On the Epistemic Solution to the Sorites Paradox

by

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A Thesis submitted to the Department of Philosophy of The University of Manitoba in partial fulfillment of the requirement of the degree

of

Master of Arts

0-612-32099-5

THE UNIVERSITY OF MANITOBA

FACULTY OF GRADUATE STUDIES

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Introduction

The Greeks are generally credited with introducing the problem of vagueness into philosophy in the guise of the sorites paradox. The sorites argument is concise. relatively easy to comprehend. and also seemingly quite intractable. The argument can be explicated informally as follows: suppose that we have a heap of sand. Remove one grain of sand from that heap. The heap of sand remains. Remove another. and again. the heap remains. Continue this process until one grain remains. Certainly this one grain of sand does not constitute a heap. yet we are at a loss when asked to give an account as to when a transition occurred from heap to non-heap. More formally. the argument may be couched as a mathematical induction. The first premise. or the base step. states that the predicate in question is true of some object(s). For example. ten thousand grains of sand make a heap. The second premise. or induction step. states that if the predicate is true of some object. then it is true of the succeeding or preceding object. For example. if ten thousand grains of sand make a heap. then ten thousand minus one grains also make a heap. The conclusion states that the predicate (heap) is true for any number of grains (including 0). Thus we have seemingly good premises. seemingly good reasoning and yet end up with an unacceptable conclusion.

This simple argument has rather far-reaching consequences for logic. semantics. epistemology and ontology. This is in large part due to the types of solutions that have been offered up in the recent literature. For example. the nihilist concludes that the sorites argument demonstrates that our standard ontology is by and large vacant. Those who would offer a semantic solution have by and large given up on the notion of bivalence.

the principle of excluded middle. or both. Thus even classical logic and semantics are at stake. The epistemicist offers a solution that commits us to an amazingly precise ontology. as well as a surprisingly definite semantics. This solution also commits one to a form of realism whereby the realm of verifiable facts is taken to be smaller than the realm of truths. In effect. the truth about the boundaries of our concepts may outrun our capacity to know them. Still others propose that the sorites paradox implies that physical objects are vague.

The first chapter will begin with a brief examination of the various forms the sorites argument can take. These include a conditional form. a disjunctive form and a mathematical induction. For the purposes of the thesis. I take the mathematical form as canonical. although I maintain that this is of little consequence in analyzing the sorites paradox. or in offering a solution to it.

Also in this chapter. we will look at various solutions that have been offered up the recent literature. Given the simplicity of the paradox itself. there are a correspondingly limited number of solutions. There are five possible avenues in this regard.

First. one may accept the conclusion of the sorites paradox despite its absurdity. I believe that no one has chosen this route. given the abhorrent consequences of doing so. Namely. one would have to countenance outright contradictions. For example. to accept the conclusion is to accept that the same person is tall and non-tall. bald and non-bald. or that the same object may be red and non-red.

Secondly. some have suggested that the sorites argument is invalid. For some philosophers. this means that we must reject mathematical induction. or at the very least. place restrictions on its use.

Third. one may deny the base step of the induction. which is the approach taken by the nihilists. They contend that a vague predicate is true of nothing. thus eliminating our present ontology and making the first premise false.

Many more philosophers have argued that the second premise. or the inductive step. is false. Taken at face value this entails that our predicates are precise in their extensions. However. with the exception of the epistemicists. most philosophers have attempted to reinterpret their denial in such a way that they are able to avoid this conclusion. By and large this has meant an alternative logic of some sort. These alternatives include a multivalued logic. where the iterations in the sorites series have partial truth values. Supervaluationists opt for truth-value gaps. where some statements concerning these iterations are neither true nor false. Others opt for a continuous or fuzzy logic. where the sorites series and the truth values associated with the stages therein. correspond to the real numbers. Thus there are an infinite number of truth values to consider.

The last view to be considered is one that offers us a vague ontology. The reason that we cannot decide where vague predicates cease to apply (or begin to apply) is that objects themselves are vague.

Chapter two looks at the epistemic solution in more detail. The epistemic solution maintains that the inductive step is false. but that this denial should be taken at face value. Predicates do indeed have precise extension. although we must remain ignorant of where these predicates begin to apply or cease to apply in the sorites series. There is no need for a reinterpretation of our denying the inductive step. nor a need for an alternative logic. Two of the most prominent defenders of this view are Roy Sorenson and Timothy

Williamson. The chapter will examine their arguments from two vantage points: first, there needs to be an account or defense of the view that there are precise extensions corresponding to our predicates. Second, we need an account of how it is we remain irremediably ignorant of where such predicates begin to apply or cease to apply. Both points will be examined.

Mark Heller argues that the epistemic solution is not tenable. He claims that if the epistemic thesis were true, then the ignorance that the epistemicist claims for a small portion of the sorites series, turns out to be ignorance along the entire series. This position is examined in some detail, but is found wanting.

The final chapter examines some additional problems encountered by the epistemic solution. The charge to be considered is that the epistemicist is forced to separate use and reference, and use and meaning for vague predicates. The basis for this charge arises from concerns about the nature of the ignorance posited by the epistemicist. Is the epistemicist able to give an account of reference for supposedly precise predicates? Two theories of reference are looked at in this chapter: a descriptive theory and a causal theory.

CHAPTER 1: THE SORITES PARADOX

1.1 Introduction

The sorites argument has been generally credited to the logician Eubulides of Miletus, a contemporary of Aristotle. Despite this lengthy history sorites arguments were, until relatively recently, considered semantic curiosities. Today, we find it infecting all manner of philosophical issues from the correctness of classical logic to ontological questions of whether ordinary mid-sized physical objects exist. But again, despite this lengthy history and recent revival, it seems that no satisfactory solution to this paradox has been formulated. Colin McGinn has suggested that it is beyond our powers to understand fully where the problem lies in the sorites argument. Attempting to solve the sorites is analogous to asking a rat to find its way out of a maze. A solution to the sorites may very well be beyond our capacities. Initially, this strikes one as being somewhat odd, since the argument itself is quite simple and parsimonious. Here are some representative examples.

> Mother told me that I must not touch the peanuts. But there are so many that she will never notice if I just eat one. That was good and see, there are many peanuts still left. Perhaps I can eat another. There will be many left. Yes, that one was good also, and there are still many left. But wait! It will always be true that if I remove a single peanut from a bowl with many peanuts in it, there will still be many left. So I can eat all the peanuts I want as long as I eat one at a time. There will always be many left. Mother will never know...[1]

> Suppose that a movie camera is focused on a tadpole confined in a small bowl of water. The camera runs continuously for three weeks, and at the end of that time there is a frog in the bowl (the conclusion of the [sorites] argument) means that there

[1] Stephen Weiss, "The Sorites Fallacy: What Difference Does a Peanut Make?", Synthese **33**, 252.

> is some picture in the series S such that it is a picture of a tadpole, while in the very next picture, taken one twenty-fourth of a second later, it is not a picture of a tadpole.[2]

> There are mammalian ancestors. There have not been infinitely many mammalian ancestors. Therefore, some mammalian ancestor has no mammalian ancestor who was mammalian.[3]

All these arguments depend on a gradual variation of some measure or quantity embedded in a series where we would say that it is difficult, if not impossible, to draw the line of transition. Once swept into the series, we seem to be at a loss as to how we might halt the series at an nonarbitrary point. Of course in here lies the force of the paradox: we possess seemingly good, intuitively true premises, have seemingly good reasoning, and yet end up with an unacceptable conclusion.

1.2 Forms of the Sorites Argument

1.2.1 The Conditional And Related Forms Of The Sorites Argument.

To see where the problem lies, and to add some substance to our map, we should analyze the form of the argument. There are at least two forms that the sorites has taken in the literature. First, the argument can be cashed out in terms of universal instantiation, conditionals and modus ponens. This argument would take the form (using "short" as our vague term of choice):

1) A man of height 4 feet is a short man.
2) (h)(if a man of height h is short, then a man of height (h + 1/120) feet is a short man.
3) Therefore, a man of height (((h+1/120) + 1/120) +1/120) feet is a short man.[4]

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[2] James Cargile, "The Sorites Paradox", British Journal for the Philosophy of Science **20**, 193.

[3] D.H. Sanford, "Infinity and Vagueness", The Philosophical Review **84**, 521.

[4] Richmond Campbell, "The Sorites Paradox", Philosophical Studies **26**, 175.

There are several variations of this form. We could just as well use N conditionals and N applications of modus ponens. Thus we would have.

1) A man with a height of 4 feet is a short.
2) If a man with a height of 4 feet is short, then a man with a height of 4 feet + 1 inch is a short.
3) If a man with a height of 4 feet + 1 inch is short, then a man with a height of 4 feet + 2 inches is short.

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.
.

N) A man with a height of 10 feet is short.

On the other hand, we could also replace the conditionals and modus ponens with "either-or" and the Disjunctive Syllogism.

1) A man with a height of 4 feet is short.
2) It is not the case that a man with a height of 4 feet is short or a man with a height of 4 feet + 1 inch is short.

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N) A man with a height of 10 feet is short.

1.2.2 Mathematical Induction.

A second alternative allows us to formulate the argument in the form of a mathematical induction rather than a chain argument. Mathematical induction has clear conditions which an argument must satisfy to be considered an acceptable mathematical induction. According to Weiss these conditions are as follows:

B1) There is some set S which is ordered in such a way that its members may be put into a one to one correspondence with the natural numbers without altering the ordering.[5]

B2) There is some property P which is true of some elements s_0 of S.

B3) It is possible to show that if P holds for any given element of the set, it holds for the next element.[6]

B2 is called the base step of the induction. B3 is called the induction step and the set of objects S on which the induction is performed is called the induction set. So, referring back to our "short man" example, we could produce the following argument.

1) The first member of S is short (B2).
2) If the nth member of S is short, then the n + 1st member is short (B3).
3) Every member of S is short.

I will take the inductive form as canonical for my purposes. However, I think that the forms discussed above are simply different ways of saying the same thing. Nothing substantive results from choosing one over the other. In addition, I will take it that a solution to the sorites must demonstrate that the argument is unsound. In the literature, this means that solutions to the sorites argument can be classified in terms of the way in which they attempt to show how the sorites argument is indeed unsound. That is, the solutions offered have taken the argument to be valid with at least one false premise.

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[5] This criterion seems to eliminate the continuum form of the sorites argument. This form of the sorites contains a uncountably or nondenumerable infinite number of members in the set (i.e. an infinite number of truth values). This form will be discussed in a further section.

[6] Weiss, 253.

1.3 Solutions to the Sorites Paradox

The remainder of this chapter will look at several attempts at solving the sorites paradox. Given that the sorites argument is quite simple, the number of solutions is correspondingly limited. I take it that there are three components to the argument itself: namely, the validity of the argument, the conclusion of the argument and the premises of the argument. The solutions may be categorized in terms of which feature they address.

First, one may say that the conclusion of the sorites must simply be accepted (i.e. the argument is sound), despite its absurdity. To my knowledge no one has been tempted to adopt this position. To do so would be to countenance outright contradictions to the effect that every person is tall, every person is short, everything is red, everything is non-red, etc. Here, I will not concern myself with those who would countenance contradictions. I will not speak of them again.

Secondly, one may deny that the argument is valid (i.e. the reasoning used in the argument is faulty).

Lastly, one may deny the truth of one of the two premises. Here we find several positions. The first group, the nihilists, deny the first premise, or the base step. Generally speaking, it is maintained that predicates like short are vague and that as a result nothing in our standard ontology fits into the extension of such predicates. The second group, the semantic theorists, epistemic theorists, and the metaphysical theorists, accept the base step (the premise which asserts that the predicate in question is true of some object), but deny the second premise, or the inductive step. This denial would seem to commit them to a precise cutoff in the sorites series; namely, while a value n may satisfy the predicate in question, n+1 does not. A significant portion of the literature (with the exception of those advocating the epistemicist approach) is devoted to demonstrating that the denial of the inductive step does not have such a counter-intuitive conclusion. That is, denying the inductive step does not commit one to precise cutoffs in the sorites series. Let us look at these options in more detail.

1.4 The Invalidity Approach

1.4.1 Rejecting Mathematical Induction.

Some philosophers contend that the sorites argument is invalid.[7] Joseph Wayne Smith claims that the sorites demonstrates the invalidity of mathematical induction, and so we should reject arguments of this sort.[8] The first and most obvious response is to point out that the sorites may be formulated without an appeal to mathematical induction. Smith replies that this simply shows that there are at least two types of paradoxes, and that any paradox that does not make use of mathematical induction is not a true sorites. These paradoxes would require separate treatment. Now this seems to have the smell, if not stench, of ad hocery. First, we saw in the previous section how the sorites could be formulated in a number of equally effective lines of reasoning. These arguments do not

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[7] Some philosophers contend that we cannot formally demonstrate the invalidity of the sorites. Rather, we should adopt the position that the argument is neither valid or invalid. Rudolph Carnap and Susan Haack maintain that we restrict logic to nonvague predicates. This is not the drastic move one might initially think it is, since vague predicates could be replaced by precise counterparts without significant loss. Thus 'swizzle stick', which is vague and hence subject to the sorites, would be replaced by 'one million atom swizzle stick'. Such a swizzle stick is sensitive to the removal of one atom and hence not subject to the sorites.

[8] Joseph Smith, "The Surprise Examination on the Paradox of the Heap", Philosophical Papers **13**, 43-56.

rely on mathematical induction, and so the sorites arguments would be immune to this sort of criticism. In addition, the cost of the wholesale rejection of mathematical induction, an effective and well established form of reasoning, is too high a price for an incomplete solution to one version of the sorites. Independent arguments would be needed to demonstrate the flaws of mathematical induction.

