Theories of Vagueness. BY ROSANNA KEEFE. (Cambridge: Cambridge University Press, 2000. Pp. xii + 233. Price £35.00)

Vague predicates such as 'hairy dog' have borderline cases. Despite this, supervaluationists think it true of every dog that it is either hairy or it isn't. Vague predicates are also appropriately described as having "fuzzy boundaries" of application. Despite this, supervaluationists think that in a sorites series of dogs starting with a St. Bernard and ending with a Mexican Hairless, there will be a hairy dog right next to one that isn't hairy, however gradual the change in hairiness from one dog to the next. Indeed, supervaluationists think that in such a series there is a *particular unique* point at which the transition from hairy to not-hairy is located. Rosanna Keefe is a supervaluationist. In *Theories of Vagueness* she argues that a cost-benefit analysis of theories of the semantics of vague expressions yields supervaluationism as the unique best.

Keefe's preferred formal presentation of supervaluation semantics is that found in Kit Fine's "Vagueness, Truth and Logic" (Synthese 30, 1975). Simplifying somewhat here, a supervaluational model is a *specification space* containing one or more *specification points*, each of which may be thought of as a classical model. Truth at a point for first-order formulas is defined classically. Truth in a space is truth at every point in the space. Falsity in the space is falsity at every point in the space. The *correct* (or intended) space, the one reflecting the actual truth values of our sentences, is the one containing all and only those points that constitute admissible precisifications of the predicates in our language. Supervaluationists hold that there is more than one admissible way of precisifying the vague expressions in our language. A sentence such as 'Harry is hairy', when Harry is a borderline case, will be true in some but false in others of the classical models corresponding to the admissible ways of precisifying the vague expression 'hairy'. The sentence is thus neither true nor false in the correct model. Nevertheless, the disjunction of that sentence with its negation is true in every classical model, hence true in every model, including the correct one. It is neither true nor false that Harry is hairy, but it is true that he's either hairy or not hairy.

More generally, it seems that the supervaluationist is committed to classical logic since for first-order sentences the argument from premise-set Γ to conclusion ϕ is classically valid just in case it is supervaluationally valid. Nevertheless, there is debate about whether the supervaluationist's logic really is classical. The issue is thought to turn on what happens when a "definitely" operator, D, used to express vagueness, is added to the language. Taking D as primitive, we may define a borderline case operator B in terms of it as: $B\phi$ abbreviates $\neg D\phi \wedge \neg D\neg\phi$. (Or we may take B as primitive and define $D\phi$ as $\phi \wedge \neg B\phi$.) Supervaluationists regard the following as valid: $D\phi \rightarrow \phi$. So there are supervaluationally valid sentences that are not classically valid. Keefe concedes (pp. 176–178) for this reason alone that the supervaluationist's consequence relation is not classical. But that concession strikes me as needlessly quick. Extensions of classical logic are not all to be deemed non-classical. Given an appropriate notion of *substitution instance*, the supervaluationist's logic may be deemed classical even in the presence of D in the sense that a sentence or argument is classically valid just in case every substitution instance of it is supervaluationally valid.

