Vagueness and Language Use

International Conference

Paris – ENS – April 7-9, 2008

Program

Organizers:
Paul Égré (IJN) & Nathan Klinedinst (UCL)

Institut | Nicod
CNRS-EHESS-ENS

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Conference description

Vagueness is a pervasive phenomenon in natural language, which appears to be instantiated in nearly all lexical categories (including adjectives, nouns, verbs, and quantifiers). In recent years, progress has been made, both in philosophy and in linguistics, to characterize the sources as well as the varieties of vagueness. At the foundational level, a central and ongoing debate concerns the epistemic vs. semantic nature of the vagueness phenomenon, and the proper understanding of the relation between the notions of vagueness, ambiguity, context-dependence, and imprecision. In linguistic theory, some significant advances have been made on the semantics of gradable adjectives and on the role and behavior of vagueness related adverbs (such as "clearly", "approximately", and "definitely"). These advances raise the question of how empirical studies of language may bear on the debate about the nature of vagueness, and whether they can help to adjudicate between competing accounts (epistemic vs semantic theories, contextualist vs non-contextualist accounts). In addition to that, a number of issues remain open for investigation: is vagueness manifested and resolved in the same way across lexical categories (nouns vs. adjectives, logical vs. non-logical expressions)? How is the vagueness of lexical items blocked or inherited in larger semantic units (e.g. in comparative constructions), and what can this tell us about its nature? How do various theories explain the fact that we use vague terms successfully to communicate meaning in spite of their vagueness? The aim of this conference will be to bring together linguists and philosophers, with contributions on both the foundational and the empirical aspects of the phenomenon of vagueness in natural language.

Foreword and acknowledgements

'Vagueness and Language Use' was organized as part of the research program « Cognitive Origins of Vagueness », funded by the French National Agency of Research (ANR). We are grateful to the ANR for making this event possible, and to the Ecole Normale Supérieure for welcoming it in its buildings. We are also grateful to Sophie Bilardello, Emmanuel Chemla, Jérôme Dokic, Neftalí Villanueva Fernández, Isidora Stojanovic, François Récanati, Julien Fournigault, and Dan Kopton, for their help and advice at various stages of the preparation of the conference.

As announced initially in the call for papers, the main goal of the conference is to bring together linguists and philosophers working on vagueness, taking advantage of recent flourishing work in this area from both communities. While vagueness has attracted increasing attention since the 1970s, both from linguists and philosophers, and while many lectures are organized on the topic every year, we believe linguists and philosophers have only few official opportunities to meet and compare their views on matters of common interest. We hope this is one of them.

We are also most grateful to the members of the scientific committee for helping us to select the papers and to build what looks to be a very promising program, and we thank the invited speakers and the contributors for their energy and work in the preparation of this event.

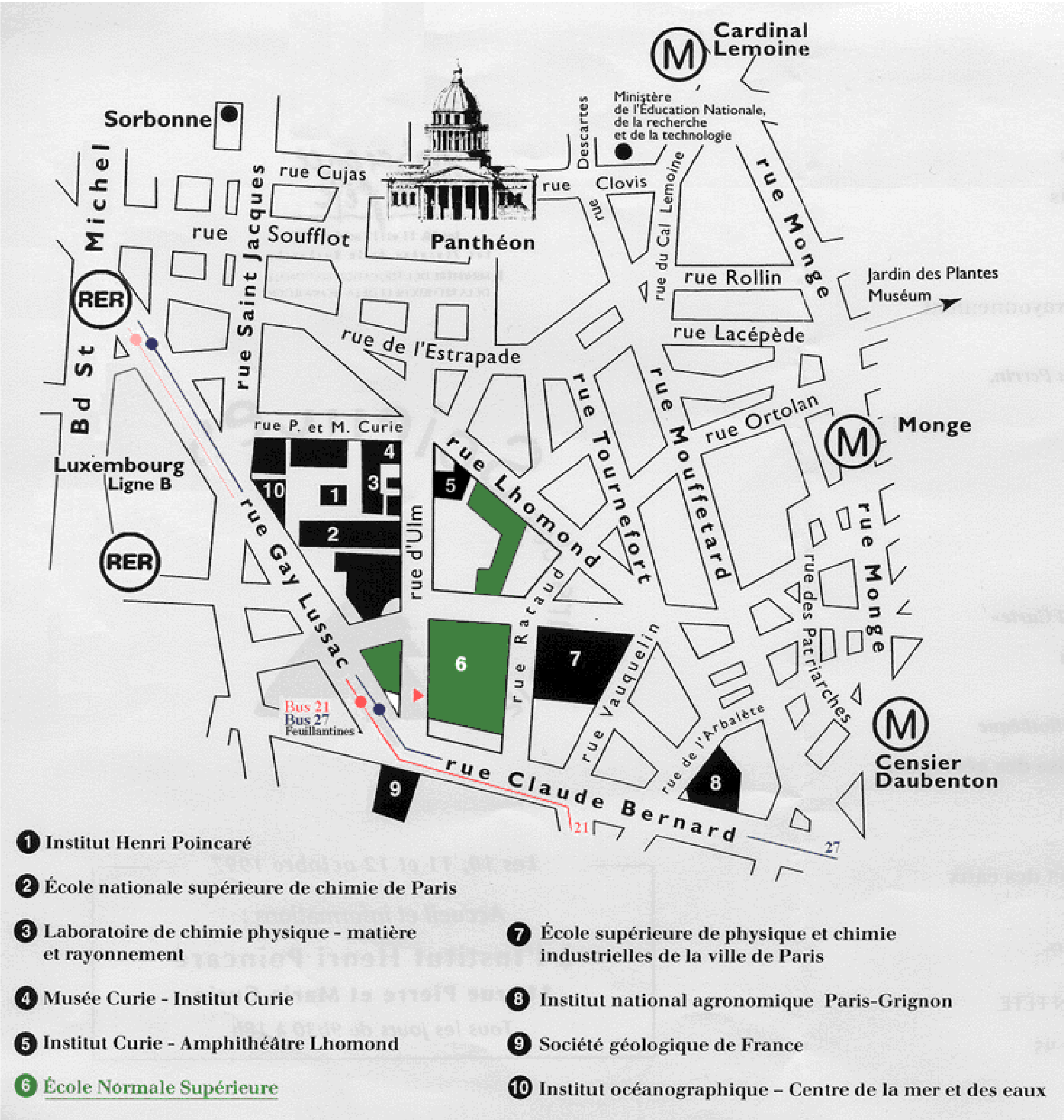
We hope the conference will not only contribute to the understanding of vagueness, but spark and foster collaborations into the future.

Paul Égré and Nathan Klinedinst

Paris and London, April 2008

Practical Information

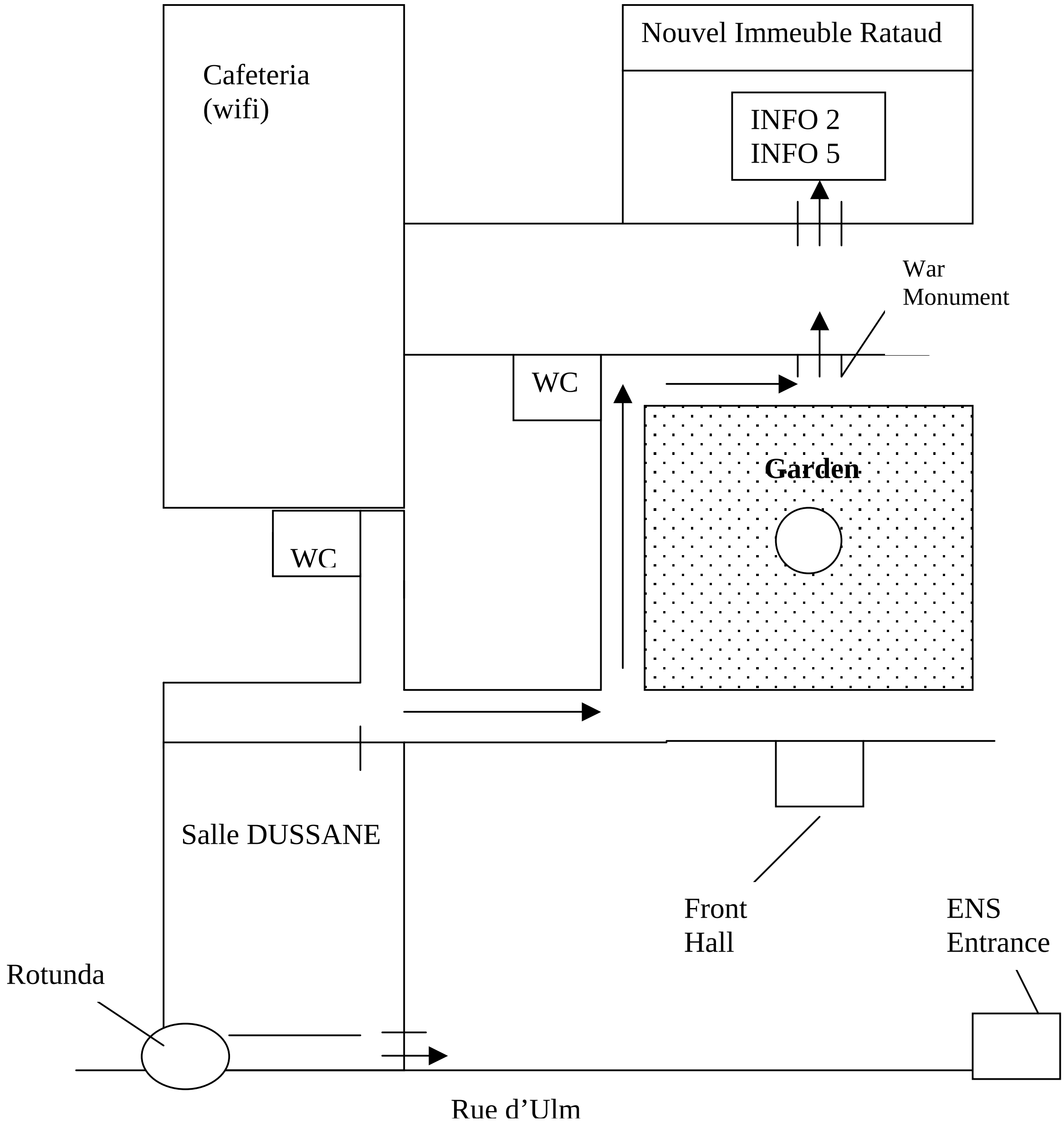
- **Lunchtime** : there are plenty of restaurants and boulangeries not far from the Ecole Normale Supérieure where you can have lunch or buy a sanwich. You may try (see the map below):
  - rue Claude Bernard (*Le 77*, or the nearby pizzeria)
  - rue Gay Lussac (*l'Etrier*,…)
  - rue Soufflot (several boulangeries and restaurants)
  - rue Saint-Jacques (boulangerie, lebanese deli, …)
  - rue de l'Estrapade (*Café de la Nouvelle Mairie*, boulangerie, pizzerias)
  - rue Mouffetard (restaurants and sandwich places all along the street)
  - Rue du Pot de Fer (*La Montagne, le Pot de Terre,...*) : the street is the continuation of Rue Rataud intersecting rue Mouffetard



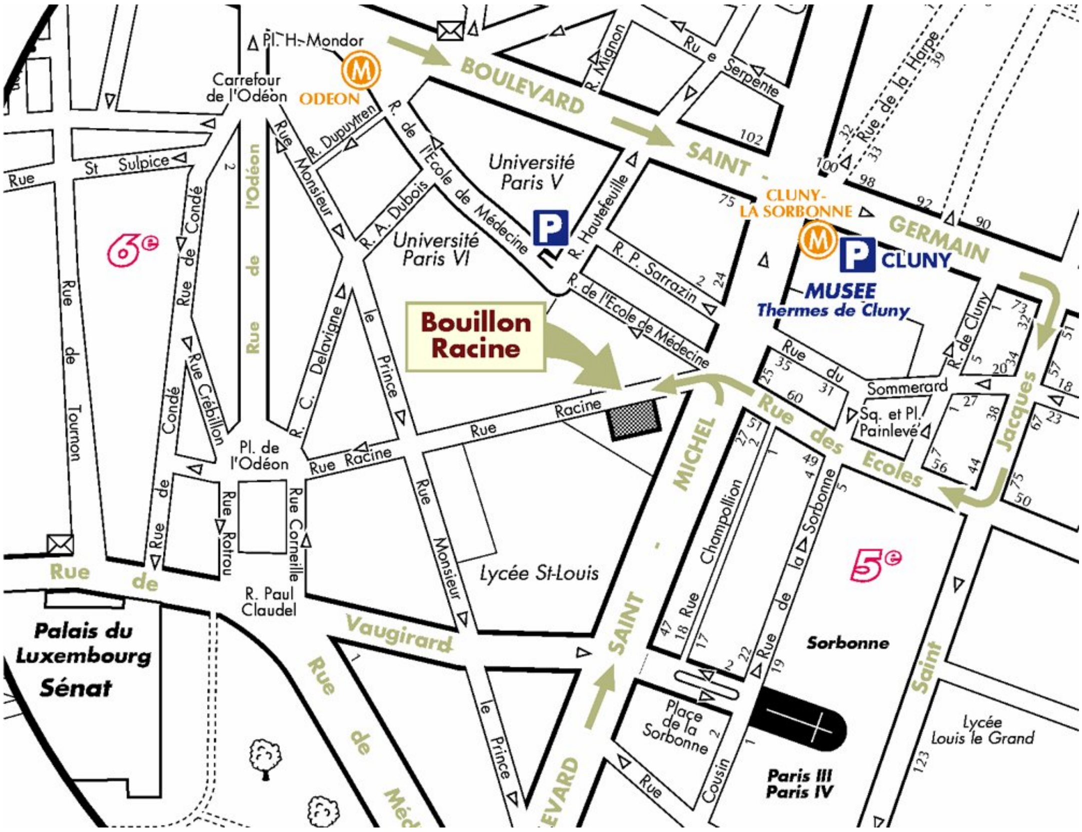
- **Parallel sessions :** the two parallel sessions will take place in salle DUSSANE, the main conference room, and in rooms INFO 5 and INFO 2 (located in « Nouvel Immeuble Rataud »). To reach these rooms from Salle Dussane, follow the map :

- To access rooms **INFO 5** and **INFO 2**, enter the building : pass the automatic door, take the elevator or the stairs, down to level « PB ».

- All **coffee breaks** will take place in the rotunda of salle Dussane (back of the room).



- **The Conference dinner** (40 euros, you should have registered in advance): will take place at the Restaurant « le Bouillon Racine », located 3, rue Racine – 75006 – Paris, on tuesday April 8th, from 7.30pm.



- **Internet Access :**
  - a wireless connection is available for laptops in salle Dussane, the main conference room.
  - Salle Dussane will be closed during lunch breaks. If you need to use the internet then, you may go to the ENS caféteria, where there is wireless connection (the password is indicated near the bar).

- **On Thursday, April 10 : Stephen Schiffer (NYU)**, presents *'Vagueness, Concepts, and Properties: a Non-Semantic and Non-Psychological Account of Vagueness*', as part of a series of invited lectures in the ENS Dept. of Philosophy. time: **April 10, 10h30-12h30**; place: **salle des Résistants** (ENS).

Keynote Speakers

Chris Barker (New York University) – *Achieving Clarity*

Why ever assert clarity? If "It is clear that p" is true, reasonable discourse participants already have all the evidence they need to conclude that p, so asserting clarity seems at best superfluous. According to Barker and Taranto (2003) and Taranto (2006), asserting clarity reveals information about the beliefs of the discourse participants, specifically, that they both believe (that they both believe) p. The belief theory of clarity makes a number of accurate predictions, including that "It is clear that p" fails to entail p (perhaps contrary to initial impressions). However, the belief theory is both too weak and too strong: mere belief is not sufficient to guarantee clarity ("It is clear that God exists"), and clarity is possible without belief ("It is reasonably clear that p"). I will suggest that "It is clear that p" means instead (roughly) 'the publicly available evidence justifies concluding that p'. What asserting clarity reveals is information concerning the prevailing epistemic standard that determines whether a body of evidence is sufficient to justify a claim. Thus assertions of clarity constitute declarations about the vague standard for justified belief. If so, the semantics of clarity constitutes a grammatical window into the discourse dynamics of knowledge and skepticism.

Delia Graff Fara (Princeton University) – *Context, Content, Interests, and Saying the Same Thing*

The paper responds to recent criticism (Keefe 2007) of interest-relative accounts of vagueness by examining the import of "saying the same thing" across different contexts.

Chris Kennedy (University of Chicago) – *Vagueness and Comparison*

Vagueness and comparison are linked together in a number of different ways, both empirically and analytically. Vague predicates typically support comparison (though not all predicates that support comparison are vague); some notion of comparison or similarity plays an important role in many accounts of vagueness; and several influential semantic analyses of (grammaticized) comparative constructions are based on prior semantic analyses of vagueness. However, despite (or maybe because of) these connections, the subtlety and significance of the places where vagueness and comparison do not line up have not been fully appreciated, either by philosophers or linguists. The goal of this talk is to examine such cases and discuss their significance. I will take a close look at the semantic and pragmatic properties of several different ways of expressing comparison, and show that some of them preserve canonical features of vagueness while some of them do not. I will then discuss the implications of the facts for the analysis of vagueness, for the semantics of comparison, and (potentially) for our understanding of the ways that natural languages do and do not differ in encoding these concepts.

