

**UNDERSTANDING VAGUENESS:
IN A COMMONSENSE WAY**

by

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ABSTRACT

Vague predicates such as "pile" "tall" and "thin" are plagued by a logical paradox. Many attempts have been made to solve such a paradox, however they all lead to some unintuitive conclusions. The aim of this paper is to look which view, if any, is more acceptable, keeping in mind current understandings about how the world and our language operates.

Chapter 1

WHAT'S WRONG WITH VAGUENESS

The Problem

Every day we use vague predicates: I will arrive *soon*, that basketball player is *small*, or that's a *small* ant. Most of the time the context of the usage allows us to understand these phrases, which independently appear to lack some content. When I call my fiancée and say that I will arrive *soon*, she expects that I mean in the next fifteen to twenty minutes; not, as I have learned, the next hour or two. The wonderful thing about these vague terms is that we can use the same word to describe different objects, objects whose properties do not conflate. Nobody expects a small ant to be five-foot three inches, nor a small basketball player to be less than one-sixteenth of an inch. In cases such as these the utility of vague predicates can be appreciated. However, these words present a relatively serious problem for them, for there are cases in which it is unclear if a predicate is applicable or not. Shaquille O'Neal at 7'1" is clearly a tall man, while Sonny Bono at 5'5" was clearly not a tall man. However, would one say that Gene Wilder at 5'10" is a tall man? I do not believe that the answer is obvious one way or another. Borderline cases of tallness such as Gene Wilder demonstrate the problem with vague predicates. While there are some cases of determinate value, borderline cases appear to be of indeterminate value.

One may ask, so what? We human beings seem to manage just fine using our vague terms; and if they fall apart somewhere, why does it matter? A paradox threatens the use of vague terms. This paradox has been around for thousands of

years, with the Ancient Greeks calling it the Sorites paradox ('soros' being the Ancient Greek word for 'heap'). Imagine one million grains of sand grouped together. Any competent user of the word 'heap' would call such a grouping a heap. Now imagine that the wind blows away a single grain of sand from the heap; is it still a heap? Everyone would say, yes, this is still a heap of sand. In fact it could be further surmised that one would need to remove more than a single grain of sand from a heap to make it not a heap. Thus, when the wind blows away yet another grain, one would still call that grouping of sand a heap. If this process kept repeating for one grain after another, eventually we would get to the point where there are zero grains of sand. Yet, because of the thought that one must remove more than one grain of sand from a heap to make it not a heap, then we are forced to say that zero grains of sand are a heap. This is an absurd conclusion, and by absurd I mean to say that it does not appear to capture our understanding of our language or of the world. On account of this there are two choices: we either accept or reject the paradox. Below I will evaluate each choice and the methods used to do so. Not only will I be examining the soundness of each view, but I will also look at its implications.

Acceptance

Let us begin by examining what it would be like to accept the paradox. To do this one would have to either simply accept the conclusion of the paradox, or take the conclusion with some other belief or facts about the world. Let us first examine simply accepting the conclusion of the paradox. The paradox works with not only subtraction but also addition. Let us begin with the assumption that zero grains of sand are *not* a heap. If we place a single grain of sand then there is still no heap. If another grain of sand is added to that grouping, again, there is still no heap. Repeating

the process a million times, we get the conclusion that one million grains of sand are not a heap. By accepting this conclusion, one believes that there are no heaps. This has been a view held by Peter Unger, who takes its implications to greater lengths. In his paper *There are No Ordinary Objects* he asserts that not only are there no heaps, but also no stones, tables, or logs. To do this he applies a version of the Sorites to material composition. A stone is made up of more than a single atom, adding one more atom will not turn something into a stone, and thus there are no stones. In his view the problem with vague predicates is that "those terms cannot apply to anything real." (Unger 147.)

However, many would posit that these objects must exist, but still accept the soundness of the argument. If so they would have to believe that the objects which exist are actually vague, a thesis referred to as ontological vagueness (or equivalently ontic vagueness). This thesis asserts that the indeterminacy from borderline cases is not a failure of language, or of anything else. Rather the indeterminacy actually exists in the world. As ordinary intuition would have it, in some cases the property of *heapness* is instantiated, in other cases it is not. However, what makes further cases indeterminate is not our inability to determine via knowledge and cognition whether this grouping of sand is a heap or not. Instead it is the world itself which dictates that that this grouping is a heap or not. Another way to phrase this is to say that there is no determinate value to the question, "Is this a heap?" in some cases and not in others. If you were to ask God whether one an indeterminate grouping was a heap or not, he would not know the answer. This is not because God lacks the capacity to know this fact, but because there is no fact for God to know.