There is a real sense, however, in which, as Keefe concedes, her supervaluational consequence relation $\models_{SV}$ is not classical. In the presence of the D operator, it is not closed under certain operations such as contraposition and conditional introduction. For example, following Fine, Keefe accepts a principle we might call D-introduction: $\phi \models_{SV} D\phi$; but she does not accept that $\models_{SV} \phi \rightarrow D\phi$, since that conditional might have an indefinite antecedent and a false consequent, in which case it will be indefinite. Keefe proposes alternatives to the classical closure principles. For example, in place of classical conditional introduction (if $\Gamma, \phi \models \psi$ then $\Gamma \models \phi \rightarrow \psi$) she proposes that if $\Gamma, \phi \models_{SV} \psi$ then $\Gamma \models_{SV} D\phi \rightarrow \psi$. Combined with D-introduction, the principle is very strong. For example, given that $\models_{SV}$ is transitive (if $\Gamma \models_{SV} \phi$ and $\Delta \models_{SV} \gamma$ for every $\gamma \in \Gamma$, then $\Delta \models_{SV} \phi$) and classical in the weak sense that $\Gamma \models_{SV} \phi$ if the argument from Γ to ϕ is classically valid, one can show that if $\models_{SV} \phi$ then $\models_{SV} D\phi$; that $\models_{SV} D(\phi \rightarrow \psi) \rightarrow (D\phi \rightarrow D\psi)$; and that $\models_{SV} D\phi \rightarrow \phi$. The resulting logic for D is thus at least as strong as the modal logic KT. In fact it is stronger, probably too strong to accommodate higher-order vagueness. Since $\phi \models_{SV} DD\phi$ (by D-introduction and transitivity), by Keefe's version of conditional-introduction, $\models_{SV} D\phi \rightarrow DD\phi$, which in the presence of second-order vagueness should fail for the same reason that $\models_{SV} \phi \rightarrow D\phi$ fails in the presence of first-order vagueness. On the classical conception, there is a connection between entailments and certain strict material conditionals (necessarily, if ϕ is *true* then ψ is). In the presence of higher-order vagueness, the supervaluationist who wants to maintain that ϕ entails $D\phi$ should favor a connection with some other kind of conditional instead, perhaps a subjunctive one (if ϕ *were* true then ψ would be).

Keefe's central criticisms of alternative accounts that reject bivalence all turn on the issue of higher-order vagueness. But Keefe also objects to many-valued theories in virtue of their treatment of sentences expressing "penumbral connections." Following Keefe, we will say that an advocate of "many-valued logic" is one who rejects bivalence; and who holds that the truth value of a negation, conjunction or disjunction is a function of the truth value of its immediate constituents, and who extends this idea to the quantifiers in the natural way. On one extreme, the many-valued theorist may admit, in addition to truth and falsity, a single extra value. (Whether any sense can be made of the distinction between admitting a third value and admitting just a lack of value for sentences is a philosophically interesting question I will here ignore.) On the other extreme, the many-valued theorist may admit a continuum of values (degrees of truth) between truth and falsity linearly ordered by *truer than*. Either way, the many-valued theorist has a hard time making generalizations. It seems true for example to say that for any x and y, if x is tall and y isn't, then x is taller than y. But unlike supervaluationists, many-valued theorists cannot agree, since they think it common for a sentence to have the same truth value as its negation. Obviously, it is not true to say that for any x and y, if x and y are both tall then x is taller than y. Keefe rightly regards this as a point in favor of supervaluations against many-valued logics. But she doesn't think it tips the balance. The problem of higher-order vagueness turns out to be the real proving ground.

For many-valued theorists and also supervaluationists, a problem of higher-order vagueness may arise in the following way. We are told by these theorists that there is no sharp boundary between the Fs and the not-Fs (on an appropriately constructed sorites series) in the sense that the segment of the series comprised of the objects truly described as F is not contiguous with the segment of objects falsely described as F. But this sounds very much like the claim that there is no sharp boundary between California and New York because the two states are not contiguous, from which it does not follow that neither state is itself sharply bounded. If the segment of objects truly called F is not to be sharply bounded, it must be that there is no sharp boundary between the objects truly called F and the *rest*. To be told that the objects falsely called F do not constitute the rest seems beside the point. The supervaluationist and the many-valued theorist might like to respond to the new problem by adapting their answer to the old one: there is no sharp boundary between those objects truly described as F and those not truly described as F because the segment comprised of those of which it is *true* to say that they are truly described as F is not contiguous with the segment comprised of those of which it is *false* to say that they are truly described as F. The answer strikes me as no more helpful than the original one, but Keefe finds that at this point we already have a problem for the many-valued theorist.

If, faced with the problem of higher-order vagueness, the many-valued theorist proposes that there are claims of the form 'S has value v' which are themselves not true for any v among the values the theorist posits, then the theory is not stable. For then if V is the set of values posited by the theory, then the universal generalization 'every sentence has a value from V' will be evaluated as untrue by the theory itself.