Peter Pagin (Stockholm/LOGOS) – *Vagueness and Domain Restriction*

In 'Vagueness and Central Gaps' I observed that in a domain where individuals don't form a sorites sequence with respect to a predicate F, a tolerance principle for F is true without inducing a sorites contradiction. I suggested a strategy for making use of this fact in the semantics for natural language: the effect would be to make all normal use of vague vocabulary unproblematic, leaving contradiction only for extreme cases. The method for achieving this would be to employ semantic assignments with quantifier domain restriction. The potential threat to this method is that both sentence and discourse semantics have needs that counteract restriction: Often a given domain is expanded in contextual updates as a discourse progresses. This threatens to remove restrictions that save consistency. Sometimes domain restriction is counterintuitive because of the choice of quantifierrs. Here I shall explore the field of those dangers.

Agustín Rayo (MIT) – *A Plea for Localism*

It is natural to suppose that part of what one does when one comes to master a language is associate *meanings* with the language's basic lexical items -- that is, rules specifying which uses of a lexical item are correct -- and that one exercises one's mastery of the language by deploying one's knowledge of which meanings are associated with which lexical items. I think this is a mistake. I suggest instead that language mastery consists in large part of the ability to use speech-acts as evidence for proposed presupposition updates, and that -- in much the way that we lack access to a rule which would allow us to infer a person's age-in-days from an examination of their physical appearance -- we lack access to a rule which would allow us to infer a proposed presupposition-update from a given speech-act.

Robert van Rooij (ILLC, Amsterdam) – *In Defense of Comparison Classes*

Whether John is tall or not depends on who he is compared with. Klein (1980) concluded that we should thus interpret adjectives with respect to comparison classes, and he proposed that in terms of them we can also account for comparatives. Klein's simple analysis has come under attack both in philosophy and in linguistics. Philosophers have complained that context dependence is not enough to account for the vagueness of the adjective. Linguists have pointed to the fact that if John's length is just a bit higher than Mary's length, we can say that John is taller than Mary, but not that John is tall compared to Mary. In this talk I want to address both problems. I will show that although 'tall' needs not be vague with respect to each comparison class, we can put natural constraints on the behavior of the adjective with respect to comparison classes such that the resulting tallness ordering is a so-called semi-order (Luce, 1956) and thus gives rise to the Sorites paradox. I will also show that in terms of these constraints, we can explain why adjectives used in comparatives are sensitive to smaller differences than positive uses of adjectives, if we stick to Klein's original proposal how to account for comparatives.

Uli Sauerland (ZAS, Berlin) – *Approximating Expressions and Vagueness* (joint work with Penka Stateva)

Expressions such as "definitely", "exactly", and "absolutely" make a statement less vague, while "possibly", "approximately", and "more or less" increase its vagueness. We are interested in the fact that these expressions cannot be used interchangeably, but have each their own specific distribution. The distribution, we argue, provides a new criterion for distinguishing between different sources of vagueness and uncertainty. On this basis, we develop concrete semantic mechanisms for two kinds of vagueness and approximation.

Selected Abstracts

Vagueness and Communication: A Minimally-Contextualist Approach [Abstract]

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Epistemicism about vagueness makes the connections between understanding, use and meaning mysterious. We are ordinarily what we may call *first-order users* of vague expressions. Taking "tall" as our sample vague expression, we classify some people as tall, some as not tall and some others we are unable to classify either way: these are the borderline cases. No two people classify the same way in every situation. No one person classifies the same way across all appropriately-similar contexts, as we know from considering the influence of "near neighbours" when people are asked to classify members of a sorites sequence. Yet from this semi-chaotic behaviour, a sharp zero-order boundary is supposedly fixed. It is not clear how. This also raises questions about correct understanding. How are we to know if our behaviour is properly reflective of how things are? How are we to tell whether we share the same vague concept? Could we in fact be grasping different but similar concepts?

Epistemicists argue that we should not expect to grasp the relationship between meaning and use. The semantics and the theory of proper use are two distinct components of a theory of vagueness. Besides, they might add, how much better do rival semantic approaches fare? Semanticists take borderline case behaviour – ambivalence, explicit classification – to reflect the incompleteness or the richer structure of vague concepts. But it is not quite as simple as that. Ordinary speakers typically prefer to classify with the "zero-order" options: "tall" and "not tall". Borderline cases are typically cases where speakers find themselves unable to resolve differences. Speakers are unwilling to assent to the statement that a borderline tall person is either tall or not tall but are also unwilling to agree that such a person is neither tall nor not tall. Finally, the first-order picture suggests first-order boundaries but these are not reflected in our classificatory behaviour either. It is widely agreed that genuinely vague expressions are higher-order vague to some degree (possibly infinite). Yet by admitting higher-order vagueness, the gap between use and meaning widens again. For higher-order vagueness has no echo in our ordinary practices with vague expressions and it is not at all clear how we are to understand it. Hence, it can still be asked what determines the correct use of vague expressions and in what our shared understanding of them consists. Semanticists too seem just as much to need sharply to distinguish the semantics from the theory of use.

It is therefore worth exploring whether there is space for a position which avoids first-order boundaries and higher-order vagueness and which makes better sense of the relationship between understanding, use and meaning. In this paper, I sketch an outline of just such an approach. I call the position *minimal contextualism*. Vague expressions are incomplete, flexible and highly context-sensitive expressions. Vagueness is a semantic phenomenon, with borderline cases as reflective of incompleteness and to be reflected in truth-value gaps. The account has affinities with the positions of Soames (1999) and Shapiro (2006) but the context-sensitivity is more radical, the contextualism reflecting an response-dependent component to the meaning of all vague expressions that contributes equally to determining the determinate as well as the borderline cases: it is this that yields boundaryless without higher-order vagueness and makes the contextualism 'minimal'.[1] In the remainder of this abstract, I shall sketch some of the key points.

Underpinning the analysis is an understanding of vague concepts as primarily rough-and-ready tools designed for fast, efficient, but sloppy classification and

[1] Soames, S. (1999): *Understanding Truth*. New York: Oxford University Press, ch. 7; Shapiro, S. (2006) *Vagueness in Context*. Oxford University Press.

communication. They are flexible classifiers that enjoy no fixed relationship to the world. They are simple: something either falls in the positive or negative extension of the concept or neither. We aim to classify positively or negatively, as this is both simple and informative. This ultimately explains our unwillingness to aver that someone can be neither tall nor not-tall. We exploit their flexibility when we communicate. I suggest we have a basic policy of trying to maximise communicative ease through coming to know each other well enough to be able to predict each other's classificatory reaction with a high rate of success. This takes the form of aiming to be in agreement with another and aiming to know where we disagree. Whilst we have our own views on how our concepts apply – we differ in our basic opinions, after all – they are not set in stone. We exploit their plasticity to bring ourselves into a state of "communicative harmony" or mutual understanding, where the level of harmony or mutual predictability is determined contextually by our needs. By sharing a common conception of how a concept applies, we can communicate with each other successfully thereafter.

At a basic level, we may consider ourselves as simple speakers, who exhibit three basic individual classificatory behaviours with vague expressions: positive application ("tall"), negative application ("not tall") and indecision ("I'm not sure", "Not quite either"). If we coincide on our views (positive or negative), then all is well. If we do not, then (ultimately) we may either accept the case to be borderline, agree to resolve it one way or the other or we may stand by our classifications. In the first two cases, we choose to operate with the same standards; in the latter, we choose not to. The correctness of our applications of courses consists not in agreement alone. But we must avoid the idea that the flexibility of vague concepts is parasitic on the speaker-independent determination of the determinate and borderline cases. To put it crudely, the process is rather one in which the world provides materials that speakers mould into concepts. Once this process has taken place and speakers abide by communicative rules such as the above, the concept is said to be *stable*.

Vague concepts are primarily designed for real-world classification. Sorites sequences are artificial philosophers' constructs. So long as we stick to the ordinary, our similarities and tolerance of one another bring it about that there is a stable, shared concept. Individually, each member of a sorites sequence can be coherently classified but these classifications cannot be brought together. There is no context in which a whole sequence can be evaluated. So much is familiar. But by according speakers their role in determining how vague concepts apply, we must look on our inability to effect a coherent classification not as the malfunctioning of measuring instrument but as the malfunctioning of a tool deployed outside its normal functioning environment. Vague concepts are designed to be used in contexts where few things appear. They break down when they are pushed to work in soritical contexts. In this respect, the analysis is similar to Horgan's (1994, 1998) transvaluational approach.[2]

A rough but essentially correct condition for being tall is therefore:

(1) x is tall in c iff a speaker or group of speakers would judge that x is tall in a context c (where speakers, conditions and the context are in the relevant senses normal and "tall" is stable.)

It is potentially misleading to think that legitimately and separately disagreeing speakers may be right "in their own contexts" whilst the case is properly classed as a borderline case. No: the disagreeing speakers reflect the vagueness of the expression and the case is borderline with respect to a more "populated" context. There is no single, all-embracing and coherent context in which people can be spoken of as tall or not-tall. This would be to restore boundaries. We can legitimately ask what it is to be tall and who is in fact tall so long as we accept the vagueness of the response. What we will see is the "first-order picture": the pattern of agreement shading off into disagreement and

[2] Horgan, T. (1994): "Transvaluationism: A Dionysian Approach To Vagueness" in Horgan (ed.) *Vagueness*. The Proceedings of the Spindel Conference 1994, published as *The Southern Journal of Philosophy* 33, *Supp. Volume;* Horgan (1998): 'The Transvaluationist Conception of Vagueness', Monist 81, pp. 316-33.

ambivalence and back into agreement again. We can point to regions of this pattern and say that the tall are roughly here and that the borderline cases start about here. This is the most we can do and the most we need ask for.

The analysis forges a close connection between the meaning, use and understanding of vague expressions. The paper will show how more complex patterns of classificatory and communicative behaviour are easily and naturally accommodated. It will also indicate how higher-order vagueness is constructible (but unnecessary) and how the determinacy operator should primarily be understood as a communicative device of co-ordination to ensure speakers understand each other the right way by signalling that raised standards are now operative: one says that this person is to be counted as tall in any context.

Borderline, yet not definitely so

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Abstract

Take a long (but finite) sorites series of men for the predicate 'tall'. There seems to be no sharp transition from the members of the series that are tall to those that are not. The truth-gap theorist explains this seeming absence of a sharp transition saying that there is a borderline case between the members of the series that are tall to those that are not. This explanation amounts to the truth of the next *gap principle* for the predicate 'tall': for any member x of the series, if x is truly tall, then it is not the case that its successor in the series is truly not (= falsely) tall. Since for the truth-gap theorist '*definitely*' is an object-language expression of the theory's own truth-predicate, we might express this gap principle in the object language:

(GP for 'T') $\mathcal{D}T(x) \rightarrow \neg\mathcal{D}\neg T(x')$
(where 'T' stands for 'tall' and x' is the successor of x in the series)

But the seeming absence of sharp transitions in the series cuts deeper than that. Avoiding a sharp transition between the tall and the non-tall members of the series, but positing one between the truly tall and the non truly tall members seems to achieve no real progress. Now in order to avoid a sharp transition between the truly tall's and the non truly tall's, the truth-gap theorist is committed to the truth of a second gap principle, this time for *definitely tall*:

(GP for '$\mathcal{D}T$') $\mathcal{D}\mathcal{D}T(x) \rightarrow \neg\mathcal{D}\neg\mathcal{D}T(x')$

The reasoning generalizes for any iteration of '$\mathcal{D}$' rendering all the gap principles of the form,

(GP for '$\mathcal{D}^nT$') $\mathcal{D}\mathcal{D}^nT(x) \rightarrow \neg\mathcal{D}\neg\mathcal{D}^nT(x')$

In a 2003 paper Delia Graff Fara argues that the truth-gap theorist cannot endorse all these gap principles. According to Fara the truth-gap theorist is committed to the rule of $\mathcal{D}$-introduction ($\varphi \vdash \mathcal{D}\varphi$). But Fara shows that given $\mathcal{D}$-introduction, the truth of all these gap principles is inconsistent for finite sorites series.

It is often assumed that supervaluationism in vagueness is committed to *global validity*. If this is the case, then the supervaluationist is subject to Fara's objection, since the reasoning used in her proof is globally valid. However, the notion of supertruth preserved by global validity is too strong. Global validity preserves truth in all precisifications but this notion is itself precise (since, according to this notion of supertruth, a sentence is supertrue in a precisification just in case it is supertrue in every precisification and, thus, it cannot be indefinite whether a sentence is supertrue). If the notion of supertruth is itself vague, supervaluationism is committed to a weaker notion of logical consequence named *regional validity*. The idea is, roughly, that whether something is supetrue is itself a relative-to-precisification matter; and regional validity preserves this weakened notion of supertruth.

The target of this talk is showing that the supervaluationist might (consistently) endorse gap principles adopting the regional notion of consequence. The crucial feature to show this fact is that regional validity allows (in a qualified sense) that members in a sorites series can be borderline, yet not definitely so.

References

Fara, D. G. (2003). Gap principles, penumbral consequence and infinitely higher-order vagueness. In J. C. Beall (ed.) *Liars and Heaps: New Essays on Paradox*. Oxford University Press. Originally published under the name 'Delia Graff'.

Clarity and Objectivized Belief

Ariel Cohen and Lavi Wolf

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Barker and Taranto (2003) analyze *clear* as a vague predicate. Their account is based on belief: (1) is true iff the belief of the speaker and hearer in the truth of the proposition that Abby is a doctor is greater than some standard.

(1) It is clear that Abby is a doctor.

Barker (2007) argues that belief is inappropriate for an account of clarity. He points out that belief is not sufficient for clarity: both speaker and hearer may believe in the existence of God, yet still deny (2a); belief is not necessary either, because speaker and hearer might (perhaps irrationally) believe that there is life on Mars, yet assent to (2b).

(2) a. It is clear that God exists.
b. It is reasonably clear that Mars is barren of life.

Instead of belief, Barker suggests an account based on justification: (1) is true iff it is justified to conclude that Abby is a doctor. To formalize justification, Barker makes use of Kratzer's (1991) stereotypical ordering source (which is independent of belief), and proposes a function that maps worlds to degrees in a way compatible with this ordering source. Thus (1) is true iff in all worlds consistent with the evidence whose "degree of normality" is greater than some standard of skepticism, d(**clear**), Abby is a doctor.

We agree with Barker's arguments against using subjective belief to explain clarity; nonetheless, there are at least two reasons why an account based on belief is attractive.

One reason has to do with expressions of personal clarity, for example:

(3) It is clear to X that Abby is a doctor (where X could be *me*, *you*, *John*, etc.).

What does it mean for some proposition to be clear to, say, the speaker, but not to the hearer? Barker (2007) suggests that this occurs when the speaker and the hearer have access to different evidence, or that they have a different standard of skepticism d(**clear**).

However, we feel that this account does not do full justice to personal clarity. Consider a case where the same evidence is observed by both participants; for example, both Alex and Bill see a photograph of Abby wearing a stethoscope and smoking. Alex may conclude from the stethoscope that Abby is a doctor, while Bill may conclude from Abby's unhealthy behavior that she is not. The following exchange, then, is quite possible:

(4) Alex: It is clear to me that Abby is a doctor.
Bill: It is clear to me that she's not.

We assume that Alex and Bill share the same evidence, so this cannot explain their disagreement. The other option open to Barker is that they have different standards of skepticism, but this still won't do: if Bill is more skeptical than Alex, it means that Bill requires that Abby be a doctor in a superset of the worlds which are required by Alex; hence, the proposition that Abby is a doctor may not be clear to Bill, but its negation will not be clear to him either.

The exchange in (4), then, poses a problem for Barker. In contrast, an account in terms of belief is quite straightforward (cf. Barker and Taranto 2003): Alex and Bill reason in different ways, and come to believe different things on the basis of the same evidence.

Barker draws an analogy between personal clarity and what Lasersohn (2005) calls predicates of personal taste, as in:

(5) Alex: This chili is tasty
Bill: This chili isn't tasty.

But note that in such cases, what Alex and Bill disagree on is not merely the defining standard of the vague predicate *tasty*: "these predicates display vagueness… but that is a separate issue from the kind of apparent interpersonal variation in truth value that we have been concerned with" (Lasersohn 2005, p. 655). The differences between Alex and Bill may be formalized as a difference between two sets of possible worlds (cf. MacFarlane 2006; Egan 2007), which lends itself quite naturally to an interpretation in terms of differences in belief.

The second reason why belief is an attractive choice for an account of clarity involves the different behaviors of *clear* and *clearly*. Piñón (2006) identifies three properties of modal adverbs that distinguish them from modal adjectives. Observing these cases, we note that *clearly* patterns with modal adverbs, while *clear* patterns with modal adjectives:

1. Modal adjectives can be negated, modal adverbs cannot:

$$(6)\quad \left\{\begin{array}{l}\text{It's improbable that/ * Improbably}\\ \text{It's impossible that/ * Impossibly}\\ \text{It's unclear}\quad\ \text{whether/ * Unclearly}\end{array}\right\}\ \text{Abby is a doctor.}$$

2. Modal adjectives, but not modal adverbs, can occur in the protasis of a conditional:

(7) a. If it's possible/probable/clear that Abby will be a doctor, then I, too, should apply to medical school.

b. *If Abby will possibly/probably/clearly be a doctor, then I, too, should apply to medical school.