As interesting as these two views are, I do not wish to endorse them. Recall that when I called the conclusion of the Sorites absurd I stated that it does not appear to capture our understanding of the world and language. Thus, by accepting the paradox in any way there will be a great cost. Under Unger's view one is forced into nihilism, and thus denies the existence of objects which we take for granted every day. Ontic vagueness, on the other hand, appears to fly in the face of science as well as observation. Science operates on the assumption that there are facts of the matter which are to be discovered, but Ontic vagueness asserts that there are facts to some matters and not to others. In both cases I believe the cost is too great. If there is a solution to the Sorites which restricts its implications to either us or our language, rather than the world itself, then those are the solutions worth pursuing. If no such solution works, then one could reasonably adhere to the views described above.

Rejection

So how then does one go about rejecting a paradox? One begins at how a paradox is constructed. A paradox is a series of seemingly true premises which entail a conclusion that is either contradictory with the premises themselves, or with some other generally accepted tautology. Let us describe the Sorites in argument form as:

1. 1 million grains of sand are a heap
 2. If 1 million grains of sand are a heap, then 999,999 grains of sand are a heap
 3. If 999,999 grains of sand are a heap, then 999,998 grains of sand are a heap
- -

4. If 1 grain of sand is a heap then 0 grains of sand are a heap
-

5. 0 Grains of sand are a heap

To reject this argument one needs to either say that

1. Sorites expressions cannot be represented by logic
2. One of the seemingly true premises is false
3. Assert that the argument is not valid.

To understand what is said in (1), commonly called the *ideal language approach* one can look at other kinds of expressions which cannot be represented by logic. Imperatives, for example, are not capable of being rendered into logic. When I tell a cab driver, "Stop here!" I am not making an assertion. "Stop here!" can neither be true nor false. Therefore, if one asserts that Sorites expressions cannot be represented by logic, one is claiming that they lack any truth values. Bertrand Russell championed such a view, even going so far as to say that "'True' and 'false' can only have a precise meaning when the symbols employed are... precise" (Russell 64). By using vague terms, one is unable to assign truth values. Thus when I say that Sonny Bono was not tall, I am not really saying anything of semantic value. In order to actually talk about the height of Sonny Bono I would have to speak in precise empirical terms. Thus, I could say that Sonny is five feet and five inches tall, or his height is below that of average Americans. Ideally, under this view, we would all speak in precise empirical terms, because that is the only way to make assertions.

I feel that this is also an unintuitive response to the problem. When I say that Sonny Bono was short I feel like I am saying something of value. Not only do I feel this way, but I also behave as if I asserting something of value. If someone were to

put a gun to my head and ask me if Sonny Bono was short I would, without hesitation, say "Yes". It is for reasons such as these that I do not believe that (1) is the correct way to reject the paradox. I began by stating that we use vague expressions all the time. If such expressions had no semantic value, then how do we deem anyone to be competent users of the word? Again my behaviors do not conflate with such beliefs. If we were to take (1) as true, I should have no feeling at all about a man who claims that Shaq is short. However, I do have a feeling about such a man, namely that he is a not competent user of the word "short"! Why? Because he is wrong; i.e. claiming something which is false!

What about rejecting some premise? The paradox, as presented here, is simply a long chain of conditionals (if-then assertions). If we remove a single one of these conditional links the entire argument falls apart. The simplest way to reject a premise is by drawing a line, so to speak, in the sand. There is a particular number of grains that, when one is removed, it changes that grouping of sand from a heap to a non-heap. This is not an arbitrary line, but one that is dictated by the very nature of heapness. In other words, there is some fact about the number of grains of sand in a heap just as there is some fact about the velocity of a falling object. At first blush this may seem ridiculous, but it does allow us to keep some of our judgments about the world. First of all, it allows for vague predicates to pick some things out in the world, and so we are allowed to keep our ontology. This also allows for us to understand some determinate cases: we can pick out some of the heaps and some of the non-heaps. Furthermore, it saves classical logic, since with some dividing line there would be no truth-value gaps.

These are all great motivations. However, there is an important question to be asked. If there is such a dividing line, then would we be able to empirically find it? By doing some science could we discover which things are heaps and which are not heaps? I do not believe this is possible. Any such claims about the line between heaps and non-heaps would come off as arbitrary. The problem is, then, how does one assert the existence of a dividing line while not appearing arbitrary. Roy Sorenson and Timothy Williamson have both advocated a view which they call Epistemicism. The view holds that there is such a dividing line, yet it is impossible for human beings to ever gain such knowledge about this dividing line. As Sorenson writes, "...it is analytically impossible to discover a specific counter-example [to the Sorites]," yet he believes there must be one (Sorenson 2). Williamson puts it in these terms, "We are necessarily ignorant of something" (Williamson 185). This dividing line is a feature of the universe. Just as water is made of H_2O , n grains of sand constitute a heap and $n-1$ grains of sand are not a heap.

Another option for rejecting the premises is the idea of supervaluation. We have already stated that there are cases where a vague predicate definitely applies, and cases where it definitely does not. Let us say that n grains of sand are definitely a heap, while z grains of sand is definitely not a heap, and v and w are both borderline cases, where w is equal to $v + 1$ grains of sand. So what can we say about these cases? Under one possible interpretation some individuals are willing to say that v is a heap. If they do, then those individuals will also say that w grains of sand are a heap. There is no other rational choice under that particular interpretation. Another interpretation is that w is not a heap. Under such an interpretation one would then rationally deny that v is heap. The final interpretation is that w is a heap but v is not.

