Predicates Without Extensions[[1]](#footnote-1)

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Abstract

Sainsbury argued that exact extensions for predicates entails the unacceptable infinite tower of higher order vagueness so that exact extensions must be rejected. I offer a second argument: The exact extensions arise when semantic values are assumed to be (exact) properties. But no assignment of unique properties to predicates could arise from any real-world finite basis. How, then, is talk of properties as semantic values to be understood? We distinguish the precise compositional rules of semantics from the operation of messy, imprecise rules at the word/world interface for applicability of minimal predicates. When such application is sufficiently clear it is idealized as property instantiation and semantic composition proceeds in familiar ways. These imprecise rules for application of minimal predicates provide the proper locus for study of vagueness. The conclusions thus far apply to show that higher order vagueness is not forced and that classical logic can generally be retained. I discuss implications for the sorites paradox. Abandoning properties entails abandoning simple correspondence truth understood as *Pa* is true just in case *a* has the property signified by *P*. As an alternative I outline a pragmatist approach to truth, the spirit of which is conveyed by the slogan, “To be true enough is to work well enough.”

Key words: Vagueness; predicates; properties; truth; semantics; idealization

 **1. Introduction.** Most, if not all, predicates in natural language are vague. How should we understand their meanings that determine to what they apply? I will argue for and further develop Sainsbury’s approach (1991,1997), which is entirely different from well- known accounts such as epistemicism, supervaluations, or multiple truth values.

Some terminology: I will use ‘predicate’[[2]](#footnote-2) as a catch-all for syntactic categories that can be thought of as used to characterize referents. So this will include not just simple adjectives but larger adjectival and verb phrases. My primary interest will be in predicates that attach to smallest semantic values - where the “word/world” interface occurs.

My objective here is the positive project of developing my own approach to vagueness. While not needing an alternative logic is already a point in its favor, detailed comparison with alternatives will have to wait.

 My objective is methodological rather than analytic: I further develop Sainsbury’s broad characterization of vagueness but will not propose a more specific account. My objective is instead to argue that, at least in philosophy, we require an approach to vagueness very different from familiar ones.

 **2. Sainsbury’s treatment of “Concepts Without Boundaries”.**[[3]](#footnote-3) In what Sainsbury calls “the classical picture” meaningful predicates have extensions, understood as sets, where both I and Sainsbury [1997, 252,] take sets to have exact membership. Set valued extensions generate the problem of higher order vagueness. Sainsbury gives the pattern of argument as exemplified with the case of ‘child’ (1991, 168-169; 1997, 254-255). As ‘child’ is vague, there is no set of things which contain all and only children. So we consider a threefold partition of sets: children, non-children, and cases “in between”. But this three-part strict division no more accommodates vagueness than the two-part division:

[I]t would be as absurd to suppose that a heartbeat could make the difference between membership of this set [of children], and consignment to the set of borderline cases, as it would be to suppose that a heartbeat could make the difference between belonging to the set of children and belonging to the set of non-children. (1997, 254)

Thus we are driven to second-order borderline cases. The argument reiterates for all finite orders of higher order vagueness. But the original problem remains. We now have a new three-part division: The set of things “of which the predicate is absolutely definitely unimpugnable true” (1997, 255), the set of things of which the predicate is absolutely false; and “the union of the remaining sets [at all finite orders of higher-order vagueness that] would supposedly correspond one or another kind of borderline case”. (1997, 255) Sainsbury concludes:

So the old problem re-emerges: no sharp cut-off to the shadow of vagueness is marked in our linguistic practice, so to attribute it to the predicate is to misdescribe it. (1997, 255. See also Sainsbury’s 1991, 169).

In sum, the sharp boundaries of the classical seem to require all orders of higher order vagueness for all vague predicates, without, however, removing the problem that the sharp boundaries induced to begin with. All of this misdescribes the vagueness of natural language predicates.

 Sainsbury rejects accounts of vagueness that work with “fuzzy logic” or supervaluations. A fuzzy logic that assigns degrees of truth in the interval [0,1] gives us the same three-part division, those with truth value 1, those with truth value 0, and the cases in between. (1997, 256) Supervaluationism takes a vague statement to be true just in case it comes out true on all sharpenings or “precisifications”. But it can’t be all – only “appropriate” sharpenings can be allowed. The vagueness of ‘appropriate’ requires that we already understand too much of what is to be explained. (1997, 257).

 Sainsbury concludes that “[t]he right way to characterize the vagueness of a predicate is by the fact that it classifies without drawing boundaries: it is boundaryless” (1991, 179)

 My plan is to expand on Sainsbury’s approach to concepts without (sharp) boundaries.[[4]](#footnote-4)

 **3. Further development of what Sainsbury calls the classical picture, and difficulties therewith.** Until the late 20th century much of philosophy of language, and I suspect linguistics, paid relatively little attention to vagueness. With vagueness under little consideration it was natural to think in terms of what Sainsbury calls the classical picture, which supposes predicates to have extensions understood as sets. If the meaning of a predicate were its extension there could not be coextensional predicates that differed in meaning; and the extension of such a predicate could not change over time or vary over different counterfactual and other intensional contexts. So the meaning must be some intermediary that maps circumstances to extensions. These intermediaries are often referred to as properties.

Nothing here will turn on the metaphysics of properties. We need only a mapping from circumstances (actual and counterfactual) to extensions. Indeed many (e.g. Montague 1969; Lewis 1986) characterize properties as maps from possible worlds to subsets of their domains.[[5]](#footnote-5) Such properties-as-mappings are often called intensions, for which I will also use the expression ‘property in the minimalist sense’. A property, as I will use the term, is anything that determines such a mapping, or the mapping itself. Properties, minimalist or more robust, are always precise in that their extensions are sets – I believe that broadly in philosophy properties are presupposed to be precise in this sense.

Since Sainsbury’s classical picture turns on taking properties to be the semantic values of predicates, I will henceforth call this account the properties view (of the meaning of predicates).

