Anna Mahtani

# Vagueness

## Book section

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# Vagueness

## Article Summary

In ordinary conversation, we describe all sorts of different things as vague: you can have vague plans, vague ideas, and vague aches and pains. In philosophy of language, in contrast, it is parts of language – words, expressions and so on – that are said to be vague. One classic example of a vague term is the word 'heap'. A single grain clearly does not make a heap, and a million grains (when arranged in the right way) does make a heap, but where exactly does the boundary lie? How many grains, do you need to make a heap? There seems to be no precise answer to this question, and because the term is imprecise in this way, we call it vague.

Vague terms are extremely common in natural language. The term 'bald' is vague, because there is no precise number of hairs that mark the boundary between 'bald' and 'not bald'; the term 'hot' is vague because there is no precise temperature that something must reach to count as hot – and so on. As we have seen, adjectives can be vague, but so can nouns, adverbs, and perhaps all parts of language. To find terms which are precise rather than vague, we need to look to the languages of logic and mathematics.

We can use vague terms to construct paradoxes known as sorites paradoxes. From an obviously true premise, such as that a collection of 1,000,000 grains (in a certain arrangement) is a heap, together with the claim that 'heap' has no sharp boundary, we can derive the absurd conclusion that just 1 grain counts as a heap. Any theory of vagueness must offer some solution to this paradox. Some of the most popular theories of vagueness include supervaluationism, the degree theory of truth and the epistemic theory, and many of the available theories demand a radical rethink of classical accounts of logic and language.

## Main Entry

### The problem of vagueness

Some people are tall, and some people are not, but where does the boundary lie? What height, exactly, must you reach to count as tall? Is it 175cm? Or 175.5cm? Or what?

A first thought might be that it depends on the context. We might describe a toddler of just 100cm as tall, but also deny that a grown man of 160cm is tall. To remove any confusion then, let us focus on a single context: we will suppose that we are interested just in the heights of male undergraduates at a particular university. We will suppose that each student has had his height carefully measured, and we have access to a table listing all the results. Now we can ask the question afresh: where does the boundary to 'tall' lie (in this context)? Clearly some students (for example, those over 220cm) are tall; and clearly some students (for example, those under 150cm) are not tall. But there are some students – some 'borderline cases' – who we don't know how to classify. If we try to draw a sharp boundary separating the students who are tall from those who are not, we will not know where to draw it, despite the fact that we have fixed the context.

Intuitively, the problem here is not our ignorance. To see this, let us take a contrasting case, and suppose that instead of trying to classify the students into those who are tall and those who are not, we are trying to classify the students into those who meet the height requirement for the basketball team and those who do not. Suppose further that the height requirement for the basketball team has been (relatively) sharply defined – so the requirement might be that all players must be at least 183cm, or at least 184cm, or something of that sort – but we do not know what it is. The problem here is (mostly) just one of ignorance: we don't know where the boundary lies. In contrast, the term 'tall' does not seem to have a sharp boundary at all, known or unknown, and this shows that the term 'tall' is vague.

Vague terms are extremely common, and include adjectives such as 'tall', 'bald', and so on, and other parts of language too. So prevalent are vague terms that it is a challenge to find terms which are *not* vague in any way, and we have to retreat to the language of logic or perhaps mathematics to find any such terms.

Having vague terms in our language presents us with a problem, because we can use them to construct paradoxes. A paradox is an argument that is apparently valid (that is, apparently the conclusion follows from the premises), has apparently true premises, and an apparently false conclusion (see glossary entry on *Argument*). Solving a paradox involves explaining away one or more of these appearances – that is, either explaining why the argument isn't valid (even though it looks it), or why the premises are not all true (even though they seem to be) or why the conclusion is actually true after all (contrary to appearances). The paradoxes that we can construct using vague terms are called 'sorites paradoxes', with 'sorites' derived from the Greek word for 'heap', for traditionally the paradox was constructed using the vague term 'heap'. We will construct the paradox using our vague term 'tall', with the context fixed as described above. We start the argument with this premise:

P1: A male undergraduate with height 200cm is tall.

This premise P1 certainly seems to be true, but if you have any doubts, then increase the number of centimetres until you are convinced. Our next premise is as follows:

P2: For any number *n*, if a male undergraduate with height *n*cm is tall, then a male undergraduate with height *n*-0.1cm is tall.