3. Modal adverbs, unlike modal adjectives, are not acceptable in questions:

(8) a. Is it possible/probable/clear that Abby is the best doctor in the hospital?

b. ?Is Abby possibly/probably/clearly the best doctor in the hospital?[1]

Piñón argues convincingly that these differences follow from the assumption that modal adverbs modify the strength of the speaker's belief in the assertion, rather than its content. Additional evidence comes from the distribution of overt indicators of illocutionary strength, e.g. *certainly* or *presumably* (cf. Krifka 2007): they preclude the use of modal adverbs, but not modal adjectives:

(9) a. Certainly/presumably it is possible/probable/clear that Abby is a doctor.

b. *Certainly/presumably Abby is possibly/probably/clearly a doctor.

If the above arguments are granted, an account of *clearly* must make use of belief; and since the meaning of *clear* is obviously related to *clearly*, its meaning must involve belief too.

We therefore need a uniform account of both *clear* and *clearly*, which is based on belief, yet maintains the sense of objectivity of justification.

We formalize belief in terms of probability. Specifically, we use Halpern's (1990) logic of probability, which includes arithmetic operators. We assume, for each believer *i*, a discrete probability function over possible worlds, f_i. We introduce into the logic distinguished propositional functions P_i, such that the intended meaning of $P_i(\varphi)$ is the subjective probability of φ according to *i*. Formally, for any proposition φ, modal base W, model M, world w and assignment function v:

$$(10)\ [[P_i(\varphi)]]^{M,w,v} = f_i\,(\{w\in W \mid (M,w,v) \vDash \varphi\})$$

Belief in φ, then, is the probability of φ over an epistemic modal base; P without any subscript defaults to the probability according to the speaker.

We propose an assertion operator $\mathcal{A}$, with two arguments: the content of the asserted proposition and its degree of strength. For example, the content of the assertion of (11a) is that Abby is a doctor, and the strength is some default degree of belief, which we take to be "at least **high**". This is expressed formally in (11b):

(11) a. Abby is a doctor.

b. $\mathcal{A}\,(\mathbf{doctor}(\mathbf{a}), P(\mathbf{doctor}(\mathbf{a})) \geq \mathbf{high})$

The logical form of (3) is (12), which expresses the statement that X believes to a degree of at least d(**clear**) that Abby is a doctor, and the speaker believes to a high degree that X believes to a degree of at least d(**clear**) that Abby is a doctor.

(12) $\mathcal{A}(P_x(\mathbf{doctor}(\mathbf{a})) \geq d(\mathbf{clear}), P(P_x(\mathbf{doctor}(\mathbf{a})) \geq d(\mathbf{clear})) \geq \mathbf{high})$

[1] Sentences like (8b) are considered ungrammatical by Piñon, though others (including an anonymous reviewer) may accept them. But we think it is safe to say that *clearly* gets the same grammaticality judgments as other modal adverbs.

Regarding non-personal clarity, the idea is that a speaker who utters (1) or (2) is saying that people with sound judgment would come to believe, on the basis of the available evidence, that Abby is a doctor, God exists, or Mars is barren of life. We formalize this idea by defining a probability function over the judgments of possible individual reasoners. Each individual reasoner $1 \leq i \leq n$ is assigned a weight, w_i, indicating how good a reasoner he or she is; we define $P_{\text{justification}}$ to be the weighted sum of these individual probabilities:

(13) $$P_{justification}(\varphi) =_{def} \sum_{i=1}^{n} w_i P_i(\varphi)$$

If the sum of all weights is 1, it is easy to see that $P_{\text{justification}}$ is a probability function.

Thus, the assertion of (1) is represented as follows:

(14) $\vdash(P_{\text{justification}}(\textbf{doctor}(\textbf{a})) \geq \text{d}(\textbf{clear}), P(P_{\text{justification}}(\textbf{doctor}(\textbf{a})) \geq \text{d}(\textbf{clear})) \geq \textbf{high})$

This formula means that it is justified to conclude that Abby is a doctor, and the speaker believes to a high degree that it is justified to conclude that Abby is a doctor.

Following Piñón, *clearly* modifies the strength, rather than content, of the assertion Hence, the representation of (15a) is (15b):

(15) a. Abby is clearly a doctor.

b. $\vdash(\textbf{doctor}(\textbf{a}), P_{\text{justficiation}}(\textbf{doctor}(\textbf{a})) \geq \text{d}(\textbf{clear}))$

This means that Abby is a doctor, and it is justified to conclude that Abby is a doctor.

It is often claimed that a vague phenomenal quality, such as *red*, is defined by collective judgments of good observers. For example: "For an object to be (definitely) red is for it to be the case that the opinion of each of a sufficient number of competent and attentive subjects…would be that it was red." (Wright 1987, p. 244). Our approach can be seen as a way to apply this intuition to the case of clarity, where we consider good reasoners rather than good observers, Our view of justification as "objectivized" belief provides a uniform account of clarity, both personal and non-personal, both adjectival and adverbial.

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Vague Color Predicates and the Fineness of Grain Argument

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Is vagueness merely a semantic phenomenon? Can it impact the debate in other areas of philosophy? I argue here that vagueness plays a significant role in the conceptual/nonconceptual content debate in the philosophy of perception. I begin by claiming that two philosophical puzzles can be generated from the same example. This example is a set of color patches, each just discriminable in color from its neighbors, which runs from a clear case of one color to a clear case of a different color. The example is commonly taken as the source of a sorites paradox for color predicates. But the example also generates a puzzle for conceptualists in the philosophy of perception, known as *the fineness of grain argument*. The fineness of grain argument claims that since we do not have as many color concepts as shades of color that we can sensibly discriminate, some of the content of our color experience is not captured by our color concepts.[1] Next, I identify the unifying feature of these two arguments, found in their shared example, as the distinction between coarse-grained color predicates and fine-grained color patches. Finally, I examine John McDowell's solution to the fineness of grain argument in Mind and World.[2] Here I argue that because the two puzzles are alike, by trying to solve the fineness of grain argument in a particular way, McDowell opens the door to a sorites paradox. This undermines McDowell's argument that all content of our experience is conceptual.

Crispin Wright defines a "tolerant" predicate as one that can admit changes too small to make any difference in the predicate's application.[3] In the case of color, tolerance amounts to the fact that a predicate like "red" is such that if one color patch can be called "red," then a patch whose color is so similar to that first patch so as not to make any difference in application can also be called "red." A carefully arranged set of color patches plays off of the tolerance of vague color predicates and yields a sorites paradox.[4] If patch one is red, and each patch in the series is just discriminable in color from its neighbors, since red is a tolerant predicate, then patch ten (which is, in fact, orange) is said to be red. In addition to this sorites paradox, it is also the case that we possess color concepts such as "red" and "orange." Patch one is a clear case of red, while patch ten is a clear case of orange. But the precise relationship between red and patch one, and orange and patch ten is such that while patch one is red and patch twelve is orange, the concepts "red" and "orange" apply to other patches in addition to patch one and patch twelve. For example, since patch one is a clear case of where the concept "red" applies, and patch two is just discriminable in color from patch one, "red" also applies to patch to patch two. We can sensibly discriminate patch one from patch two, however, since the two patches are just discriminable. In the case of patch one and patch two, then, we have an example of two color patches that we can sensibly discriminate, yet for which we have only one common color term. And this is precisely the claim of the fineness of grain argument: we do not have as many color concepts as shades of color that we can sensibly discriminate. Therefore, according to the fineness of grain argument, some content of our color experience is not captured by color concepts.

The unifying feature of the sorites paradox and the fineness of grain argument is the common distinction between vague, coarse-grained, color predicates and precise, fine-grained, color patches. In the fineness of grain argument, the distinction between coarseness and fineness of grain corresponds to the distinction between color concepts and shades that we can sensibly discriminate. Our experience of sensible shades is fine-grained experience, since it is experience containing detailed information. Our

[1] Gareth Evans, *The Varieties of Reference*, edit. John McDowell, (Oxford: Clarenden Press), 1982, p. 229.
[2] John McDowell, *Mind and World*, (Cambridge: Harvard University Press), 1994, pp. 56-60.
[3] Crispin Wright, "Language-Mastery and the Sorites Paradox" in *Vagueness: A Reader*, Ed. Keefe and Smith, (MA: MIT Press), p. 156.

[4] *Ibid*., p. 157.

color concepts, however, are more coarse-grained than our fine-grained color experience. This same distinction between coarseness of grain and fineness of grain exists in the sorites paradox. The sorites paradox for color predicates employs the color predicate "red." "Red" can apply to multiple color patches, since it is a coarse-grained predicate. In the sorites paradox, we can contrast the coarse-grained predicate "red" with the fine-grained instances of red exemplified in each individual color patch.

McDowell attempts to bridge the gap between our coarse-grained general color concepts and the fine-grained color shades that we can sensibly distinguish by employing fine-grained color concepts which match our fine-grained color experience.[5] He agrees that color experience is more fine-grained than our general color concepts, but argues that general color concepts are not the only concepts which can be used to capture our fine-grained color experience. So it does not follow from the fact that we do not have as many color concepts as shades of color we can sensibly discriminate that some of our color experience is not captured by our color concepts. This is because we can deploy a context-dependent *demonstrative* concept to fill the role of capturing our color experience. We can use a demonstrative phrase such as "that shade" to capture the fine-grained detail of our color experience. I argue that when McDowell makes this move he generates a sorites paradox.

Some general color concepts have the feature that they subsume other color concepts. Orange may have traces of red in it, yet it is *not* subsumable under the general color concept "red." We cannot predicate red of orange. The sentence "Orange is red" does not make sense. With the concept "maroon," it is more difficult to say whether or not it is subsumable under the general color concept "red." On the other hand, a concept such as "light red" is subsumable under the concept "red." We can predicate "red" of "light red" and form the true proposition, "Light red is red." Similarly, the concept "kelly green" is subsumable under the concept "green," and the concept "lilac" is subsumable under the concept "purple." The sentence "Lilac is purple" makes sense.

With this in mind, let us suppose that the utterance *this shade* refers to a line on the color spectrum which is a paradigm shade of red. If "light red" is subsumable under the concept "red," then "paradigm red" is subsumable under the concept "red." Consider the following proposition in this context: "*This shade* is red." Since *this shade* is a paradigm case of red, we can predicate "red" of *this shade* to form a true proposition.

Given that "*This shade* is red" in the context described above is true, McDowell's solution to the fineness of grain argument falls prey to the sorites paradox. Let us denote the utterance of *this shade*, which refers to a paradigm case of red, as *this shade* (1). Let us then associate *this shade* (10) with patch ten, a paradigm case of orange. We can then fix each token utterance of *this shade* to a different patch in the example (*this shade* (2) to patch two, *this shade* (3) to patch three, etc.). This generates a sorites paradox:

P1: *This shade* (1) is red.

P2: If *this shade* (1) is red, then *this shade* (2) is red.

P3: If *this shade* (2) is red, then *this shade* (3) is red.

…

P(*n*): If *this shade* (*n-1*) is red, then *this shade* (*n*) is red.

C: Therefore, *this shade* (*n*) is red.

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[5] *Mind and World*, p. 57.

Suppose that n=10. *This shade* (10) is orange. Yet the conclusion to the argument states that *this shade* (10) is red. McDowell is caught in a sorites paradox generated by his use of demonstrative concepts.

Why does this paradox arise for McDowell? In his solution to the fineness of grain argument, color predicates are coarser-grained than demonstrative concepts, and demonstrative concepts have the same granularity as sensible discriminables. This is because in order to bridge the gap between color predicates and sensible discriminables in the fineness of grain argument, McDowell introduces demonstrative concepts with equal granularity to sensible discriminables. In doing this, McDowell closes the gap in granularity between concepts and shades that we can discriminate. But in doing this, he creates a new gap in granularity between color predicates and demonstrative concepts**.** And it is precisely this new gap in granularity, created by McDowell's solution, which yields the new sorites paradox for vague color predicates.

Vague Desire: The Sorites and the Money Pump

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An important foundational project in understanding language use is the Gricean [3] program of reducing meaning to communicative intentions. Here I will fill in some details in the Gricean picture, by outlining how linguistic vagueness arises from indeterminacies in preferences, as studied in models from economics and psychology. (The proposal is related to Fara's [2] treatment of "vague desire".) I will also sketch a connection with supervaluationist semantics.

An intention can be factored into a desire to make something the case and a belief that it will happen. For Gricean communicative intentions, the object of the attitude is that the audience comes to believe something, by means of recognizing the speaker's intention. Hence, a Gricean should attempt to reduce linguistic vagueness to indeterminacies in belief, and to indeterminacies in desire (preference and indifference).

A model for this approach can be found in the treatment of the perceptual foundations of belief, in Raffman's [5] study of intransitivities of indiscriminability. She argues that pairwise judgments of perceptual sameness undergo Gestalt shifts as a subject works her way through a sorites series, and this results in judgments about the items in a sorites series being subject to a sliding standard. This offers a contextualist dissolution of the sorites paradox: although each individual step seems compelling in some context, there is no context where they all seem compelling.

A similar phenomenon arises for desire, thanks to intransitivities of indifference. Consider these two examples (from Luce and Armstrong, respectively, cited by [4]). You prefer two lumps of sugar to one, and you prefer each to no sugar, yet you are indifferent between changes in a single grain of sugar. Hence your indifferences are intransitive, due to accumulating perceptual indiscriminabilities. A child prefers a bike with a bell to one without a bell, but is indifferent between each and a pony. Again indifference is intransitive, due to multiple criteria of evaluation. (The case focused on by Fara, where one of the competing criteria is efficient decision making, is an instance of this general phenomenon.)

Preference is connected with choice by the principle that an option is choiceworthy if undominated: there is nothing available which is preferred to it. The objects of choice in Gricean communication are the extensions and anti-extensions of predicates in a context. So we can see how sorites predicates (like "heap") arise as in the sugar example, while multi-criteria words (like "vehicle") behave in a manner like the example of the child.

Intransitivities of indifference lead to choiceworthiness being context-dependent. Especially, intransitive indifferences yield violations of this property of "expansion consistency" (as in [7]): if a pair of options are choiceworthy, then it isn't the case that only one remains so when the menu of options is enlarged. In our Gricean picture, this leads to the prediction that vague predicates will have different extensions depending on what else is in the context.

Intransitive indifferences lead to a paradox of sequential pairwise choice similar to the sorites. If you are willing to trade up for more preferred options, and you are willing to exchange items that you are indifferent between, you will end up in a potentially endless cycle of choice (and an expensive one, if you must pay to upgrade). It is has been argued (by [6]) that the problem with the "money pump" is not the preferences but how choice is determined by them: one should not choose independently of past choices or expected future options. This suggests that in a "forced march" sorites, one should not treat each step as if it occurred outside of the context of the march.

The psychological sources of vagueness are also of interest from un-Gricean perspectives. (For instance, Dummett [1] cites these psychological indeterminacies as determining the incoherence of language.) We can make a connection with the popular semantic theory of supervaluationism (as in [1]). There are several ways of extending intransitive indifferences into transitive ones, [4] and choosing on the basis of any transitive extension will avoid cyclical choice. So if partial meanings are determined by intransitivities of indifference, then their precisifications are determined by transitive extensions of indifferences. Some penumbral constraints on meaning can be seen as determined by transitivities in the preference relation, and by stronger conditions like Luce's semi-orders (representing threshold preferences in the sugar example).

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<u>Normative Predicates and Vagueness</u>

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Almost every theory of vagueness shares at least one feature: it uses, and in most cases heavily relies on, some kind of normative predicate (or predicates) in its metalanguage. Metalinguistic normative predicates are discussed chiefly by supervaluationists and other defenders of higher-order vagueness. According to this group of theorists, the existence of higher-order vagueness depends on and is explained by the vagueness of predicates like "definitely x". However, the question of how to characterize these predicates has wider interest. The vagueness of metalinguistic normative predicates may seem particularly worrisome to theorists who insist that the metalanguage used to describe a theory of vagueness be precise. In general, however, both for those who accept metalinguistic vagueness and for those who deny it, even in ordinary language normative predicates are difficult to classify. If they are not vague, what are they? If they are precise, how do you explain the possibility of generating a sorites paradox with them? Is a different solution to the paradox necessary for this class of predicates?

Normative predicates differ from standardly vague predicates such as tall and red in that their extensions are not arbitrary, that is, do not permit of multiple standards of application. A non-normatively vague predicate (tall, red) would not usually engender a heated debate about its application because its vagueness is widely recognized. But a normative modification of a claim involving a vague predicate (such as the claim that Bill is definitely tall – not just tall – or that Sally's hair color mandates the description red – not just that Sally's hair is red) is different. Two or more competent speakers of the language in which these claims are made would not debate these normatively modified claims; at the first sign of disagreement, they would have to withdraw the normative modification. For example, they would concede that Bill is tall according to one of them, but to the other he seems average, and so instead of being definitely tall they would say he is on the tall side or even tall compared to most people.

As a matter of fact, this very feature of normative predicates (that they do not permit of multiple standards of application, and hence do not allow for disagreement) explains why they get used so often in theories of vagueness. Normative modifications seem to eliminate the vagueness of vague predicates because they imply a kind of certainty (a definitely tall person really is tall). However, in practice, there are no people who are definitely tall, in the sense that every competent speaker of the language will always say they are tall in every context. Even if there are a few outlying cases that the vast majority of people would agree are definitely tall, the predicate definitely tall is just as susceptible to a sorites series as the predicate tall. Normative predicates share some features with vague predicates (e.g., lacking sharp boundaries) and other features with precise predicates (e.g. not permitting multiple, arbitrary standards of application). The difficulty lies not in deciding whether they fit better into the category of precise predicates or vague ones, but in the fact that they do not seem to fit satisfactorily into either, which suggests that they belong to a third distinct category.