In the late 20th century, as consciousness grew about the need to address vagueness, many scholars attempted to apply the current theoretical tools – the properties view.[[6]](#footnote-6) Above I summarized Sainsbury’s objections: Properties have exact extensions, exact extensions require the tower of higher order vagueness, and this terribly misrepresents the vagueness of natural language predicates. On this analysis properties are the root of the problem.

 Taking the semantic values of predicates to be properties is equivalent to bivalence[[7]](#footnote-7). A predication, *Pa*,[[8]](#footnote-8) is true just in case the referent of *a* is in the extension of the property signified by *P* and false just in case that referent is in that property’s counterextension.[[9]](#footnote-9) Thus, taking the semantic values of predicates to be properties excludes any semantic vagueness! Either one must reject properties as the semantic values of predicates or one must embrace the epistemic account of vagueness, the view that all contentful predications are bivalent, together with the gloss that the phenomenon of vagueness is the purely epistemic phenomenon that so called borderline cases are ones in which we cannot determine the truth value of the predication. Since the properties account is equivalent to bivalence[[10]](#footnote-10) those who reject the epistemic account of vagueness must reject the properties view of the meaning of predicates. For those not ready to reject epistemicism the next step is an independent argument against the properties view.

First an informal statement of what I take to be going on “under the hood” of the coming argument. For a given predicate to have a property as its semantic value there must be some specific property that, somehow, got picked out to play that role. I do not claim that there are no such things as properties that could play that role. Rather the problem is that, if there are such things as these properties, for a given predicate there are *too many of them* for any naturalistic process to succeed in picking out a unique one to play the needed role. Even more briefly, the world is too complicated for any naturalistic process to succeed in picking out from nearby candidates just one property for attachment to a predicate.

Here is the argument with defense of the premises to follow:

(1) Outside of mathematics, to pick out one property as opposed to similar candidates requires an infinitely precise discrimination.

(2) Any naturalistic means of establishing the semantic value of a predicate can make only finite discriminations.

Therefore

(3) Outside of mathematics no unique property could, by any naturalistic process, be picked out to be the semantic value of a predicate.[[11]](#footnote-11)

Defense of premise (1): By discriminating one property from others I understand some process of identifying the property in question as opposed to other properties. I cannot show that (1) holds with complete generality but will show that it holds for an extremely wide range of predicates, which is enough to sink the properties account of the meaning of natural language predicates. Begin with the familiar example of the term ‘heap’. On the properties view, in particular on the epistemic view of vagueness, there is a (precise!) property that is the semantic value of ‘heap’. This property must distinguish not just which piles of sand but also which piles of bricks, firewood, trash, laundry, toys, snow, litter, newspapers, raked leaves, junked autos … count as heaps. If there is a precise property of being a heap, this property must, in *each* of the foregoing cases make indefinitely fine discriminations. Start with my neatly organized stack of firewood. Begin moving the individual logs out of place, gradually increasing the level of disorder. If there is a precise property of being a heap there comes a point at which moving one log just one millimeter, nay, just one micrometer, nay just one…. marks the point at which the neat stack has become a heap. On the assumption that the property of being a heap is precise, the point of demarcation will involve a distance characterizable in terms of some real number. Other candidate properties would draw the line, exact to all decimal places, at different points. Thus any process that picked out the property that is in fact the property of being a heap would have to discriminate that property from uncountably many alternatives.[[12]](#footnote-12)

So far this is just one example. But take any in a huge range of predicates and I will play the same game: ‘shirt’, ‘window’, ‘transparent’, ‘stone’, ‘hard‘, ‘planet…. In particular, gradable adjectives will succumb to the strategy illustrated for ‘heap’. At just which nanometer does the window count as open? At just which nano cc of water does the glass count as full? How about geometrical properties such as being flat or being round? In natural languages these terms function as (dimensioned) graded adjectives. On their strictly geometrical reading they are mathematical properties, which have been explicitly excluded from the scope of the argument.

One last effort: Surely specifying a range of values for some quantity. e.g., ‘being between one and two meters in length’, does not face these problems of discrimination. This fails because there is no property of being one meter in length that has been completely discriminated from alternative, very close lengths that might serve as the unit of length, as I will explain just below.

Defense of premise (2): Any naturalistic means of establishing the semantic value of a predicate can make only finite discriminations. Qualitatively the problem is that any process of establishing the semantic value of a predicate, whether performed by an individual, a speech community, any naturalistic process such as natural selection, will have only finitely many moving parts each of which, being a finite system, can make only finite discriminations.

To make this qualitative argument more precise consider the case of metrology,

where humans apply the best of their science and technology to establish units of measurement. Until recently for the meter this was done with the standard meter bar the length of which was, by definition, one meter. But the desired length could not be specified, or exemplified, with complete precision. One had to control for thermal contraction and expansion, bending of the bar, width of the marks on the bar,… none of which could be controlled with complete precision. Given these limitations only a not completely definite range of lengths, not a unique one, was picked out to define one meter. Today the meter is defined in terms of a light-second – the distance light travels in one second. But similar limitations apply again in precisely characterizing the speed of light and characterizing the standard second. Today the relative uncertainty in the definition of the meter is 2.5 x 10-16; that is, only a not completely determinate range of properties is identified, a range of, approximately, one part in 2.5 x 1016. Not bad! But still this leaves a range of uncountably many length properties among which no discrimination has been made., If this is the best that metrology can do, how much more will this be the case more broadly for picking out properties as semantic values?

**4. Resolving a problem for compositional semantics.** We have seen that resources are too meager to pick out unique properties to serve as semantic values of predicates. This constitutes a problem for compositional semantics. When semanticists specify semantic values they use expressions such as

[[red]] = red

where on the left-hand side ‘[[red]]’ refers to the semantic value of the word ‘red’ and on the right-hand side the word ‘red’ signifies – what? Sainsbury and I have argued that the usual choice, a property, isn’t an option. If such placeholders on the righthand side do not pick out properties how should we understand them?