This premise P2 is called the 'tolerance principle' because it captures the intuition that 'tall' is a vague term and so tolerant of small differences: intuitively, the term 'tall' does not draw a sharp boundary between two people who differ in height just by 0. 1cm. If you deny this tolerance principle, then you are forced to claim that there is some number *n* such that a male undergraduate with height *n* is tall, but a male undergraduate with height *n*-0. 1 is not tall, and this looks like the claim that the term 'tall' does draw a sharp boundary – that there is some precise height that a male undergraduate must reach to count as tall.

The tolerance principle makes a general claim, and from it we can infer lots of specific claims. One such claim is that if a male undergraduate with height 200cm is tall, then a male undergraduate with height 199.9cm is tall. We can combine this claim with P1 to infer (by a law of logic – see the the glossary entry on *modus ponens*) that a male undergraduate with height 199.9cm is tall. Thus from our two premises, we have reached a conclusion (which we can call C1) that a male undergraduate with height 199.9cm is tall. Now we can once again use the general tolerance principle to infer the specific claim that if a male undergraduate with height 199.9cm is tall, then a male undergraduate with height 199.8cm is tall, and we can combine this with the conclusion C1 to infer that a male undergraduate with height 199.8cm is tall. We can call this conclusion C2. We can continue in this way, repeating these steps, until we reach the following absurd conclusion (which we can call C1000):

C1000: A male undergraduate with height 100cm is tall.

This conclusion is clearly false, but if you have any doubts then just repeat the steps until you reach a conclusion that seems clearly false to you. This then is a paradox: the premises seem true, the conclusion seems false, but the argument seems to be valid. A solution to the problem of vagueness, amongst other things, should explain what goes wrong in the sorites paradox (see Keefe 2000). Several solutions have been proposed, and the three most prominent are supervaluationism, the degree theory of truth, and the epistemic view.

Supervaluationism

This account begins with the observation that there are many ways we could make the term 'tall' (as applied to male undergraduates) precise. We could stipulate that the boundary to 'tall' lies at exactly 177.2cm, or we could stipulate that the boundary lies at exactly 177.3cm, and there are many other possibilities. Could we similarly stipulate that the boundary to 'tall' lies at, say, 100cm? This would conflict with our widely accepted intuitions about the term, for a male undergraduate with height 100cm is obviously not tall. We can say that a precisification of a vague term is 'admissible' only if it coheres with uncontroversial truths about that term. 'Tall' then has a range of admissible precisifications, including the precisification that draws the boundary at 177.2cm, the precisification that draws the boundary at 177.3cm, and so on.

On the supervaluationist's account, a sentence is said to be 'super-true' iff it is true under all admissible precisifications; it is said to be 'super-false' iff it is false under all admissible precisifications; and otherwise the sentence is neither super-true nor super-false. To illustrate how this works, take the sentence 'a male undergraduate of 100cm is tall'; this sentence is false under all admissible precisifications, and so super-false. In contrast, the sentence 'a male undergraduate of 200cm is tall' is true under all admissible precisifications, and so super-true. A sentence involving a borderline case, such as the sentence 'a man of 177.2cm is tall' is true under some precisifications, and false under others, and so it is neither super-true nor super-false.

Let us consider how the supervaluationist would respond to the sorites paradox. Recall the tolerance principle, P2:

P2: For any number *n*, if a male undergraduate with height *n*cm is tall, then a male undergraduate with height *n*-0.1cm is tall.

On the supervaluationist's account, this sentence is super-false, for it is false under every admissible precisification. To see this, let us take as an example the admissible precisification that draws the boundary to 'tall' at 177.2cm. Under this precisification, it is not the case that for any *n*, if a male undergraduate with height *n*cm is tall, then a male undergraduate of height *n*-1cm is tall. For take the case where *n* is 177.2cm: as this is where the boundary to 'tall' lies (according to this precisification), a male undergraduate with height 177.2cm is tall, even though a male undergraduate of height 177.1cm is not. Thus P2 is false under the precisification that draws the boundary to 'tall' at 177.2cm. P2 will similarly be false under each admissible precisification, for each precisification draws a sharp boundary, even though they all draw the sharp boundary in different places. As P2 is false under each admissible precisification, it is super-false. The supervaluationist can combine this point with an account of validity (in terms of super-truth, as opposed to traditional accounts of validity in terms of truth) to offer a solution to the sorites paradox.