1.4.2 Ziff and Weiss on Invalidity.

Paul Ziff and Stephen Weiss have proposed more moderate solutions in this regard. They maintain that a proper solution to the sorites does not require that we view the sorites arguments as invalid. Rather, to avoid any such logical error, we must place restrictions on mathematical induction. Ziff illustrates this as follows:

> A man with only one penny is poor. That's true. And giving a poor man a penny leaves him poor: if he was poor before I gave him the penny he's poor after I gave him the penny. That's true too. Both of these statements are obviously true. Nevertheless if you keep doing this, if you repeat the argument over and over again you'll get into trouble. You must stop before it's too late or you'll end up with a false conclusion. The moral of the fallacy is plain: it's a perfectly good inference to make if you don't make it too often.[9]

This proposal is quite problematic, specifically highlighted by the notion of "too often". In one sense this appears to be a trivial and ineffective restriction. Put simply, to know if I have made the inference too often, I must already know the truth value of the conclusion. In other words, to stop my slide down the sorites, I must already be able to locate the last X in circumstances in which we do not seem to be able to draw the line between Xs and non-Xs.[10] This seems to leave us in the same predicament with which we began.

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[9] Paul Ziff, "The Number of English Sentences", Foundations of Language **2**, 530.
[10] Roy Sorenson, "Vagueness, Measurement, and Blurriness", Synthese **75**, 47.

Weiss has also proposed that we place restrictions on mathematical induction. His analysis however is more detailed and technical. His restrictions are such that in a mathematical induction the induction predicate cannot be less precise than the relation by which the objects in the induction class are ordered.[11] Thus, the following argument would be invalid:

1) A 10 foot man is tall
2) If a n foot man is tall, then a n-1 foot man is tall
3) A 2 foot man is tall.

In this case, both 'taller than' (the ordering relation) and 'is tall' (the induction predicate) are partitions of the height parameter. That is, both can divide "some groups of people into mutually exclusive and exhaustive subgroups".[12] The group varies in height from 2 feet to 10 feet by 1 foot increments. The 'taller than' relation can effectively partition this group, but 'is tall' cannot. The ordering relation here is more precise than the inductive predicate, and so the argument is invalid.[13]

According to Sorenson, Weiss runs into serious problems when he attempts to use this idea to solve the sorites paradox. The criteria that Weiss presents is the following:

> An instance of mathematical induction applied to any subject is an acceptable argument (sound) if it satisfies the conditions for induction within mathematics but does not satisfy the condition that with respect to the induction set, the ordering relation partitions more precisely one of the parameters than the inductive predicate partitions.[14]

[11] Ibid., 47.
[12] Ibid., 47.
[13] Ibid., 47.
[14] Weiss, 266.

However, it is difficult to see how satisfaction of this criterion is a necessary condition for soundness. We might be willing to say that it does act as a sufficient condition, but this does not seem to be enough to convince one that the sorites is unsound.

In addition, it seems that this criterion eliminates arguments that are truly valid. Take the following argument:

1) A 1000 pound man is fat.
2) If an n pound man is fat, then an n-1 pound man is fat.
3) A 50 pound man is fat or squares are squares.[15]

Since the conclusion is a tautology, the argument is valid regardless of whether it is valid via mathematical induction. Thus Weiss ends up eliminating arguments that are valid, and cannot (necessarily) eliminate those he wishes to.

1.5 Nihilist Approach

If we can maintain that the sorites argument is indeed valid, only two options remain: i) deny the base step of the sorites or ii) deny the inductive step of the sorites. Here we will look at the first option. To deny the base step is without doubt the more radical solution. Denying the base step would entail that vague predicates have no extension. Recall that the base step claims that the vague predicate is true of one member (i.e. the first member) in the sorites series. That is, it says that a person of height n is tall (or short). In denying this step, the nihilist is saying that no matter what n is (and n could be any number), the predicate in question is true of no one. This applies to all vague predicates. For example,

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[15] Sorenson, 48.

Peter Unger maintains that predicates like "bald", "heap", "table", and "person", which give rise to the sorites, are true of nothing. Here is a typical argument taken from Unger:

> Here is an argument to deny alleged swizzle sticks, those supposedly popular swizzle stirrers. We note that the existential supposition:
>
> 1) There is at least one swizzle stick.
>
> is inconsistent with the propositions we mean to express as follows:
>
> 2) If anything is a swizzle stick, then it consists of more than one atom, but only a finite number.
> 3) If anything is a swizzle stick, then the net removal from it of one atom, or only a few, in a manner most innocuous and favorable, will not mean the difference as to whether or not there is a swizzle stick there.
>
> Supposing 1) and 2), by 3) we get down below two atoms and still say that a swizzle stick is there. That contradicts 2). The only way to maintain 2) and 3), while being consistent, is to deny the existence of these sticks.[16]

This effectively eliminates swizzle sticks (as well as people, stones, chairs, etc.), assuming of course that we maintain bivalence and accept 2) and 3).

1.5.1 The Vagueness of 'Vague'.

I think Unger runs into problems on two fronts, the first being more serious than the second. Roy Sorenson has pointed out that the vagueness of 'vague' entails that the premises of Unger's argument must be jointly inconsistent. He presents his argument as follows:

1) There are ordinary things only if the predicates used to describe them have extensions.
2) These ordinary predicates are vague.
3) All vague predicates lack extension (for they are incoherent as shown by the sorites).
4) Therefore, there are no ordinary things.[17]

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[16] Peter Unger, "Skepticism and Nihilism", Nous **14**, 519.
[17] Sorenson, 51.

A problem arises because the argument makes use of the term 'vague'. This seems to lead to an inconsistency if 'vague' turns out to be vague. If 'vague' is in the extension of 'vague', then 'vague predicate' lacks an extension by (3). This is of course inconsistent with (2). Thus, we may conclude that Unger's argument is unsound (i.e. premise 2 is false) if the vagueness of 'vague' can be established. This seems to be quite plausible on two grounds. First, since most (if not all) predicates seem to be vague, there is good inductive support for the notion that 'vague' is vague.

Secondly, we can show that 'vague' is vague as follows: there seems to be a consensus that the sorites argument requires a vague predicate, and so we could establish the vagueness of 'vague' if we could embed it in a sorites argument.[18] Say we have a series of integers from 1 through n, whose smallness is in question. Sorenson then posits a series of numerical predicates, namely '1-small', '2-small', etc. He defines the nth predicate as applying to cases where the integers are either small or less than n. That is, an integer is n-small (for some n) if it is small or less than n. Such predicates are then used to imbed 'vague' in a sorites paradox.

1) '1-small' is vague.
2) If 'n-small' is vague, then 'n+1-small' is vague.

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3) 'One-billion-small' is vague.[19]

According to Sorenson, the vagueness of '1-small' is equivalent to the vagueness of 'small' since both predicates apply to 0 and also to all other small integers. This also is true for '2-

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[18] Ibid., 51-52.
[19] Ibid., 52.

small' and '3-small'. But then we "reach predicates in which the 'less than n' disjunct eliminates some borderline cases."[20] When we reach a predicate where all borderline cases have been eliminated, we have a nonvague predicate. However, it is unclear when we reach this point. In other words, 'vague' is vague.

1.5.2 The Precisification of Predicates.

Patrick Grim has pointed out another problem in the programs of Unger and Quine. Nihilists like Unger and Quine believe that the sorites arguments demonstrate that most of the familiar objects of everyday life do not exist. However, neither of these philosophers believes that in using vague utterances we are speaking nonsense - we are not just making noise. Is it possible to reconcile the view that vague expressions are empty, and yet all the while engage in meaningful conversation? To that end, it has been assumed by Unger and Quine that we can easily introduce precise predicates to replace the ordinary vague concepts which give rise to the sorites type arguments. Quine asserts:

> When we do reach the point of positing numbers and playing their laws, then is the time to heed the contradictions and to work the requisite precision into the vague terms we learned by ostension. We arbitrarily stipulate, perhaps, how few grains a heap can contain and how compactly they must be placed...The sorites paradox is one imperative reason for precision in science among others.[21]

Grim notes that if the sorites arguments are taken seriously, this project is much more difficult than it might first appear. To show this, let us follow Unger and Quine and create limited-grain heaps, atomically-specified logs and '1-billion-atom swizzle sticks'. Can '1-billion-atom swizzle sticks' escape the sorites argument? Probably not.

Grim constructs the following argument, paralleling the one made by Unger.

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[20] Ibid., 52.

[21] W.V. Quine, "What Price Bivalence?", Journal of Philosophy 77, 92.

1) There is at least one 1-billion-atom swizzle stick.

This is inconsistent with.

2) If something is a 1-billion-atom swizzle stick. then something is a swizzle stick and is composed of 1 billion atoms.
3) If anything is a swizzle stick. then it consists of more than one atom. but only a finite number.
4) If anything is a swizzle stick. then the net removal from it of one atom. or only a few. in a manner most innocuous and favorable. will not mean the difference as to whether or not there is a swizzle stick there.[22]

3) and 4) are the premises of Unger's original argument and 2) certainly seems to be true. Yet. if we want to be consistent while accepting 2). 3) and 4). we must deny 1). thus eliminating 1-billion-atom swizzle sticks.

However. what if we were to posit another type of swizzle stick. This is a 1-billion-atom-swizzle-stick. Such a swizzle stick is sensitive to the removal of one atom. and could be sensitive to the actual configuration of the atoms that make up the swizzle stick. Such a swizzle stick is not subject to the sorites. for the removal of one atom (or perhaps even a shift in its position) eliminates a 1-billion-atom-swizzle-stick. Initially this strikes one as quite plausible. and in fact it seems we could make many if not all vague predicates precise in this way. That is. we could stipulate that to be tall is to be of a height of exactly n millimeters. However. I think that this stipulative victory rings a bit hollow. A replacement program as envisioned above may work. but the original problem remains. That is. is there a solution to the sorites. and what does this solution tell us about the vague predicates that are now in use? More precisely. the vague predicates and the resulting borderline cases seem to be immune to a process of discovery. That is. we are prevented from *discovering* whether a

[22] Patrick Grim. "What Won't escape the Sorites Arguments". Analysis **42**. 40.

borderline case of tall is tall or not. That we may invent or stipulate a resolution does not is of little help in resolving that difficulty.

1.6 Denying The Inductive Premise

Given that the sorites is valid. and given that we find the base step reasonable. the only remaining alternative is to reject the induction step. While this seems to be the most popular approach in the recent literature. such a denial raises a serious problem for it is obvious that any such rejection is tantamount to asserting its negation. That is. to deny the inductive step would commit one to saying that there is a precise minimum number of grains of sand necessary for being a heap and so. there must be sharp divisions between heaps and nonheaps. For example. recall that the inductive premise claims that if n grains make a heap. then n-1 grains make a heap. To deny this is to say that while n grains do make a heap. it is not always the case that n-1 make a heap. In other words. one grain makes the difference between a heap and a non-heap (or one millimeter makes the difference between being tall and being non-tall. one shade divides red form non-red. etc.). Most philosophers have desperately tried to avoid this commitment and so attempt to alter the interpretation of what it means to negate the induction step. There are several positions in this regard. Before we go into the details. here is a brief map of these positions.

The epistemicist will accept the denial of the inductive step at face value. and accept the counter-intuitive consequence that there are precise thresholds corresponding to our predicates. The exposition of this view will be left for later chapters.

In opting for a semantic solution, the inductive step is denied (i.e., seen as false), but it is maintained that we are not committed to precise thresholds. This is so, since the vagueness of our expressions is a matter of a deficiency in our language. Namely, vague terms do not have precise satisfaction conditions, and so there can be no precise divisions related to our predicates.

Lastly, some have been tempted to posit metaphysical vagueness as a means of solving the sorites. It is maintained that we cannot draw a precise demarcation in the sorites since the objects themselves are vague. This vagueness is independent of the language that we use to describe these objects and independent of how we might think of them.

As a brief aside, the question might be asked whether the choice of a particular solution has ontological import. Now certainly, to deny both the inductive step (with of course the proper reinterpretation) and the epistemological solution does seem to commit one to a rejection of precise thresholds. The question is, what does this rejection amount to? Certainly, opting for the epistemic solution (which will be explicated later) commits one to a precise ontology. However, opting for a semantic solution ***seems*** to leave the question open. Philosophers like Dummett and Lewis, who argue that vagueness is semantic indeterminacy, believe that the notion of vague objects is incoherent. Others, like Michael Tye, argue that the world does indeed contain vague objects. Thus it seems that opting for a semantic reinterpretation of the inductive step has no prior ontological commitments (at least with respect to vague objects). Let us briefly map out some of these solutions, beginning with the semantic solutions.

1.6.1 Multivalued Logic.

Some philosophers claim to solve the sorites by denying that classical logic holds when vague words occur in the argument. This is an attempt to reflect the intuition that vague predicates seem to have degrees of applicability and such an intuition is purported to be captured through the introduction of intermediate truth values. Such intermediate truth values are usually represented by the closed interval from 0.0 to 1.0, where 0.0 represents full falsity and 1.0 represents full truth. Thus given that Tom has 100,000 hairs on his head, the statement "Tom is bald" would be fully false (i.e., have a truth value of 0.0). This truth value would gradually expand until we had plucked all the hairs form Tom's head, and there the statement "Tom is bald" would be fully true (i.e., have a truth value of 1.0). Under this interpretation, it cannot be the case that one grain of sand will be the crucial difference between a heap and a nonheap, for a single grain only makes a difference to the degree of truth there is in the claim that the collection of sand is a heap.