I propose to adapt a methodology familiar in physics. How would one develop a physical theory of the fluid properties of water? Calculation from the underlying micro-theory would require solving equations with 1026 variables to say nothing about how one would set up such equations in the first place. Instead we use underlying microtheory to explain why water macroscopically behaves very much like a continuous fluid. Then we idealize[[13]](#footnote-13) by redescribing water as a perfectly continuous medium. With this simplification one can provide excellent descriptions of the fluid properties of water.[[14]](#footnote-14)

Idealizing water as a continuous fluid accomplishes two things. It summarizes the relevant micro-facts about water in a way that suffices for understanding water’s fluid properties. In so doing it insulates hydrodynamics from all the complications of what goes on at the microlevel that are not hydrodynamically relevant. Likewise, giving an account of the meaning of longer segments of language, such as full sentences, divides into two separable problems. Words, morphemes, relatively short segments must be connected with things in the world. I call such points of connection “the word/world interface or connection”.[[15]](#footnote-15) Once short segments of language have been brought to bear worldly information there is the problem of how these smaller units combine to build longer meaningful segments from shorter ones.

The two separate problems each needs to be addressed in its own way. The problem of the word/world interface is complicated, messy, and can be very context dependent. But once short linguistic segments have acquired their worldly interpretation the details of how that was accomplished can be put to one side by describing the results as the instantiation of a property, understanding so doing as a summary of the results of making the word/world connection. On this interpretation talk of a “property” is not of some abstract thing “out there in the world” but functions as an streamlined or idealized summary of or placeholder for the results of making the complex word/world connection. Leaving aside details that do not bear on the process of composition enables stating regularities that would be harder to state and apply if all those complications were carried along.[[16]](#footnote-16) Working with properties-as-idealizations facilitates exact statement of compositional rules.

Is the separation of problems perfect? In the case of hydrodynamics micro-effects may sometimes be relevant, for example when diffusion is a relevant consideration. Similarly, complications of the word/world interface will sometimes be relevant to composition. This may happen for composition at very low levels, as in understanding compound nouns such as ‘stone lion’ or ‘toy gun’. As in the example of diffusion and hydrodynamics, when considerations about the first problem are relevant to those of the second problem, such considerations can be brought in. But it appears that in most cases issues about the word/world interface can be completely left aside when addressing semantic composition, and when not the simplification of properties-as-idealizations may nonetheless illuminate treatment.

**5. Application of the proposed methodology to the study of vagueness.** Taking the semantic value of predicates to be properties rules out any semantic vagueness. But pursuant to the foregoing arguments properties, taken literally, anyway cannot be the semantic values of predicates. The most prominent theories of vagueness, epistemicism, supervaluationism, and multiple truth-value accounts, all rely on properties. In effect epistemicism appeals to them directly.Supervaluationism assumes that its precisifications are precise. Multiple truth-value accounts draw the boundaries in more complex ways but still appeal to sharp boundaries. Having rejected properties, where can one turn to understand vagueness?

 We need to review the role properties were supposed to play as semantic values. On the one hand they provided well defined “pegs” that could be structured following the precise rules of composition. But antecedently, the properties-as-semantic-values were supposed to be meanings, meanings in the Fregean sense of that which determines predicate application: The predication, *Pa* is correct just in case the referent of *a* has the property signified by *P*.

Predication understood as property instantiation is one thing, how agents judge such predications is another. To appeal to the meanings – the properties – agents would have had to use various methods to identify properties and then determine instantiations. With the properties gone we still have the methods (explicit rules, procedures, skills,…) that people use, methods that had been interpreted as functioning to identify properties and their instantiations. Agents use such methods to judge predications. The properties were functioning as a kind of middlemen in this process. These methods were interpreted as identifying properties and their instances, with the properties then determining whether or not a predication is correct. But having abandoned the properties, the same methods operate just as they did before, only leaving out the property-middlemen. With the properties gone the methods that have been doing the real work in judging predications provide a new locus for studying vagueness.

Many will want to distinguish between methods for judging a predication that count as providing the meaning of the predicate in question and other methods that have been contingently acquired and that track the meaning conferring methods. Detecting facial hair is a reliable way to sort men from women but not part of the meaning of ‘man’. I will talk about methods that are taken to be meaning conferring as *rules*, and I will take these rules to be special cases of rules as generalizations interpreted as guiding choices and other behaviors. Broadly speaking, methods need not be completely precise: No one would expect that a method for baking bread would be completely precise. But many believe, wrongly I will argue, that, at least often, cases of explicitly stated or stateable rules can be completely precise, leaving no ambiguity in what counts as correct application.

This distinction between methods, more broadly speaking, and the special case of meaning-conferring rules is extremely rough and ready, but further refinement is not needed to make the point that, aside from exceptions from mathematics, no humanly usable rule can be completely precise. In this respect there is no distinction between rules and methods more broadly speaking. That is, no humanly usable rule can fix, for all actual and counterfactual cases and with complete precision, exactly how the rule correctly applies. That’s why we need judges. The same applies to other kinds of rules: rules (recipes) for cooking an omelet, rules (protocols) for performing an experiment, rules (policies) for running a company. Application of a rule always requires interpretation - even in “clear cases” if only because classifying a case as clear is itself an interpretation.[[17]](#footnote-17)

 For any humanly applicable rule there will be cases in which the rule does not specify what the outcome of application has to be.[[18]](#footnote-18) There will be cases in which the rule specifies a positive or a negative outcome. There may be cases in which the rule explicitly specifies that it has no application. But in addition, for humanly usable rules, there will be cases in which it is just left open whether or not the rule applies and if so how. This conclusion is a corollary of the argument of section 3: A humanly applicable strict rule would constitute a property in the minimalist sense – a map from counterfactual cases to extensions understood as the cases satisfying the consequent of the rule. In “open” cases in which a rule falters, agents who follow the rule as best as is humanly possible are entitled to disagree about their application.[[19]](#footnote-19) That is, for a rule to be imprecise is for there to be cases in which agents can faultlessly disagree about how to apply the rule, exactly as in the case of legislated rules – laws - for which we need judges to decide whether to hear a case and when heard there can be dissenting opinions. I will use the term ‘open-ended’ to describe imprecise rules in as much as they admit cases of faultless disagreement where different responses can be equally reasonable.[[20]](#footnote-20) [[21]](#footnote-21)

 I conclude that the vagueness of a predicate at the word/world interface is a manifestation of the open-endedness of the rule or rules that govern application of the predicate. I am putting some weight on the proviso, “govern application of a predicate”. For there to be an objective contrast between correct and incorrect application of a predicate there have to be in place community wide standards for what is to count as correct application. As with all humanly applicable standards, these guidelines will count as rules in my extremely broad sense, and as with all humanly applicable rules there will, again, be cases in which it is up to rule users to decide applicability.