The vagueness of normative predicates is a largely unrecognized problem. There has been an ongoing debate about the vagueness of the predicate 'vague', but this is a separate, though related, issue. Whether or not the predicate 'vague' is vague depends entirely on the definition of vagueness in question. The vagueness of normative predicates, on the other hand, is a problem for all theories of vagueness. In theories which recognize higher-order vagueness, the two issues overlap. The vagueness of normative predicates and the phenomenon of higher-order vagueness explain one another, and any theory recognizing higher-order vagueness likewise recognizes the vagueness of 'vague'. These theorists must still account for the normative force of these predicates, however, which sets them apart from typical vague predicates. Other theorists of vagueness deny higher-order vagueness and also define vagueness independently of borderline cases, but they must also still explain the status of normative predicates, especially if they employ normative predicates in their metalanguage.

Although this paper is not chiefly concerned with the question of whether the predicate ‘vague’ is vague, in my first section I will review the literature surrounding this debate for background. In Section II, I will present Diana Raffman’s theory of vagueness as an example of a theory that denies higher-order vagueness and defines vagueness independently of borderline cases. Despite defining vagueness in such a way as to seemingly eliminate the troubling problem of the vagueness of ‘vague’, she still does not have a way to classify normative predicates, and the question of whether ‘vague’ is vague arises again in connection with this classification. In Section IV, I will consider whether the epistemic account of vagueness offers a plausible solution for normative predicates.

Epistemicists do not rely on normative predicates in their metalanguage in the same way other theorists of vagueness do. Since they argue that all predicates have precise extensions, epistemicists do not use predicates such as ‘definitely x’ to help determine whether the vague predicate x applies in a particular case. If anything, ‘definitely x’ expresses the degree of certainty the speaker has that the predicate x applies. However, the speaker’s certainty about whether x applies or not has no bearing on whether the predicate actually does apply, and in borderline cases knowledge of whether it applies or not is simply not possible.

Not only do normative predicates not create problems in the metalanguage of an epistemic view, but they also seem to reduce the view’s implausibility. The main reason for the implausibility of the epistemic view is that the application of vague predicates seems arbitrary, and competent speakers of a language happily accept multiple different extensions for predicates without argument. However, uniquely in the case of normative predicates, their normative force seems to permit only one extension, even if nothing in the meaning of word itself specifies what this extension is.

The plausibility of the epistemic view of vagueness in the particular case of normative predicates does not save the whole view from charges of implausibility. It is a point in the favor of any theory of vagueness if it supplies one unified explanation for all cases of vagueness, but such a preference does not guarantee that a unified explanation is the right one or even possible. Normative predicates may fall into a distinct category within the field of vagueness, and if so it is possible that they require a distinct explanation. If such a separate explanation is permissible, or in fact necessary, the epistemic view may provide a plausible solution for this distinctive group of predicates.

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Membership for constructible concepts

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Conceptual vagueness reflect the fact that, apart from quantitative concept like *to-be-young*, *to-be-tall*, or even *to-be-red*, which can be qualified as *fuzzy*, there exist concepts for which membership is not an all-or-nothing matter. For these concepts, as observed by E. Rosch, the notion of membership degree must be substituted to that of the classical IS-A model. However, recent work on compositionality and concept determination showed important drawbacks in the original models, and the utility of a precise quantitative notion of membership became more and more dubious: see for instance (5), (7) and (8) for a discussion of the adequation of classical fuzzy logic to model categorization or prototype theory.

We propose an approach that enlarges and generalizes that of fuzzy logic, while better modelling the basic intuitions on which is founded categorization theory. Rather than dealing with a uniform gradation function, that would supposedly measure for each concept at hand its associated degree of membership, we represent membership relative to a concept f by a function *whose set of values depends on* f. Indeed, as observed by several authors (for instance (6)), there is no reason why the same set - the unit interval - should serve as a uniform criterion, being invariably referred to as a measure of membership whatever the concept at hand. This function is built with the help of the set Δ_f that gathers the *defining features* associated with f. The membership function takes its values in an abstract set, totally ordered through a relation $\leq_f$. It enables comparison between the objects at hand: such a representation is the most adequate to model notions like *object* x *plainly falls under the concept* f, *object* x *falls definitely not under the con-*

cept f or *object x falls more than object y under the concept f*. Comparing membership relative to a concept is indeed more basic a behavior than sorting for each object a membership value: for instance, an agent may consider that an *elevator* is definitely less a *vehicle* than a *chairlift*, while being unable at the same time to attribute a precise numerical membership degree to any of these items. Most often, the membership value attributed to a given item proceeds from its explicit or implicit comparison with other items.

In order to build the membership function, we start from the observation that, usually, concepts are learnt and understood through the help of several *simpler* concepts. Such a concept f is thus present in the agent's mind together with a finite set Δ_f of *defining features* that are considered as simpler, or less complex than f. Postulating the existence, at least for a given class of concepts, of a d*efining feature set* is part of several theories on categorization: see for instance (1), (3), (10), (11).

We recursively define the *complexity level* of a concept by ranking at level 0 the *sharp* concepts - those for which membership *is* an all-or-nothing matter - and, at rank n, the concepts whose defining features have complexity less than n. The set $\mathcal{F}$ of *constructible* concepts gathers, in a given context, all the concepts that can be attributed such a complexity level. Constructible concepts can be therefore considered as the outputs of a dictionary, whose inputs would consist of defining feature sets. There may exist other kinds of concepts in the agent's world representation. For example the (vague) concept *to-be-a-heap* is not a constructible one, and, therefore, the *sorite paradox* does not fall in the scope of the present theory, which is only meant to deal with constructible concepts.

This being done, it becomes possible to associate with each concept f of $\mathcal{F}$ a strict partial order $\prec_f$ that measures the relative f-membership of the objects at hand. This is performed by induction on the complexity of f: for instance, we may set $x \preceq_f y$ if, for all elements g of Δ_f, it holds $\varphi_g(x) \leq_g \varphi_g(y)$. Actually, the order defined in (4) is a little more subtle, as it accounts for the relative salience of the elements of Δ_f.

The membership order gives raise to a membership function φ_f taking its value in a finite totally ordered set. It is possible to normalize this function and obtain a membership gradation δ_f with values in the unit interval, thus retrieving the classical notion of membership degree. However, the direct use of membership orders and of their resulting non-normalized membership functions reveals itself to be more adequate to deal with compound concepts: these are concepts of the form $g \star f$, where g is a head-modifier of the (principal) noun-concept f. Then, membership relative to a compound concept is compositional, and the treatment of vagueness in composed concepts is free from the drawbacks encountered in classical theories.

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Vagueness, Semantic Representation and Verification

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This paper claims that the vagueness inherent in gradable adjectives is a reflection of an independently-motivated, underlying measurement mechanism, called the *analog magnitude system* (AMS). The AMS is a language external system that can be called on to help verify sentences. Differences between positive forms of gradable adjectives like *tall* (1) and their comparative forms (2), in terms of vagueness, is a consequence of what the AMS is measuring: for positives it measures and compares objects, and for comparatives it measures and compares abstract units (degrees). This distinction is caused by the morpho-syntactic differences between positives and comparatives.

(1) John is tall ∅/for a jockey/compared to Bill.

(2) John is taller than Bill.

Positives differ empirically from comparatives in at least three ways.[1,2] First, comparatives allow measure phrases to describe the difference between the two objects compared, but not positives. (3-4).

(3) John is **three inches** taller than Bill.

(4) *John is **three inches** tall for a jockey/compared to Bill.

Second, only comparatives allow crisp judgments (5-6). Comparatives can be used to describe even minute differences, but small differences are not enough to warrant application of the positive.

(5) Context: a 100 page novel and a 99 page novel
 a. This novel is longer than that one.
 b. #This novel is long compared to that one.

(6) Context: a boy is 5' 1/8", while everyone else in his family is exactly 5' tall
 a. This boy is taller than everyone else in his family
 b. #This boy is tall for a member of his family.

Third, positive adjectives *even when they are accompanied by an explicit standard* create compelling Sorites premises (7)-(10)[7], but comparative adjectives (14) resist them.

(7) √Anyone who is 1mm shorter than someone who is tall is also tall.

(8) √Anyone who is 1mm shorter than someone who is tall for a jockey is also tall for a jockey.

(9) √Anyone who is 1mm shorter than someone who is tall compared to Bill is tall compared to Bill.

(10) #Anyone who is one nanometer shorter than someone who is taller than Bill is also taller than Bill.

These differences are unexpected if the semantic representations of both positives and comparatives should be written in terms of *degrees*, or precise points on a measurements scale, as in (11-12).

(11) ||John is tall|| =1 iff ∃d [john is d-tall and **d > c**] *c = salient standard height*

(12) ||John is taller than Bill|| =1 iff ∃d∃d' [john is d-tall & Bill is d'-tall & **d > d'**]

This is true even in cases where the standard is expressed via a *for-PP* or a *compared-to* phrase. A degree analysis would posit a precise degree to represent the standard expressed in those phrases. So, a positive adjectival construction can be a comparison, but not of two exact degrees.

Models of AMS's accurately describe the abilities of many species (including humans, human babies, bees, rats, and monkeys) to mentally represent number, quantity, or magnitude without counting.[3,4,5] An analog magnitude is an inherently noisy mental representation that obeys Weber's law: their imprecision linearly increases with their magnitude.[6] The higher the number, the fuzzier it gets, and the harder it is to discriminate it from other high (and fuzzy) numbers that are close to it. For instance, even when we are prevented from counting, we are still very good at discriminating quantities of 2 and 3; but we get much worse when forced to discriminate 8 from 9, 22 from 26, or 360 from 380, etc. The same applies to discriminating magnitudes such as luminosity, weight, heat, etc.[6] Analog magnitudes can be accurately represented as Gaussian, and as such, a mathematics has been devised so that they can be compared via addition and subtraction algorithms, the result of which can indicate the higher or lower of two magnitudes (with an error dependent on Weber's Law).

The AMS can help describe the differences between positives and comparatives. Let's assume that the AMS measures and compares the entities in a positive adjectival construction under verification. First, measure phrases cannot describe the distance between two analog magnitudes because these analog magnitudes do not exist on a scale, nor can their differences be measured consistently. Second, because analog magnitudes can be difficult to discriminate, we cannot make crisp judgments. This predicts that crispness is a function of discriminability, which appears to be true. A 1' difference is enough for a crisp judgment when comparing 5' and 6' but not 200' and 201'.

(13) Context: John = 6', Bill = 5'; John's office building = 200' Bill's building = 201'.

c. John is tall compared to Bill.

d. #?John's office building is tall compared to Bill's office building.

Third, positive adjectives are vague because Gaussian values do not have boundaries in the sense that degrees do (or degree intervals, which have precise boundaries). Hence, the vagueness that is apparent in positive adjectival constructions is a product of the verification device that measures magnitudes.

It has been argued that even comparative adjectives are vague, though in a different way than positives.[8,9,2] This vagueness appears to be dependent on measurement granularity. Russell famously pointed out that perhaps all of natural language was vague and used a measure phrase as an example: what counts as one foot?[10] The answer depends on our own interests and abilities in the contexts that we use measure phrases. We could measure very precisely, and exclude measurements that are too big or small, or we could measure less precisely and include those very same measurements. The unit itself (for instance, *one foot*) is vague. Let's call this *observational tolerance*. Hence, even though there are clear differences in (7-10), we can arrange a context in which the granularity of measurements creates borderline cases and a tendency to accept Sorites sentences. Suppose John wants to wear Bill's suit. Pete is taller than Bill, and can't fit into Bill's suit.

(14) Anyone who is only 1/8" shorter than some who is taller than Bill is still taller than Bill.

For (14), when the context becomes one in which we are worried about wearing suits, then small differences are tolerated, provided they aren't too big to make a difference for suit-wearing. 1/8" isn't going to make a difference: if Pete couldn't wear the suit, neither could John. It is the granularity of our measurements, i.e., measurements consistent with our needs and worries, that drive this type of vagueness (or, 'natural precisifications' in [11].) We can provide an explanation for this if we again invoke AMS for use in verification. The difference is that in comparatives, AMS measures a unit of measurement, not an entity, as it does with positives. Recursive application of this measurement smooths out error and fuzziness, and we get the properties that are apparent in comparatives.

Something about the semantic representation of each construction forces the AMS to either measure and compare entities or units of measurement. The difference between the two is a matter of whether or not there is measurement unit in the semantic (or conceptual) representation or not.

(15) Degree comparison: entities must be mapped onto degrees and their degrees compared

(16) Individual comparison: entities must be compared directly, without intermediary degrees

Then, the AMS simply does what comes natural to it: it measures units (or, degrees) for comparatives and individuals for positives. Degree comparison vs. individual comparison must therefore be a function of the degree morphology *–er/more* and its syntax.

There is (at least) one exception to the generalization that positives are comparisons between individuals: [12] points out that *full* is different from *tall* in that included in the conceptual meaning of *full* is a maximum measurement. A container can be *completely full* but one can't be **completely tall*. This maximum, [14] argues, is responsible for adjectives such as *full* behaving like comparatives – with precision and (at most) observational tolerance. Assuming that this is true, we can say that the AMS does not measure an entity's *fullness*, even in the positive form, because *full* conceptually provides a unit, namely the container. The container that is being compared is itself a unit. This is why a glass, pool, or lake can be *a quarter full, half full,* etc. The AMS is not intimately wired into the semantic module such that it responds to specific requests for it to measure particular things. Rather, it simply measures the things that if finds to be measurable, i.e., entities or units.

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“Vagueness and Rationality” – Abstract

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Sometimes we organize our practical concerns around vague concepts. For example, I may care about *baldness*. I may, all other things being appropriately equal, prefer that I be (fully, determinately) hirsute rather than (fully, determinately) bald. Indeed, I may prefer that I spend $10,000 on cosmetic surgery and be (fully, determinately) hirsute rather than keep the money and be (fully, determinately) bald. But I may lack a general preference for having more hairs on my head. I may not prefer that I have 56,604, rather than 56,603 hairs on my head – after all, one hair is not going to make the difference between my being hirsute and my being bald.

Here is a sorites-like argument to the conclusion that preference-patterns like this are irrational. Consider, first, states of affairs S_0 to $S_{100,000}$.

S_0 In which I end up with 0 hairs on my head and pay $0
S_1 In which I end up with 1 hair on my head and pay $0.1
.
$S_{100,000}$ In which I end up with 100,000 hairs on my head and pay $10,000

For any n, I prefer S_n to S_{n+1}. ‘Why pay ten cents to end up with one extra hair?’ But I do not prefer S_0 to $S_{100,000}$. I will happily pay $10,000 to be hirsute, rather than bald. So my preferences between states of affairs are intransitive. But rationality demands of me that my preferences between states of affairs be transitive.

The argument shows that if we organize our concerns around vague concepts (i.e. we are willing to pay $10,000 to end up hirsute, rather than bald) then we are rationally committed to caring about small increments (i.e. being willing to pay ten cents to end up with one extra hair).

Well and good. In this paper I will look at some sorts of cases in which there is a tension between organizing our concerns around vague concepts and caring about small increments.

The primary sort of case is one in which the increments are small enough to be *imperceptible*. Suppose that I am willing to pay $10,000 for a bright yellow suit, but unwilling to pay anything for a dull yellow suit. Many yellow suits are available for me to purchase, ranging from dull to dazzling, cheap to expensive. Consider states of affairs S_0 to S_{100}.

S_0 In which I end up with a dull yellow suit, and pay nothing
S_1 In which I end up with an imperceptibly less dull yellow suit and pay $100
.
S_{100} In which I end up with a bright yellow suit and pay $10,000

I prefer S_{100} to S_0. So, if I am to avoid having intransitive preferences between states of affairs, there must be some n such that I fail to prefer S_n to S_{n+1}.

But, for any n, why not prefer S_n to S_{n+1}? – after all, the suits in S_n and S_{n+1} are imperceptibly different, and I am $100 better off in S_n. It seems irrational to pay an extra $100 for an imperceptibly brighter suit.

There is an apparent paradox here. Some philosophers have suggested that we should resolve it by conceding that there are cases in which it is rational to have intransitive preferences between states of affairs. I disagree. We should instead concede that it may be in our interest to pay for imperceptible phenomenal upgrades ($100 for an imperceptibly brighter suit). I argue that the thought that it is irrational to do so equivocates between two senses of 'imperceptible.'

This primary sort of case has an important moral. Because there are situations in which it is in our interest to pay for imperceptible phenomenal upgrades, there are situations in which we are unreliable authorities on our own hedonic good.

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An Interpretive Theory of Vagueness

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I outline an interpretive theory of vagueness, emphasizing its advantages as a theory of language in use, compatibility with the data of descriptive linguistics, and its explanation for the interest-relativity of vagueness. Central to the theory is the notion that a 'language' in the usual sense is not a well-defined object but a cluster of more or less similar sound-meaning mappings which speakers and interpreters choose among in concrete circumstances to achieve particular communicative goals. Vagueness is argued to be located not in the expressions of any particular sound-meaning mapping, but in the range of such mappings available as interpretive theories in a particular communicative situation. This approach has several advantages: it is derived from an independently motivated theory of interpretation; it explains the interest-relativity of vagueness noted by Graff (2000) without stipulation; and it provides an account not only of how but also of *why* some predicates are vague and others are not.