The most obvious objection to this sort of approach is that it subverts the very solution it puts forth. Such a solution replaces vagueness and the apparent lack of thresholds with seemingly infinite precision and a multitude, if not a potentially infinite number, of definite thresholds. Say that we have a series that begins with Xs and ends with non-Xs. If one opts for an epistemic solution, there is a precise threshold between the last X and the first non-X. But to opt for multivalued logic is to posit many thresholds between Xs and non-Xs. So, for example, we would have seemingly precise thresholds between the predicate assigned a value of completely true (or 1.0), one that is assigned a value of 0.9 true, and one that is assigned a value 0.8 true, etc. But if we find it intolerable to have the first non-X as an immediate neighbor of the last X, why would we find the more exotic neighbors any more attractive. "The exotic neighbor crowds the last [X] as intolerably as the conservative old neighbor."[23] To add more and more neighbors (i.e., more partial truth values) is futile and simply leads to a vicious regress since the new and more abundant neighbors (i.e. thresholds) are no more satisfactory than any of the older ones. Certainly, if a single precise threshold is unacceptable, two or more (and potentially infinitely more) are equally objectionable. This commitment to a multitude of precise dividing lines is not only unbelievable, but seems to reject what Michael Tye calls the 'robustness' of vagueness.

1.6.2 Continuous Logic.

The flaws with multivalued logic may be remedied if we posit a continuous or fuzzy logic with a continuum of truth values instead of discrete and finite truth values. For example, imagine a color spectrum moving from white to black. Now imagine a patch that is completely black, but at every moment grows more white, even if imperceptibly. There are as many moments in this process as there are numbers between 0 and 1, and there are also as many shades of color as there are numbers between 0 and 1, namely an infinite number. Thus there are a potentially infinite number of truth values corresponding to each particular shade. But this means that there is in fact no point of transition from black to white. Choose any two points in the process from black to white. One cannot determine a point of transition, since there are an infinite number of iterations within this gap. This is true no matter how narrow the gap. That is, there is no point x at which the patch is black and the next point x+1 where the patch is white, for there are an infinite number of points between x and x+1. Thus there are no points of transition between black and white, tall and short, bald and non-bald, etc.

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[23] Roy Sorenson, "The Metaphysics of Words", Philosophical Studies **81**, 199.

The problem faced by the fuzzy logician is the same as that of the multivalued logician: both run into problems when trying to deal with second-order vagueness. Recall that the original problem was our inability to decide in borderline cases concerning the truth value of vague statements. That is, in borderline cases of 'tall', we cannot decide whether a person fits into the extension of 'tall'. Fuzzy logic was to deal with this by insisting that truth values run along a continuum and that sentences adopt these partial truth values depending on where in the continuum they lie. However, consider the following sentence:

'He is tall' is true to a degree less than 0.501.

According to Timothy Williamson, the problem with sentences like this is not that they are far too precise, but rather that they are in fact very vague. That is, it is difficult to decide whether this sentence is clearly true or clearly false. Our attempts to decide its truth value will be just as problematic as those used to determine the truth value of ordinary vague statements. One should not be fooled by the precision of the mathematical terms in the sentence, for the notion of a degree of truth of a sentence is not a mathematical one. According to Williamson it "represents an empirically determined mapping from sentences in context to real numbers".[24] In many cases, we would end up with vague results.

1.6.3 Supervaluationism.

Another semantic approach is the supervaluationist program. The problem of vagueness might be seen as a problem of generalizing a formal theory of meaning, which is applicable only to precise languages, to a theory that is equally applicable to vague languages as well. That is, we evaluate vague sentences in relation to a non-vague sentences. One such method would involve making the vague language precise and then applying the original formal theory. The vagueness of language, under such an interpretation, would consist in its capacity in principle to be made precise in more than one way.[25]

Now, assuming that under a supervaluationist program vague meanings are conceived as incomplete specifications of reference, in order to make the language more precise we need to complete these specifications without controverting their original content. So, to make 'heap' precise is to assign it a value that is true in the clear cases, false in the unclear cases, and neither true or false in the borderline cases. To determine the truth value of the vague sentence is to "treat it as a function of the truth values of each of a series of nonvague sentences." [26] Thus, for any vague sentence P, we would consider all the possible precisifications of P. P would be true if all the P-precisifications were true, false if the P-precisifications were false and would have no truth value if some of the P-precisifications were true and some false.[27] Instead of intermediate truth values, we have truth value gaps. So, for example, what does the sorites paradox look like under such a scheme. The sorites argument is considered classically valid. The base step (e.g. ten thousand grains of sand make a heap) is true (supertrue in fact), and the conclusion (e.g. one grain of sand makes a heap of sand) is false (superfalse in fact). But, the inductive premise has a counterexample to each admissible valuation, and thus comes out superfalse. In other

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[24] Timothy Williamson, Vagueness (New York: Routledge, 1994), 128.
[25] Ibid., 143.
[26] Mark Heller, The Ontology of Physical Objects: Four-Dimensional Hunks of Matter. (Cambridge: Cambridge University Press, 1990), 82.
[27] Ibid., 82.

words. different valuations will posit different cutoffs in the sorites series. Thus. the argument is valid. but not sound.[28]

1.6.4 Second-Order Vagueness.

This is a rather novel treatment of the problem. and has much to recommend itself. However. like the multivalued logic approach. supervaluationism has difficulty in dealing with second-order vagueness. Again. if it is a hopeless task to look for a definite boundary between true and false. it seems equally hopeless to look for a definite boundary between true and neither true nor false. Initially. the point of positing an alternative logic was that it could avoid postulating a single unrealistic threshold. But. as we have seen. both the multivalued approach and the supervaluationist program do posit such thresholds. if only at a higher level. Part of the problem for both approaches is that they have relied on a classical meta-language. That is. the language used to describe vagueness at the first-order. is essentially classical logic. It retains. among other things. bivalence (whereby every proposition that makes a declaration is true or false). In addition. both supervaluationism and the multivalued approach include claims to the effect that their systems converge with classical logic when dealing with precise predicates. Now some philosophers (for example Kamp and Goguen) have indeed recognized that such a system negates a recognition of higher-order vagueness. More explicitly. if we want to describe a borderline 'borderline tall'. then the meta-language that we use must have the tools that the supervaluationist or multivalued theorist needs for their respective theories (i.e. truth value gaps. degrees of truth). However. given they have opted for a classical meta-language. a language that does not contain these tools. they cannot account for this

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[28] Williamson. 153.

second-order vagueness. However, it is hoped that such a concession (i.e., representation of only first-order vagueness) will retain the desired rigor.

> Our models are typical purely exact constructions, and we use ordinary exact logic and set theory freely in their development. This amounts to assuming we can have at least certain kinds of exact knowledge of inexact concepts. (When we say something, others may know exactly what we say, but not know exactly what we mean.) It is hard to see how we can study our subject at all rigorously without such assumptions.[29]

1.6.5 Vagueness All the Way Up.

It might very well be argued that we do not need to settle for a half a loaf whereby we can represent only first-order vagueness, and so some philosophers suggest that we should make vagueness go all the way up.[30] Not only would we have a logic of indeterminacy, but also a meta-logic of indeterminacy. Roy Sorenson has pointed out some difficulties in opting for this approach. It can be granted, and has been admitted that none of the proposed systems are fully developed meta-theories: instead, they are simply sketches of a formal system. Certainly, promissory notes are not unacceptable given that there are some prospects for developing them more fully. However, herein lies the problem. According to Sorenson, "Meta-theory is a study of sentences used to express the truths of logic. By definition, a formal language must be completely specified without any reference to the meaning of the formulas. This requirement of uncompromising definitude is the essential difference between informal discussions of logic and the formal enterprise that is meta-theory."[31] A potentially rigorous meta-theory is not an actual rigorous meta-theory. But is this not what is eventually required – a precise, rigorous meta-theory? This

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[29] J. Goguen, "The Logic of Inexact Concepts" Synthese **19**, 327.
[30] See Kit Fine, "Vagueness, Truth, and Logic", Synthese **30**, 265-300., and Michael Tye, "Sorites Paradoxes and the Semantics of Vagueness", Philosophical Perspectives **8**, 189-206.

would obviously conflict with the desired vague formulations. The use of an indeterminate meta-language will thus lead to the following dilemma: if the object language results in an endless chain of indefinite meta-languages. then we are left with an infinite regress of definitions. On the other hand. if we attempt to make use of a single or perhaps a limited number of meta-languages. then the definition is incomplete.[32]

1.6.6 Metaphysical Vagueness.

It might be suggested that we may solve the sorites paradox by positing vague objects. Recall that the metaphysical theorist maintains that the inductive step is false. but there are no precise divisions in the sorites sequence since the objects themselves are vague. Thus there is no sharp division between a heap and a non-heap since a heap is a vague object (i.e.. has no definite boundaries).

The question is. how different are the ontic theorists. the epistemic theorists and the semantic theorists in general and. perhaps more importantly. with respect to offering a solution to the sorites paradox? I think it evident that there are commonalties among all theorists. Most theorists agree that vagueness will be cashed out in terms of borderline cases. All theorists also seem to agree that vagueness is an indication of a certain kind of ignorance. So. for example. at various times I do not know whether I am in the town of Steinbach. not because I do not know where I am (since I could point out my exact position on a map. etc.). but because I do not know whether where I am counts as being in the town of Steinbach. Epistemic theorists conclude that there is a fact of the matter in such borderline cases. but will explain our ignorance (and hence the phenomena of

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[31] Roy Sorenson. "The Metaphysics of Words". 209.
[32] Ibid.. 210.

vagueness) in terms of our cognitive failings. Semantic theorists (generally) agree that objects in the world have determinate boundaries, but wish to say that vagueness (and the reason for our inability to solve the sorites) is a result of vague predicates having indeterminate satisfaction conditions. This explains our ignorance and the phenomenon of vagueness.[33] But if the theory of metaphysical vagueness is to have some substance, it must say more than this. One of the problems hindering this endeavor is determining exactly what such a substantive thesis amounts to.

Perhaps we can begin by delimiting what a vague ontic theory is committed to. Certainly at the intuitive level, it seems obvious that we think of certain, if not all, objects as vague. Mount Everest certainly *seems* to be a vague object if anything is. It is not clear, say when descending the mountain, when one is no longer on Mount Everest. However, this seems to be an indication of linguistic laziness, rather than an ontological commitment. Indeed, much of the discussion has focused on what it *means* to say that an object (such as Mount Everest) is vague. This is easier said than done. Michael Dummett writes that "the notion that things might actually be vague, as well as vaguely described, is not properly intelligible."[34] Yet, many philosophers have felt that, while ontic vagueness is false, it is quite intelligible. Still others claim that not only is the idea intelligible, but is in fact true. Let us briefly survey one of the most prominent accounts of the meaning of ontic vagueness.

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[33] Sainsbury, 64.
[34] Michael Dummett, "Wang's Paradox", 260.

1.6.7 Vague Identity Statements.

Gareth Evans argues that the thesis that the world contains vague objects relies on (in part) the thesis that identity statements are sometimes vague.[35] B.J. Garrett makes this explicit and states that "the thesis that there can be vague objects is the thesis that there can be statements which are indeterminate in truth value (i.e., neither true nor false) as a result of vagueness (as opposed, e.g., to reference-failure), the singular terms of which do not have their references fixed by vague descriptive means."[36] In the literature, it is commonly held that Evans believes that it is false that identity statements are, or can, be vague. The argument presented in Evans is quite simple. Assume that it is indeterminate whether x=y. So, it is not determinate that x=y. However, it is determinate that x=x. Thus, x has a property that y lacks: namely, the property one has whereby it is determinate whether x=one. Identity is governed by Leibniz's law: if x=y then it must be the case that every property of x is a property of y. Hence, it is not the case that x=y. This of course undercuts the original supposition that it is indeterminate whether x=y.[37]

A large body of discussion surrounds this argument, not all of which seems to me legitimate simply because I do not think the argument necessarily demonstrates what many have supposed. Even if the above argument is correct, it does not follow that the world is in no respect vague. Identity is after all one relation among many. Evans himself speaks of objects about which it is a fact that they have fuzzy boundaries. Yet fuzzy boundaries do not seem to require vague identities in any obvious respect.

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[35] Gareth Evans, "Can there be Vague Objects?" Analysis **38** (178) 208.
[36] B.J. Garrett, "Vagueness and Identity", Analysis **48**, 130.
[37] Williamson, 253.

In addition, and perhaps more importantly, Lewis has made the point that many philosophers have in fact completely misunderstood the point of Evans' argument as a whole. According to Lewis the correct interpretation of Evans is this: in the proof we find a supposed equivalence between two statements.

1) it is vague whether...a...

2) a is such that it is vague whether...it...

According to Lewis, when a is non-rigid, the equivalence between (1) and (2) is fallacious. It is reminiscent of the fallacious equivalence between 'It is contingent whether the number of planets is nine' which is true, and 'The number of planets is such that it is contingent whether it is nine' which is false.[38] Lewis contends that the misunderstanding is to say that Evans overlooks this fallacy, proceeds to endorse the proof, as well as conclusion that there can be no vague identity statements. Yet, Evans seems to take it for granted that there are vague identity statements, and that a proof to the contrary is incorrect. Lewis concludes that the view that attributes vagueness to semantic indeterminacy avoids the above fallacy. The view that there are vague objects affords no diagnosis of the fallacy and so must accept the proof and the unwelcome conclusion that there can be no vague identity statements.[39]

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[38] David Lewis, "Vague Identity: Evans Misunderstood", Analysis **48**, 129.
[39] Ibid., 128. It is worth noting that Lewis received personal communication from Evans to the effect that this interpretation is correct. See Lewis' "Vague Identity: Evans Misunderstood", p.130. Brian Garrett has argued that despite this mutual bolstering session, both Evans and Lewis are mistaken in their interpretation of the argument. He maintains that while the argument does not prove what Evans (or Lewis) thinks it does, with some modification, the argument may be used against those who would opt for ontic vagueness. See Garrett's "Vague Identity and Vague Objects" in Nous **25**, 341-351.