Is there a distinction between the rules that govern the application of a predicate and other rules, contingently connected with use of the predicate, that agents may also use in making decisions about predicate application? Meaning holists will say no. Others may give various accounts of which rules for predicate application count as determining meaning. Any of a wide range of approaches to this question will be compatible with the methodology described above. Just how the word/world interface is navigated is an empirical question about which there is currently a great deal of discussion.[[22]](#footnote-22)

This is not the place to sort out details of meaning-rule imprecision, which in any case is an empirical issue. But a few examples and some further discussion will illustrate considerations that mat be in question.

**6. Examples and discussion of open-endedness of humanly usable** **rules**. By way of a first illustration let’s take the rule for applying ‘short’, as a characterization of a person’s height, to be:

It is salient that the target is relatively low in height in comparison with others in the assumed reference class.[[23]](#footnote-23)

“Salient” is open-ended – it functions as a guideline, not a strict rule. In applying ‘short’ speakers must make judgements as to whether the target is sufficiently low in height compared with others to be easily noticed as such by the audience. When speakers judge that the target might not stand out as relatively low in height, or when speakers are unsure, they are well advised not to use ‘short’. Note that applicability of such rules while open-ended are still, for the most part, objective. In each case it will be an objective matter whether or not or to what extent, for a given person, that person is easily noticed to be shorter than others.

A second example: The application of ‘flowerpot’ is specified, in part, in terms of functioning as a container in which flowers and other plants can be grown. This characterization is hardly a strict rule. The most important sticking point is “functions”. To the extent that a container is not very deep and its sides are sloped its flower growing functionality is compromised. Just how well must the functionality be realized? Broadly, “functions” is always open-ended. Speaker and audience must agree or, usually tacitly, negotiate whether the function is performed well enough to make application of the function term appropriate and not misleading in the context. Again, and to emphasize, once an agreement or results of negotiation are in place, how well the required functionality is realized is an objective matter.

 How are we to understand the needed notion of “interpretation” and the notion of “discretion” that is used in the process of interpretation? Interpretation and discretion are not mysterious powers. They are skills that can be explained and understood. What is relevant here is that these skills can yield different results depending on fine details of a situation. They are skills that can, in a situation, be applied differently by different people. Details of how interpretation and discretion work are empirical issues. But without putting on lab coats, there are some general things we can say.

I take the operative consideration to be that cooperative speakers will endeavor to inform hears and not mislead them. Speakers, usually tacitly, make judgements as to whether a hearer might be misled by use of a term. When the case seems problematic a speaker will often add a qualifier: This paint is reddish, but perhaps not really red. This is a flowerpot, not an urn. Speakers make, usually tacitly, judgements about whether such qualification is advisable. In marginal[[24]](#footnote-24) cases speakers, and the same speaker in slightly different situations, may properly make such judgements differently, all the while applying the same rule for the use of the predicate, all such cases counting as following the rule as well as could be done. In “close call” cases decisions may be arbitrary.[[25]](#footnote-25)

**7. Higher order Vagueness.** No question that instances of second order vagueness occur. I can be unsure whether I am really unsure whether James is bald. The present issue is whether for each vague predicate second and all higher orders of vagueness *must* occur. Sainsbury has shown the failure of the natural effort to argue for or motivate forced higher order vagueness. The fallacious argument turns on the classical, what I am calling the properties, view. More specifically, the problem arises because the properties view takes extensions – and so also their counterextensions – to be sets. To review the argument: Suppose that things to which the predicate, ‘child’, applies make up a set, called the extension of ‘child’. Then the complement of this set, ‘child’s counterextension, is likewise a set. Splitting this counterextension into a set of (determinately? clearly?) non-children and set of unclear cases just puts off the problem – Just which heartbeat moves a case from one of a child into the set of unclear cases? So there must be unclear cases between the set of (clearly?) children and of (clearly?) unclear cases – the cases of second order vagueness. Then the pattern of argument repeats. But if the things to which a predicate correctly apply don’t constitute a set the argument can’t get started. While, no question, there are clear cases of children and of non-children, Sainsbury and I have argued that there are no sets of these. When we get to marginal cases, when the rules for predicate application, whatever they may be, start to become unclear, competent speakers are entitled to disagree.

There is an obvious objection to the foregoing way of dispensing with forced higher order vagueness.[[26]](#footnote-26) Let’s consider how the argument for higher order vagueness plays out for ‘short’. Suppose a set reference class. I’ve made the point that any rule covering what counts as a vague predicate, such as ‘short’, will be open-ended. That is that there will be cases in applying this rule for which agents can faultlessly disagree. For the case of short, let’s refer to any such height as a “disagreement friendly height”, (DFH).

Consider one DFH, say 160cm. Consider a height for which candidates clearly count as short, as it might be, 150cm. Now consider heights as they are gradually lowered from 160cm and ask of each one, is it a DFH? There must be a lowest one of these[[27]](#footnote-27) before we get to 150cm! Call it “the short boundary” (SB). The same form of argument shows that there must be an upper bound on the DFHs - call it the “not short boundary” (NSB). Assuming the penumbral condition that if a first person is shorter than a second, and the second counts as short, then so does the first, someone unequivocally counts as having a DFH just in case their height is between SB and NSB, not otherwise. We have proved that, after all, there is a set of heights that will unequivocally count as disagreement friendly! It would appear that the only way to avoid this conclusion is to postulate cases of second order vagueness between the DFH and, on the one hand, the short heights, and on the other the not short heights.