Williamson (1994) explains vagueness as an epistemic phenomenon: speakers have only inexact knowledge of their language. Williamson assumes a strong form of semantic externalism according to which a language is an external object of knowledge for speakers, so that, for instance, "[t]he thoughts and practices of speakers of English establish that the truth condition for 'Harry is bald' is that Harry is bald…" (1997, p. 217). Thus the character of a speaker's language is fully determined by facts about his linguistic community, which is assumed to be a well-defined object.

Lassiter (2008) argues that this type of strong externalism is incompatible with the findings of descriptive linguistics that language variation is typically gradual, that linguistic communities cannot be defined with any precision, and that normal usage is subject to considerable variation. In other words, a 'language' in Williamson's sense is a prototypically vague object, unable to fulfill the demands he places on it. As an alternative, Lassiter proposes a theory of interpretation motivated by facts about code-switching and sociolinguistic accommodation. He argues that a 'language' is a cluster of sound-meaning mappings whose precise composition can vary considerably from situation to situation, and that partial and shifting overlap between a speaker's intentions and a listener's interpretive theory is the norm.

The account of vagueness that I will explore is an epistemic theory of sorts, beginning with this hypothesis: vagueness is not incomplete knowledge of a precisely defined common language, but incomplete knowledge of the intended language of communication, and therefore a natural byproduct of the process of interpretation. Since an interpreter can never have complete knowledge of a speaker's intended meaning, there is always a range of interpretive theories which, given the linguistic and non-linguistic context, could be used to interpret a speaker's utterance in a plausible fashion. Vagueness exists because an interpreter can never know exactly which of these theories are intended.

According to Stalnaker (1978), the function of an assertion is to eliminate certain possibilities from the common ground, construed as a set of worlds considered by the conversational participants as live possibilities for how the actual world might be. Stalnaker's model of assertion can be extended to metalinguistic assertions (cf. Stalnaker (2001)). Among the assumptions that speakers bring to a conversation are facts about the linguistic context, notably a prior theory about what sound-meaning mappings are likely to be useful in communicating information given facts about the situation (the identity of the speaker, the location of the conversation, etc.; see Davidson (1986)). Thus assertions can also serve to eliminate interpretive theories from the common ground. For instance, suppose someone asks, 'What is an optometrist?' Given the speaker's ignorance, there might be two live possibilities: in L_1, 'optometrist' and 'eye doctor' are mapped to the same concept or set of individuals; in L_2, 'optometrist' and 'plumber' are mapped to the same concept or set of individuals. In this context, the reply 'An optometrist is an eye doctor' serves to eliminate L_2 from the common ground (if we take possible languages as a separate dimension within a multidimensional semantics as in Stalnaker (2001); alternatively the utterance could serve to eliminate possible worlds in which the language of communication in the ongoing conversation is L_2, cf. Barker (2002)).

One consequence of Lassiter's (2008) notion of a cluster of interpretive theories is that there is a very large number of possible languages, many of which are minimally different from each other. This, then, is a further similarity between languages and possible worlds in the Stalnakerian theory of assertion described above. In principle, any string of sounds could be used to designate any arbitrary set of objects or properties. Suppose that a language L contains only non-vague expressions. If a string of sounds U is taken by an interpreter to express some predicate ϕ in L which divides an ontologically continuous object or property (e.g. height or the color spectrum) into two or more sections, U could in principle express an unlimited number of distinct predicates $\phi_1 \ldots \phi_n$ corresponding to distinct divisions of the continuum, each of which is embedded in a distinct language $L_1 \ldots L_n$. For example, there are possible languages in which the dividing line between 'tall' and 'not tall' is 5′11″, 6′0″, 6′0.1″, 6′0.2″, 6′0.21″, 6′0.22″, and so on.

Suppose that a speaker A utters a string of sounds U directed at a listener B. B's initial task as an interpreter is to determine, using whatever prior knowledge and contextual clues she can assemble, the intended meaning of U. In normal situations B will have a reasonably clear idea in advance of what kinds of utterances A is likely to use to convey what meanings even for potentially vague utterances. For instance, if B knows that A is a speaker of English and A utters the sentence 'My new car is red', B's prior theory will exclude most possibilities for the reference of 'red', e.g. that it refers to old objects or the portion of the color spectrum normally designated by 'blue'. Thus B, using features of the context (e.g. knowledge of the interests and linguistic dispositions of A or people like A) immediately eliminates the vast majority of potential candidates for the reference of 'red', but many candidates remain. Each of these candidates can be taken as a predicate of any of a class of languages each of which contains only non-vague predicates. Even with most possible languages excluded from consideration by a prior theory, then, there is a large number of possible languages which are potentially useful for interpreting A's utterance.

By this reasoning, the appearance of vagueness boils down to this: the applicability of a vague predicate appears to drop off gradually as we move along a continuum because the interpreter has gradually diminishing justification for taking the speaker's utterance U to express *just this predicate*. This theory predicts that if there were for some reason a sharp cut-off in the plausibility of an interpretive theory at a single point in a continuum, vagueness would disappear. This prediction seems to be borne out: a sharp decline in the plausibility of neighboring interpretive theories is precisely what characterizes non-vague predicates. The reason is that the justification for an interpretive theory is intimately tied up with reasoning about a speaker's interests, values, and communicative purposes. A human speaker is likely to use terms that apply to groupings of objects or properties that serve some particular human purpose; so, for example, a term covering tables, chairs, and lamps ('furniture') is useful not because these items form a natural class ontologically, but because they are useful to humans in particular ways. Similar groupings make less plausible linguistic items not because they are ontologically more diverse than furniture, but because no obvious human purpose would be served in talking about them.

I suggest that the reason that some predicates are non-vague is that there is a sharp cut-off in the plausibility of any interpretive theory that extends them further. For example, 'human' is relatively clear: fetuses excepted, there is little room for borderline cases. An interpretive theory taking various human-like things (e.g. chimps and cardboard cut-outs of people) to be borderline cases of 'human' would be wildly implausible given known human interests (e.g., talking to other people) and the fact that there are sharp boundaries in the things in the world that can fulfill these interests. The theory proposed here, like Graff (2000), makes the prediction that vagueness should be predictable from human interests. Graff explains interest-relativity by enriching the logic with a NORM operator; in contrast, I propose that the interest-relativity of vagueness can be derived from an independently motivated theory of interpretation.

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Vagueness and Ordinary Understanding of Measurement Phrases

Trying to Understand Vagueness Differently

Sophia's height is *183 cm according to this two-meter stick (which has a precision of 1 cm).*
My pen's length is *14.3 cm according to my ruler (which has a precision of 1 mm).*
Mary's weight is *58 kg according to her scale (which has a precision of 0.5 kg).*
The length of this movie is *113 min according to this chronometer (which has a precision of 1 min).*

The term "**measurement phrases***" refers to all of the measurement phrases written *in italics* in the previous sentences and, more generally, all of the measurement phrases of the form:

Being X [um] ***according to*** **MI(p[um])**

(*MI(p[um])* is a measuring instrument whose precision is p[um] (with p a decimal number);
[um] is an abbreviation for "unit of measurement"; and,
X is a decimal number corresponding to one of the graduations of MI, the measuring instrument used.)

We can distinguish two ways of understanding measurements. The first one, which we will call "***full* understanding,**" corresponds to the understanding and the expression of measurements as they are used in experimental sciences and laboratories. According to this kind of understanding:

(FU1) Measurements *basically* expressed a comparison between:
- one aspect of an object (or event) and
- aspects of other objects of the same kind (grouped together or not) taken as reference points.

According to this full understanding, for instance, the sentence

My pen's length is 14.3 cm according to my ruler (which has a precision of 1 mm),"

expresses the following comparison:

Among all of the distances separating the mark on my ruler referred to by "0" and other marks on it, the one which is the closest to the length of my pen is the one separating the mark "0" and the mark that can be referred to as "14.3."

Consequences of (FU1) are two facts that are well known by all scientists who have performed experiments in laboratories and are as follows:

(FU2) (a) Every measurement contains some uncertainty; and so
(b) Every measurement should be expressed with the mention of that uncertainty.

As a consequence of (FU2), in experimental sciences, a measurement is usually expressed not only by *one* number and a unit of measurement but by a number (i.e., the best estimate), a unit of measurement, *and an uncertainty*, in other words, by *a range* and a unit of measurement. (Concerning uncertainty in measurements, see the first chapters of Taylor (1997) as an example).

For example, in the case of the pen, if for simplicity we suppose that the uncertainty in measurements comes only from the ruler's precision we should have:

My pen's length is 14.3 ± 0.05 cm; or

I can be reasonably confident that my pen's length lies somewhere between 14.25 and 14.35 cm.

The uncertainty involved in every measurement is also usually called "error" or "margin of error." Using "uncertainty" seems preferable in order to avoid two possible misunderstandings. First, in science, the term "error" does not carry the usual connotations of mistake or blunder. Second, the "margin *of* error" is not equivalent to the "margin *for* error" of Williamson (See for instance Williamson (1994)).

The other way of understanding measurements corresponds to the ***ordinary* way** and is actually a *partial* understanding. It is characterized by the following double unawareness: unawareness of (FU1) and unawareness of (FU2).

It can be shown that two fascinating similarities occur between measurement phrases* when ordinarily understood and vague predicates:

(1) Features similarity: When understood in the ordinary way, measurement phrases* have the same distinctive features as vague predicates, i.e., an apparent possession of borderline cases, an apparent lack of a well-defined extension, and an apparent ability to generate sorites paradoxes. Additionally, in both cases, these features generate the same kind of problems (e.g., truth-value unclarity in borderline predication, questioning bivalence, questioning excluded-middle, sorites paradoxes).

(2) Solutions similarity: If one continues with the ordinary way of understanding measurement phrases* and tries to settle the problems raised, one can discover and propose explanations and solutions similar to the four main classical theories of vagueness: epistemicism, supervaluationism, many-valued logics, and ontological vagueness. Moreover, as in the case of vague predicates, each of these similar solutions exhibits important drawbacks.

From this double similarity, we can seemingly claim that:

(3) Vague predicates and measurement phrases* share a common fundamental way of working.

However,

(4) If measurement phrases* are fully understood, the distinctive features that they share with vague predicates appear to be *only* apparent ones, and the problems mentioned previously vanish. For instance, there is no more real difference between what appeared to be borderline cases and what appeared to be clear cases: both have to be explained and expressed by a range of values.

Therefore, from (3) and (4), we can seemingly claim that:

(5) If it is acknowledged that vague predicates and measurement phrases* share a same fundamental way of working and if this working is fully understood, then the distinctive features of vague predicates appear to be only apparent ones, and all the problems and difficulties surrounding vague predicates vanish (while we can, for instance, keep the classical logic).

and so

(6) The vagueness of vague predicates is a phenomenon that appears when one does *not* acknowledge that they share a same fundamental way of working with measurement phrases* or when this working is *not* fully understood.

The new path outlined above would *not "only"* give a more adequate account of vagueness (i.e., one with fewer drawbacks than the main classical positions) *but also* explain why the four classical theories of vagueness have important drawbacks and that none clearly prevails over the other because they all rest on a double misunderstanding.

Many things should be done and added to fully expound and defend the presented position. The principal ones obviously should be giving extensive arguments for (1) and (2) and a description and an explanation of the same fundamental working that is common to vague predicates and measurement phrases* mentioned in (3). This is obviously not possible in the limits of this talk. Therefore, after a presentation of the outlines of the new position that I am trying to explore, I will focus my talk on the first arguments in favour of (1). Thus, my talk can be seen essentially programmatic.

In conclusion, I would like to say that measurements have already been associated with vagueness on several occasions, sometimes in very different contexts (for instance, see Keefe (2000), p.125-138, in which measurements and measurements scales are considered to deal degree theorists a decisive blow), and sometimes in close ones (for instance, see Pinkal (1996) or much earlier Swinburne (1967)). Nevertheless, even if local parallels are sometimes possible, the overall strategy described here – with its consideration of a special kind of measurement phrase, of two possible understandings of measurement phrases, and of the idea of a common origin for vague predicates and measurement phrases* and with its explanation of why the classical positions on vagueness have important drawbacks – has not yet been explored at all.

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Indeterminate Reference

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> The only intelligible account of vagueness locates it in our thought and language. The reason it's vague where the outback begins is not that there's this thing, the outback, with imprecise borders; rather there are many things, with different borders, and nobody has been fool enough to try to enforce a choice of one of them as the official referent of the word 'outback.' Vagueness is semantic indecision. (Lewis, 1986, 213)

According to the view of vagueness as semantic indecision, whatever it is that in the thoughts, experiences and practices of language users determines the meaning of expressions, it fails to determine any single one entity as reference, from a given range of equally natural ("precise") candidates. According to a view where there is vagueness *in rebus*, by contrast, some objects or properties can themselves be vague.

But is the view of vagueness as semantic indecision committed to vagueness in *semantic* rebus? (Merricks, 2001) suggests that it does, in this paper I argue that it does not.

(1) is indeterminate and (2) is false:

(1) Harry is bald.

(2) 'Harry is bald' is true.

How about (3)?

(3) 'bald' applies to Harry.

I guess one may use 'applies' in a way that makes (3) match (1)—along the lines of (4)—and in a way that makes (3) match (2)—along the lines of (5). If the former, (3) is itself indeterminate, if the latter, it is simply false.

(4a) The extension of 'bald' has Harry as a member.

(4b) The property 'bald' signifies is had by Harry.

(5) 'bald' is true of Harry.

Similarly, (6a) is true, (6b) indeterminate, and (6c) false:

(6a) 'Everest' refers to Everest.

(6b) 'Everest' refers to Everest_{17}.

(6c) 'Everest' refers to Kilimanjaro.

So the view of vagueness as semantic indecision makes (3)—understood along the lines of (4)—indeterminate. According to (Merricks, 2001), assuming that "bald" and 'Harry' are (relevantly) precise, the view is then committed to vagueness in (semantic) rebus. But this is so *unless* 'applies' (as well as 'extension,' 'refers,' 'signifies,' and the like) exhibits itself semantic indecision. In the paper I argue that the view of vagueness as semantic indecision actually predicts such indeterminacy in semantic vocabulary.

Merricks considers this, and says that in that case “there would be no indeterminacy or semantic indecision.” But I argue show that his reasons depend on the wrong contention that ‘applies’ *determinately* refers to all of its precisifications—instead of *indeterminately* referring to each one of them.

(Salmon, 2007) objects that semantic indecision of the semantic vocabulary would generate a vicious hierarchy of different semantic notions. I finally argue that the hierarchy doesn’t need to involve than just the same notions once and over again, and that it is as innocuous as that of truth in:

(7a) Everest is a mountain.

(7b) ‘Everest is a mountain.’ is true.

(7c) “Everest is a mountain.’ is true.’ is true.

...

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“Epistemicism about vagueness and meta-linguistic safety”

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In his seminal book *Vagueness*, Timothy Williamson defends a combination of the following positions: First, sentences containing vague expressions satisfy (other things being equal) the relevant instances of the law of excluded middle and the law of bivalence. For example, even if Jack is a borderline case of baldness, then either Jack is bald or he is not bald, and ‘Jack is bald’ is either true or false. To speak more metaphorically: vague expressions have “sharp cut-off points”. Second, we do not and cannot know the sharp cut-off points of vague expressions. Third, the explanation of why we do not and cannot know the sharp cut-off points of vague expressions is a safety-based explanation. Roughly, the explanation is this: in close-by possible worlds, ones in which the use facts for a certain vague expression differ only ever so slightly than the actual use facts, the meaning and consequently the cut-off point of the expression is slightly different (to use the terminology of Hawthorne (2006), vague expressions are ‘semantically plastic’). This entails that our beliefs about the cut-off points of vague expressions are not safe and thus do not constitute knowledge.

Our aim in this paper is to challenge Williamson’s safety based explanation for why we cannot know the cut-off point of vague expressions. We assume throughout (most of) the paper that Williamson is correct in saying that vague expressions have sharp cut-off points, but we argue that Williamson’s explanation for why we do not and cannot know these cut-off points is unsatisfactory.

In **§1**, we present Williamson’s position in more detail. We note in particular that Williamson’s explanation of our ignorance implicitly relies on the following safety-principle being a necessary condition on knowledge:

The principle of meta-linguistic safety for belief (MBS): An agent X's belief that p is safe if there is no close possible world *w* such that (i) in *w*, X has a belief that can be adequately described in *w* using ‘p' (ii) that belief is false in *w*.

In **§2**, we argue that even if MBS were a necessary condition on knowledge that would not entail that we cannot know the cut-off points of vague predicates. In **§3**, we present our core objection to Williamson’s view. We argue that MBS is not a necessary condition on knowledge by presenting a series of cases where an agent has a belief which violates MBS but which nonetheless constitutes knowledge. In **§4** we discuss an objection to our view, one according to which if it were allowed that we know non-meta-linguistic cut-off point claims (‘*m* is the cut-off point for tallness’) that violate MBS, then it should be allowed that we know meta-linguistic cut-off point claims (‘*m* is the cut-off point for ‘tall’’) which violates a more straightforward safety condition on knowledge. We argue that this objection is not compelling. Finally, in **§5** we briefly discuss what are the possible directions that a theory of vagueness can take if our objections to Williamson’s theory are taken on board.