1.6.8 On the Coherence of Vague Objects.

As was pointed out, a substantial number of philosophers have concluded that the notion of ontic vagueness is quite false if not incoherent. Lewis writes that

> the only intelligible account of vagueness locates it in our thought and language. The reason it's vague where the outback begins is not that there's this thing, the outback, with imprecise borders; rather there are many things, with different borders, and nobody has been fool enough to try to enforce a choice of one of them as the official referent of the word 'outback'. Vagueness is semantic indecision.[40]

This seems to be the most intuitive and satisfactory way of looking at the notion of vague objects. Indeed, it is difficult to imagine how we should speak of vague existence at all. Is it possible to describe the borderline between existence and non-existence as vague? I don't think so. Anyone who believes that objects are related to "exists" as a person stands in relation to "short", will have a difficult time stating such a position coherently. van Inwagen puts it this way: suppose for the moment that it is not definitely true or false that James exists. Must we say that this is so because even given perfect knowledge of James's properties, a person would be left in doubt as to whether James exists? The obvious reply is "Look, either James is *there* for you to hesitate over, or he isn't. If he is there, he exists; if he isn't, he doesn't."[41]

However, let us suppose that we can make sense of what it means to posit vague objects (i.e., an object that has vague boundaries). Does positing such objects aid us in solving the sorites paradox? According to Mark Heller, positing imprecise or vague objects is not a viable solution to the sorties paradox. He argues as follows: suppose that there are indeed vague objects, and let us consider one in particular, a table named Charlie. Begin a

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[40] David Lewis, On the Plurality of Worlds (Oxford: Basil Blackwell, 1986), 212.
[41] Peter van Inwagen, Material Beings (Ithaca, N.Y.: Cornell University Press, 1990), 233.

process of chip removal from Charlie until we are left with but a single chip. At what stage did Charlie cease to exist? If one has opted for a vague objects thesis. there is no last stage at which Charlie exists. nor a first stage in which Charlie does not exist. But consider the following claim:

(A) Charlie will survive the loss of a single chip.[42]

Now suppose that A is true. Certainly this cannot be the case at every stage of Charlie's existence. for it entails that Charlie would exist even if composed of a single chip. But if this is so. then there must be some stage at which Charlie exists and A is not true. Call this stage s. However. it now seems that. contrary to our original assumption. Charlie has precise boundaries. He exist at stage s but not afterwards. Therefore. Charlie cannot have precise boundaries.[43]

Heller does note that this argument. which I take to be decisive. presupposes classical bivalent logic. Thus. those who wish to respond to this argument must choose some form of deviant logic. such as multivalued logic or perhaps a supervaluationist program. However. such semantic solutions have already been shown to be problematic. I conclude that a metaphysical solution. besides being misguided in terms of its ontological commitments. cannot afford a solution to the sorites as a stand alone theory. or when combined with a supplemental semantic analysis.

To summarize. the epistemicist will accept the denial of the inductive step at face value. and accept the counter-intuitive consequence that there are precise thresholds corresponding to our predicates. In opting for a semantic solution. the inductive step is

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[42] Heller. 76.
[43] Ibid.. 76.

denied (i.e., seen as false), but it is maintained that we are not committed to precise thresholds. This is so, since the vagueness of our expressions is a matter of a deficiency in our language in that our expressions lack precision. Namely, vague terms do not have precise satisfaction conditions, and so there can be no precise divisions related to our predicates. The denial of the inductive step is generally reconciled with imprecise thresholds via an alternative logic. Lastly, some have been tempted to posit metaphysical vagueness as a means of solving the sorites. It is maintained that we cannot draw a precise demarcation in the sorites since the objects themselves are vague.

CHAPTER 2: THE EPISTEMOLOGICAL ACCOUNT

2.1 Introduction

According to the epistemological account, the induction step in the sorites series is false but there is no need to alter the standard logic. There are precise divisions, and hence no genuine indeterminacy. There are no borderline cases between blue and non-blue, tall and non-tall or bald and non-bald. Any such distinctions are in fact sharp. However, it is not necessarily the case that we know, or are in a position to know where such division points may lie. Thus, vagueness is a matter of ignorance on the part of the speaker and hence the existence of sharp division points is supposedly reconciled with our inability to specify them. Cargile and Campbell claim that this ignorance is due to our less than perfect understanding of vague words and so describe our ignorance as "semantic uncertainty". Timothy Williamson and Roy Sorenson take the position that the ignorance is a cognitive failing and rely on an epistemological analysis to explicate the idea that vagueness is not metaphysical, nor semantic, but a feature of our mental capacities.

For the purposes of this work I will take it that anyone who offers an epistemological solution to the sorites has two explanatory tasks. The first is to explain and justify the assertion that there are precise divisions applicable to vague terms and expressions. At the intuitive level, this is one of the more bizarre claims of the epistemic theory. Now if this were the only objection, we might is stop here and reply "Change your intuitions". After all, one of the jobs of philosophy is to evaluate intuitions and separate the correct intuitions from the incorrect. But there are more forceful considerations to take into account.

The second explanatory task of the epistemicist is explain and defend the notion that we are completely ignorant of the precise divisions corresponding to supposedly vague predicates. Note that it is not only that we are ignorant, but irremediably ignorant of such precise divisions. No new information, no matter how detailed or extensive, would remedy this ignorance. As such, vague statements form a class or subclass of unknowable truths. We will now look at attempts by Roy Sorenson and Timothy Williamson to answer these concerns.

2.2 Williamson's Bivalence

Many non-epistemicist theorists have argued that to do justice to the robustness of vagueness, borderline cases cannot simply be a matter of ignorance as the epistemicist would contend. In such borderline cases, there is nothing to be known, and so nothing for us to be ignorant of. In this nebulous region there are no determinate truth values. We have seen that several alternative solutions to the sorites (such as the semantic solutions) have opted to deal with this problem by adopting alternative logics. Under such views bivalence is rejected. It is thought that by abandoning this notion, we do justice to the depth of the problem of vagueness and the resulting sorites paradox.

Williamson contends that the epistemic thesis in general, and the thesis of bivalence in particular, provides the only plausible solution to the sorites paradox. In his view the most obvious argument in favor of the epistemic thesis is that it involves no revision of classical logic and semantics. The majority of the rival theories insist on such revisions. Certainly, one of the options in dealing with the sorites is to reject such revisions, retain bivalent or classical logic intact and reform our notions of natural languages to conform to our needs. In effect, we may "either idealize the data to be explained and hold (standard) logic fixed, or else leave the data as it is and change the (standard) logic."[44] Idealization is a perfectly acceptable activity and so we should not let that dissuade us from accepting this position.[45] In fact Williamson argues that the costs of rejecting idealization are quite high. He maintains that classical logic and semantics are vastly superior to any such alternatives in terms of simplicity, power, past success and integration with theories of other domains. Therefore, it makes sense to adopt the epistemic view in order to retain classical logic and semantics.[46]

However, despite such comments, Williamson believes that he has forceful independent arguments for the epistemic thesis, and more specifically for the thesis that there are precise divisions related to vague predicates. Williamson's argument relies on accepting, or more precisely retaining the principle of bivalence. The principle of bivalence (hereafter PB) may be formulated as the following schema:

PB If u says that P, then either u is true or u is false.[47]

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[44] Avashai Margalit, "Vagueness in Vogue" Synthese **33**, 214.
[45] Quine has argued that we do in fact idealize in ordinary situations. He maintains that we follow the path of least mutilation. Standard logic is at the core of our conceptual scheme and so should be the last to be revised.
[46] Timothy Williamson, "Vagueness and Ignorance", Aristotelian Society, suppl. **66**, 162.
[47] Williamson, Vagueness, 187.

In PB, 'u' will be replaced by the name of an utterance and 'P' by a proposition which states that something is the case. The truth and falsity in PB may be cashed out in terms Tarski's and Aristotle's dictums on truth. Thus we can say:

T) If u says that P, then u is true if and only if P.

F) If u says that P, then u is false if and only if not P.[48]

It is the contention of non-epistemic theorists that vague statements present a counterexample to PB. That is, given that our language is vague, and given the intractability of the sorites paradox, we must abandon bivalence. To present a counterexample, we must first refer to the antecedent of PB by saying that something is the case. So for a particular utterance 'P' we would expect:

1) u says that P.

The consequent of (PB) must also be falsified, such that:

2) Not: either u is true or u is false.

Taking 1) and the consequent of T) and F) to get:

3a) u is true if and only if P.

3b) u is false if and only if not P.

From 3a) and 3b) we may substitute their right-hand sides for their left-hand sides in 2), giving

4) Not: either P or not P.

Applying De Morgan's law where the negation of a disjunct entails the conjunction of the negations of its disjuncts, 4) turns into

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[48] Ibid., 188.

5) Not P and not not P.

Assuming the acceptance of bivalence, 5) is a clear contradiction. Thus, attempting to provide a counterexample to bivalence leads to a straight contradiction.[49]

If we cannot deny bivalence, then we cannot accept the notion of cases where it is indeterminate whether a predicate applies. That is, as we progress down a sorites series, there is a definite cutoff in the series. In other words, there are no borderline cases. Since it is typically taken that borderline cases are indicative of vague terms and concepts, it follows that there are no genuinely vague terms and concepts.

2.3 Sorenson's Limited Sensitivity

A key objection to the epistemological approach is that it makes an unrealistic assumption about the sensitivity of vague concepts. King emphasizes that proponents of the epistemic approach must say that a millimeter can make the difference between a runner starting out from New York being far from San Francisco and his not being far from San Francisco. King maintains that there can only be division points if there are determinants, where determinants are what makes a proposition true. The determinant for 'far' cannot be conventional, since ordinary usage will not be decisive. The determinant cannot be natural, since there are no natural boundaries between far and non-far points from San Francisco. Since the determinants must be either conventional or natural, there

[49] Ibid., 189.

are no determinants for vague predicates and so no sharp division.[50] In effect, our vague predicates are not sensitive enough to have determinants.

First and foremost it must be noted that the sensitivity objection is equally applicable to supervaluationism and the many-valued approach. This was first pointed out by Unger.[51] The many-valued theorists are committed to saying that a one atom difference can affect the degree to which a predicate like "tall" applies to an object. But why would we say that the truth of "this person is tall" can be decreased from 0.555559 to 0.555558 by removing an atom? In a similar light the supervaluationist is committed to saying that the removal can make a difference between a proposition having a truth value and having no truth value. Since one of the primary motives for adopting many-valued logic, or a supervaluationist approach, was to avoid unlimited sensitivity, once it is clear that such an appeal cannot succeed, the departing from classical logic seems unnecessary.

Sorenson believes that any non-epistemic explanation for the appearance of vagueness is incoherent; vague concepts do indeed have sharp boundaries. Given any sorites series, and any vague predicate X, there will be a determinate last X and a determinant first non-X. This is true irrespective of the gap between the relevant predicates. Thus, vague predicates must, at least in this case, be of unlimited sensitivity. "[T]here is no degree of change, however small, in those relevant respects which is always sufficient to change the status of an item in point of [X]-ness."[52] Consequently, anyone who rejects the epistemic thesis must also accept that vague predicates are of a

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[50] J.L. King, "Bivalence and the Sorites Paradox", American Philosophical Quarterly **16**, 19.
[51] Peter Unger, "There Are No Ordinary Things", Synthese **41**, 117-154.
[52] Crispin Wright, "The Epistemic Conception of Vagueness", The Southern Journal of

correspondingly limited sensitivity: "more precisely, that for each such predicate there will be some degree of change, u, in some relevant parameter(s) such that no possible pair of items, one a positive, the other a negative instance of the predicate, differ only to degree u or less."[53] For example, let our predicate be 'heap', and let 'u' be one grain of sand. Limited sensitivity would dictate that moving from a heap to a non-heap cannot be due to the removal of one grain of sand. 'Heap" is just not that sensitive.

Sorenson concludes though that the concept of limited sensitivity, and any theory that adopts it, is actually incoherent. He hopes to demonstrate this via a meta-sorites. Suppose that F is any predicate, say "short", and u a degree of change in some relevant respect to which F is insensitive. Of course F may be sensitive to changes in the order of thousands of u. Sorenson proposes the following:

> A sorites argument concerning "short man" has a false inductive step if the step's increment equals or exceeds ten thousand millimeters.
>
> If a sorites argument concerning "short man" has a false induction step if the step's increment is n millimeters, it also has a false inductive step if the step's increment is n-1.
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> All sorites arguments concerning "short man" having induction steps with increments convertible to millimeters have false inductive steps.[54]

The conclusion states that "short' has an unlimited sensitivity. If this is unacceptable, then one must either deny one of the premises, or deny the argument is valid. Certainly the latter is no real option. But the first premise seems undeniable. Therefore, opponents of epistemicism must reject the second premise. However, Sorenson maintains that to deny

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Philosophy, suppl. **33**, 139.
[53] Ibid., 140.

the second premise is to suppose an exact threshold to the degree of limited sensitivity of "short". But this simply goes epistemicist at the second order and seems to concede defeat. What could motivate one to make exceptions for second-order epistemicism?