 What’s wrong with this argument? We are considering a continuum of heights as we descend from 160cm. In particular we need to consider whether, say, someone who is 157.83592846cm tall counts as short. But characterizing someone as 157.83592846cm tall doesn’t make sense! The conception of height of a person will not support such fine discriminations. The size of an atom is around .00000003 cm. So the exact position of any point on a person’s head will go up and down by more than 0.00000003cm in small fractions of a second as a few atoms come and go from that point on the scalp. In addition just which point on the scalp, to the last atom, counts as the top is also a fluid matter.

Here is yet another consideration that undermines the question of what a person’s height is to indefinitely many decimal places. Any such specification requires a unit of measure of length. Above I sketched the reasons why in practice there can be no such unit for length, accurate to arbitrarily many decimal places.

The conception of a person’s height is itself open-ended, so the question, exactly what height is the greatest for someone to count as short is for that reason already not well formed.

Will this example generalize? Consider the example of ‘heap’ discussed earlier. We already saw that the use of ‘heap’ cannot support indefinitely fine discriminations. In addition, for the same kinds of reasons as there being no such thing as a person’s height to eight decimal places there is no such thing as the exact position of a log to eight decimal places. As for the question of whether there could be a precise time at which a child turns into a non-child, times are temporal distance from a reference event, but events and their temporal relations cannot be specified with complete precision. In addition for both age and time there is the problem of no completely precise definition for the unit of time. With some variation case to case this argument pattern will apply whenever the variable in question is a continuous quantity.

What about discrete variables as generally appear in sorites arguments? What is the last hair removal of which will finally turn a man bald, the last grain of sand removal of which will turn a heap of sand into a pile? It might appear that the considerations that arise in the case of continuous quantities might not apply in discrete cases.

 In the case of ‘heap’, we’ve already seen how this kind of case fails for a heap of firewood. That case showed that not just number, but exact position provides a crucial consideration, nonetheless true for heaps of sand. As for the slide from hirsute to bald, suppose we don’t remove that last hair but cut it off a bit? Or double it over so that it does not show quite as much? In the end, *completely* precise boundaries for ‘heap’ and ‘bald’ would depend on continuous variables every bit as much as does ‘short’.

In all the cases thus far I have made use of some continuous variable that is, at least implicitly, involved in the case. Sorites sequences of colored tiles would appear not to involve any continuous variable at all. Suppose 100 colored tiles that shade from clearly blue to clearly green. There will be a small number of of disagreement friendly tiles in the middle Must there, then, not be a determinate set of these? Even in this case, no. We must also consider the conditions of observation and differences in observers’ perceptual system. If we try to describe the case where these are held sufficiently fixed we will rule out cases that we would want to count as disagreement friendly, and/or have reintroduced continuous variables.

To summarize: Whenever we can state a condition, such as being short, or being 150cm tall, we often think of these conditions as picking out a unique class of cases. This is just to suppose that the boundaries are sharp. When we look closely at a case, just where this sharp boundary is supposed to be becomes, in different ways in different cases, elusive.[[28]](#footnote-28)

**8. Sainsbury’s characterization of vagueness, discussion of logic, and the sorites paradox.** The forgoing establishes, for a very wide range of natural language predicates, that these predicates cannot have set valued extensions. To appreciate the substance of this conclusion it is essential to remember that it applies to counterfactual as well as actual cases. If it were only the question of which actual people as they are in the actual world count as short the answer could, in principle, be given by stipulation, yielding a set valued extension. But, as mentioned in section 3, the meaning of a predicate cannot be its real-world extension because if it were the meaning could not cover counterfactual cases or change of extensions over time, and there could not be coextensional predicates with different meanings. In counterfactual cases, on the margins, speakers are allowed latitude that can sensitively depend on details of the case, in particular depend on the interests and values of speaker and audience that will vary from case to case.[[29]](#footnote-29)

Given the foregoing considerations I follow Sainsbury in suggesting that vagueness of a predicate can be characterized as the condition that the predicate has no precise boundaries, in the sense that there is no set of cases, actual or counterfactual, to which the predicate correctly applies. To be emphasized, in this context what counts as correct application is not instantiation of a property but satisfaction of relevant community wide standards expressible as open-ended rules as discussed above. In addition, insofar as one is inclined to characterize borderline cases as the ones where speakers can faultlessly disagree, to be vague is to have borderline cases in this sense.

The foregoing considerations show the relation of classical logic and vagueness. When predicate application is clear enough we idealize and treat the situation as one with sharp boundaries. With sharp boundaries presupposed, classical logic applies unproblematically. That is, classical logic applies in the idealization.[[30]](#footnote-30) When dealing with a situation in which unsharpness of boundaries is relevant there may be call for alternative logics. Of course the appeal of alternatives will turn on how effective such alternatives are in addressing important outstanding problems. I leave it to readers to judge claimed successes of alternative logics to deal with cases in which unsharp boundaries cannot be ignored; and, indeed, the frequency of such cases to begin with.

 When it comes to sorites arguments, what the present account can contribute is a somewhat different way of thinking about the inductive premise,

 (1) (∀n)(*Pa*n -> *Pa*n+1)

I suggest that the plausibility of (1) rests, in part, on thinking of predicate, *P*, along classical lines that take it to have a set-valued extension. I have argued that for predicates in natural languages this is, at best, an idealization, if only because human beings, and their finite resources, can’t pick out one property as opposed to similar candidates to be the intension of a predicate. With idealized treatment of *P* the inductive premise counts, strictly speaking, as either false or truth-valueless. The point of an idealization is that for its secure domain of application one can rely on it, but care is required to recognize where the idealization breaks down.[[31]](#footnote-31) One reason for the attractiveness of the inductive premise is that it has a robust secure domain of application. But the sorites situations are set up precisely to exploit where the idealization breaks down. A valid argument with an idealized premise can support its conclusion when used in the idealization’s domain of secure application, but where premise breaks down the argument does not support its conclusion as either true or reliable.[[32]](#footnote-32)