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Borderline cases and permissibility

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The paper explores the idea that when a proposition p is borderline, p is permissible: we can assert p, deny p or suspend judgement about p - for all we know, nothing mandates one of these attitudes. The vagueness of p leaves open what we have to *think* of p. Recognition that p is borderline amounts to be *tolerant* toward any of three following attitudes on p: 1) hesitant acceptance of p (positive view); 2) hesitant denial of p (negative view); 3) agnosticism about p (agnostic view). Let's say that p is *permissible* when it is *recognised* that it is borderline. Permissibility is thus an attitudinal notion, though it is linked to the status of being borderline, it is not just the notion of borderliness but, rather, our characteristic attitudes to towards three possible dispositions towards borderline propositions - i.e. denial, acceptance and suspension of judgment. When p is borderline, we consider permissible having any of the three latter attitudes towards p.

In the paper I scrutinize two main readings of permissibility. According to the first one - the *excusatory conception* - the tolerant attitude characteristic of permissibility is connected to the absence of epistemic blameworthiness. Whoever takes a view in borderline cases is not blameworthy of having overlooked some evidence since the fact is evidence-transcendent. Whoever decides to be agnostic is excused in the sense that, being inescapably ignorant of the fact of the matter, she is exculpated in forming any relevant belief because of the impossibility for her to get any further information - there is no further evidence she could acquire to take a view for, if she has not formed any belief, there is nothing more she can do to unlock her suspension of judgement. This reading assumes that there is no possibility of having knowledge in the borderline area and that, *a fortiori,* our judgements in borderline area are not knowledgeable. Whether or not there is there is actually a fact of the matter about p, knowledge whether p, when p borderline, is foreclosed to us. But if this is so, then why should I assert or deny that

p when I know that I cannot but lack knowledge of p? And why should I even entertain any belief about p? Analogously, why should I ever be disposed allow someone to take a view if I know that she does not know and that she cannot know? The excusatory conception falls victim to the problem that agnosticism becomes rationally mandated - let's call this problem the *Agnostic Collapse* (originally formulated in Sorensen (1994)).

A second reading of permissibility - the *lacking-any-reason-against conception* - interprets "tolerant" as "lacking any reason against": recognition that a case is borderline amounts to lacking any evidence against a positive view, a negative view and a agnostic view. However, this reading is hostage again to the Agnostic Collapse problem. Suppose I recognise that a proposition p is borderline, this recognition is tantamount to the fact that I lack any reason against taking a positive view; but I also lack any reason against a negative view. Hence I lack reason against any view. But if I lack any reason against p and not-p, I have no reason for not-p and for not-not-p. Hence I should be agnostic on p.

The the Agnostic Collapse problem shows that permissibility cannot easily be stabilised to make justice to intended liberality of underlying intuition.

In the paper I explore whether either contextualism (Kamp (1981), Fara Graff (2002), Raffman (2005), Shapiro (2006) or supervaluationism (Fine (1975), McGee and McLaughlin (1994), Keefe (2000)) can spell out the excusatory conceptions thus escaping the Agnostic Collapse problem and I argue that they cannot. I consider then a refinement of the lacking-any-reason-against conception that could escape the Agnostic Collapse problem. According to this refinement the source of vagueness is a form of second-order ignorance: in borderline cases we gently disagree because we are not in a position to assess the knowledgeability of the verdicts. Borderline cases are cases where we cannot identify a warrant for a positive or negative verdict and where, at the present state of information, it is undecidable whether this unidentifiability is due to the impossibility to advance a knowledgeable verdict in the borderline area (Wright (2001)). Agnostic Collapse is avoided because, since we are not in a position to know whether borderline propositions are unknowable, we should abstain from blaming who takes any of the three views.

Crispin Wright's proposal in "Being on a Quandary" is here considered and criticized. The main problem with that proposal is that permissibility was explicated as the lack of warrant for the inference that goes from from the denial of failure of Cognitive Command to Cognitive Command itself - where Cognitive Command - CC - says that, put it roughly, that a disagreement involves cognitive blameworthiness on the part of one of the disputants. However, the attitude of accepting that there cannot be cognitive blameless disagreements while refraining to assert CC does not avoid the problem of Agnostic Collapse. In fact, according to quandarysm, given we lack knowledge of the existence of some evidence for taking a view in a borderline case, if a thinker has not formed any belief, there is nothing more she can reflectively do to unlock her suspension of judgement. The agnostic attitude seems to be a cautious attitude that is rationally appropriate in such cases. Moreover, according to quandarysm it is also true that any reflective subject who takes a positive or negative view cannot but believe that her view and the opposite one cannot be both right, and hence, provided acceptance of a view involves the attitude that the view should be taken, she cannot but regard the opposite view as something that should not be taken and hence incorrect. Quandarysm seems to justify only the agnostic view while at the same time leaving no conceptual space for any notion of permissibility.

It seems then that an agnostic theory must avoid agnostic collapse by refraining to infer from the impossibility of the falsity of CC to the impossibility of recognizing on the part of someone who takes a view in borderline cases any legitimacy to take the opposite view. By analysing borderline permissibility as a peculiar situation where the informative state of a thinker introduces a peculiar opacity to her reasons for or against the relevant borderline proposition, I try to show that this opacity is reflected in the reasons that we, as reflective thinkers who take a view in borderline cases, can attribute to whoever take an opposite view, thus avoiding to be committed to delegitimize the opposite view.

The paper ends exploring some objections and connecting this view to agnostic theories of vagueness.

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Graded Predication by Evaluation

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Background —Apart from a specialised degree vocabulary, languages have many less specific means for indicating the degree to which a predicate holds. Evaluative adverbs, for instance, can modify degree when they immediately precede a predicate, as in (1).

(1) Iwan is unbelievably tall.

This paper considers the semantic question of how this form of degree modification comes about and how to explain the ways in which it is restricted. In the syntactic literature, two types of degree expressions are normally distinguished (Neeleman et al. 2004 and references therein): those restricted to the adjectival domain (*very, too*), and those that are less restricted in their modification (*quite, more, enough*). Evaluatives, however, seem to form a separate group.

(2) Iwan is *very / quite / *unbelievably a weirdo.
(3) Iwan is a(n) *very / *quite / unbelievable weirdo.
(4) Iwan is very / quite / unbelievably weird.

The use of evaluatives as degree modifiers is restricted in two more senses. Firstly, in languages that distinguish plain adverbs from adverbs ending in -*weise* (German) or its cognates, only the simpler forms act as degree modifiers, as shown for German in (5).

(5) Der Film ist unglaublich bizarre.
The movie is unbelievably weird.
'The movie is unbelievably weird.'

(6) Der Film ist unglaublicherweise bizarre.
The movie is unbelievably-weise weird.
`Unbelievably, the movie is weird.'

Another restriction is that the class of degree modifying adverbs is limited to a certain group of evaluative adverbs. For instance, modal adverbs do not modify degree, unless they are negated.

(7) Iwan is necessarily angry. (only: it is necessary that Iwan is angry)
(8) Iwan is unnecessarily angry. (possible: Iwan is angry to a degree that is unnecessary)

There exist a handful accounts of the semantics for (1) (Morzycki 2007; Katz 2005). To the best of my knowledge, however, the remaining data have not been observed or discussed before. In this paper, I build on and extend an earlier proposal I made for (1) (Nouwen 2005).

The proposal —I account for the contrast between (1) and (9) by assuming a difference in underlying logical form, where in (9), but not in (1), *tall* is in the positive form. That is, whereas in (1) the degree argument of *tall* is modified, in (9) it is provided by a silent positive operator.

(9) Unbelievably, Iwan is tall. (only: Iwan is tall, and that's unbelievable)

The -*weise* adverbs in languages like German and Dutch are propositional operators. So, the adjective in (6), but not in (5), is left in the positive. Two questions spring to mind, however, if non-propositional adverbials modify gradable predicates: (i) What does this modification semantically involve? and (ii) Why is their distribution not that of other degree modifiers?
My proposal is to have a fairly simple semantics for predicate-modifying evaluatives, as in (10).

(10) unbelievably: $\lambda P.\lambda x.P(x)$ & unbelievable[^P(x)]

Degree modification occurs when a predicate comes with a (silent) degree head which makes the degree argument of the predicate available for modification (cf. Kennedy 1997; Morzycki 2006). The precise implementation is not crucial, as long as an <e,t> predicate is lifted to a <d,<e,t>> predicate. For instance:

(11) DEG : $\lambda P.\lambda d.\lambda x.\text{grade}(P, x, d)$
(12) unbelievably DEG tall : $\lambda d.\lambda x.\text{grade}(\text{tall}, x, d)\ \&\ \text{unbelievable}[{}^\wedge\text{grade}(\text{tall}, x, d)]$

If we further assume the degree argument is existentially closed, then *Iwan is unbelievably tall* comes to mean, that there is a degree d such that Iwan is d-tall and it is unbelievable that Iwan is d-tall. Note that this predicts that *unbelievably A* does not entail *A*. This is correct, as can best be seen with absolute adjectives like *full*: a surprisingly full glass, is not necessarily full. Morzycki 2007 argues against an account along the lines of (10)/(12) on the grounds that it predicts that e.g. someone can be called amazingly tall for very odd reasons. Say Iwan's bank account number is 17743, and, say, he is exactly 1 metre 77 centimetres and 43 millimetres tall. Surely, that is an amazing coincidence, and hence, surely, this means that it is amazing that his height is such as it is. Nevertheless, this does not mean that Iwan is amazingly tall. I agree, but claim that the reason is not because (12) is wrong, but rather because (12) has entailments which exclude the use of evaluative adverbs in cases like the one just described. I claim that both evaluative predicates and gradable predicates are monotone decreasing. If Iwan is tall to degree d, he is automatically tall to any lesser degree (see e.g. Heim 2000). Moreover, if I find a certain proposition surprising, I will be equally surprised at anything entailing this proposition. It follows that if I find it surprising that Iwan is tall to degree d, I will be equally surprised in a situation where Iwan is tall to any degree higher than d. This blocks me from using *amazingly tall* in the bank-account scenario, since it would entail me finding Iwan's height amazing had he been 1m78 tall.
Monotonicity also accounts for why only certain adverbials can modify degree. Modals, for instance, are upward entailing, and so if the modal in *Iwan is necessarily tall* is construed as degree modifying, this example ends up meaning that there is a degree d such that Iwan is d-tall and that it is necessary that Iwan is tall to that degree. This is vacuously true (take the minimal d). Negated modals, like *unnecessarily*, are downward monotone again, and so license a sensible degree modified reading. The proposal so far does not account for the fact that evaluative adverbs cannot modify indefinites, for if an indefinite like *a weirdo* is degree modifiable by *quite*, then why can't an evaluative adverb access a degree argument in the same position? The reason, I will argue, is that in this position, evaluative adverbs can only be interpreted as a sentence embedding operator. This becomes clear from Dutch and German. In Dutch, for instance, both a plain and a *–weise* adverb can occur adjacent to an indefinite. In the latter case, however, comma intonation is needed. This, I argue, is a sign of sentence embedding.

(13) *Dit is verrassend een bizarre film.
This is surprisingly a weird movie.

(14) Dit is, verrassend, een bizarre film.
This is, surprisingly, a weird movie.
'Surprisingly, this is a weird movie.'

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Vagueness and Omniscience

Vagueness manifests itself (among other things) in our inability to find borders to the extension of vague predicates. A semantic theory of vagueness like supervaluationism plans to justify this inability in terms of vague semantic rules which govern language and thought: the idea is that it is not our fault if we are unable to find such a border, even an omniscient being like God would be equally unable. My paper has two aims. First, I argue (contrary to Hawthorne (2005)) that, given higher-order vagueness, God cannot be asked to be cooperative in her linguistic performances and, as a consequence, she cannot manifest cooperatively such an inability. Second, I claim that the assumptions supervaluationism should make in order to allow God to have such an inability are incompatible with supervaluationism being a semantic theory.

My work is divided into four parts. The first part is a short presentation of Hawthorne's argument. In the second part, I explain which premise of Hawthorne's argument I do not consider to be true and why. In the third part I propose a different account of God's cooperativeness which allows for her to verbally express a precise border to the extension of a vague predicate and I argue that a supervaluationist would object to it and to any other account of cooperativeness. In the last part, I argue that the reasons that allow rejection of God's cooperativeness are problematic for supervaluationism as a semantic theory.

1. Hawthorne's argument

Suppose God is confronted with a sorites series: for example, a series of 10.001 women, the first hairless, the last hairy and such that there is a small difference of hair between each woman and the following one. For each woman in the series we then start asking God: 'Is the woman under consideration bald?'. How would she react? John Hawthorne (2005) argued that God, as defined from a supervaluationist perspective, would behave linguistically in a progressively vague way in order to be cooperative.

Hawthorne's argument assumes the supervaluationist semantic and a language with the "definitely" operator (abbreviated Def) which expresses supertruth. The Def operator is treated as the modal operator "necessarily" and different modal logics could be adopted. The only rules (concerning Def) which are relevant for the arguments in consideration are Def-introduction (P $\vdash$ DefP) and Def-distribution (Def(P$\rightarrow$Q) $\vdash$ DefP$\rightarrow$DefQ).

Let us now consider again the situation presented at the beginning of the paragraph. Hawthorne considers the two following demands to make of God:

1): Def (God says "Yes") or Def $\neg$ (God says "Yes")

2): Def (God says "Yes" iff the woman under consideration is bald)

From the two demands it follows supervaluationally:

C) Def (the woman under consideration is bald) or Def $\neg$ (the woman under consideration is bald)

which is an unacceptable conclusion for a supervaluationist who rejects bivalence.

The solution Hawthorne proposes is to give up premise 1). He concludes that God cannot be precise in her linguistic performances, she has to be "slippery" instead.

2. My objection to Hawthorne's argument

I object that premise 2) should be rejected instead.

Here is the argument Hawthorne proposes in order to adopt 2). He accepts the following premises:

A] [God says "Yes" and $\neg$(the woman under consideration is bald)] $\rightarrow$ $\neg$ (God is cooperative)

B] [$\neg$(God says "Yes") and the woman under consideration is bald] $\rightarrow$ $\neg$ (God is cooperative)

From the two premises, it follows:

C] God is cooperative $\rightarrow$ [God says "Yes" iff the woman under consideration is bald]

Assuming that God is cooperative, it follows by *modus ponens*:

C'] God says "Yes" iff the woman under consideration is bald

And by the Def-introduction rule, it follows:

C''] Def (God says "Yes" iff the woman under consideration is bald)

I argue that premise B] is not supertrue. I assume that one of the necessary conditions for God's being cooperative is that she definitely does not say "Yes" when the proposition expressed by "the woman under consideration is bald" is neither supertrue nor superfalse. Now, in order to realize that B] is not supertrue, imagine a case where: "God says "Yes"" is superfalse, "the woman under consideration is bald" is neither supertrue nor superfalse, and "God is cooperative" is supertrue. If one premise is not supertrue, the argument does not allow us to deduce that the conclusion is supertrue. And I actually reject the supertruth of the conclusion C''] (i.e. 2)) as well as of B].

3. A different proposal for God's cooperativeness and its rejection

Now, let us consider again the argument with premises 1) and 2). In my opinion, 2) should be abandoned and 1) should be maintained. But 2) was introduced in order to characterize God's cooperativeness. Now, how should God's cooperativeness be defined? When should God say "Yes" in order to be cooperative? A proposal is to use the operator 'Definitely*' (abbreviated 'Def*') introduced by Williamson (1994); 'Def*P' means the infinite conjunction 'P and Definitely P and Definitely Definitely P and …..'. God's cooperativeness is defined in the following way:

2*): Def (God says 'Yes' iff Def*(the woman under consideration is bald))

From 1) and 2*) it is possible to deduce:

C*) DefDef* (the woman under consideration is bald) or Def¬Def* (the woman under consideration is bald)

C*) is compatible with the rejection of bivalence and with infinite higher order vagueness. If the supervaluationist accepts conclusion C*), then he allows for there being a precise border to the extension of a vague predicate and for God's finding it.

As a matter of fact, most supervaluationists would reject C*). Why? Williamson writes that a supervaluationist "may insist that even 'Definitely*' is vague". If Def* is vague, then C*) cannot be accepted. And if C*) is to be rejected, so is 2*): whenever it is neither supertrue nor superfalse "Def*(the woman under consideration is bald)", "God says 'Yes'" is to be superfalse in order to guarantee God's cooperativeness and 2*) is not supertrue.

Now, if Def* is considered to be vague, so is each iteration of Def and/or Def*. What is the consequence of this consideration? It should be realized that God cannot be cooperative. Any definition of God's cooperativeness should assume the following form:

Def (God says 'Yes' iff ………)

However we decide to fill in the gap, the solution may be neither supertrue nor superfalse; and if we allow 1) to be indisputable, it follows that we are not allowed to give an appreciable definition of God's cooperativeness. This result is quite different from Hawthorne's: while Hawthorne claims that God should use a "slippery" language in order to be cooperative, I argue that God should be precise in her linguistic performance, but she could not be cooperative if any iteration of Def and Def* were vague.