What supervenientists want to do is collect data on all of these interpretations and assign truth values based upon the data collected.

What kind of truth value does one assign then to the statement “ n grains of sand is a heap”? Earlier we stated that n grains of sand is definitely a heap, but what is meant by “definitely”? In the supervenientist picture, “definitely” has semantic meaning. If we say that “ n grains of sand are definitely a heap” then it means that under *any* interpretation, also called a sharpening, “ n grains of sand is a heap” comes out true. In such instances we would say that the statement “ n grains of sand is a heap” is *supertrue*. When we say that z grains of sand is definitely not a heap, we are saying that all interpretations of “ z grains of sand is a heap” come out false, and that statement would be *superfalse*. But what do we say about the borderline cases? In these cases some interpretations come out true, and some false. We would say that v grains of sand are neither supertrue nor superfalse. Thus, the logic for the supervenientist is non-bivalent, there are more than two truth values.

The application of supervenience is an attempt to show that the problem of vagueness is a semantic one. In some cases we have decided what the semantics of a heap are, while in other cases there is indecision. Lewis writes in *On the Plurality of Worlds* that the reason the boundary of the outback is vague is simply that, “nobody has been fool enough to try to enforce a choice of one of them [boundary] as the official referent of the word ‘outback’” (212).

To sum up there are three main approaches: ideal language, epistemicism, and supervenience. It is these last two approaches which I find the most compelling. Both attempt to capture our common views of the world, but do so in drastically different ways. The epistemicist claims that the problem is caused by our inabilities,

while the supervaluationist believes that it is semantic indecision. Epistemicists do not provide a method of dealing with the problem. They only wish to describe the nature of it. The supervaluationist, on the other hand, wishes to say that it is at least possible to alleviate some of the issues from vagueness. It is these two contrasting views which will be the focus of the remainder of the paper. We will look at whether there is some evidence for the epistemicist account. For the supervaluationist, we will look at whether such a view can salvage classical logic. After reviewing these two points we will discuss which view is more rational to accept.

Chapter 2

IS THERE EVIDENCE OF A DIVIDING LINE?

Omniscient Speakers

The usefulness of such a dividing line does not matter, if such a thing does not exist. Take the example of Vulcan. This was a postulated planet which was supposed to explain the unusual orbit of Mercury. However, it did not exist. What evidence is there for a dividing line? Does such a thing exist?

Williamson attempts to answer the question by considering what omniscient speakers would say. Suppose there are omniscient speakers. If there is any fact of the matter an omniscient speaker would know it. If something some grouping of sand is in fact a heap, they would know that it is a heap. If the grouping is not a heap, then they would it not a heap. This is not meant to be a question begging example. If a grouping of sand was definitely not a heap nor definitely a heap, then omniscient speaker would know this fact as well.

Let us imagine that these omniscient speakers are competent English users. We can ask them any matter of fact question such as "Is this group of sand a heap", and these omniscient speakers will always reply honestly with answers such as, "'Yes' or 'No'; she can say 'That is indeterminate' or 'To degree 0.917' or 'You are asking the wrong question' if she likes" (199). When asking one speaker, there will at least be circumstances in which she will say 'Yes.' Take for example a 100,000 grain collection of sand. If asked if this is a heap of sand she will reply 'Yes.' If we went through the arduous process of removing one grain a time and repeating the question

the omniscient speaker would give a series of responses with some being 'Yes', while others may fall into the 'To degree 0.917' category. However, there will still be a chain of 'Yes' answers. If we let y represent the number of grain removals where she said 'Yes', then $y+1$ are the other ones. The shift from her yes replies denotes hints at the possibility of a hidden boundary, but one individual is not enough evidence.

Williamson then considers asking a group of omniscient speakers the same series of questions in the same manner. Each is asked separately and there is no sort of collusion. All the omniscient speakers want to be as truthful as possible. If all of these individuals responded changed their 'Yes' answers at y grain removals, then that would serve as evidence for the claim of some dividing line. However, it could be the case that at some grain removals it would be mandatory to say 'Yes', while at others it would be permissible, but not mandatory to say 'yes'. The Omniscient speakers are allowed to use their discretion as they see fit. Therefore, they could have differing numbers of 'Yes' replies, and there is no evidence of a hidden boundary.