 Thinking of sorites situations in terms of idealization may be a novel formulation, but I doubt that there is anything importantly new about the content. In particular, formulation in terms of idealization may work similarly to contextual approaches. Broadly, contextual approaches work in terms of varying content with change in context. (See [Åkerman](https://compass.onlinelibrary.wiley.com/authored-by/%C3%85kerman/Jonas) 2012) Formulation in terms of idealization does something similar but instead of varying content, variation is in terms of domain of application from secure to values for which the idealization breaks down. Possibly some will find the novel formulation useful, and in any case it places treatment of the sorites paradox in the landscape of the present account.[[33]](#footnote-33)

**9. The problem of truth.** On the classical picture the standard for correct predication is truth: *Pa* is true just in case the referent of *a* has the property signified by *P* – a straightforward correspondence view. With properties gone this standard is no longer available. What will be the alternative standard for predication? I propose that the sensible thing to do is look for an alternative standard that will do for us what we value in truth.[[34]](#footnote-34)

Why do we value truth? Some say that we value truth for its own sake. This can be, at best, a small part of the story. It does not differentiate trivial truths from the truths that we value. Most importantly, we value truth for its usefulness. We use what we take to be truths to guide us in what to expect, how to plan, how to coordinate with others…., broadly about how to act in ways conducive to our ends. Statements can be reliable without literal truth. We think of the reliability of statements that aren’t (we say) exactly true in terms of their being sufficiently accurate, “approximately true”, “close to the truth”, and the like. These are problematic notions: In the absence of an independent standard of truth, what are accuracy, being approximately true, or close to the truth?

We can appeal to the reliability of statements directly without getting bogged down in any metaphysical worries about accuracy, approximate truth,…. I have said that a statement is reliable, as I intend the idea, insofar as one can depend on the statement about what to expect, how to plan, broadly about how to act in ways conducive to our ends. To illustrate with a simple example, suppose I am told that John weights 70 kg. If I put him on a very accurate scale, I would find 69.95 kg. Moreover, people’s weights go up and down a good two kilograms a day. Nonetheless the statement of 70 kg is reliable for just about any ordinary purpose that might come up. For just about any end in view, when using 70 kg instead of the more accurate 69.95 kg (at the moment), nothing will go wrong.

The kind of reliability that is in question in this example is exactly the reliability for which we value truth. What counts is whether, or to what extent, treating a statement as classically true will advance our aims and not get us into trouble. What counts is that we won’t be misled when using such statements anymore than we would be misled if they were exactly true. The claim isn’t that we can’t be misled about anything. Rather, for a robustly broad range of interests it is, objectively, very unlikely that we would be misled. The broader the range and the smaller the likelihood of being misled, the more the statement counts as reliable. The foregoing can also be relativized to a subject matter: Treating John as weighing 70 kg. will be reliable for all medical considerations.

Using reliability as a surrogate for truth also works in science. All successful statements in science are either vague (water is H2O) or idealizations (field equations of general relativity). Either way, the working scientist has to know where and how such statements can be trusted. We can bring them under a uniform treatment by extending the understanding of ‘useful’ to include usefulness in science and by taking our interest to include those covered under scientific curiosity.[[35]](#footnote-35)

‘Reliable’ has graded and ungraded, or positive, forms. In the graded form something (statement, picture, person…) can be not very, moderately, or very reliable (always relative to some interest or objective). One thing is more reliable than another. In the ungraded form: To say that a statement is (just plain) reliable is to say that it is reliable enough for the purposes in view. It is reliable enough so we don’t have to worry about the degree of reliability. A statement being reliable in the ungraded sense is what is involved in taking reliability as our surrogate for truth.

An alternative statement of what I take to be the same idea is that a statement counts as objectively reliable when or to the extent that the statement functions as a classical truth in the interplay between beliefs, desires, and actions. How should we understand what it is to treat a statement as classically true (where treated as true will be understood as treated as true for a given range of applications)? To treat a statement as classically true is to rely on a belief with the content of that statement in the belief’s planning and action guiding functions. A statement counts as objectively reliable when, or to the extent that when so relying on it does not get one into trouble. A more detailed answer will require an account of the relation of belief, desire, and action. [[36]](#footnote-36)

Three comments are in order. Reliability isn’t probability. Ordinarily one understands probability as probability of truth. Here we are taking reliability (as explained above) as a surrogate for truth. So we understand probability as probability of reliability.

 On its face the account falls into the pragmatist circle. But the standard objection to pragmatist accounts of truth, that in special situations a false statement can function as a truth, here has no application. As I am using the notion, to be reliable is to be reliable *sufficiently broadly*. This characterization rules out those “special situations”. How broadly is “sufficiently broadly”? Broadly enough so that the reliability can be counted on for anything that might reasonably be expected to come up. This can also be relativized to context. Considering the ordinary sort of context for judging a dinner tabletop to be clean, if the tabletop is free of crumbs and any visible spilled food, for that context the statement that the tabletop is clean is reliable, just as, for that context, one would ordinarily say that the statement is true. But if it is a lab table and the experiment requires a hyper-clean environment, being free of crumbs and spilled food isn’t enough. If there is a very small amount of extraneous material, in that context saying that the tabletop is clean is not reliable, just as, for that context, the statement would not ordinarily be said to be true.

Yet one more way to express the idea is to say that classical truth functions as an idealized simplification of the more nuanced desiratum of reliability.[[37]](#footnote-37) In this way we retain most of our practical appeals to truth. Treating classical truth as a useful idealization also fits in smoothly with the reinterpretation of talk of properties as the semantic values of predicates. In the reinterpretation, talk of properties as semantic values is understood as an idealization that we harmlessly make in situations in which the status of predications, as correct or as incorrect, is unproblematic. With reliability as our standard for correctness of predications, idealization as a property with exact extensions is unproblematic exactly then the predication, *Pa*, is reliable. In this way we can think in terms of one idealization that comes to both treating the semantic value of predicates as properties and treating truth as an idealized way of talking about the secure reliability of a predication.[[38]](#footnote-38)

**10. Concluding comment.** This paper has argued for a three-part proposal. I have suggested how, in more detail, we can understand Sainsbury’s notion of “concepts without boundaries”. I have further developed Sainsbury’s intent of using this understanding as the fruitful approach to understanding vagueness in natural languages. And I have facilitated the foregoing by separating the problem of the word/world interface from the problem of composition in natural languages.