The supervaluationist faces various objections, and one such objection concerns higher-order vagueness. The problem is that just as 'tall' does not seem to draw a single sharp boundary between those who are tall and those who are not, so it does not seem to draw multiple sharp boundaries either. Yet on the supervaluationist's account, any sentence of the form 'a male undergraduate of *n*cm is tall' will be super-true if the value of *n* is high enough, super-false if the value of *n* is low enough, and neither super-true nor super-false if the value of *n* is somewhere in-between. It looks then as though the supervaluationist has rejected a single sharp boundary to 'tall', only to replace this with two other boundaries: one between those whom it is super-true to describe as tall, and those whom it is not, and another between those whom it is super-false to describe as tall, and those whom it is not. But intuitively these boundaries should not themselves be sharp, for the term 'tall' seems to draw *no* sharp boundaries. Thus the supervaluationist seems to have made no progress. This is the problem of 'higher-order vagueness', and there are attempts in the literature to respond to this and other objections to the account.

Supervaluationists include Kit Fine (1975) and Rosanna Keefe (2000), and for those interested in learning more, Keefe (2008) is a very good place to start.

## The Degree Theory of Truth

According to classical logic, all claims are either true or false. According to the degree theory of truth, in contrast, all claims have some degree of truth which is a number between zero and one. A claim that is completely true has degree one, a claim that is completely false has degree zero, and all other claims have some degree of truth in between. Take the claim that a male undergraduate of *n*cm is tall. If we substitute, say, 200cm for *n*, then this claim will have a degree of truth of one. If we substitute smaller and smaller numbers in place of *n*, then at some point the degree of truth of the claim will begin to drop, until eventually the claim will be completely false and have a degree of truth of zero.

Introducing degrees of truth has raised many questions, and there are various conflicting answers to these questions in the literature. One question concerns the truth-value of compound claims. For example, let us suppose that we have two claims, P and Q, each with its own degree of truth. If we now take some compound claim, such as P&Q, how should we calculate its degree of truth? Some degree theorists give a truth-functional account, on which the degree of truth of a compound claim like P&Q is fixed by the degrees of truth of the simpler claims that it contains. Others have drawn inspiration from probability theory, and just as the probability of P&Q is not fixed just by the probabilities of P and Q, these theorists have similarly maintained that the degree of truth of P&Q is not fixed just by the degrees of truth of P and Q.

A further question for the degree theorist to settle is what it is for an argument to be valid. On the classical conception of validity, an argument is valid if and only if the truth of the premises guarantees (in some sense) the truth of the conclusion. How should this conception of validity be adapted given the degree theory of truth? According to some theorists, an argument is valid if and only if the premises all having degree of truth one guarantees that the conclusion also has degree of truth one. According to other theorists, an argument is valid if and only if the degree of truth of the conclusion is guaranteed to be at least as high as the degree of truth of the least true premise. There are further alternatives to be found in the literature. The solution that the degree theorist offers to the sorites paradox will depend on the definition that (s)he gives of validity, together with other details of the account.

The degree theorist faces a version of the problem of higher-order vagueness. One way to raise this problem is to point out that on the degree theorist's account a sentence of the form 'a male undergraduate with height *n*cm is tall' is true to degree one if *n* is high enough, true to degree zero if *n* is low enough, and otherwise some intermediate degree of truth. Thus the terms seems to draw two sharp boundaries: one between those whom it is true to degree 1 to describe as tall and those whom it is not, and another between those whom it is true to degree 0 to describe as tall and those whom it is not. The degree theorist rejects classical logic on the grounds that vague terms do not draw sharp boundaries, but then sharp boundaries seem to resurface in the degree theorist's account. Various responses to these and other objections have been put forward by degree theorists.

Degree theorists include Kenton Machina (1972) and Dorothy Edgington (1996), and for a good first introduction to the degree theory, see Edgington (2001).

<u>The Epistemic View</u>

On this view, vague terms do draw sharp boundaries – it is just that we don't know where they lie. Thus for example there is some precise height that a male undergraduate must reach to count as tall, though we do not know what this height is. Borderline cases are borderline only in that they are the cases that we do not know how to classify. On this view the solution to the sorites paradox is to straightforwardly deny the tolerance principle, P2.

On this approach we need make no adjustments to classical logic, and in this respect the epistemic view differs from supervaluationism and the degree theory. For example, according to classical logic, every meaningful claim is either true or false, and while this principle must be dropped (or qualified) by supervaluationists and degree theorists, it is upheld on the epistemic view. To see this, take the claim that a male undergraduate of 177cm is tall. As this concerns a borderline case, the claim will be neither (super)true nor (super)false on the supervaluationist's account, and according to the degree theorist it will have some intermediate degree of truth. But on the epistemic view, the claim is straightforwardly either true or false – we just don't know which. More generally, on the epistemic view classical logic is fully preserved.