Williamson then posits his final two variations of the case. If you ask a group of omniscient speakers to be as conservative as possible with their 'Yes' replies, then they should all answer 'Yes' the same number of times. If one answers 'Yes' a greater number of times, then he would not be as conservative as *possible*. The other omniscient speakers would show that he could in fact be more conservative, and thus was not following your instructions. This then marks one hidden boundary. You could then reverse the instructions and ask the omniscient speakers to be as liberal as possible with their 'Yes' responses. Again they would all answer the same number of times, otherwise they are disobeying the instructions. This marks yet another hidden boundary. From this alone we do not know what the boundary marks. Despite this

Williamson writes, "It may or may not be the boundary between truth and falsity. What matters is that it is of semantic significance, and was hidden from ordinary speakers" (Williamson 201). Thus, Williamson believes that he has shown that vagueness is an epistemic phenomenon. Furthermore, though the example does not prove it, Williamson claims that most reasonable explanation of the hidden boundary is that it does in fact mark the difference between truth and falsity. The reason this boundary is hidden from us is that, "we are in no position to find out which truth-value the vague utterance has" (201).

Omniscience Through Time

Williamson concludes that the case of omniscient speakers shows that there is some boundary which is hidden from ordinary speakers. Indeed, omniscient speakers have access to some special knowledge which humans are *unable* to obtain. However, I believe there is an explanation for the special knowledge, which does not preclude human abilities. What kinds of knowledge does an omniscient speaker have? For one thing, it is possible to say that she has knowledge across all times. If I were to ask an omniscient speaker what the winning lottery numbers for tomorrow were, it is reasonable to believe that she could provide an answer to that question. Is there a way to make such future knowledge accountable for the change in 'yes' replies from the omniscient speakers when asking about heaps?

Consider the possibility that supervaluation is the proper way to deal with vagueness. If such a view were true, and society accepted it, then perhaps mankind would begin to reduce the number of borderline cases by classifying some things as supertrue or not. When such activities occur, it is possible for the language itself to change. Perhaps 'heap' begins to have a more well-defined border, and more

individuals become competent users of the term. It does not matter how such a change occurs — for instance, if the word actually transforms its meaning, or is simply replaced by some new homographic symbol. Omniscient speakers would have knowledge of this change.

Williamson allowed the omniscient speakers to give any number of answers along with the binary 'Yes' and 'No'. One particular reply sticks out from his list: 'You are asking the wrong question?' How, then, could one ask the wrong question? Let us consider other possible questions. If I were to ask an omniscient speaker, "Who are *all* forty-four presidents of the United States?" how should he reply? The Omniscient speaker could take "all" under a restricted quantification, meaning "all up to the present." However, let us say that the question is asked in an unrestricted manner. The individual asking it honestly believes that there will be no more presidents of the United States, that there will be only forty-four presidents. The Omniscient speaker knows that all of the presidents includes more than forty-four individuals and knows the individual's beliefs. An appropriate response is to correct the ordinary speaker by saying, "You are asking the wrong question." Consider a similar case which does not involve cross-time knowledge. If a person, Luke, gleaned all of their knowledge of dinosaurs from old text books, then Luke would, mistakenly, believe that *triceratops* and *torosaurus* were different species. Imagine that you take Luke to a natural history museum. Pointing to a horned skeleton, he asks you, "Is that a *triceratops* or a *torosaurus*?" How do you respond? One reasonable reply is something along the lines of, "You are asking the wrong question." Upon which you could inform him as to why, namely, that *torosaurus* and *triceratops* are in fact the same species, and that the skeletal differences are merely a matter of maturation.

I believe that this is the kind of response an omniscient speaker is likely to give. When you ask the Omniscient speakers at $y+1$ grains of sand, "Is this a heap?" the Omniscient speaker has to reply in some way and honestly. You honestly have no idea whether this thing is a heap or not, and the omniscient speaker knows this. In order to give an adequate response, perhaps the Omniscient speaker has to say, "You are asking the wrong question." Why, because the present use of "heap" doesn't adequately describe the grouping of sand, and the Omniscient speaker would need to reply in a future use of "heap". Thus, the shift from "Yes" replies would, then, be accounted for by future knowledge about heaps, or rather knowledge of future English speakers' use of "heap." The dividing line marked by the change in "yes" replies is not evidence of lack of humans, inability to deal with vague terms, but rather their inability to see into the future.

Objections to Omniscience Through Time

There are several ways in which one may attempt to dispute the above claims concerning omniscience over time. The first of which is that omniscient speakers do not, in fact, have access to the information across times. Such a statement appears to deny two things: first that the future does not exist second, that causal determinism does not exist. The first point is clear, there is no existing future, otherwise they would know all the facts contained within it. Causal determinism simply is the belief that the present state of the universe plus the laws of nature determines the future state of the universe. In other words everything can be traced back to some cause. Any opposition to omniscience over time must deny this. Otherwise an omniscient speaker could still gain knowledge of the future by tracing causal chains into the future. Is rejecting omniscience over time worth the cost?

There are those who hold that only the present time exists. They are known as presentists. Under such a view there is only one temporal region of space, the present. Not only does the future not exist, but neither does the past. Any information one has about the past or even the future is derived from evidence from the present moment. Thus, the reason that we know Martin Luther King Jr. led a march in Washington is because of documentation of the event as well as the memories of those who experienced the event, and any other such evidential support. How, then, could god be omniscient? There are some portents that exist at this present time from which god could know of the future. An alternative method of denying the existence of the future is the growing block view championed chiefly by Ned Hall. Much like the presentist's view it holds that the future does not exist. It does, however, hold the past does. One way to think of the view is that time functions like a zipper. As the zipper moves, i.e. as time passes, times are created, which continue to exist after that point. Both of these views deny the existence of the future, but do not discount causal determinism. Thus omniscient speakers could still have knowledge over time, by following the portents in the present.