As Crispin Wright points out, there is some maneuvering room for the non-epistemicists. One might question Sorenson's identification of the rejection of the second premise in the above argument with its classical denial.[55] However, the argument may be strengthened to avoid this difficulty through the following principle:

> If some sorites argument for F works with a series each pair of adjacent elements of which differ by exactly n u, and contains a major premise to which there is a counterexample in the series, then some sorites argument for F that works with a series each adjacent elements of which differ by exactly n-1 u will contain a major premise to which there is a counterexample in its series.[56]

Since this entails that there is no lower limit to the sensitivity of any predicate which has both positive and negative instances, there are no predicates of limited sensitivity. However, this premise is entailed by the supposition that F is of limited sensitivity. Therefore, if F is of limited sensitivity, then there can be no such predicates.[57]

Given that the thesis of limited sensitivity is inconsistent, why is it compelling? Sorenson claims that part of the explanation is found in a suggestion made by J.S. Mill to the effect that many people fallaciously argue that the causes of a phenomenon must resemble the phenomenon itself. Thus we find the claim that a grain of sand cannot make the difference between a heap and a non-heap since such a tiny change could not have such a sizable effect. But science affords numerous counterexamples to this

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[54] Sorenson, "Vagueness, Measurement, and Blurriness", 66.
[55] Wright, 140.
[56] Ibid., 141.
[57] Ibid., 141.

proportionality principle. For example, a very small change in velocity can determine whether a craft escapes earth's gravity, or falls back to earth and crashes.[58]

2.4 Sorenson's Clones

Sorenson presents another line of argument for the idea of sharp divisions. That is, our predicates have precise extensions in that there are precise thresholds between areas where the predicate applies and ceases to apply. For example, there is a precise threshold at which 'tall' applies and the next point at which it does not. For predicates subject to the sorites we can imagine a process of gradual change as an object slowly loses or acquires such a purported vague property. Imagine two objects, qualitatively identical, which are subject to such a process. Sorenson opts for a pair of clones that go through the process of growing tall. Suppose that Clone A begins the process of growing tall before Clone B, and they grow at exactly the same rate.[59] Now consider the following principle:

> (SC) If an item undergoes some finite process of change, then had it started earlier and changed at just the same rate, it would finish sooner.[60]

It would of course follow that if two objects were involved in such a process, having similar starting points and the relevant processes proceed at exactly the same rate, then the object that starts first, finishes first. Thus Clone A finishes growing tall before Clone B, and so Clone A has become tall while Clone B has not. Let H^A be A's height at a particular time and H^B be Clone B's height at a particular time. Thus "tall" has a

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[58] Sorenson, "Vagueness, Measurement , and Blurriness", 68.
[59] Roy Sorenson, "A Thousand Clones", Mind **103** (1994), 47-54.
[60] Wright, 147.

threshold between H^A and H^B. This interval could of course be as small as one would like. Thus, "tall" (or any other similarly vague predicate) has a precise threshold.[61]

The argument is not convincing as it stands for it appears to beg the question. The supposition that the above argument is intended to resolve is whether there is a precise threshold corresponding to vague predicates. That is, is there a precise division between non-tall and tall? However, in the above argument, this appears to be the very point that is assumed. That is, how can we say that Clone A finishes growing tall before Clone B if there is not already such a precise threshold? In other words, the argument assumes that vague predicates are true (or not true) of a particular thing (i.e. x is tall, x is short, x is bald, etc.) at every point in the series. But this is the very point the argument was intended to validate.

2.5 Our Ignorance of Sharp Cutoffs

In the previous sections we looked at two accounts which favor the idea that there are precise cutoffs in the sorites series. That is the first explanatory task of the epistemicist. The second is to offer an account of the fact that, given there are such precise divisions, we remain irremediably ignorant of where such divisions lie. Here, we will first examine an account offered by Timothy Williamson. Then I will look at Mark Heller's criticism of this approach, whereby he argues that the epistemic account commits us to ignorance along the entire sorites series, and not just ignorance of the point of transition within the sorites series.

[61] Ibid., 147.

If it can be granted that there are indeed sharp divisions of seemingly vague predicates, the question becomes, how is that we remain ignorant of these dividing lines? Note that the epistemicist regards this ignorance as irremediable. It is not simply a matter of gaining more information about the predicates and their referents. Our ignorance generates a far greater problem. Williamson is one of the few philosophers who takes the question of our ignorance regarding sharp cutoffs seriously:

> For most vague terms, there is knowledge to be explained as well as ignorance. Although we cannot know whether the term applies in a borderline case, we know whether it applies in many cases that are not borderline. The epistemic view may reasonably be expected to explain why the methods successfully used to acquire knowledge in the latter cases fail in the former.[62]

2.5.1 The Reliabilist Conception of Knowledge.

Williamson's attempt relies on a reliabilist conception of knowledge. A reliabilist conception of knowledge is one in which we attain knowledge if there is a reliable mechanism that brings this knowledge about. Williamson maintains that any reliabilist conception of knowledge will require that knowledge will be cushioned by a margin of error. Let us make this explicit. Consider the sorites series $x_1, \ldots, x_n$ for some predicate F (for example, "tall"). To know that x_i is an F would entail that one is reliable in taking x_i to be an F. Reliability in this case would involve a certain margin for error, where a margin of error obtains in taking x_i to be an F only if items sufficiently close to x_i are also F. In other words, one has a margin for error in taking x_i to be an F only if x_{i-1} and x_{i+1} (x_i's immediate neighbors) are also F. Neighbors is not be to taken as indicating physical

[62] Williamson, Vagueness., 216.

location, but refers to a neighbor in the F sequence. Williamson claims that as a result of these considerations the following principle obtains:

I) If x_i is known to be F then x_{i+1} is F.[63]

This principle in turn will explain why we cannot know the conjunction, "x_i is F and x_{i+1} is not F." That is, it explains our ignorance of a precise transition of the applicability and non-applicability of F. In order to know this conjunction, one would have to know its first conjunct (i.e., x_i is F). By I), if one knows the first conjunct, then the second conjunct (i.e., x_{i+1} is not F) is false. If the second conjunct is false, so is the entire conjunction, and so it cannot be known (given that knowledge entails truth). Therefore, I) rules out knowledge of the conjunction.[64]

For example, if I am to know where a precise boundary falls within the scope of heights ranging from tall to short, I would have to be able to tell that some person is tall, and at the same time know that her immediate neighbor is short. However, I cannot tell that a certain person is tall unless my impression that she is tall is a reliable indicator that this is so. But this will only be the case if that person is flanked on both sides by people that are tall. If they are tall, then these people cannot be known to be short. In effect, I could not reliably determine, just on the basis of vision, a sharp tall/short distinction. So, given that there are such sharp divisions, I could not know them since I could not be reliable about where such a division lies.[65]

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[63] Timothy Williamson, Identity and Discrimination (Oxford: Basil Blackwell, 1990), 105.
[64] Ibid., 105.
[65] Wright, 149.

2.6 Heller's Objection

2.6.1 The Epistemic Thesis.

According to the epistemic thesis, we can solve the sorites paradox by denying the inductive step. Unlike other purported solutions, here no attempt is made to soften this position by adopting alternative logics. The denial of the inductive step is accepted unmodified and at face value. Thus the epistemicist is committed to precise cutoffs in the sorites series, but maintains that we remain ignorant of where such divisions lie. Say there is a table named Charlie, and Charlie is subjected to a sorites series whereby small parts or chips that make up Charlie are removed. The epistemicist will claim that at some point in the series the statement

(I) Charlie will survive the loss of a single chip.[66]

will change in truth value (i.e. from true to false). Given a commitment to bivalence, this point is precise. Given a commitment to an epistemic solution to the sorites paradox, we cannot know where this point is.

Heller contends that the epistemic thesis has rather far-reaching consequences: namely, if the thesis is true then we will never know if an object will survive or has survived the removal of a discrete part. Assuming that we may sometimes know when tables survive the loss of a single part or chip, we would be forced to admit that the objects of our standard ontology may exist, but it turns out that we are completely ignorant of when any *given* object exists. "Fundamentally, we would be concluding that there are tables, but we have no knowledge of the persistence conditions (or essential properties) of such objects."[67] So we would have no real idea of what the world, nor its furniture, is really like. Thus, I

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[66] Heller, 76.

take it that the success or failure of Heller's argument will depend on whether the epistemic solution does indeed have such a consequence.

2.6.2 Heller's Argument.

Heller sums up his argument this way:

> If all the evidence we might have for where the boundaries of an object are would not be enough to allow us to know where the boundaries are, then all the evidence we might have for where the boundaries are not should not be enough to yield knowledge of where the boundaries are not. If our possible information would be insufficient for knowledge of the cutoff point between when a thing exists and when it ceases to exist, then the same type of knowledge should also be insufficient for knowledge of when a thing continues to exist.[68]

A central feature of Heller's argument for this thesis is the nature of the problem cases (i.e., cases in the sorites where we cannot decide on the applicability of the sorites predicate) that seem to be an unavoidable part of our knowledge of the existence and persistence of objects. It seems that the problem cases are not epistemically privileged: there is nothing about these cases that should *make* them problem cases. The evidence we have in the problem cases is no more difficult to obtain, nor is it less detailed, than the evidence in the easy cases. Why then the asymmetry? Let us see if we can produce a plausible account of the problems involved.

2.6.3 The Sorites Decomposition and Case 1.

To begin, let us use Heller's analysis to explicate a plausible account of how we generally view the sorites series and how we divide this series into problem cases and the easy cases. Suppose that we have an apparently reliable mechanism for producing mostly true beliefs about the existence and persistence of objects. Heller uses perception as the

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[67] Heller, 91.
[68] Heller, 92.

mechanism of choice. Let us return to our observation of Charlie's decomposition. Here it seems obvious that we do know that our table Charlie survives in the early stages of his disintegration, and yet remain ignorant of the precise point at which he ceases to exist. Thus we should not find it surprising that there are problem cases and easy cases.

To make this clearer let us make this sorites series somewhat more general. Following Heller, we will call this Case 1. Suppose, we have a series of lines roughly arranged in order of descending lengths. Some of the lines are obviously different in length from others in the series, while others are only minutely different in length from their neighbors. In this case, a person is easily able to distinguish the first and last line, but cannot distinguish adjacent pairs of lines. In this instance it is not the case that our perceptual mechanism has broken down, but the mechanism is simply not sensitive enough to make such fine distinctions between adjacent members in a series. "Our inability to discriminate two neighbors in a series does not in itself count against our ability to distinguish the first several members of the series from the last several members. It seems as if only someone who fails to learn this lesson will be persuaded by the Sorites arguments."[69]

2.6.4 Case 2.

Heller attempts to make the above more analogous to Charlie's case by revising Case1 (call this Case 2) so that we are now concerned with but a single line called L. Line L is six inches long. Compare L with another line L*, which we know to be one foot long. Obviously one can tell that L is not the same length as L*. Now add a small amount to L so that it is imperceptibly longer. Again, compare L with L*. And again, it is obvious that L is not one foot long. Continue with this process until it is obvious that L is longer than one foot. At the beginning of this process, we knew that L was shorter than L* and at the end of the process we know that L was longer than L*. However, there is a small region where L is imperceptibly different from L*.[70] So a person observing this process is not able to say when L became one foot long. This seems analogous to the case of Charlie's gradual disintegration. Consider the following two sentences:

(II) Charlie exists.
(III) L is less than one foot.[71]

In (II) we seemed to be at a loss as to why we seem to know this statement to be true in the easy cases, but cannot know exactly when this stops being true. This is not the case for (III). We can certainly know that (III) is the case for a certain number of iterations and yet not know when (III) stops being true. Our perceptual mechanism is not quite sensitive enough to say when the transition occurs, but we still are quite certain of our knowledge in the easy cases. Likewise, for (II) our mechanism is not quite sensitive enough to tell us exactly at what point Charlie ceases to exist, but we are still able to make judgments in the easy cases: cases where is seems obvious that Charlie exists or not.[72] This seems to be an eminently plausible explanation and catches our intuitions about what makes the sorites so intractable.

2.6.5 The Disanalogy Between Case 2 And Case 3.

However, Heller wants to argue that there is a disanalogy between Case 2 and any sorites series. To make the disanalogy evident, consider another case, Case 3. Here we are asked to consider two lines L1 and L2. Suppose that they are the same length, and we know

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[69] Heller, 97.
[70] Heller, 97.
[71] Heller, 98.
[72] Heller, 98.

this to be the case. L2 is taken away and replaced. Has the length of the line been changed. Specifically, has

(IV) L1 and L2 are the same length[73]

stopped being true? Repeat this procedure several times. At some later stage, we clearly see that L2 is longer than L1, but we are not in a position to say when it actually became longer. For the sake of argument, let us suppose that (IV) was true for some of the early stages in the removal process and that the person observing the process believed (IV) was true at each stage. Could this person know this to be the case? Heller says no. Our perceptual mechanism is not sensitive enough to reliably form beliefs in cases where L1 is the same length as L2 nor in cases where they are different in length. After all, given a situation in which L1 is the same length as L2, had L1 been of a different length than L2, our mechanism would have produced the same belief. Thus perception is not reliable in producing the belief that L1 is the same length as L2, even if it is the case that L1 is the same length as L2.