The epistemic view is widely considered to be counterintuitive. One natural objection to the view is this: given that words like 'tall' are just made up by us, and given that we have not stipulated any sharp boundary, what could possibly have fixed the boundary? What is it, for example, that could have determined that the boundary to 'tall' lies at exactly 177.2cm rather than 177.3cm? A further challenge for the epistemicist is to explain our ignorance: if vague terms have these sharp boundaries, then why can't we know where they lie? Furthermore, what is the source of our intuitive judgment that they do not have these sharp boundaries at all? Responses to these and other challenges have been offered by supporters of the epistemic view.

Supporters of the view include Sorenson (1988), and Williamson (1992, 1994).

<u>Other theories of vagueness</u>

Above I have described some of the most popular theories of vagueness, but there are many other theories of vagueness to be explored. For example there is nihilism (Unger (1974)), contextualism (Raffman (1994)), and many others. There are also many wider questions raised by the vagueness literature, including questions over the use of vagueness in our language, whether there are vague objects, and the role of vagueness in ethical and other debates.

Vagueness is a prevalent, ineliminable part of our language, and there is lively ongoing debate over how we should respond. Every response that has so far been proposed has its costs: some theories have strongly counterintuitive implications, and many require major and wide-ranging revisions to our understanding of logic.

**See Also**

Many-valued logics

Williamson, Timothy (1955–) section 2, 'Philosophical logic, vagueness and epistemicism'

Ambiguity

Language, philosophy of

Fuzzy logic

**Bibliography and Further Reading**

Edgington, D. (1996) 'Vagueness by Degrees', in Keefe, R. & Smith, P. (eds.) *Vagueness: A Reader*, Cambridge MA: MIT Press, 617-30

Dorothy Edgington argues here for her preferred version of the degree theory, in which degrees of truth are modelled using principles drawn from probability theory. This article is technical in places.

Edgington, D. (2001) 'The Philosophical Problem of Vagueness', *Legal Theory*, 7 (4): 371-378

Introduces the topic of vagueness and the author's own version of the degree theory. This paper is written for a journal of law, and so does not assume familiarity with philosophical literature.

Fine, K. (1975) 'Vagueness, truth and logic', *Synthese*, 30: 265-300

A classic introduction to supervaluationism. Quite a technical paper.

Keefe, R. (2000) *Theories of Vagueness*, Cambridge: Cambridge University Press

A clear and thorough introduction to the topic of vagueness that covers all the theories described above. Generally accessible though technical in places. Rosanna Keefe is a supervaluationist, and this book also contains her defence of this position and objections to the alternatives.

Keefe, R. (2008) 'Vagueness: Supervaluationism', *Philosophy Compass*, 3 (2): 315-324.

A clear and accessible introduction to the supervaluationist account.

Machina, K. F. (1972) 'Vague Predicates'. *American Philosophical Quarterly* 9: 225-33

Discusses and rejects a range of responses to vagueness, and then explains and defends many-valued theories, introducing the degree theory of truth towards the end of the paper. Generally readable but technical in places.

Raffman, D. (1994) 'Vagueness without paradox', *Philosophical Review* 103: 41-74

Diana Raffman argues for her contextualist response to the problem of vagueness.

Sainsbury, M. (1996), 'Concepts without boundaries', in Keefe, R. & Smith, P. (eds.) *Vagueness: A Reader*, Cambridge MA: MIT Press, 251–264.

Explores the phenomenon of higher order vagueness, and argues that it requires a radically different approach to language.

Sorensen, R. A. (1988), *Blindspots*. Oxford: Clarendon Press

Discusses a wide range of areas where we are necessarily ignorant of some fact – including cases of vagueness.

Unger, P. (1974) 'There are no ordinary things', *Synthese,* 4: 117–54

In this readable and entertaining article, Peter Unger argues for his nihilist response to the sorites paradox.

Williamson, T. (1992) 'Vagueness and Ignorance', *Proceedings of the Aristotelian Society*, supplementary vol. 66 :145-177

Introduces and defends the author's own version of the epistemic view. This paper is published alongside a response by Peter Simons.

Williamson, T. (1994) *Vagueness*, Oxford: Routledge

Explores the history of philosophical work on vagueness, up to the present day. Raises objections to various theories, and offers an influential defence of the epistemic view. Generally accessible though technical in places.

**Keywords**

Vagueness: indeterminacy, fuzzy logic, sorites paradox, supervaluationism, epistemicism, degree theory