start to finish); and that I'd been keeping score from home and therefore had a memento of the occasion in the form of a scorecard.³⁰⁸

³⁰⁸ Clearly some of these component propositions are more central to the experience than others, but I am inclined to think that I took pleasure in one large conjunctive proposition

This type of question is further complicated by the fact that we ordinarily do not consider the duration of episodes of pleasure in this manner. In typical cases, when choosing the more pleasant of two potential episodes of pleasure, we often focus on intensity (almost) exclusively while duration plays a much more minor role; this in spite of the fact that, *ceteris paribus*, longer-lasting episodes of pleasure contain more pleasure. I suspect that this is has to do with the fact that the relevant *ceteris paribus* clause is almost never satisfied. That is, when choosing the more pleasant of two potential episodes of pleasure, the temptation to select the longer-lasting episode must in ordinary cases be tempered by the realization that we often get bored by long-lasting objects of pleasure. This propensity toward boredom causes us, in normal circumstances, to focus on intensity of pleasure and to behave in a way that suggests that it is the only significant variable, which, of course, it is not.

Furthermore, in cases like this one, we are often distracted by extraneous, hedonically irrelevant factors. It is important to distinguish between *my enjoyment* of the fact that Jon Lester is a cancer survivor who went on to pitch a no-hitter from its greater moral significance (if there is any), or its impact on Lester's life, which doesn't affect me; its impact on Lester's friends and family, which, though significant in some sense, nevertheless doesn't affect me;

So how much longer would the episode of pleasure consisting of my enjoyment of Ellsbury's catch have to be in order to be hedonically equivalent to the episode of pleasure consisting of my enjoyment of the final out? I'm not sure. I am sure it would have to be quite a bit longer at the same level of intensity, but I cannot be sure just how much longer. However, it is worth noting that there is always imprecision in empirical ordering operations; the question regarding quantitativity of pleasure and pain has to do with the extent and

rather than taking several simultaneous attitudes of enjoyment in several discrete propositions.

nature of the imprecision, and not with the mere fact that it exists. For example, the empirical ordering of objects according to their mass, using an equal-arm balance, while generally reliable, involves a not-insubstantial element of imprecision. This is because of the friction between the arm of the balance and its pivot point, as well as difficulties ensuring that the arms of the balance are precisely equal in length and that the pans of the balance are precisely equal in mass. These difficulties render determinations of mass-order impossible beyond a certain level of precision.³⁰⁹ We do not, however, regard these practical difficulties to be evidence of ontological, theoretically significant imprecision in the quantity *mass*. I have attempted to demonstrate that coarse-grained hedonic discriminations are possible, and we should not underestimate the significance of this fact. I have also attempted to demonstrate that fine-grained discriminations are also possible, and that many of the difficulties surrounding these kinds of discrimination are practical in nature and do not pose a serious theoretical problem, even if the practical problems are indeed serious.

In light of the foregoing, I recommend that we tentatively conclude that the preponderance of evidence suggests that pleasure and pain are genuinely quantitative.

9. Hedonic Zero

Another important issue concerns whether or not a hypothetical hedonic scale containing a natural, non-arbitrary zero point could be constructed. This is important because the defining characteristic of the ratio-type scale is the presence of such a natural zero. Sidgwick argues that there is a non-arbitrary hedonistic zero point, which would make pleasantness measurable on a ratio scale. He follows Plato in claiming that some apparently pleasant experiences are actually merely releases from pain, and are intrinsically neutral,

³⁰⁹ Krantz, et al. 1971, p. 27.

hedonically speaking. This hedonic neutrality is a type of experience that is neither pleasant nor unpleasant, which makes it a natural candidate for the hedonic zero point. Any non-pleasant but non-painful experience would count as zero, hedonically speaking.³¹⁰

Although Sidgwick and Plato have identified an important phenomenon, it is not clear that they are correct to regard it as hedonic zero. If, for example, I experience a release from pain, I am likely to be *glad* about the fact that I have been released from the pain. That is, I take pleasure in the fact that I am no longer taking pain in anything. I am therefore not in a hedonically neutral state; I am taking pleasure in something. Although being relieved of pain is not itself an episode of pleasure, it is nevertheless something we often take pleasure in.

Bergström and McNaughton propose similar hypotheses. According to them, unconsciousness and death are paradigm instances of hedonic zero.³¹¹ A dead person experiences no pleasure and no pain; a dead person experiences nothing whatsoever. Similarly, a person is not conscious of anything when he is dreamlessly unconscious, so he is not taking pleasure or pain in anything. So, according to Bergström and McNaughton, unconsciousness and death are examples of hedonic zero.

It is not clear, however, that this is correct. This picture is not analogous in several important ways with standard accounts of other types of propositional attitudes. For example, the standard account of the attitude of belief holds that belief comes in degrees that measure the believer's confidence in the proposition believed. This is commonly represented by a scale between zero and one, according to which if S believes that P to degree 1, then S regards P as being completely certain, whereas if S believes that P to degree 0, then S regards P as being certainly false. If S believes that P to degree .5, then S regards P

³¹⁰ Sidgwick 1903, pp. 140 – 1.

³¹¹ Bergström, p. 292, McNaughton, p. 176.

as being just as likely to be true as false.³¹² But notice that although belief of .5, the point at which S neither believes nor disbelieves P, is closely analogous to hedonic zero, the point at which S takes neither pleasure nor pain in P, we do not want to claim that the dead or the unconscious are neutral with respect to belief—that they believe everything to degree .5. We would not want to claim that S believes P to degree .5 in situations in which S has not considered P. For example, my wife has not considered the proposition that the Philadelphia Athletics won the World Series in 1911. Not only does she not believe it, she does not regard it as having a probability of .5 of being true—she does not *regard* it at all. She has no attitude concerning this proposition, since she has never considered it. She therefore does not believe it—her relationship to the proposition that the Athletics won the 1911 series is not represented by the standard scale of degree of belief.

The lesson we should draw from this analogy to doxastic attitudes is this: the sort of situations McNaughton and Bergström describe should not be thought of as hedonic zero, since hedonic zero is the attitude of taking neither pleasure nor pain in some proposition. Because the dead and the unconscious have no attitudes, they cannot be said to take neither pleasure nor pain in any proposition, for the same reason that they cannot be said to regard any proposition as being equally likely to be true or false. Similarly, the unconscious cannot be said to regard any proposition as being neither hedonically positive nor negative, nor can the dead. On the current view, the zero point on the hedonic scale applies to situations in which S considers the relevant proposition, and takes neither pleasure nor pain in it. Situations in which S has not considered P, whatever the reason, do not appear in the relevant order, and therefore receive a hedonic rating equivalent to “not applicable.”

³¹² See Jeffery 1983 and Skyrms.

The question, therefore, is this: are there situations in which a person considers a proposition but takes neither pleasure nor pain in it? The answer is 'yes.' When I consider the proposition that the Philadelphia Athletics won the World Series in 1911, I take neither pleasure nor pain in it. I've considered it, and I believe it, but I don't care. There's no team I would rather have won that series; it was too long ago for it to matter to me one way or the other. We can tentatively conclude, therefore, that pleasure and pain satisfy the formal and structural criteria necessary and jointly sufficient for ratio measurability: there exists an empirical order of episodes of pleasure and pain from least to greatest according to the amount of pleasure or pain the episode contains, and this ordering admits of genuine intervals, and contains a natural, non-arbitrary zero point.

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