How would one go about rejecting causal determinism? One way to do so would simply deny causation. There simply is no reason for anything to be how it is now. Clearly this cannot be what Williamson would want, for he points to the case of omniscient speakers as evidence of ignorance being the *cause* of vagueness. A less extreme method is to assume that there is genuine chance in the world. The current state of the universe plus the laws of nature, plus a metaphysical dice roll dictates the future state of the universe. Accepting either of these alone does not deny knowledge over time for omniscient speakers. If the future events actually exists, then any

omniscient being would be required to know about them. The eternalist view holds that all times exist, whether we are presently experiencing them or not. The time at which Jesus was born, my first hour at university, or even the time at which Sol will supernova all actually exist, simply at different temporal regions of the universe. Even if these times are not causally connected, an omniscient being, by definition, would have to know about all their facts.

This still shows a weakness to Williamson's case of Omniscient speakers. The case is meant to grasp the intuitions of anyone. However, the proposal of knowledge across time limits its effectiveness to only those who reject the existence of the future as well as causal determinism.

Another objection to omniscience through time is to question whether I am examining Williamson's case properly. The strongest objection of this kind concerns the omniscient speakers themselves. Specifically, what does it mean to call them *competent* speakers of English. Languages evolve over time, and some may claim that the English language from one-hundred years ago is *not* identical to the English that exists today. Therefore the omniscient speaker must speak in today's English, not in future English. When I ask her whether this collection of sand is a heap, she should respond to my current day usage of "heap", and not some future version/replacement of the word. To do so would be like responding in an entirely different language.

Richard Hanley has proposed a historical account of language identity. This is similar to a historical account of species identity. What makes us *Homo sapiens* is not our current state of abilities or collection of properties, but rather the evolutionary history of our species. Similarly what makes English itself isn't just its current lexicon and grammar, but its evolutionary history. Imagine a society on an island which by

mere coincidence develops a language qualitatively identical with English, call it Shmenglish. Now a group of English speakers lands on the island, and much to their surprise they are able to communicate with the natives. Why is this a surprise? Because the native Shmenglish has a different history than English. They are different languages. If a present day individual traveled back in time to the Elizabethan era, we would not be surprised by his ability to communicate with a lady of Queen of Elizabeth's court. Why? Because present English and Elizabethan English have the same evolutionary history. In some sense they are the same language.

With this consideration in mind, what is it to claim that Omniscient speakers are responding in a different language if they are using a future usage of the word "heap"? It would be like saying that the history of the present English and future English are, in fact, different. However, there is a reasonable response that they are in fact the same. We could consider English to be some higher-order individual, which is constituted by different first-order individuals at different times. Mark Johnston introduces the concept of a higher-order individual in *Surviving Death*, giving as an example the mythical being the Phoenix from Ovid's *Metamorphoses*. This is a bird, which when reaching the age of five hundred years, bursts into flame, only to rise from the ashes as a new bird. Johnston points out that this is not some strange form of reproduction, because that would not properly convey the idea of the Phoenix set forth by Ovid. Instead Johnston claims that the Phoenix is a "higher-order bird, a bird variably constituted by different first-order birds at different times" (Johnston 323). Each five hundred year cycle is the life span of some first-order bird. Johnston even names some of these birds as Phoebe, Pho, and Phoenicia. Each is simply a mere bird, they do not survive the self immolation upon death, they simply die. The Phoenix, as

one bird, survives all of these deaths. Why does it do this? Phoebe has a special kind of concern for herself over any other birds. The Phoenix on the other hand has the same concern for each Phoebe, Pho, and Phoenicia. This concern is what allows the Phoenix to be a higher order individual.

Johnston also gives the concept of a higher order entity as opposed to an individual. He gives the following example with language;

A TYPE AND TWO TOKENS

THE

THE

He writes that, “there are three things, indeed three words, there below the title, two word tokens and one word type” (Johnston 321). Tokens are individual instantiation of some concept, called a type. Take for example the idea of a computer mouse. The mouse next to my computer is not a computer mouse-type, but merely a token. The third word listed above is a type-word which has its own history independent of English. It came into existence before it entered the English language, and may, in fact, go into disuse in the future. In a sense then the types are higher-order individuals over their tokens. We can use the same concept with a languages themselves. We can describe a higher order English is constituted by different first order English languages at differing times. Elizabethan English, present English, and future English are all just first-order languages which constitute higher-order English. One can then say that they are all English. If this is the case than there is no equivocation between the use of "heaps" for an omniscient being, who, by having knowledge at all times, therefore knows higher-order English, and therefore all of its first-order languages. Some

opposing account of language must given, in order for the case of Omniscient speakers to be evidence for Epistemicism.

