THE SORITES PARADOX

Little-by-little

The sorites paradox is another famous paradox created by Eubulides of Miletus. This paradox tackles the idea of vagueness. The word *sorites* comes from the Greek word *soros*, which means "heap." The sorites paradox states:

Imagine you have a heap of sand. While a single grain of sand does not make a heap, many grains, like 1,000,000 grains, for example, do make a heap.

1. If you were to remove a single grain of sand from the 1,000,000 grains of sand, then you would still have a heap.
2. If you were to remove another grain of sand, then you would still have a heap.
3. If you were to remove another grain of sand, then you would still have a heap.

Eventually, you can remove enough grains of sand so that it is no longer considered a heap, but at what point is that the case? Is 500 grains of sand still considered a heap but 499 grains of sand not?

The sorites paradox is also seen in another paradox created by Eubulides: the Bald Man. This paradox states:

1. If a man has one hair on his head, then he is considered bald.
2. If a man that has one hair on his head is considered bald, then a man with two hairs on his head is considered bald.
3. If a man that has two hairs on his head is considered bald, then a man with three hairs on his head is considered bald.

Therefore, a man with 1,000,000 hairs on his head is considered bald.

Even though a man with 1,000,000 hairs would certainly not be considered bald, according to logic, he should be considered as such. So at what point is the man no longer considered bald?

Philosophers Gottlob Frege and Bertrand Russell argued that ideal language should have precision and that natural language has a defect, vagueness. By getting rid of vagueness, one would eliminate soritical terms, thus getting rid of the sorites paradox.

Later, American philosopher Willard van Orman Quine believed vagueness could be eliminated from natural language entirely. While this would affect ordinary ways in which people talk, the "sweet simplicity," as Quine describes it, would be worth it.

PROPOSED SOLUTIONS

There are four responses that philosophers typically use to explain the sorites paradox:

1. Denying that logic is applicable to the sorites paradox
2. Denying some of the premises within the sorites paradox
3. Denying the validity of the sorites paradox
4. Accepting the sorites paradox as sound

Let's look at each possible solution.

Denying That Logic Is Applicable to the Sorites Paradox

Denying that logic is applicable to the sorites paradox does not seem to be the best possible solution. It seems that in order for logic to have any impact, it must be applied to natural language and not only to an ideal form of language. Therefore, the soritical terms cannot be avoided and must be dealt with in another way.

Denying Some Premises

Denying some of the premises of the sorites paradox is the most common solution today. In these solutions, logic can be applied to natural language; however, there are issues regarding the premises on which the sorites paradox is based.

The Epistemic Theory

In the epistemic theory, one conditional is assumed to be false and there is a certain cutoff point in any sorites paradox where the predicate no longer applies (and instead, the negation applies). If we were to again use the Bald Man paradox as an example:

1. A man that has one hair on his head is considered bald.
2. If a man that has one hair on his head is considered bald, then a man that has two hairs on his head is considered bald.
3. If a man that has two hairs on his head is considered bald, then a man that has three hairs on his head is considered bald.

Therefore, a man that has 1,000,000 hairs on his head is considered bald.

Imagine now that we reject one of the other premises besides the first premise. For example, let's imagine the cutoff point to be at 130 hairs. This means that anyone with 129 hairs on his head would be bald, while anyone with 130 hairs on his head would not be bald.

Naturally, many find the epistemic theory to be questionable. If one of the premises is false, how would anyone know which premise it is? Additionally, how would one find out this information? If we use the word *bald*, that word has meaning because of how we use it. But how can we use that word to determine a standard when we can't know what that standard is?

The Truth-Value Gap Theory

Another theory, the truth-value gap theory, states that we cannot know the cutoff point because there is no specific cutoff point. Intuition tells us there exists a group of people for which saying they are bald is simply true, and there exists another group of people for which saying they are bald is simply false. However, there also exists a group of people in the middle. For these people in the middle, calling them bald is not saying anything true or false. For these people, the word *bald* is undefined.

According to the truth-value gap theory, because sentences can be undefined instead of true, not all of the premises are true. However, even the truth-value gap theory runs into problems.

If you were to look at the sentence "It is either raining or not raining," normally you would consider this to be a logical truth. However, under the truth-value gap theory, if there were a borderline case of rain, both "It is raining" and "It is not raining" would be undefined, and therefore neither would be true.

Supervaluationism

Supervaluationism attempts to solve the problem of the middle group discussed in the truth-value gap theory. When looking at the

baldness example, there are examples of thinly haired men for whom it would not be true to say that they are bald (as dictated by the rules of being "bald"); however, it would not be false to say they are bald, either. Therefore, it seems to be up to us to determine these cases.

In supervaluationism, drawing the line between baldness and non-baldness is referred to as a "sharpening" of the term *bald*. While simple sentences regarding borderline scenarios can lack a truth-value, compounds of these sentences will in fact have truth-values, and supervaluationism will allow for standard logic to be retained (even with the existence of truth-value gaps). With this idea of sharpening, supervaluationism states the following:

- A sentence is true if and only if it is true with regard to all sharpenings.
- A sentence is false if and only if it is false with regard to all sharpenings.
- A sentence is undefined if and only if it is true with regard to some sharpenings and false with regard to other sharpenings.

So according to supervaluationism, premises of the sorites paradox will be true regarding some sharpenings, false regarding other sharpenings, and therefore, some will be undefined. This allows for there to be valid reasoning with a false conclusion.

However, even supervaluationism has its problems as a theory. Supervaluationism states "It is either raining or not raining" is always true even if neither event is true. If we return to the idea of baldness, supervaluationism would assert that the statement "If you have 130 hairs on your head, you are not bald, but if you have one less, you are bald" is false, while also claiming "There is a number of

hairs with which you are not bald, and if you have one less, you are bald" is true. There is clearly a contradiction here.

Denying the Validity of the Sorites Paradox

The third option in attempting to solve the sorites paradox states that one can accept all of the premises but deny the conclusion. According to this option, sentences are not considered to be absolutely true or false; instead, they are considered to be true to a certain degree. Therefore, each statement should be determined by the degrees of truth within its parts.

Accepting the Sorites Paradox as Sound

The last option is to embrace the sorites paradox and accept it as sound. If one embraces the sorites paradox, then it seems that both positive and negative versions must be accepted. No one is bald and everyone is bald. Any number of grains will make a heap and no number of grains can make a heap. Since this cannot be the case, however, embracing the sorites paradox must be more restricted by accepting classical reasoning and denying terms like *baldness* or *heapness*, so that these words apply to nothing.