2.6.6 Case 3 Exemplifies The Sorites Series.

It is Case 3 that Heller believes characterizes the disintegration of Charlie (and the sorites series in general). In the easy cases it becomes evident that the mechanism is almost always reliable. That is, before we begin any removal process, we are confident that the object exists. Likewise, when a large portion of the discrete parts have been removed we are also confident that the object does not exist. However, the mechanism breaks down in the problem cases. Specifically, it stops producing true beliefs (or any beliefs for that matter) about the object's continuing existence when a certain number of parts have been removed for it is in these difficult cases that we seem to rely on judgments of sameness. while in the easy cases we rely on judgments of difference.[74] Thus we will sometimes be able to know when an object does not exist (for example. in the last few steps of the removal process). but once we begin a removal process. we can never know that such an object does (or continues to) exist. However. if our mechanism is supposed to be sensitive enough to yield knowledge in the easy cases. then it must also be sensitive enough to yield knowledge in the problem cases. In other words. there should be no problem cases. It does not matter how sensitive the shift from existence to non-existence is. our mechanism must be just that sensitive to determine whether a change has not occurred. But if the mechanism is indeed that sensitive. then it must also be sensitive enough to determine that a change in the sorites series has occurred.[75] Since the latter does not hold. neither does the former. So the epistemic thesis commits us to wholesale ignorance in a sorites-type series. since it seems that we can only know that Charlie survives the loss of a number of parts if we can also know the precise point at which Charlie goes out of existence. Crispin Wright has made an objection in a similar vein. He maintains that. while the epistemicist may have shown why we cannot know where the division lies in a particular sorites series. he must also explain why it is that we cannot know where the dividing line *is not*. In other words. has not our ignorance spread out over the entire sorites series?[76]

The structure of Heller's argument can be summed up as follows:

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[73] Heller. 98.
[74] Heller. 100.
[75] Heller. 101.
[76] Wright. 149.

1) If judgments which we make in Case 3 (judging the sameness of line lengths) are not reliable, then judgments of the sameness of Charlie are not reliable.

2) Our judgments in Case 3 (judging the sameness of line lengths) are not reliable.

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3) Judgments of the sameness of Charlie (i.e., sameness of existence state) are not reliable.

2.7 Equivocation

2.7.1 The Unreliability of Judgments in Case 3.

Premise 2) in the above argument seems to be true. In Case 3 the mechanism is supposed to produce knowledge of sameness. However, according to Heller, while judgments of differences may be the product of reliable mechanisms, such mechanisms cannot be reliable for judgments of sameness. Consider again Case 3, and specifically line L2. There is only one length that is the same as line L2. "To provide knowledge of sameness, the mechanism must be sensitive enough to discriminate between that length and other similar lengths. It must be able to distinguish anything that does not have that length from the things that do."[77] If not, then there would be numerous (illegitimate) contenders for the position of "the same length as L2", and any judgment we make would not be any better then a good guess. Case 2 , with its judgments of difference, is not like this. To provide knowledge of difference, knowledge that L is different in length than L*, the mechanism need only distinguish some things that do not have that length from things that do.[78]

Perhaps an example will make this clear. Say that we have two sets of lines, with 100 lines of varying length in each set. What we want to do is select one line from each set

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[77] Heller, 99.
[78] Heller, 99-100.

and compare their lengths to see whether they are the same. Furthermore, suppose for the sake of argument that our judgment in this situation is accurate to within plus or minus 4 millimeters. (The types of measurement and the specific errors therein are not relevant. We could posit lines made up of chips and make the error plus or minus 8 chips.) Furthermore, we may suppose that we are limited to integral measurements and that each measurement pair within the error range is no more likely than any other. To begin, let us choose two lines (line x and x*) that are of the same length. Given the error analysis above there are 81 possible pairs of measurement outcomes, none more likely than any other. Thus, our chance of correctly judging these two lines to be of the same length is 1/81. In other words, 80 of the measurement pairs yield the incorrect judgment that the lines are the same length. Clearly an unimpressive result. What happens if the lines are not the same length? For example, suppose that our two lines (x and x*) differ by a length of 4 millimeters. That is, line x has length n, and x* has length n+4. In this case, 25 measurement pairs will yield the incorrect judgment that the lines are of the same length. What if the lines differed by 6 millimeters (i.e., line x is n millimeters and line x* is n+6 millimeters)? In this case, 9 measurement pairs yield the incorrect judgment that the lines are the same length. These results would of course be expected. The number of measurement pairs that yield an incorrect judgment is a function of the separation of the two lines in question. As the line lengths diverge, our errors would decrease since the number of possible measurement pairs within the margin of error decreases. I conclude that Heller is quite right in saying that we are not reliable in making judgments of this kind.

2.7.2 Equivocation On Judgments of Sameness.

While premise 2) is true, premise 1) is much more problematic. I think the above argument fails to get Heller the conclusion he wants, for there seems to be an equivocation on "judgments of sameness". Consider the notion of "judgments of sameness". We cannot and do not make a judgment of sameness without its being a judgment *of* something. Rather, we always make judgments of sameness with respect to some property. The question is, what property of Charlie is Heller asking us to consider with respect to the judgments of sameness? Two candidates present themselves.

First, our judgment of sameness could be relative to the number of chips that make up Charlie. That is, our judgment of the sameness of line length is like the judgment of sameness of Charlie with respect to the number of chips that constitute Charlie. This appears to be a likely possibility in relation to premise 1), for premise 1) is true if the judgment in question is concerned with the *sameness of the number of chips* that constitute Charlie. That is, premise 1) is true if we are asked to judge minute differences in the number of chips of Charlie and in the lengths of lines. These judgments seem to be analogous, for in both instances, there is only one correct answer for our judgments of sameness, be it a correct judgment with respect to the sameness of line length or sameness of the number of chips that make up Charlie. For example, suppose that Charlie x is made up of 100 chips. If any other Charlie (say Charlie x*) in the series is (reliably) judged to be the same as Charlie x then Charlie x* must be made up of exactly 100 chips. The question is, what does this interpretation get Heller?

Consider what would happen if we ran Heller's argument through under this interpretation. We end up with the conclusion that we cannot reliably determine if two consecutive Charlies in the decomposition are the same (i.e., have the same number of chips). But this seems perfectly reasonable and Heller is quite right in saying that our judgments in this instance are not reliable. That is, in making judgments of this kind, there is one and only one correct answer to the question of whether two Charlies are in the same state with regard to the number of chips that make up Charlie, and furthermore, we are not reliable in judging this to be the case. Consider again the preceding discussion on the truth of premise 2). Furthermore, this is not something that the epistemicist would be forced to deny. Recall the discussion of the margin of error principle in the previous section. If the epistemicist is correct in saying that there are precise dividing lines relating to Charlie, but we cannot know where such a point lies, then the argument as interpreted above does not conflict with the epistemicist's account. I conclude that interpreting 'judgments of sameness' as referring to judgments of sameness of the number of chips of Charlie is of little help to Heller.

The second option we have in relativising judgments of sameness to a property is with respect to the 'existence state' of Charlie. If premise 1) is made true in the way just described (i.e., the judgments of sameness are with respect to the number of chips that make up Charlie), then the conclusion Heller needs and wants does not follow, for in the conclusion Heller is concerned with judgments concerning the *sameness of the existence state of Charlie* between any two stages in Charlie's decomposition. He states "We would sometimes be able to know when Charlie does not exist...but once chips began to be removed we would never be able to know that Charlie does exist."[79] That is, the conclusion that Heller needs is that we are not reliable in making judgments concerning the existence state of Charlie. But this conclusion seems false, since it seems that our judgments in this regard are in fact reliable. This can be seen if we posit a scenario analogous to that which demonstrated the unreliability of judgments concerning the sameness of line lengths (and of the number of chips of Charlie). Consider a series of Charlies, not seen individually in the decomposition, but rather the entire line of decomposing Charlies from Charlie 1 to Charlie 100 viewed at the same time. Run through the series as follows: say we have 100 such Charlies before us and we compare Charlie 1 and Charlie 2 who are adjacent members in the series. Are they in the same 'existence state'? Yes. Compare Charlie 2 and Charlie 3. Are they in the same 'existence state'? Yes. Do this for the entire series, and it seems that the judgments of the sameness of the 'existence states' of Charlie are consistently correct. Note these comparisons may be done in another way. Begin at opposite ends of the series. Compare Charlie 1 and Charlie 100. Are they in the same 'existence state'? No, for Charlie 1 clearly exists (i.e., is a table), while Charlie 100 (at the end of the decomposition) does not. Repeating this procedure, we again consistently make correct judgments concerning the 'existence states' of the Charlies. There are points in the series where we are unsure about the existence of Charlie and so unsure about our comparisons of various sameness states. This of course simply reiterates the sorites puzzle. Say that this zone is 10% of the series. That is, from Charlie 45 to Charlie 55 we are uncertain concerning the status of Charlie and so uncertain concerning our judgments of the sameness. That still leaves us with a 90% success rate concerning the remaining judgments. So judgments concerning the 'existence states' of Charlie are reliable.

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[79] Heller, 100.

Heller is thus left with the following dilemma: if premise 1) is true, then the conclusion that we are unreliable in our judgments concerning the 'existence state' of Charlie does not follow. If the conclusion is true (i.e., we are unreliable in making judgments of the sameness of the 'existence state' of Charlie) then premise 1) is false, for it is not the case that judgments of the sameness of line length are like judgments of the sameness of the 'existence states' of Charlie and so the unreliability of the former does not imply the unreliability of the latter. Either way, Heller's argument fails.

2.7.3 The Problem Generalized.

The problem may be further explicated and generalized as follows: it seems that treating 'existence' as we would certain other predicates involved in the sorites leads to the difficulties described above. Note that this is not only the case with 'existence' as our predicate for this point applies to other sorites subject predicates as well. (Of course it may be the case that 'existence' poses a special problem in that we should not view 'existence' as a property. But I will not concern myself with this point here.) Say we are considering whether a person is bald. As a general rule, we are capable of determining whether a person is bald or not. Certainly there are the problem cases where we have no answer as to whether the person in question is bald, but in many instances we are in fact good at telling a bald person from a non-bald person. However, if asked to make judgments as to the number of hairs that a person has in relation to preceding or succeeding instances, we generally receive a failing grade along the whole sorites series. This dichotomy seems to result from the fact that in considering the sorites series, we seem to make use of two distinct classes of terms. There are the predicates like 'tall', 'bald', 'thin', and possibly 'existence' which are generally the chief concern of the sorites. But we also make use of 'numbers of hairs', 'numbers of chips', and 'millimeters' etc., that are members of the decomposition. These might be seen as tools for generating the sorites paradox in that these are the ordering relations within the sorites series. The sorites is generated because our intuitions tell us that one hair, etc., cannot be the difference between a bald person and a non-bald person. We are never (or almost never) reliable at distinguishing adjacent members in the series when we make use of these expressions, and hence we are swept into the sorites series. Conflating the two classes leads to the equivocation that invalidates Heller's argument. Namely, we are reasonably good in making judgments where we are concerned with people in the 'same bald state', 'same tall state', etc., but not with judgments with respect to 'same number of hairs', 'same number of chips', 'same number of millimeters', etc.

2.8 Additional Problems

There are at least two other problems with Heller's account. First, there is the alleged disanalogy between Case 2 and Case 3 which drives the notion that in the sorites series, we rely exclusively on judgments of sameness. Secondly, there is the notion that judgments of sameness and judgments of difference lie on opposites ends of the spectrum (in terms of reliability). Both of these considerations are implicit in premise 1) of the above argument. Let us take each of these in turn.

2.8.1 The Disanalogy Between Case 2 and Case 3.

First, I do not think that there is a disanalogy between Case 2 and 3. Rather, Heller has taken a sorites series and proposed two separate analyses of essentially the same or similar processes. More precisely, it seems clear to me that Case 3 is merely a subset of Case 2. That is, Case 3 represents the typical problem cases that we see in a sorites series in that the typical problem cases in the sorites are just those where we are comparing neighboring areas in the series. It is constitutive of the series, and the problems it engenders, that, when we compare neighbors in the sorites series, we cannot say that they differ or that they are the same.

Now Heller is perfectly right in saying that we are not sensitive enough to know when in the sorites series the transition has occurred and thus we are not sensitive enough to know when the change has not occurred. But note that this applies only to pairwise comparisons. That is, given a comparison of two neighbors in the sorites series, we are ignorant of whether a change has occurred, and likewise ignorant of whether a change has not occurred. But this is in fact what an epistemicist (of Sorenson's or Williamson's brand) would predict should happen. Let us for the moment assume that the margin-of-error principle holds. It states that we can only make judgments of the kind that are required, if the judgments (i.e., pairwise comparisons of adjacent members) occur outside the margin of error. But if this principle does indeed hold, then we cannot make judgments of either sort—that is, we cannot make the judgment that the change has occurred, nor should we be expected to say that the change has not occurred inside this margin of error. If we can say that Case 3 represents not the entire series, but a mere subset, then that part of Heller's objection fails, for while he is right that we cannot determine the transition inside this subset series, once we move outside this region where our judgments rely on a significant gap between neighboring instantiations of a certain predicate, we can make relatively reliable judgments.

In addition, I think that there is indeed a dissimilarity between Case 2 and Case 3 in that in Case 3 we are asked to judge adjacent members, which is exactly the focus of the sorites and what makes it so problematic. In Case 2, we are judging, in large part, not adjacent members, but members that are separated by a sufficient distance such that we do have reliable judgments about their similarity and their difference. In effect, Case 3 seems to represent those cases that are just the problem cases, and Case 2 is indicative of the easy cases. Note that in Case 2 there are still problem cases, but they represent a minor subset, namely Case 3. Imagine that the problem cases are analogous to a floating index on the sorites series. Within this buffer zone the mechanisms that we use to make our judgments, assuming that there are two different judgments to be made, do not produce reliable beliefs about the status of the predicate in question. But notice that this buffer zone is only applicable to judgments concerning adjacent members - that is, in making judgments about objects that are next to or very near one another. Heller seems to have taken this buffer zone and expanded it along the sorites series, leaving only the first and the last few iterations. He then claims that this expanded buffer zone represents the entire sorites series. But this seems to be only a subset, the subset that represents the paradigmatic problem cases. If the epistemicist is supposed to have eliminated all the problems cases, then Heller has returned the favor and made everything a problem case. But this move only goes through if there is indeed a disanalogy between Case 2 and Case 3. I have argued that there is no such disanalogy.