Cooperative Speakers

I feel that the above objection is of little importance, if Williamson's example does not hold up to further scrutiny. Let us grant the case of omniscient speakers does in fact demonstrate a boundary which is hidden from ordinary speakers. If one looks closely at the structure of Williamson's example, it almost appears inevitable for this to occur, given the nature of the omniscient speakers themselves. These individuals are described to be very much like ordinary speakers, with one obvious difference, they are omniscient. In other words the only significant difference between the two speakers is an epistemic one. However, this is enough for the omniscient speakers to solve the Sorites paradox. Thus, the root of the paradox appears to be some sort of epistemic phenomenon. We thus see the structure of the example; posit beings who are exactly like humans except for their knowledge. Then if the Sorites is no longer a problem for those beings, it must be a lack of knowledge which causes the problem for ordinary speakers. This argument is simple and powerful in structure. But what if an argument with the same structure could be given for a view other than epistemicism? If the argument can reach opposing conclusions, then any result from it would be weakened.

Consider now a group of individuals I will call *cooperative speakers*. These individuals start out limited in the same ways as humans. They possess the same amount of knowledge and are biologically identical to humans. However, whenever one of these individuals come of age he or she has a chip implanted into his or her brain, which only serves one purpose. Whenever the individual comes across some

borderline case, for example a grouping of sand, he can decide to activate the chip or not. When the chip is activated it sends out a signal to all other chips, asking the individuals to give their input as to whether the collection is a heap or not. They are allowed to reply with either vote yes, no, or unsure. After all votes have been given, the results are provided to all chip users. These results could then have influence over a cooperative speaker's uses of the term heap. Let us say that the results are ninety percent say "yes", eight percent "no", and two percent are "unsure". If I were in the minority ten percent, then I would be inclined to change my understanding of the term heap, upon seeing this data. The sheer number of people who are inclined toward saying "yes" is enough to for me to feel that it is rational to change my opinion from either "no", or "unsure." After collecting many of these polls this society would be able to narrow down the number of borderline cases, as individuals changed their uses of "heaps" to fit the more popular opinion.

This narrowing down is meant to be representative of supervaluation. By having access to the votes, the cooperative speakers are simply viewing different sharpenings of the term heap. I believe that this case is similar in structure to Williamson's case of omniscient speakers, except that it does not support the thesis that vagueness is an epistemic phenomenon. Instead it is constructed around the thought that vagueness is semantic indecision. Recall the quote of Lewis which I had given about semantic indecision as a problem with drawing a boundary for the outback: "nobody has been fool enough to try to enforce a choice of one of them as the official referent of the word 'outback'" (Lewis 212). In the case of cooperative speakers the whole society acts as the aforementioned "fool." By having the ability to

actually make semantic decisions, the cooperative speaker is able to determine which vague terms ought to be assigned to what things.

Objections to Cooperative Speakers

One minor objection to the example of cooperative speakers is an objection to their authority. In the case of omniscient speakers the authority of their replies comes from their guaranteed knowledge. There is no such feature for the cooperative speakers. While it is true that they have access to some information which we humans do not currently have, it is nothing special. The only real factor which separates them from the ordinary speaker is logistics. It might be objected, then, that without any special qualifications, the cooperative speakers should not be able to speak more clearly about vague subjects? Also, if their societies are similarly constructed as ours, then some cooperative speakers' opinions ought to be more valuable, while others are practically useless.

Firstly, this objection almost comes out circular. It assumes that one needs some special abilities in order to narrow the vague interval. That is the key difference between the epistemicist and supervaluationist! The former believes that humans lack the requisite ability to deal with the indeterminacies of vague predicates, while the latter does not. Whether one agrees with this thought or not, the second prong of the objection can be dealt with independently. I have already taken into some account the value of some individuals opinions over others. Recall that chip is only installed when the individual "comes of age." This eliminates some of the more problematic cases. Children, or anyone else who is in the process of learning a language, cannot give their

input. We could also modify the case and say that only competent users of the term are given the chance to vote in their opinion.

Another consideration is the possibility that the abilities of a group may be greater than the sum abilities of its members. In an article call *Wisdom of the Crowds in Combinatorial Problems*, Yi, Steyvers, Lee, and Dry demonstrate some evidence that a group's ability to solve problems is better than any individual's. In one experiment they presented what they called the minimum spanning tree problem, or MSTP. A series of nodes were given which had to be connected in such way that one could trace a path between any two nodes. The test subjects were tasked to connect these dots in as few lines as possible. They then compared each subject's results to the optimal solution, and two different aggregations to the optimal solution. What they discovered is that overall in three different problems (30 nodes, 60 nodes, and 90 nodes) the group outperformed any individual in the group. (S, K, M, Yi et al 454-458).

A stronger objection concerns whether or not the cooperative speakers are actually *individuals*. Since they have the ability to share information and update that information, then some may argue that they lose their individuality over time. Their own opinions on matters will soon be replaced by those of the group, making each individual more or less the same.