4. Supervaluationism confronting infinite regress of higher order vagueness

The impossibility of God's being cooperative depends on the vagueness of every iteration of Def and Def*. I believe that this last assumption is very problematic for supervaluationism as a semantic theory.

Suppose that there is a woman, let us say Mary, whose baldness is indeterminate for any higher order of vagueness. Whenever we consider Mary, "Def (the woman under consideration is bald)" is indeterminate, infinitely indeterminate, infinitely infinitely indeterminate and so on. Let us now ask: what is the epistemic status of God when faced with the proposition expressed by "the woman under consideration is bald" while considering Mary? If we consider Hawthorne's definition of omniscience, we should accept that

Def P iff God believes P

And we should conclude that any attribution to God of belief or indefinite belief concerning Mary's baldness is itself indeterminate, infinitely indeterminate and infinitely infininitely indeterminate and so on. This is quite a problematic result. There are two possible interpretations I can think of concerning the description of God's epistemic state and they are both difficult to accept for a semantic theorist.

A first conjecture is that there is no linguistic sentence which truly describes the epistemic status of God. If that is the case, God has a particular epistemic status concerning some propositions which can only be vaguely described. This is quite problematic because it accepts a gap between language and the mind of God (a result which is highly problematic for any semantic theorist).

There is a second conjecture: it is probable that a semantic theorist would not like there being a gap between language and the mind of God. If that is the case, it should be concluded that there is not an epistemic status of God which can only be vaguely described, but that the epistemic state of God is itself indeterminate and infinitely indeterminate and infinitely infinitely indeterminate and so on. The vagueness of language reflects the vagueness in the mind of God. If that is the case, it should be conceded that the vagueness in the description of God's epistemic state is not just dependent on the rules of language, but it reflects the vagueness in the reality it describes. If that is the case, supervaluationism is not just a semantic theory of vagueness but an ontic theory instead.

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Vagueness pertaining to degree constructions

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Since Russell (1905), semanticists often characterize gradable predicates as mapping entities to real numbers $r \in \Re$ (Kennedy 1999). The mapping is additive wrt a dimension (Klein 1991). For example, the degree function of *long*, f_{long}, is 'additive wrt length'. It represents ratios between quantities of length in entities – the fact that the length of the concatenation (placing end to end) of any two entities d_1 and d_2 (symbolized as $d_1 \oplus_{length} d_2$) equals the sum of lengths of the two separate entities ($f_{long}(d_1 \oplus_{length} d_2) = f_{long}(d_1) + f_{long}(d_2)$). This analysis provides straightforward semantic accounts of numerical degree predicates (NDPs; like *2 meters tall*) ratio predicates (like *twice as happy as Sam*), and difference predicates (*2 meters shorter*).

Yet, many predicates don't license NDPs (#*two meters short*; #*two degrees warm* /*beautiful* /*happy*), rendering the numerical analysis unintuitive. Moreover, there is much indeterminacy concerning the (presumed) mapping of entities to numbers. Given the real interval [0,1], why would one have a degree 0.25 rather than say 0.242 in *happy*? (Kamp and Partee 1995); which set of real numbers forms the degrees of *happy*? Moltmann (2006) concludes that only the few predicates that license NDPs map entities to numbers. Conversely, I propose that any gradable predicate (including *happy*) maps entities to numbers, but no mapping (including that of *tall*!) is fully specified, resulting in a limited distribution of NDPs, ratio-modifiers, and unit names. Let me explain these claims in more details.

Let the set W_c consist of worlds that given the knowledge in some *actual context* c (the common knowledge of some community of speakers out of the blue) may still be the actual world (Stalnaker 1975). We cannot count directly quantities of the 'stuff' denoted by mass nouns (*height, heat, happiness*). These quantities have no known values (like 1,2,3,..) Thus, objects d with a non-zero quantity of height (say, the meter) should be mapped to different numerals in different worlds ($\exists w_1,w_2 \in W_c$: $f_{tall,w1}(d) \neq f_{tall,w2}(d)$). Still, meter rulers tell us the ratios between entities' heights, and in any w, $f_{tall,w}$ represents these ratios (in every $w \in W_c$, entities with n times d's height are mapped to the numeral $n \times f_{tall,w}(d)$). All *tall*'s functions in W_c, then, yield the same ratios between entities' degrees (these ratios are known numbers). Let's call all objects, whose height equals that of the meter, '*meter unit objects*'. I propose that an entity d falls under NDPs like *2 meters tall* iff the ratio between d's degree in *tall* and the meter unit-objects' degree in *tall*, $r_{m,w}$, is 2 ($\forall w \in W_c$: $f_{tall,w}(d)=2 \times r_{m,w}$). So it is not the case that Dan is 2 meters tall iff f_{tall} maps Dan to 2. The value to which f_{tall} maps Dan is unknown ($\neg\exists n$: $\forall w \in W_c$, $f_{tall,w}([[Dan]]_w)=n$). We feel that we have knowledge about entities' degrees in *tall* only because **the following two preconditions hold**:

(i) The ratios between entities' degrees are known numbers ($\forall d_1,d_2$, $\exists n \in \Re$: $\forall w \in W$, $f_{tall,w}(d_1)=n \times f_{tall,w}(d_2)$), and

(ii) There is an agreed-upon set of unit-objects s.t. any d is associated with a known number *representing the ratio between d's degree and the unit-objects' degree* in *tall*.

Violations of (ii) : Lack of agreed-upon unit-objects

Consider *happy* or *heavy* (understood as *feels heavy*). Even if one speaker treats certain internal states as unit-objects, no other speaker has access to these states. So no object d can be s.t. it would be *agreed-upon by all the community* that d is a unit-object. My proposal predicts that the lack of conventional unit-objects will prevent the possibility of determining numbers for entities.

This proposal is superior to non-numerical theories (cf. Moltmann 2006) because it accounts for the compatibility of *happy* with ratio and difference modifiers. For example, the felicity of *Dan is twice as happy as Sam* shows that the ratios between *happiness* degrees can be treated as meaningful (it is true iff $\forall w \in W_c$: $f_{happy,w}([[Dan]]_w)=2 \times f_{happy,w}([[Sam]]_w)$). Generally, we don't need to know entities' degrees, only the ordering or ratios between their potential degrees.

Violations of (i) : Lack of knowledge about ratios between degrees

While we may feel acknowledged of the ratios between, say, our degrees of happiness in separate occasions, we can hardly ever feel acknowledged of the ratios between degrees of entities in predicates like *short*. This is illustrated by the fact that ratio modifiers are less acceptable with *short* than with *tall* or with *long* (as in *Dan is twice as tall as Sam* vs. #*Dan is twice as short as Sam*, and as Google search-results show). In accordance, the present analysis predicts that, in the lack of knowledge concerning ratios between degrees, numerical degree predicates will not be licensed (as in **two meters short*).

Still, numerical degree predicates *are* fine in the comparative (as in *two meters shorter*). In actual contexts, we can positively say that Dan's degree in *short* is n meters bigger than Sam's iff Sam's degree in *tall* is n meters bigger than Dan's. Elsewhere (Salt 18), I show that any function that linearly reverses and linearly transforms the degrees of f_{tall} can predict these facts. I.e., I propose that for any $w \in W_c$ there is a constant $Tran_{short,w} \in \Re$, s.t. $f_{short,w}$ assigns any d the degree ($Tran_{short,w} - f_{tall,w}(d)$) (so Dan is taller iff Sam is shorter); the transformation value, $Tran_{short}$, is unknown ($\neg\exists n \in \Re$: $\forall w \in W_c$, $Tran_{tall,w}=n$). Therefore, if in c *tall* maps some d to 2 meters ($\forall w \in W_c$, $f_{tall,w}(d)=2\times r_{m,w}$), *short* maps d to $Tran_{short}$–2 meters ($f_{short,w}(d)= Tran_{short,w} - 2\times r_{m,w}$). So in the lack of knowledge about $Tran_{short}$ (it varies across W_c), we can't say which entities are *2 meters short* in c ($\neg\exists d$: $\forall w \in W_c$, $f_{short,w}(d)=2\times r_{m,w}$). However, in computing degree-differences, the transformation values cancel one another: $\forall w \in W_c$, d_2 is 2 meters taller than d_1 ($f_{tall,w}$ maps d_2 to some $n \in \Re$ and d_1 to $n-2\times r_{m,w}$) iff $\forall w \in W_c$, d_1 is 2 meters shorter ($f_{short,w}$ maps d_2 to $Tran_{short,w}-n$ and d_1 to $Tran_{short,w}-(n-2\times r_{m,w})$; the degree difference is still $2\times r_{m,w}$.) Thus, we can felicitously say that entity-pairs fall, or don't fall, under '*two meters shorter*'.

Finally, positive predicates (like *warm*) may have transformation values, too, which (among other things) render, e.g., #*2 degrees warm*, but not *2 degrees warmer*, infelicitous.

A third (but different) source of vagueness

I proposed that despite the fact that, e.g., $f_{tall,w}$ differs across worlds in W_c, we have knowledge about the ratios and ordering between entities' degrees in predicates like *tall* (so there is no denotation-gap in predicates like *two meters tall* or *taller*). Similarly, in previous vagueness-based gradability theories (Kamp 1975; Fine 1975), the denotation of *taller* does not vary across valuations in a vagueness-model. Yet, sometimes we do not know the truth value of statements like *Dan is (two inches) taller than Sam*. I submit that this vagueness is due to a different source.

I propose that individuals are distinguished by their property values (the values that the degree functions assign to them). For instance, if the referent of *Dan* in w_1 is 1.87 meters tall, and the referent of *Dan* in w_2 is 1.86 meters tall, I say (following Lewis 1986) that the name *Dan* refers to two different individuals in these two worlds. However, if in w_1 and w_2 the referent of *Dan* is 1.87 meters tall, and identical in all the other property values, even if 1.87 counts as 'tall' in w_1 but not in w_2, I still say (unlike Lewis 1986) that the name *Dan* denotes the same individual in these two worlds (it is only our interpretation of the word *tall* that has changed). I do take individuals to be real entities, identified with their 'real' properties. So it is invariably determined for each two individuals in D what their heights are. However, when we use proper names, we do not know exactly which individuals in D they refer to (since we do not know all of their property values). When we do not know the heights of these individuals, we may easily not know how their heights compare. If Dan's height is not accessible to me (its referent is 1.87m tall in w_1, 1.86m tall in w_2, etc.), I may not know whether *Dan is taller than Sam* it true or not.

Future research should establish whether judgments about *That was fun*/ *tasty* that form a basis for a relativist semantics (Lasersohn 2005; Stephenson 2007) can be accounted for without a move to full-blown relativity (I thank the referee for bringing this up). I propose that such judgments involve measuring extents of internal states. This directly predicts that people may vary in judgments, which, if we expect our inner extents to be similar, may seem contradictory.

Vagueness and Adverbial Polarity Items

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Introduction: Japanese reference grammars often state that the degree adverbs *zenzen* and *mattaku* both serve to strengthen the force of an expressed negation (similarly to *at all* in English), as in (1):

(1) Okane-ga {*zenzen* /*mattaku*} nai.
money-NOM ZENZEN/ MATTAKU NEG.EXIST
'I don't have money at all.'

However, *mattaku* and *zenzen* are not uniform in terms of scalarity and polarity. In sentence (1), *zenzen* is natural in a situation where the speaker actually has a little money, whereas *mattaku* is unacceptable in such a situation. Descriptively, we can summarize this distinction as follows: '*Zenzen* not P' implies 'a little P' but '*mattaku* not P' entails 'completely not P.' (P= gradable predicate).

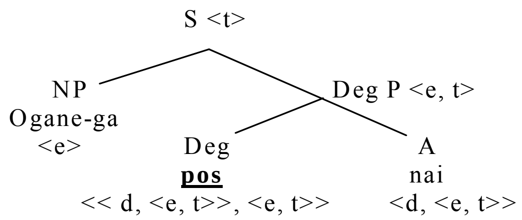
The purpose of this paper is to investigate the relation between vagueness and adverbial polarity items (PIs) and argue that there are two types of adverbial PIs in Japanese, absolute and relative, which is similar to the case with gradable adjectives (e.g. Kennedy and McNally 2005; Kennedy 2007). *Mattaku* is absolute in the sense that it denotes the minimum endpoint of a scale, while *zenzen* is relative in the sense that it denotes that the actual degree is 'far removed' from the contextually determined standard. This paper shows that the lexical semantics of PIs is diverse (Giannakidou 1998, 2006; Yoshimura 2007).

Semantics of *zenzen* and *mattaku*: What are the semantics of *zenzen* and *mattaku*? Before answering this question, it is necessary to consider the semantics of simple negative sentences, such as (2):

(2) (Context: the speaker has to pay $500 rent for his/her apartment.)
Okane-ga nai.
money-NOM NEG.EXIST
'I don't have money.'

(2) does not mean that the speaker has zero money. Instead, it means that 'the actual amount of money is less than a contextually determined standard' (e.g. Morita 1994). Here, I would like to assume that the adjectival *nai* can behave as a 'relative' gradable adjective when it co-occurs with a gradable noun (e.g. money, time) (cf. Furukawa 2005). Here, I follow the assumption that unmodified APs (type <d, <e,t>>) actually contain a 'null degree morpheme' *pos* whose function is to relate the degree argument of the adjectives to an appropriate standard of comparison (e.g. Cresswell 1977; von Stechow 1984; Kennedy and McNally 2005), as shown in Figure 1. (3) shows the compositional semantics of (2):

Figure 1



(3) a. $[\![\text{nai}]\!] = \lambda d\lambda x.\ \neg\ (\text{exist}_{\text{gradable}}\ (x)=d)$

b. $[\![\text{pos}]\!] = \lambda G\lambda x.\ \exists d\ [d\geq \text{Stand} \wedge G(d)(x)]$

c. $[\![\text{pos}]\!]\ ([\![\text{nai}]\!]) = \lambda x.\ \exists d\ [d\geq \text{Stand} \wedge \neg\ (\text{exist}_{\text{gradable}}\ (x)=d)]$

d. $[\![\text{pos}]\!]\ ([\![\text{nai}]\!])\ ([\![\text{okane}]\!]) = \exists d\ [d\geq \text{STAND} \wedge \neg\ (\text{exist}_{\text{gradable}}\ (\text{money})=d)]$

Notice that the denotation of the adjectival *nai* in (3a) is decomposed into the negative operator and the verb *aru* 'exist'. While nai_{ADJ} and aru_{V} are in different grammatical categories, semantically, they form a polar antonym. *Aru* can also behave as a vague/relative predicate.

So what is the meaning of *zenzen*? I propose that *zenzen* is a degree morpheme similarly to *pos* and has the denotation shown in (4a), where d<!! STAND is a context-dependent relation that means

'less than a given standard by a large amount' (cf. *much*, Kennedy and McNally 2005) ((4) shows the compositional semantics of (1) with *zenzen*. The denotation of *nai* is shown in (3a)):

(4) a. $[\![\text{zenzen}_1]\!] = \lambda G\lambda x.\ \exists d\ [d <!!\ \text{STAND} \wedge G\ (d)(x)]$

b. $[\![\text{zenzen}_1]\!]\ (\ [\![\text{nai}]\!]\ ) = \lambda x.\ \exists d\ [d <!!\ \text{STAND} \wedge \neg\ (\text{exist}_{\text{gradable}}\ (x) = d)]$

c. $[\![\text{zenzen}_1]\!]\ (\ [\![\text{nai}]\!]\ )(\ [\![\text{okane}]\!]\ ) = \exists d\ [d <!!\ \text{STAND} \wedge \neg\ (\text{exist}_{\text{gradable}}\ (\text{money}) = d)]$

(4c) does not necessarily mean that I have zero money. It is equivalent to saying that the actual amount of money I have is far removed from the contextually determined standard. Thus, we can say that *zenzen* is a relative PI.

As for the denotation of *mattaku*, I argue that it can be represented in (5a) ((5) shows the compositional semantics of (1) with *mattaku*. The denotation of *nai* is shown in (3a)):

(5) a. $[\![\text{mattaku}]\!] = \lambda G\lambda x.\forall d\ [d < \text{STAND} \rightarrow G(d)(x) = d)]$

b. $[\![\text{mattaku}]\!]\ (\ [\![\text{nai}]\!]\ ) = \lambda x.\forall d\ [d < \text{STAND} \rightarrow \neg\ (\text{exist}_{\text{gradable}}\ (x) = d)]$

c. $[\![\text{mattaku}]\!]\ (\ [\![\text{nai}]\!]\ )(\ [\![\text{okane}]\!]\ ) = \forall d\ [d < \text{STAND} \rightarrow \neg\ (\text{exist}_{\text{gradable}}\ (\text{money}) = d)]$

Mattaku nai is context independent. (5c) means that the amount of money is actually zero. Thus, we can say that *mattaku* is an absolute PI.

The above discussion shows that *zenzen* and *mattaku* have differing degree of quantificational force. *Zenzen* has an existential force, whereas *mattaku* has a universal force. This naturally explains why '*zenzen* not P' has a positive implicature. I argue that the positive implicature of '*zenzen* not P' is a Q implicature, which derives from a scale <*mattaku* not P, *zenzen* not P>. (The items are ordered from strongest to weakest). '*Zenzen* not P' Q implies that '¬ (*mattaku* not P)'.