2.8.2 Judgments of Sameness and Difference.

Another problem is the distinction Heller makes between judgments of difference and sameness. Why is there this asymmetry between such judgments? Is it possible that the these judgments are actually the product a single mechanism or process? This itself might be too complex a question to answer here, but two points should be noted. First, philosophers do not have the most stellar record when it comes to *a priori* ophthalmology. This is something advocates on both sides of the issue must consider. Secondly, the burden of proof on this issue lies with Heller. That is, whether or not the judgments of sameness and judgments of difference are the result of a single mechanism, or are in fact two separate mechanisms, and that there is indeed a significant asymmetry in how they are used and in how they perform, will have to be shown by Heller. In this respect, Heller's analysis is weak, since I do not think that he has shown any of the above.

However, I think that there are some comments that can be made with respect to how we actually use the expressions of "sameness" and "difference", and how this relates to the judgments we make. I want to suggest that there is in fact no asymmetry, or at least not the type of asymmetry that Heller needs. It would seem that we consistently translate (or paraphrase) questions of sameness into questions of difference (and vice versa). For example: if someone were to ask if the pre-election Preston Manning is the same as the post-election Preston Manning, a general way to make the judgment is to see if there are any differences between the two. Note that there still will be the problem cases, cases were we cannot spot any differences between the two Mannings. In Case 3, which represents the core of the sorites type arguments since it is these cases that represent the transition of which we are unsure, we cannot answer either question with any great reliability. But this does not seem to have anything to do with the nature of sameness and difference. That is, the unreliability we experience in these problem cases does not seem to be a function of which "judgment" we happen to be using at the time. For example, suppose that we are asked to compare two lines X and Y. Now consider the following statements:

1) X and Y are the same.
2) X and Y are not different.
3) X and Y are not the same.
4) X and Y are different.

Notice the symmetry that we find among these judgments, specifically between our judgments concerning 1) and 2) and our judgments concerning 3) and 4). If asked whether the lines we are judging are indeed the same, the answer in the easy cases is no. The answer to the question of whether they are different is yes. But the questions here are not fundamentally different. If asked whether are they the same, we may just as well ask if they are not different and respond accordingly. The same seems to hold true for the problem cases. This would then indicate that the problem cases for judgments of difference and judgments of sameness are one and the same. Notice also that when we move beyond the seemingly unknowable problem cases, our judgments for difference and sameness seem to begin functioning at the same general point in the series. That is, if at some point in the series we can make a judgment of difference, we seem, in the same instance, to be able to make judgments of sameness (in that we can say that they are not the same). However, Heller bases his analysis of the Sorites decomposition (at least in part) on the fact that judgments of sameness are what characterizes these types of processes. That is, Heller has emphasized the asymmetry between judgments of sameness and judgments of differences. Mechanisms such as perception are often reliable in producing one kind of belief (i.e., differences), but virtually never in producing the other (i.e., sameness).[80] Hence, the problem for the unknowable precision (or epistemic) theorist. Yet if it turns out that these differing judgments are in fact two sides of the same coin (i.e., translatable), then it seems that Heller's argument fails. Specifically, since the distinction between judgments of sameness and difference fails, we can say that a particular object exists (for x stages in the decomposition), without knowing exactly when this stops being true. Thus the epistemic thesis stands.

[80] Heller, 99.

Chapter 3: Ignorance and Reference

The epistemic thesis is without doubt counterintuitive, with peculiar consequences. Namely, it maintains that there are precise divisions corresponding to our purportedly vague predicates, and yet we remain frustratingly ignorant of such divisions with no possible remedy in sight. This is in itself not a substantial argument against this thesis, and indeed other solutions have encountered similar criticisms. My concern here is whether we may be able to live with the counterintuitive consequences of the theory. To further narrow down this concern, I want to focus on the supposed ignorance that we have of the given cutoffs in the sorites series. Let us for the moment grant that there are these precise divisions in our language and our ontology (admittedly, a significant assumption). The question is, why can't we know where they are. Mark Heller has suggested that our ignorance in any one case implies ignorance in all cases where we attempt to apply a vague predicate. That is, if we are ignorant in one instance, we must be ignorant in all instances. Does the epistemic thesis have these stark consequences? I have tried to show in the previous chapter that, at a minimum, the epistemic theory does not have this consequence. The original problem, however, remains.

3.1 The Epistemicist's Type of Ignorance

What is it that we are ignorant of in the problem cases? That is, in those cases where we cannot decide whether a predicate applies to a particular point in the sorites series, what is there to be known? Most other theorists (supervaluationists, etc.) admit that here is indeed some sort of ignorance in the problem cases. So for example, we do not know the truth value of a proposition containing a vague predicate in the problem cases, or at least, we only know partial truth values. But according to the epistemicist our ignorance in these cases is not of this type. The ignorance in question is a cognitive failing on our part: we simply cannot make a decision either way in the problem cases, despite there supposedly being a fact of the matter. But this view seems problematic. Say someone were to ask me when W. V. Quine was born. I do not know the answer to this question, but there is no real barrier to my finding out. In such cases we are confronted, for want of a better expression, with a nuisance ignorance. We may have to do some work to eliminate the ignorance, but there is no particular intrinsic barrier to this endeavor. But what about a heap of sand? How many grains does it take to make such a heap? I do not know, nor do I know how I would go about finding out. It seems that in cases that involve predicates subject to the sorites, there is no fact of the matter that determines an answer (let alone a correct answer), nor is there an inkling of a method for actually determining what might constitute an answer. This leads us to consider the notion that in these cases there is nothing to be known; there is no hidden fact of the matter.

This also ties into another aspect of how we use language, and more importantly, how we intend our usage to be understood. Under the epistemic account, the predicates that we use have extremely precise extensions; something is a heap or not, a patch is red or not, etc. But this seems to go well beyond what we mean, and in many instance goes well beyond what we intended. Say that we are for the first time introducing the predicate 'tall' to our language. We define the term by pointing out a few paradigmatic cases which fall within the scope of 'tall'. We think we know what it refers to in some cases, but a few cases remain undetermined. It is difficult to see how an epistemic account could countenance such an activity. Certainly if there were some universal or some natural kind that we could rely on in cases like this and we were able to latch onto these natural kinds, we might have a plausible way of reconciling this activity with an epistemic account. No epistemicist has explicitly taken this route and it seems doing so would be of little help since it misses that point: we have, in some cases, the deliberate intention of leaving some things undecided. Consider a concrete example. In 1954 the Supreme Court of the United States ruled on Brown v. Board of Education, maintaining that racial integration of schools would have to take place with "all deliberate speed". It is clear that the justices intended this phrase to be vague so as to minimize potential civil unrest. However, under the epistemicist account, there is a precise account of what would constitute integrating with all deliberate speed. How can this be? How can we over-ride an intended meaning, and to some extent, our intended understanding of the term(s) in question?

3.2 Semantic Anti-realism.

One of the main underlying foundations of these concerns is semantic anti-realism. Broadly speaking, semantic anti-realism is the thesis that the realm of verifiable facts cannot be smaller than the realm of truths. In other words, it is not possible to have a subclass of unknowable truths. Comments by Michael Dummett emphasize this point.

> ...an understanding of a sentence consists in a capacity to recognize whatever is counted as verifying it is true.[81]

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[81] Michael Dummett, Truth and Other Enigmas (Cambridge Mass.: Harvard University Press, 1978), 110-111.

> A verification theory represents an understanding of a sentence as consisting in a knowledge of what counts as conclusive evidence for its truth.[82]
>
> The anti-realist insists...that the meanings of these statements are tied directly to what we count as evidence for them in such a way that a statement of the disputed class, if true at all, can be true only in virtue of something of which we could know and which we should count as evidence for its truth.[83]

The semantic anti-realist faces serious difficulties in this regard. Dummett believes that he is able to assign meanings to individual sentences in terms of what would verify these sentences. However, there seems to be no practical way of doing this for it requires that various other sentences are also true. The reason for this is that, "Unless a sentence is wholly couched in observational terms, we cannot derive any observational statement from it alone."[84] Additional premises are required for the derivation. Thus the conditions that would verify a statement do not depend on one sentence alone: a group of statements are needed. So the meaning of a sentence will not depend on such conditions alone.

The propositional assumption evident in Dummett's account presents another problem. The propositional assumption takes it that a person's understanding of his language consists in knowing the conditions under which the sentences of the language would be true. Gilbert Harman has raised a rather nice objection to this assumption.[85] It seems that the propositional assumption leads to either circularity, or an infinite regress.

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[82] Michael Dummett, "What is a Theory of Meaning II" In Truth and Meaning, ed. Gareth Evans and John McDowell. (London: Oxford University Press, 1976), 132.
[83] Dummett, Truth and Other Enigmas, 146.
[84] William Alston, A Realist Conception of Truth (Ithaca: Cornell University Press, 1996), 111.
[85] Gilbert Harman, Language, "Thought and Communication." In Minnesota Studies in Philosophy of Science, Vol. VII : Language, Mind and Knowledge, ed. Keith Gunderson.

The knowledge referred to in Dummett's account seems to require that the speaker in question be able to represent to himself the truth conditions in question (i.e. the conditions that make sentences true). That is, he thinks about them. This representation would presumably be in a language of some sort. However, what does competence in the second-order representing language amount to? If this is just the same language as the original in which the truth conditions were represented, then we have come full circle. If the second-order language is of another type, then this language will also have to be represented (given the propositional assumption). Such a representation would then require another language, and so on. Thus, we have a repeat of the original problem, or another problem of the same magnitude.

While I think that a semantic anti-realist framework does not threaten the epistemic solution (at least to the degree that I have outlined above), problems remain. Namely, how is it that our terms go so far beyond our usage, intention and conventions? One such concern is how an epistemic thesis will deal with a theory of reference. If the epistemic theory is correct, then the epistemicist is indicating what the behavior and nature of words is, and also what the behavior and nature of words is limited to. Recall that the epistemicist will deny the inductive step in the sorites in that he denies the inductive principle whereby if a predicate holds for n, it holds for n+1. But the epistemicist also holds that predicates are discriminative in that it is denied that a predicate is true for all n. For example, it is true that 'heap' applies to a million grains of sand. However, since 'heap' is discriminative, it does not apply to every number less than

(Minneapolis: University of Minnesota Press, 1975), 270-298.

1 million (1, 2, 3, etc.). Thus a predicate cannot be both inductive and discriminative.[86] This also implies that the predicates we use have discriminatory powers that go well beyond ours. Thus it is not surprising that we might be ignorant in many cases concerning the application of a vague predicate, and what the possible referent might be. Is the epistemicist able to account for this? While there are avenues open to the epistemicist, I think that there remain serious problems in specifying how we may refer with purportedly precise predicates.

3.3 Epistemicism and Reference

Since the epistemicist is making a claim about the nature of words, the dispute now enters the arena of deciding how predicates behave. Specifically, how is that the words we use are able to make discriminations in instances where we are not able to do the same, and how is it that we are able to understand these terms? That is, according to the epistemicist, the words we use are able to discriminate between tall and non-tall, etc., while we cannot. This is significant for several reasons relating to ways in which our terms refer and to our understanding of the sense of terms. One worry comes to mind: does an epistemic account sever the connection between a term and its referent? That is, can the epistemic thesis explain how terms (conceived of as precise) refer? Is the epistemic account bereft of a theory of reference (or, less seriously, forced to accept a particular theory of reference)?

Samuel Wheeler has attempted to demonstrate that the type of referential theory we adopt will determine whether we can solve the sorites. He contends that the sorites'

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[86] Sorenson, "The Metaphysics of Words", 197-198.

paradoxical nature arises from the uncritical acceptance of the resemblance (or descriptive) theory of meaning. Wheeler claims:

> I call any theory of reference which claims that the reference of a concept or term is determined by "internal" features of the concept, the language-user, or a community of language-users, a resemblance theory. According to such a theory, what a concept or term means is a function of features of the speaker himself or the concept itself. Nothing beyond, e.g., patterns of response of the organism to stimulation, or social interaction between a language-user and his fellows, need be consulted in determining what, if anything, a given term refers to. Features of the concept guarantee certain features of its referent.[87]

According to Wheeler, the essence of the resemblance theory is that the determination of meaning is *a priori*. There is nothing in the meaning of a term (and hence its referent) which cannot be determined through self-examination by the speaker or culture.

It is difficult to place Wheeler's definition in the context of descriptive theories of reference, since it is unclear how to flesh out "internal" features of the concept". What are these internal features, and how are we to understand 'concept' in this instance? In addition, such a speaker-relativized reading of the descriptive theory may be extreme. However, it may capture some of the features relevant to the epistemicist. Under a classical descriptive theory, the meaning or intension of a term will be given by the descriptions associated with that term. For example, 'Einstein' might be equivalent in meaning to "the person responsible for the Theory of Relativity". In addition to there being descriptions for names, there will also be descriptions for natural kind terms (observable ones like 'tiger', and unobservable ones like 'atom'). These are terms such that their referents belong to a class in virtue of their characteristics and these characteristics are ones they have essentially. In addition, a person will have knowledge of the descriptions for these natural kinds. With respect to 'tiger', such a description might be "a large yellow feline with black strips". This sense will then determine the reference of the term. That is, the description denotes the referent. This classical version was revised to involve a notion of a cluster of descriptions, whereby in place of one description tied to the referent of term, the newer theory ties the referent to many descriptions. A term will then refer just in case most of the descriptions denote.[88]

Now according to Wheeler, the resemblance theory is incompatible with the sorites argument and blocks any attempted solution. In a sorites, the two premises and the conclusion form an inconsistent triad. Wheeler claims that most people would affirm the two premises and affirm the negation of the conclusion (i.e. most people would affirm the inconsistent triad). He goes on to say that a resemblance theory entails that what most people would affirm is true. Therefore, those adopting a resemblance theory would affirm an inconsistent triad.[89] Hence it must be rejected as a solution to the sorites.[90]

This analysis seems wholly inaccurate. Most theorists who respond to the sorites would not affirm the premises in the sorites. In fact, the theories discussed in the previous chapters have all denied the truth of at least one of the premises. Thus it is not the case that most people would affirm an inconsistent triad. So, Wheeler has not demonstrated that holding a resemblance theory is incompatible with a solution to the sorites.