I disagree with such an objection. Even if every individual accepts the same sharpenings for each vague predicate, this does not all of sudden make their minds one. Each person still has lots of knowledge that the others do not have. Say that Fred does not know that Katie's birthday is the same day as J Edgar Hoover's, but Katie does. Neil Degrasse Tyson knows more about stars than I probably ever will. It

would be crazy to say that he and I are now one mind just because we now share the same beliefs on what constitutes a heap or tallness.

If one granted the point anyhow, then it would have absurd consequences. The world is increasingly connected to the Internet, and information is being spread at a faster rate than ever before to an even larger number of people. A consequence of this is that billions of individuals can gain the same knowledge in a relatively small period of time. Though it may be argued that this has changed *thinking* somewhat, it is implausible, indeed, to say that this renders all parties into the same personality, such that they lose their individuality. Ultimately the objection fails because individuals are constituted by more than their beliefs.

Chapter 3

SUPERVALUATIONISM AND CLASSICAL LOGIC

Preserving Classical Logic

A serious problem for supervaluationism is that it appears to violate classical logic. But why is this a serious problem? Well for one logical laws appear to be more fundamental than the physical laws which govern our universe. Physical laws operate on facts which are called contingent. Contingent facts are simply those facts in which it is possible for them to be different. Not physically possible, but logically possible: it is possible to conceive of such a thing. For example, it is logically possible to imagine a creature like Superman. The physical laws of our universe does not allow for such a thing to be possible. On the other hand there are things which are impossible to conceive, those things which are logically impossible. Nobody could possibly conceive of a four-sided triangle. Why? Because it is necessary property of a triangle to have three sides. Necessary facts are those facts which cannot logically be conceived as different. Bachelors are necessarily single, water is necessarily H₂O, and triangles are necessarily three sided. Each of these objects are defined by their necessary properties. We cannot conceive of a married bachelor, or four-sided triangle, because it is a contradiction. This is the corner stone of classical logic, what is called the law of non-contradiction which states that it cannot be the case that p and that not p . A four-sided triangle would have the properties of having three sides and not having three sides, thus it is a contradiction.

The law of non-contradiction is the most fundamental law in classical logic. However there is another fundamental law known as law of excluded middle. This law states that for any p it is either the case that p or that not p . For example, the sun will either rise tomorrow or not rise, it could not be in any other state. This law can be shown be equivalent to law of non-contradiction (see appendix for proof). Thus, one could say that the law of excluded is just as fundamental as the law of non-contradiction: to deny the law of non-contradiction is to dismiss classical logic. There is a special application of the law of excluded middle, that is known as bivalence. This is the claim that all propositions must be either true or not-true (false). In other words there cannot be any other truth-values. The supervaluationist, however states that there propositions of indeterminate truth-value. Thus, it violates bivalence and appears to reject the law of excluded middle. However, attempts have been made to say that the view simply denies the law of excluded middle in that one case, the case of bivalence. While truth and falsity for propositions does not follow the law of excluded middle, things such as the sun rising or not rising does. As Williamson points, out the idea behind the view is to deny "the meta-logical law [of excluded middle] but [accept] the logical law of excluded middle" (Williamson 145). But can this actually be done?

Kit Fine attempts to do this by creating a new operator known as the "definitely" operator D . Some proposition is definite if and only if that proposition is true on all interpretations, i.e. super true. Such an operator is analogous to the necessary operator given in modal logic. In modal logic there is logical space with an infinite number of points contained in the space representing possible worlds. It is said that necessarily A is valid only if at all possible worlds it is the case that A . For

example, the reason it is valid to claim that a triangle necessarily has three sides is because there is no logically possible world where a non-three sided triangle exists. In the analogy with the definitely operator there is the same kind of space with points. In the case of the definitely operator, though, each point represents an interpretation, rather than a possible world. Thus, we can give an account of validity without bivalence by saying that Definitely *A* is valid if and only if *A* is true at all points in a space. With an account of validity without bivalence, the supervaluationist is able to save classical logic.

Or Does It

However, there are some problems when this approach is taken to arguments. Williamson points to two differing ways to interpret validity using the "Definitely" operator. When describing the analogy between the definitely operator and the necessary operator, we could say that an argument is valid "if and only if in any space, if its premises are true *at a given point* then so is its conclusion" (Williamson 150). These are my italics. However, this is only a analogy for local validity, and what is needed is an analogy for global validity; which Williamson formulates as "an argument is (globally) valid just in case in any space, if the premises are true *at every point*, then so is the conclusion." Again my italics.