 In closing I will address one last reservation that some readers may have: Saying that vagueness is in the rules is just a material mode way of saying, in the formal mode, that vagueness is in the (meaning of a) predicate. What, then, is the advance by appealing to rules? This point is well taken. Still, restatement of a problem can be enlightening. In this case we have recast a problem about an “object” – the meaning of predicates – as a problem about a procedure – how one properly applies predicates. It was hard to see what is going on with the object, but easier to see what is involved in open-ended instructions about how to proceed. Focusing on understanding vagueness, somehow, in terms of properties has completely diverted attention from looking at the empirical facts about how people actually use vague statements in marginal cases. I submit that the foregoing illustrates how, in this case, restatement of the problem has thrown some light on how to wrestle with it.

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1. Thanks to Gabe Dupre, Mark Colyvan, Adam Sennet, Rohan French and the participants in the Davis Llemmma reading group, also two referees and the Editor, for much comment and advice. [↑](#footnote-ref-1)
2. I use single quotes to turn an expression into a name for that expression and double quotes otherwise. [↑](#footnote-ref-2)
3. Sainsbury understands ‘boundary’ as sharp, that is as there being no indefiniteness about which things are on which side. I will sometimes write ‘(sharp) boundary’ as a reminder and use ‘precise’ and ‘exact’ interchangeably with ‘sharp’. [↑](#footnote-ref-3)
4. I have found two critical comments on Sainsbury’s view. Wright (1992, 139) is incredulous that there can be cases satisfying a given condition yet no set of such. Edington (1993, 197) formulates this astonishment in an explicit argument. I will respond to the argument, and thereby the astonishment, in section 7.
 [↑](#footnote-ref-4)
5. I am happy with the idea of possible worlds as an expository device, but want to be clear that I do not take this idea literally. Hence I use ‘circumstance’ where others will use ‘possible world.’ Whether we talk of ‘possible worlds’ or ‘circumstances’ the notion is problematic, but sufficiently well entrenched in contemporary work that the idea will be clear enough for what I do here.
 [↑](#footnote-ref-5)
6. In my perception and that of my colleagues a great many semanticists take the semantic value of predicates to be properties. I do not have statistical documentation, but here is one more scholar who shares this perception:

“This take [presented in “Semantics as a Model Based Science”] on semantics differs from what is perhaps the standard picture, the picture on which what natural language semantics does is relate expressions ‘directly’ to *objects and properties in extra-linguistic reality*.” (Yalcin, 2018, 354, my emphasis. ) [↑](#footnote-ref-6)
7. Following all others in this literature I will put aside questions concerning possible bivalence failure due to sortal conflict that would complicate the discussion with no relevance to the present issues. [↑](#footnote-ref-7)
8. I will use italic uppercase ‘*P*’ as a variable over predicates and lowercase script ‘*a*’ as a variable over referring expressions. [↑](#footnote-ref-8)
9. A referee points out that if properties cum intensions are defined in terms of partial rather than, as I did above, total functions we would have trivalence. But we would still have, what is at issue, sharp boundaries. For this reason carrying along this complication would have no effect on any of the final conclusions I reach below.
 [↑](#footnote-ref-9)
10. In my (2024) I argue that the underlying driving force of Williamson’s (1994) arguments for epistemicism are precisely the embrace of the properties view. Williamson is very explicit about this at (1999, 509). [↑](#footnote-ref-10)
11. Hence forth the qualification, “outside of mathematics” will be understood. [↑](#footnote-ref-11)
12. To anyone who objects: By ‘precise’ we don’t mean completely utterly precise. We mean very or sufficiently precise, that is, some small range of precise properties. If this range is itself precise, we again have a precise property. If the range is somehow open, not completely definite, all the problems of vagueness therein reoccur and a slightly more complicated form of the discussion below will reapply. Some may also resort to appealing to properties that are themselves, somehow, imprecise. I do not here have room to examine this alternative, but will quickly state my view of the matter: I am skeptical of existing accounts of imprecise properties., the imprecise properties that these accounts propose do not correspond to the phenomenon of vagueness, and any notion of imprecise property that did so correspond would have to embody all the accidents of human language that engender vagueness and as such cannot be an independent solution to problems of vagueness. [↑](#footnote-ref-12)
13. I will use ‘idealization’ very broadly to apply to a statement that is false but is, or at least is believed to be, accurate enough to serve intended objectives. [↑](#footnote-ref-13)
14. Readers may be reminded of Putnam’s peg and hole example (1975: 295–298). [↑](#footnote-ref-14)
15. Just which segments? There is currently much discussion of this issue. (Dupre, 2022) The methodology I am proposing will easily adapt to how this issue is sorted out, including the possibility that just which kinds of verbal segments get connected with the world may vary with the kind of construction in question. [↑](#footnote-ref-15)
16. Dupre (2020, 18 and passim) argues more broadly that, in semantics, idealizing away from details facilitates stating regularities that would otherwise be obscured.
 [↑](#footnote-ref-16)
17. See van Fraassen (2002, chapter 4) for an extended argument that, when it comes to use of language, interpretation is always required. [↑](#footnote-ref-17)
18. Reminder that here and below I exclude mathematical rules from these claims. [↑](#footnote-ref-18)
19. In this respect I follow Raffman. (2014) [↑](#footnote-ref-19)
20. #####  I use ‘open-ended’ with this characterization because I feel that so doing well characterizes the way ‘open-ended’ is usually understood today. Apparently this is not exactly what Waismann intended by ‘open-texture’, which seems to have been that a rule can be extended to cases that previously were not known as when, at the advent of the theory of relativity, what had been a univocal concept of mass was refined to differentiate between rest and relativistic mass. (Shapiro and Roberts (2021, 173 ff.)