The supervaluationist does not face exactly the same problem since, given acceptance of excluded middle, she deems true the sentence 'Every sentence is either true or false or neither'. It is unclear why this should suffice for stability, however, since due to higher-order vagueness the supervaluationist does not think that every sentence satisfies one of 'S is true' or 'S is false' or 'S is neither true nor false'. Keefe responds to the problem by claiming (chapter 8.2) that "the supervaluationist's use of a vague meta-language allows as much illumination of truth-conditions as is possible while not striving for the unachievable elimination of vagueness." It was not clear to me why Keefe regards such a response as unavailable to the many-valued theorist.

Keefe does not assume, however, that positing vagueness in the meta-language is the only approach to higher-order vagueness available to degree-theorists. A degree-theorist might hold, for example, that the "fuzziness" of the boundary between the hairy and the not-hairy is already captured at the first level by the *gradual change* in degree of truth along a sorites series. The apparent increase rather than decrease in precision associated with assigning to sentences a degree of truth from the real interval $[0, 1]$ is illusory, since the precise assignments are to be taken with a grain of salt. Keefe convincingly argues (chapter 5) that this line of response is not available to the degree theorist who takes (as many but not all do) differences or quotients between degrees of truth to be semantically significant for the evaluation of conditionals.

Ultimately, Keefe's own treatment of higher-order vagueness is unsatisfying. Accounting for higher-order vagueness as she does, by positing vagueness (construed as truth-value gaps) in each of a hierarchy of meta-languages, leaves open the possibility of there being an unlocateable last dog truly called hairy. The status of the next dog may be such that we can only say of it that it is not true that it is true that . . . it is true that it is hairy (for some number of iterations of 'it is true that'). Or it may be such that we cannot even say that of it, but at best must say "can't say," or "don't ask," or nothing at all. But still, there is a transition and it is not avoided by positing meta-language vagueness. An explanation for our inability to find that transition remains unexplained.

I turn now to Keefe's comparison of her own view with views, like Timothy Williamson's *epistemicism*, that retain bivalence. Like many philosophers, Keefe accuses such theories of implausibly positing sharp boundaries for vague predicates. But the supervaluationist must take some care in articulating this objection. For she cannot object to epistemicism on the grounds that it is committed for example to the truth of 'there is a hairy dog with just one more hair than a dog that isn't hairy'. Supervaluationists share *that* commitment. Nor can the supervaluationist object that epistemicists are committed to the truth of 'there is a *definitely* hairy dog with just one more hair than a dog that definitely *isn't* hairy'. Like supervaluationists, Williamson takes that existential generalization to be false. To insist, as Keefe does (p. 185), that the claim involving 'definitely' stands or falls with another involving truth—'there is a dog truly called hairy with just one more hair than one truly called not hairy'—is to preclude by fiat the possibility of accounting for lack of sharp boundaries in a way compatible with bivalence.

Most of Keefe's criticisms of the epistemic view of vagueness are directed at Williamson's particular version of it. On Williamson's view (unlike Keefe's) there is a point in a sorites series truly described as the location of the transition from the hairy to the not-hairy, but we cannot know where the point is. Keefe rightly complains that Williamson's explanation of our inability to know where that point is does not explain why we fail to *believe* of any point in the series that the transition is located there.

Contextualists, who divorce the phenomenon of borderline cases from the phenomenon of unlocateable boundaries are able to help here. Contextualism is not a rival to epistemicism or to supervaluationism—Manfred Pinkal is a contextualist supervaluationist—but an available supplement to these theories that Keefe does not consider. But although Keefe's book will leave contextualists feeling somewhat neglected, it is on the whole comprehensive, as well as clear-headed and clearly written, rich in detail and argument. Degree theorists in particular will encounter a wealth of cogent new challenges. Philosophers immersed in the literature on vagueness will learn from the book, and advanced students will be able to do so.

Cornell University DELIA GRAFF