Williamson then proceeds to give several argument forms which are valid under classical logic, but not globally valid under the logic of supervaluation. I will only give one of the four which he provides. In classical logic there is the argument known as contraposition, which states that if one is able to argue from *A* to *B* then one can validly argue from not *A* to not *B*. From the fact that if I am in Delaware then I am in the United States, I can also assert without any geological knowledge that if I

am not in the United States then I am not in Delaware. However one cannot do this with supervaluationist logic. Even though the argument from p to Dp (definitely p) is globally valid, we cannot derive "if not Dp then not p " as globally valid. Not Dp simply means that there are some points where it is not the case that p . Thus it is possible that there are times where Dp is true and not p is false. For this reason we can say that this is not a globally valid inference. Williamson demonstrates the same problem for conditional proofs, arguments by cases, and reductio ad absurdum arguments. These three arguments are vital to the natural deduction theorem. By demonstrating their failure with the definitely operator, Williamson has effectively shown that supervaluationist logic, as it stands, does not support classical logic.

Chapter 4

DECIDING

I began this thesis looking for some answer to the Sorites paradox which was the most appropriate. In chapter one we established that such any answer that can currently be given ought to align with most of our current beliefs. Forsaking everyday objects like Unger, or denying what appears to be assertions like Russell, or accepting Ontic vagueness is far too extreme. This left us with epistemicism and supervaluationism to consider. Each proposes a unique solution to the problem, and each has its concessions. How then do we decide? I believe it is best to look at their drawbacks again and decide which wreaks more havoc on the way we intuitively look at the world.

Supervaluation does not currently appear to support classical logic, while epistemicism does. This is not a fact to be taken lightly since it is this classical logic is supposed to be representative of how humans think, how the world operates, and even how the world could possibly operate. A huge chunk of our thoughts on classical logic are formulated on the principle of bivalence, that premises can only be true or not true (false). Supervaluation ultimately must reject this and add a third category of truth value.

Epistemicism posits that there is a boundary defining vague predicates which can never be known by humans. No amount of empirical investigation could discover where this line is. Worse than this, the boundary is a necessary one, for whether or not *n* grains of sand constitute a heap is dictated by governing laws of the universe.

I find the drawback of epistemicism to be much greater than the drawback of supervaluationism. Although it appears grave violate classical logic, it also must be noted that the Sorites is not the only problem for preserving it. There are other examples of non-referring terms which also pose various problems to classical logic. One major concern revolves around reference to fictional characters, such as Sherlock Holmes. What makes the statement “Sherlock Holmes lives on 221B Baker Street” true? There does not exist a Sherlock Holmes in this world, and there does not exist at 221B Baker Street. There is much debate on how to render such statements in classical logic, with some debating that it is impossible to do so. Another, separate problem for logic revolves around what is known as the Liars Paradox. Consider a sentence named “Liar” which states that it itself is false. Liar: Liar is false. If the sentence “Liar is false” is true then Liar itself is false. If the sentence “Liar is false” is false, then Liar itself true. But Liar *is* the sentence “Liar is false”! Thus, we get Liar is false if and only if Liar is true. The principle of bivalence says that every sentence is either true or false, and thus Liar must be either true or false. This is a constructed dilemma resulting in Liar being both true and false, a clear contradiction (see appendix for formal notation). Problems like these suggest that perhaps the flaws for classical logic are fatal, and an alternative is more desirable. I will not make any definite claims about the matter here, but unless all of the other problems can be fixed, perhaps rejecting bivalence is not the worst thing in the world.

Epistemicism, on the other hand, is too hard to swallow. Yes, it does solve the Sorites, but at what cost? There is no evidence of such a thing, and its attractiveness appears to come from its utility. The concession of supervaluationism concerning bivalence at least has other motivating factors. This hidden boundary is only

motivated by Sorites. I do not believe that is reason enough to end the debate about vagueness. For ultimately that is the consequence of accepting epistemicism. There is nothing to discuss about borderline cases, because we could never know their truth values. To table a debate that has been active for millennia on such little evidence does not appear rational. Unless better evidence can be given for such a hidden boundary, it does not appear that one ought to accept it.

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Appendix

PROOFS

Equivalence of the Law of Non-Contradiction and Law of Excluded Middle

- | | | |
|----|--|--------------------------|
| 1. | $\sim(p \wedge \sim p)$ | Law of Non Contradiction |
| 2. | $\sim(p \wedge q) \vdash (\sim p \vee \sim q)$ | De Morgan's Theorem |
| 3. | $\sim p \vee \sim \sim p$ | 1, 2 |
| 4. | $\sim p \vee p$ | 3, Double Negation |
| 5. | $p \vee \sim p$ | Conclusion |

Liars Paradox

- | | | |
|----|--|------------------------|
| 1. | $p \leftrightarrow \sim p$ | Premise |
| 2. | $(p \leftrightarrow q) \vdash ((p \rightarrow q) \wedge (q \rightarrow p))$ | Material Equivalence |
| 3. | $(p \rightarrow \sim p) \wedge (\sim p \rightarrow p)$ | 1, 2 |
| 4. | $p \vee \sim p$ | Law of Excluded Middle |
| 5. | $((p \rightarrow q) \wedge (r \rightarrow s)) \wedge (p \vee r) \vdash (q \wedge s)$ | Constructive Dilemma |
| 6. | $\sim p \wedge p$ | 3, 4, 5, Conclusion |