 [↑](#footnote-ref-20)
21. One consideration bearing on the open-endedness of imprecise rules of predicate application is that when there is some question about the application of a predicate we engage in a process of giving and taking reasons for and against. Travis (1985) makes this point in application to discussion of the sorites paradox. The inductive premise is just one relevant reason. Cummin (2023) extensively elaborates on the process of giving and taking of reasons in the framework of default reasoning. Both of these address the question of an important way of proceeding when the application of a rule is called into question. Here I have in mind much more broadly the rules themselves and their study as a resource for understanding vagueness. [↑](#footnote-ref-21)
22. See Dupre (2022) [↑](#footnote-ref-22)
23. This characterization of ‘short’ is along the lines widely endorsed in the semantics literature. See Kennedy (2007, p. 17 and section 2.3 passim).

 [↑](#footnote-ref-23)
24. Since ‘marginal’ is itself vague, does this make the account circular? It would be if I were offering a necessary and sufficient conditions account. I am doing no such thing. Rather, in this passage I am giving an extremely brief and informal sketch of how, in practice, these rules function. [↑](#footnote-ref-24)
25. In these last respects I am, at least roughly, following Raffman.(2014) I differ from Raffman in expecting that in such “judgement calls” in application to borderline cases there will often be something to be said for or against a choice. [↑](#footnote-ref-25)
26. ####  This is, in my reformulation, Edington’s argument mentioned in note 4. My response also addresses Wright’s astonishment, likewise mentioned in note 4.

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 [↑](#footnote-ref-26)
27. Or a greatest lower bound. One of the greatest lower bound and least upper bound principles is assumed as part of the definition of the reals, the other being provable from the one assumed. [↑](#footnote-ref-27)
28. I take there to be an underlying reason why we can be confident that such cases will very generally fail. When philosophers propose such cases they simplify – one more time, they idealize. In trying to check that there really will be a completely determinate boundary the idealization will usually, if not always, break down. Yet another general underlying driver of these arguments that I cannot spell out in detail here: Most of the relevant cases will occur only counterfactually. Exactly which counterfactual situations are to be included? When the counterfactual conditions become sufficiently extreme the case will no longer be relevant. One more time continuous variables have reentered. [↑](#footnote-ref-28)
29. #####  Note also that often a predicate is less precise than we could make it, presumably because the additional imprecision allows speakers more flexibility that enhances their powers of communication. Egré et.al. (2023) gives experimental evidence, for one special case, of such enhanced powers of communication, Also see O’Conner (2014) for a more general discussion of how a level of imprecision may enhance powers of communication.

 [↑](#footnote-ref-29)
30. As Schiffer (1999, 501), in effect, notes. [↑](#footnote-ref-30)
31. Travis (1985) discusses at length how one needs to take into consideration a range of reasons in making judgements in a sorties series. [↑](#footnote-ref-31)
32. The point of putting this as “not either true or reliable” is that in section 9 I will note that with predicates no longer having properties as semantic values classical correspondence truth is no longer an option. I will argue that as a promising alternative we should consider, as a surrogate for classical truth, broad reliability or truth in an informal sense. [↑](#footnote-ref-32)
33. Other work on sorites could be put in terms of the breakdown of idealization. Lassiter and Goodman (2015) provide a model on which agents will not take the inductive premise to be true but only warrant a degree of belief that is a function of various contextual considerations. If an agent allows that the inductive premise might be false, this leaves room for the agent to consider additional considerations, again as suggest by Travis.(1985) Cummin’s (2023) more general default reasoning approach would apply in a similar manner. In this regard relevant work in linguistics is to be mentioned. Grinsell (2017) argues that considerations relevantly similar to those in Arrow’s impossibility theorem apply that would result in non-transitivity of the relevant “same color” (or other) sorites predicate. See Kennedy (2019) for summary and references to this and other work. [↑](#footnote-ref-33)
34. The following is an alternative exposition of thinking about truth that I have developed in much more detail in my (2017). [↑](#footnote-ref-34)
35. See my (2017) where I spell the immediately foregoing in much more detail, including how this fits in with ascribing truths to vague statements. [↑](#footnote-ref-35)
36. Some may object: To understand any of this one must understand the assertion of

*s* is reliable.

as the assertion of

The statement that *s* is reliable is true.

That is, truth is the alethic norm of assertion (there also being epistemic norms). This worry can arise throughout my exposition, but it begs the question by presupposing that assertions are assertions *as truths*, as truth is usually understood (in philosophy!). This issue requires a detailed discussion and I can here only indicate my approach. When we take reliability as a surrogate for truth we substitute ‘reliable’ for ‘true’ in the account of assertion. For example, if one takes assertion as a kind of commitment to what has been said, we replace

 When an agent asserts *s* s/he commits to the truth of *s.*

With

 When an agent asserts *s* s/he commits to the reliability of *s*.

In my (2017) I argue that truth as I explain it there, corresponding to how I have engaged reliability here, is a better model of the use of ‘true’ as it is commonly used than the traditional way of thinking about truth in philosophy (hence the parenthetical ‘in philosophy’ above). With this understanding of how the term ‘true’ functions we can write ‘true’ back into the account of assertion. [↑](#footnote-ref-36)
37. In this paper I am taking reliability as a surrogate for truth. In my (2017) I explore the idea of taking the classical way of thinking about truth as an idealization, and when used literally, ‘truth’ functions in the way I have here described ‘reliable’ as a surrogate for truth. Among other things, this yields an account of what is involved in a vague statement being true that is consistent with the present account. I feel that the alternative labels, ‘reliable’ or ‘true’ (in a non-classical sense) are a matter of tone, not substance. It matters what the notion does for us, not what we call it. [↑](#footnote-ref-37)
38. Rethinking truth along the lines of “true enough” is also developed in different ways by Elgin. (2017) [↑](#footnote-ref-38)