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[87] Samuel C. Wheeler, "Reference and Vagueness", Synthese **30**, 367.
[88] Michael Devitt and Kim Sterelny, Language and Reality (Cambridge: MIT Press, 1987), p.43.
[89] Wheeler, "Reference and Vagueness", 368-369.
[90] Wheeler contends that the resemblance theory must be rejected for other reasons not related to the sorites argument.

However, I think that Wheeler does bring up some interesting points. If the above characterizations of the resemblance theory are correct, then the epistemicist would deny it. Under an epistemicist account, it is implausible to tie reference to what people know about the terms they use. Yet this is what the descriptive theory requires. If we need descriptions to refer (or perhaps clusters of descriptions), then vague terms, which are in fact precise, would fail to refer. That is, under an epistemicist account people do not have, nor could have the requisite precise descriptions. The epistemicist says that heap is precise: there is a precise point at which we move from heap to non-heap. But if heap is to refer under a descriptive account, we would have to have precise descriptions relating to heap for it is those descriptions that determine reference. We do not have these definite descriptions relating to these heaps, and so it seems that terms subject to a sorites argument, and hence vague, could not refer.

We might say along with Putnam that while a person does not have to have a method for recognizing the referent of a term, he may nonetheless acquire the term itself, and use it correctly. This is because he may rely on a subclass of speakers who have specialized knowledge concerning the term and how to identify the referent. For example, we may envision that there is some person who has a specialized knowledge such that he is able to recognize legitimate diamonds from fake ones. The rest of us are probably quite incompetent in this regard. And this certainly seems plausible with respect to terms like "diamond", "gold", etc. But this does not work under the epistemicists account, for there is no such subclass with this specialized knowledge. It seems unlikely that there are people with an ability to identify heaps, or bald people, or tall people. And under the epistemic account, this knowledge is impossible to obtain.

These are obviously not refutations of the descriptive theory. but I do think that they indicate that an epistemic theses does not need. cannot use. nor is compatible with a descriptive theory of reference.

If we reject theories Wheeler calls resemblance theories. then Wheeler maintains it will be a causal account that solves the sorites. According to Wheeler.

> ...the property-sorites argument should convince one that the only objects that exist are ones with precise essences. Only precise essences can constitute the being of a genuine logical subject or of real properties of logical subjects. And objects with precise essences seem to exclude persons. tables. chairs. etc.[91]

While we may hesitate over Wheeler's confidence that a causal account solves the sorites paradox. he may be right in seeing that the causal theory plays a certain role in a solution to the sorites that would interest the epistemicist. Namely. it would appear that the causal theory of reference is much more amenable to an epistemic solution than is a descriptive theory. A causal theory of reference claims that terms refer just in case they are causally linked to a referent in a particular way. There are two aspects to this theory that concern us here. First. there must be the initial linking of the term in question to the referent. That is. there must be an initial fixing whereby the term is tied or identified with the referent. Secondly. there must be an account of transmission whereby people since the time of the initial fixing are able to use that term in a meaningful and correct way. That is. we still refer to the same referent in using that term. Using the term correctly will in effect turn out to be a matter of practice (or induction into a practice). In this case. a person does not need to have knowledge of the particular referent. For example. a person may not know that water is H_2O. that water freezes at 0 degrees. or that water expands when it freezes.

He need only stand in a correct causal relation to a fixing event and also be at the end of a transmission chain whereby the referent has retained its relation to the term.

The epistemic thesis seems amenable to the causal theory. in that the reference of a term is not dependent on the descriptions which we happen to have with regard to the term's referent. Rather. we rely on features that are not required knowledge on the part of the speaker. Thus I may speak of heaps (which are precise) even if I am ignorant on the subject of heaps. That is I may not know anything about heaps and yet refer. So the ignorance posited by the epistemicist in the case of most. if not all. vague terms is reconciled with our ability to refer to these things.

The initial plausibility of this link seems convincing. Unfortunately. it seems that it remains only an initial plausibility. Once we delve into the finer points of a causal theory. problems emerge. First. under an epistemicist account how can there possibly be a initial grounding of the terms? If we are too ignorant to accomplish this. how have others in the past managed this feat. That is. if our understanding resides in a practice (a practice with the requisite causal links). how could such a practice be initiated in the first place? If we cannot appeal to a fixing event. nor appeal to individual or collective ability in specifying a referent. a causal account becomes an obstacle to the epistemic thesis and not what initially seemed to be a plausible option.

There also remains the problem of natural kinds. The idea of natural kinds arises when we see that there are similarities between certain kinds of things and in virtue of this similarity we consider those things as part of a particular class. For example: say I have a glass of water in front of me. This water has certain characteristics. It has weight.

[91] Samuel C. Wheeler. "On That Which Is Not", Synthese 41. 166.

color (or lack thereof), etc. I point to the glass, and say "water". However, when I use the term, I want it to latch onto the water in front of me, as well as to all other things that are similar in relevant respects. That is, the weight is irrelevant to my calling it water. Rather, there is some feature of water that makes it water. In other words, water is a natural kind. That is, there is something about this water in front of me, and anything else relevantly similar, that places it into the class water. When we speak of natural kind terms in this way, then it is a fact of nature the things referred to exist. The referents of these terms are not fixed in advance by language or analysis, but are somehow fixed by nature. In addition, we will identify these natural kinds through scientific investigation and in terms of the explanatory role that they play in our theories.

The problem arises for the epistemic thesis in that every supposedly vague term turns out to be a natural kind. The epistemicist looks at the things in the world and concludes that they all belong to a certain class (or are of a certain kind). This is not due to language, but is a matter of fact given how things are. Say we are looking at a heap of sand. It is a fact of the matter whether this is a heap (or not). That is, there is some feature of this heap of sand in virtue of which it is a heap, and furthermore, anything just like it in relevantly similar respects is also a heap of sand. In other words, they are natural kinds. If they are, then this is a matter of discovery in the sense that this is a natural feature of the world and not a matter of linguistic analysis. Furthermore, heaps will also play a role in our laws and theories (even if only at the end of total science). However, it seems implausible that terms like 'bald', 'tall', 'heap' etc., play such a role in our (or future) scientific theories. That is, they do not seem to play a role in any laws that we know of.

nor is it likely they can. Furthermore, can we really say that there are laws of nature that determine whether some referent fits into the class designated by 'bald'? Unlikely.

Moreover, what if we introduce a new term into the language? Say the new word is 'doop'. A doop is an accident-prone determinist. If left to my own devices, the term might very well become a part of our everyday vocabulary. Under an epistemic account, the extension of the term is precise. It is a fact of the matter who is a doop (although we might very well be ignorant of this fact). Is this a natural kind term? It is hard to see how it could be. I have just introduced the term into the language, and with a bit of luck will get it to become common usage. And we might even begin to use it correctly in the majority of cases (with the typical allowance for borderline cases). But is the term precise in the way envisioned by the epistemicist? I cannot see how. In addition, it does not seem to play any role (now or in the future) in our scientific theories. And it seems highly unlikely that this term, plus all the other vague terms in our language, could be thus construed.

3.4 Conclusion

Do these considerations refute the epistemic thesis? Obviously not. However, while the problems of meaning and reference prove to be difficult matters in their own right and other purported solutions will face these difficulties as well, the epistemic thesis faces the typical problems in addition to those created by the nature of the epistemic solution itself.

This chapter has attempted to look at one aspect of this difficulty in terms of reference. It is not just that linking up our terms to referents is difficult under the epistemicist account, for it is. The fact is that the epistemicist seems to block any attempt to explicate just what this link amounts to. That is, the speakers of a language are required to have an unusual and persistent kind of ignorance. In fact, they lack the very powerful discriminatory powers of their own language. This concern may seem to hark back to a verificationist attitude (which I think is flawed), but perhaps we should not throw out the verificationist baby with the bathwater. Perhaps it is suitable to appeal to it on occasion, if only the appeal helps us deal with our methodology in philosophy. That is, one of the reasons that we have not eliminated metaphysics altogether is that we think we have some method or some analysis for leading us to enlightenment (however small it may be). The epistemicist seems to cut this off, for not only are we confronted with ignorance, we seem to have no inkling how we might get around this ignorance. Again, this can in no way be construed as a refutation of the epistemic account, but rather is a way of trying to understand the nature of the ignorance that is supposedly confronting us with respect to vague terms. Certainly, if this is ignorance, it seems to be a very strange kind of ignorance.

Conclusion

The objective of this thesis has been to explicate the nature of the sorites paradox and examine several solutions. with particular attention being paid to the epistemic solution.

The first chapter began with a brief examination of the various forms the sorites argument can take. These include a conditional form. a disjunctive form and a mathematical induction. In general. the argument can be explicated as follows: suppose that we have a heap of sand. Remove one grain of sand from that heap. The heap of sand remains. Remove another. and again. the heap remains. Continue this process until one grain remains. Certainly this one grain of sand does not constitute a heap. and yet we are at a loss when asked to give an account as to when a transition from heap to non-heap occurred. More formally. the argument may be couched as a mathematical induction. The first premise. or the base step. states that the predicate in question is true of some object(s). For example. ten thousand grains of sand make a heap. The second premise. or induction step. states that if the predicate is true of some object. then it is true of the succeeding or preceding object. For example. if ten thousand grains of sand make a heap. then ten thousand minus one grains also make a heap. The conclusion states that the predicate (heap) is true for any number of grains (including 0). Thus we have seemingly good premises. seemingly good reasoning and yet end up with an unacceptable conclusion.

Also in this chapter. we looked at various solutions that have been offered up the recent literature. Five possible avenues were examined.

First, one may accept the conclusion of the sorites paradox despite its absurdity. I believe that no one has chosen this route given the abhorrent consequences of doing so. Namely, one would have to countenance outright contradictions. For example, to accept the conclusion is to accept that a person is tall and non-tall, bald and non-bald, or that an object may be red and non-red.

Secondly, some have suggested that the sorites argument is invalid. For some philosophers, this means that we must reject mathematical induction, or at the very least, place restrictions on its use. I concluded that this was an *ad hoc* response to the sorites puzzle. Independent arguments would be needed for the abandonment or restriction of mathematical induction.

Third, one may deny the base step of the induction, which is the approach taken by the nihilists. They contend that a vague predicate is true of nothing, thus eliminating our present ontology and making the first premise false. However, problems arise when we point out that if 'vague' is vague, then the nihilists have difficulty in expounding their own view. Put simply, if they use 'vague' in their arguments, then that part of the argument cannot refer. Additional concerns were pointed out regarding the precisification efforts of nihilists like Unger and Quine.

Many more philosophers have argued that the second premise, or the inductive step, is false. Taken at face value this entails that our predicates are precise in their extensions. However, with the exception of the epistemicists, most philosophers have attempted to reinterpret their denial in such a way that they are able to avoid this conclusion. By and large this has meant an alternative logic of some sort. These alternatives include a multivalued logic, where the various iterations in the sorites series have partial truth values. Supervaluationists opt for truth-value gaps, where some statements concerning these iterations are neither true nor false. Others opt for a continuous or fuzzy logic, where the sorites series and the truth values associated with the stages therein, correspond to the real numbers. Thus there are an infinite number of truth values to consider. I concluded that all these solutions face the same difficulty: namely, they have trouble in accounting for second-order vagueness. This casts doubt upon their solutions regarding the first level of vagueness.

The last view considered was one that offered us a vague ontology. The reason that we cannot decide where vague predicates cease to apply (or begin to apply) is that objects themselves are vague. One problem noted with this view was the difficulty in explaining just what the notion of vague objects amounts to. In addition, an argument from Mark Heller was presented which makes a metaphysical solution seem dubious.

Chapter two looked at the epistemic solution in more detail. The epistemic solution maintains that the inductive step is false, but that this denial should be taken at face value. Predicates do indeed have precise extension, although we must remain ignorant of where these predicates begin to apply or cease to apply in the sorites series. The chapter examined the epistemic solution from two vantage points: first, there needs to be an account or defense of the view that there are precise extensions corresponding to our predicates. Second, we need an account of how it is we remain irremediably ignorant of where such predicates begin to apply or cease to apply. An accounting of each point was presented.

The second chapter also examined Mark Heller's argument against the epistemic account. He claims that if the epistemic thesis were true, then the ignorance that the epistemicist claims for a small portion of the sorites series, turns out to be ignorance along the entire series. This position is examined in some detail, but I concluded that Heller is guilty of a fatal equivocation so that his argument fails against the epistemic account.

The final chapter examined some additional problems encountered by the epistemic solution. The charge considered was that the epistemicist is forced to separate use and reference, and use and meaning for vague predicates. The basis for this charge arises from concerns about the nature of the ignorance posited by the epistemicist. Is the epistemicist able to give an account of reference for supposedly precise predicates? Two theories of reference are looked at in this chapter: a descriptive theory and a causal theory. I concluded that the epistemicist will encounter compatibility problems with both of these theories.

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IMAGE EVALUATION TEST TARGET (QA-3)

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