Positive *zenzen*: My argument explains why *zenzen*, but not *mattaku*, can appear in a positive assertion that contains a 'relative' gradable adjective like that in (6B):

(6) A: Kono hon-wa omoshiroku-nai-ne.
This book-TOP interesting-NEG-COMFIRMATION
'This book is not interesting. Right?'
B: {Zenzen /*mattaku} omoshiroi-yo
ZENZEN/ MATTAKU interesting-INTERJECTION
'It IS interesting.'

There is no endpoint on the scale of interestingness. Since *zenzen,* but not *mattaku*, is relative and does not denote an endpoint, it can be used with an upward directed scale that lacks an endpoint. The denotation of (6B) with *zenzen* can be represented as in (7):

(7) $[\![\text{zenzen}_2]\!]\ (\ [\![\text{omoshiroi}]\!]\ ) = \lambda x.\exists d\ [d >!!\ \text{STAND} \wedge \text{interesting}\ (x) = d]$

There is a question as to whether *zenzen* in (6B) is a PI. I argue that it can still be regarded as a PI. '*Zenzen* P' **presupposes** that P is considered false with regard to the subject (i.e. the book) from the addressee's standpoint, according to the speaker's individual epistemic model. Sentence (6B) with *zenzen* becomes odd if it is uttered without any negative background. Therefore, we may postulate that although the positive *zenzen* in (6B) does not occur in a downward entailing context or a nonveridical context, *zenzen* is **rescued** (Giannakidou 1998, 2006) by its **negative presupposition.**

Theoretical Implications: It has been argued that the base meaning of PIs requires an 'even-like' flavor (e.g. Heim 1984; Lee and Horn 1994; Lahiri 1998; Chierchia 2006). However, sentence (1) with *zenzen* cannot necessarily be paraphrased by *mo* 'even', although if *mattaku* is used, such a paraphrase is possible:

(8) Okane-ga ichi-en-mo nai.
money-NOM one-yen-even NEG.EXIST
'I don't have even 1 yen.' (=I have zero money.)

This suggests that PIs cannot be reduced to a single semantic source. This paper argues that the lexical semantics of PIs are diverse (Giannakidou 1998, 2006; Yoshimura 2007).

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Vagueness, Logic and Use: Some Experimental Results

Phil Serchuk, Ian Hargreaves and Richard Zach

Although the use of experimental data is a somewhat new methodology for philosophers, research on vagueness is poised to make excellent gains from the approach. This is because any theory that purports to explain the vagueness of natural language can benefit from data about how ordinary speakers use vague words. Nonetheless, we must carefully consider the kind of evidence that we're interested in. It wouldn't be helpful to solicit naïve opinions about the plausibility of different philosophical theories: we aren't interested in what non-philosophers think about epistemicism or degree theory. Rather, the goal is to collect data that will tell us which theories of vagueness comport with linguistic use. Of course, theories of vagueness cannot be evaluated solely on the basis of empirical evidence. But if data shows that speakers do not use vague predicates as a given theory predicts, then proponents of that theory will need to explain why their theory accurately describes the semantics of vague predicates but not our use of them. This is a new kind of objection that must be overcome. Traditionally, appeals to common practice were made from the armchair, and even then philosophers rarely gave a detailed account of the relationship between their theory and our linguistic use of vague predicates. This is a shortcoming that empirical methods promise to help us overcome. In this paper we present data from three experiments. Each tests a specific claim in the literature which, in our view, data on linguistic use has an especially helpful role in evaluating. We do not suggest that our experiments definitively establish or refute any of these claims; rather, we hold that they provide valuable data that can be used when assessing intuitions about the use of vague language.

The first experiment tests a claim made by Brian Weatherson concerning the intuitive plausibility of the treatment of borderline cases by fuzzy logic. At least some of the arguments for fuzzy logic claim that notions like degrees of truth and fuzzy boundaries are rooted in common sense.[1] To that extent fuzzy logic has more to prove in the empirical arena than other theories which rely less on appealing to (purportedly) intuitive concepts. According to Weatherson, a "good theory of vagueness should tell us ... what is wrong with Sorites arguments ... [and] why the premises looked plausible to start with".[2] The fuzzy logician answers that the Sorites premises "look plausible because we confuse near truth for truth".[3] As Edgington puts it: "The difference between clear truth and almost clear truth – between 1 and 0.99 – is an insignificant difference upon which, normally, nothing hangs".[4] But, Weatherson claims, this account is plausible only in Sorites arguments that use conditionals. The Sorites' inductive premise usually takes the following form: (SI): $P(n) \rightarrow P(n-1)$. But in classical logic, (SI) is equivalent to (SA): $\sim(P(n) \wedge \sim P(n-1))$ and (SO): $\sim P(n) \vee P(n-1)$. Fuzzy logic treats (SI) having a greater or equal truth-value than (SA) and (SO), which are assigned identical truth-values. Weatherson gives a thought experiment purporting to show that (SA) is the most plausible version of the inductive step, followed by (SI) and (SO). So, his argument goes, fuzzy logic fails to capture the relative plausibility of the inductive step's different logical forms. This is a strong argument against the degree theorist, for her argument depends on there being an at least rough correlation between degrees of truth and plausibility.

We tested Weatherson's claim. We asked 243 subjects, via paper survey, to rank the relative plausibility of the different logical forms of the Sorites' inductive step. Subjects were divided into two groups, one of which was asked about 'heap' and the other about 'rich'. Each group was presented with natural language translations of the three logical forms and asked to rank them in order of persuasiveness. We made two predictions. First, we predicted, contra Weatherson, that respondents would rank (SI) as being more persuasive than (SA). The second was that respondents would, as Weatherson predicts, rank (SA) as being more persuasive than (SO). Both predictions were supported by the data, which showed a statistically significant and identical ranking in both groups. In sum: 63% of respondents ranked (SI) as being more persuasive than (SA), and 67% ranked (SA) as being more persuasive than (SO). So fuzzy logic's treatment of (SI) as being 'truer' than (SA) parallels speakers' intuitions about their relative persuasiveness; its treatment of (SA) as being equally true to (SO) does not.

Our second experiment tests speakers' use of 'definitely' in natural language. Many theories of

1 This is especially true among the so-called fuzzy logic community in computer science; philosophical accounts are more tempered. For example, Machina claims that his "inclinations [about degrees of truth] are at least verbally in agreement with the common sense view," though he recognizes "that agreement cannot be taken at face value as an indication that the common man thinks of degrees of truth in the same way" (Machina, Kenton F. "Truth, belief and vagueness," *Journal of Philosophical Logic*, Vol. 5 (1976), p. 54).

2 Weatherson, Brian. "True, Truer, Truest," *Philosophical Studies,* Vol. 123 (2005), p. 61.

3 Weatherson, p. 61.

4 Edgington, Dorothy. "The Philosophical Problem of Vagueness," *Legal Theory*, Vol. 7 (2001), p. 375.

vagueness, particularly in their account of higher-order vagueness (e.g. Fine[5]), appeal to a 'definitely' operator. Sometimes this operator is taken in a technical sense, and in these cases correspondence with natural language may not be important. But theorists also appeal to the operator when explaining our use of vague language. Keefe argues that speakers confuse disjunctions like 'Fa v ~Fa' with 'definitely Fa v definitely ~Fa': “it is so common for our judgments of both sentences to be dictated by our judgments of [the latter]”.[6] Williams generalizes Keefe's argument in his explanation of the confusion hypothesis. “The confusion hypothesis maintains that we confuse an utterance of 'There is something that is *F*' with the claim that *there is something that is definitely F:* our intuitions about the former track the truth-values of the latter.”[7] We tested this hypothesis in two ways. For the first, we stipulated that some item *a* was a borderline case for a vague predicate 'F'. As before, there were two groups of subjects: one was asked about 'heavy', the other about 'rich'. We then asked respondents to assess the truth of a sentence of the form 'F*a*', and then later for one of the form 'definitely F*a*'. Participants had to choose one of the following options: 'true', 'false', 'not true, but also not false', 'partially true and partially false', 'both true and false', and 'true or false, but I don't know which'. We predicted, contra the hypothesis, that speakers would distinguish between the sentences by giving them different assessments: in particular, that sentences of the form 'F*a*' would be described as something other than 'true' or 'false' and that sentences of the form 'definitely F*a*' would be described as 'false'. Our prediction was supported by the data: approximately 75% of respondents assessed 'F*a*' as something other than 'true' or 'false', and approximately 75% answered 'definitely F*a*' as 'false'. Although we did not ask subjects to compare 'Fa v ~Fa' with 'definitely Fa v definitely ~Fa', such a method could be used to test Keefe's version of the confusion hypothesis.

The second method used a modified version of the questions asked by Bonini et al. (1999) in their experimental work on vagueness. Bonini et al. asked participants to give the boundaries to particular applications of vague predicates; for example, to give the smallest height that would count a man as 'tall'.[8] Building on this approach, we posed the same question to one group of respondents and an identical question, substituting 'definitely tall' for 'tall' (*mutatis mutandis* for the other predicates), to a separate group. Our hypothesis was that respondents in the 'definitely' group would attribute greater numbers to the cut-off points than those in the other group. The data proved inconclusive. Although the responses were consistently larger, the difference was statistically significant only in two of the five cases.

The third experiment tests speakers' use of negation in borderline cases. However negation works, we can assume that it must satisfy the following conditions: the negation of 'F*a*' is clearly true when '*a*' is a clear non-case and is clearly false when '*a*' is a clear case. But several different options have been proposed for how to treat the negation of 'F*a*' when 'F*a*' is neither clearly true nor clearly false, including strong, weak and intuitionistic/Gödel negation.[9] Certainly there are real technical differences between these proposed variants. But it is an open question whether these differences are reflected in speakers' use of negation. To test this, we had subjects assess the truth-values of six different sentences. As before, respondents were divided into two groups: one group was asked about 'rich', the other about 'heavy', and '*a*' was stipulated to be a borderline case. In our analysis, sentences were divided into pairs: (1) 'not F*a*' and 'it is not the case that F*a*', (2) 'Either F*a* or not F*a*' and 'Either F*a* or it is not the case that F*a*', and (3) 'F*a* and not F*a*' and 'F*a* and it is not the case that F*a*'.

For each pair we made two hypotheses: one which tracked the truth-value ascribed by the logician, and another which tested for differences in responses between negation types. For example, 'not F*a*' is supposed to be the linguistic form of strong negation and 'it is not the case that F*a*' the form of weak negation. So our first hypothesis was that 'not F*a*', the strong negation of a borderline case, would be described as something other than 'true' or 'false', and 'it is not the case that F*a*', the weak negation of a borderline case, would be described as 'true'. We generated similar hypotheses for the other four sentences. The second hypothesis was that, for pairs (1) and (2), respondents would describe the strong negation differently than the weak one; the two forms in pair (3) were predicted to receive similar descriptions. The data supported the first hypothesis and was partially

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5 Fine, Kit. “Vagueness, Truth and Logic,” *Synthese*, 30 (1975), pp. 265-300.

6 Keefe, Rosanna. *Theories of Vagueness*, Cambridge: Cambridge University Press (2000), p. 164.

7 Williams, J. Robert G. “An Argument for the Many,” *Proceedings of the Aristotelian Society,* Vol. 103:3, (2006), p. 412.

8 Nicolao Bonini, Daniel Osherson, Riccardo Viale and Timothy Williamson. “On the Psychology of Vague Predicates,” *Mind & Language*, Vol. 14:4 (1999), pp. 377-93.

9 The weak negation of P, $\neg P$, is clearly true iff it's not the case that P is clearly true, and false otherwise. P's strong negation, ~P, is clearly true iff P is clearly false and clearly false iff P is clearly true. And P's intuitionistic (Gödel) negation, $\sim_g P$, is clearly true iff P is clearly false, and false otherwise.

consistent with the second. Although many of the predictions were observed, there were some puzzling results. For instance, a plurality of respondents (39%) classed 'P or not P' as false; this contrasts with almost every theory's predicted result, though it is consistent with Keefe's confusion hypothesis. Although it was not the focus of our research, we use this data (along with some from related questions) to make observations about the presence of bivalence and the law of non-contradiction in speakers' use of vague language.

Plural Superlatives, Distributivity, and Context-Dependency

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We argue that the gradable adjective in a plural superlative has the distributive 'double-star'-operator attached to it. This analysis is consistent with the view (argued against in Stateva 2002) that the external argument of the superlative operator is always a member of its restrictor.

Stateva's observations. Stateva 2002 makes the following empirical observations regarding (1).

(1) John and Bill are the tallest students.

Observation 1: the truth of (1) entails that the property [λx. x's tallness exceeds the tallness of every student except John and Bill] holds of both John and Bill.

Observation 2: the truth of (1) does NOT entail that the property [λx. x's tallness exceeds the tallness of every student except x] holds of both John and Bill (for if it did, we would get a contradiction, namely, that John and Bill are taller than each other), and not even of one of them.

Stateva claims that any semantics for *–est* which presupposes that the external argument of *–est* is a member of the comparison set C (e.g., (2), inspired by Heim 1999), coupled with the assumption that plural morphology indicates the presence of the distributive 'star'-operator which attaches at the VP-level, works well for singular superlatives (e.g., (3)) but yields for (1) the contradictory reading from Observation 2 (see (4)).

(2) $[\![\textit{-est}]\!]^C(R^{<d,<e,t>>})(P^{<e,t>})(x^e)$ is defined only if (i) $x \in C$, and (ii) for all $y \in C$: P(y)=True and there is a degree d such that R(d)(y)=True. When defined, $[\![\textit{-est}]\!]^C(R^{<d,<e,t>>})(P^{<e,t>})(x^e)$=True iff for all $y \neq x$ such that $y \in C$: Max(λd. R(d)(x)) > Max(λd. R(d)(y)).

(3) When defined, $[\![$*John be* [*tall-est student*] $]\!]^C$ = True iff John is taller than any $y \in C$, $y \neq$John.

(4) When defined (in particular, when {Bill,John}$\subseteq$C), $[\![$*John and Bill* *[*be* [*tall-est student*]] $]\!]^C$ = True iff John is taller than any $y \in C$, $y \neq$John, and Bill is taller than any $y \in C$, $y \neq$Bill.

One could perhaps avoid the problem by positing a second superlative operator, one that applies exclusively to pluralities (and demands that no one outside the plurality be R-er than any member of the plurality). But cross-linguistic evidence suggests that plural superlatives are always expressed with the same superlative morpheme as the singular superlative. Therefore, a solution along these lines, although technically sound, is not explanatory from a cross-linguistic perspective.

Stateva considers two solutions to the problem illustrated in (4): the "presupposition elimination" solution and the inverse scope solution. We reject the former, and propose our own version of the latter.

The "presupposition elimination" solution is to remove from (2) the presupposition that the external argument of *-est* is a member of C. This allows us to obtain from the LF in (4) (*John and Bill be* *[*be tall-est student*]) the interpretation "John is taller than any $y \in C$ and Bill is taller than any $y \in C$, where C excludes both John and Bill", in accordance with Observations 1 and 2. We note, however, that interpreting the contradictory (5) relative to a C that excludes both John and Bill (an option allowed by this solution) yields a non-contradictory reading.

(5) ##John is the tallest student and Bill is too.

We may stipulate a pragmatic constraint (or procedure) according to which every minimal clause is interpreted relative to the largest C possible. This would yield a coherent interpretation for each conjunct in (5) individually, but putting them together – without changing C – would yield a reading according to which John and Bill are taller than each other. However, if the pragmatic requirement to interpret minimal clauses relative to the largest C possible always holds, *the tallest students* in an argument position (e.g., *The tallest students left*) is also interpreted relative to the largest C possible. This means that in every context where John and Bill are taller than everyone else, *the tallest students* obligatorily refers to John and Bill. But in some contexts we may want its reference to include one or more shorter individuals. We therefore maintain that the badness of (5) is due to the presupposition that the external argument of *–est* is a member of C.

The inverse scope solution is to take *–est* out of the scope of '*', thus avoiding the attribution of 'being tallest student' to both members of the subject term in (4). As Stateva herself explains, her movement-based implementation of this solution suffers from various syntactic and semantic problems. We propose our own, non-movement-based implementation of this solution, illustrated by the LF in (6), with '**' (Sternefeld 1998, Beck 2000) on *tall* and '*' on *student*.

(6) *John and Bill be* [[[***tall*]-*est*] **student*]

We assume that when attached to gradable adjectives (which denote downward monotonic <d,<e,t>>-functions), '**' delivers functions of the kind shown in (7), and that *–est* has the semantics in (8) (which maintains the first presupposition of (2)), yielding an interpretation that amounts to the following: "for every d ∈ {John's-tallness, Bill's-tallness}, for every singular y such that y≠John, y≠Bill, and there is a z∈C s.t. $y \leq_i z$: d exceeds y's tallness."

(7) a. The characteristic set of ⟦***tall*⟧ is {<d1,John>, <d2,Bill>, … ,<d1⊕d2, John⊕Bill>,...}.
   b. For any two degrees d,d', d⊕d' is the smaller of the two, if one of them is smaller than the other; otherwise, it is d.
   c. Max(λd.⟦***tall*⟧(d)(x)) is the maximal d' such that for all singular $z \leq_i x$, the height of z is at least d'.

(8) ⟦-*est*⟧^{C}(R)(P)(x) is defined only if (i) x∈C, (ii) for all y∈C such that y≠x: y doesn't overlap x, and (iii) for all y∈C: P(y)=True and there is a degree d such that R(d)(y)=True. When defined, ⟦-*est*⟧^{C}(R)(P)(x)=True iff for all y such that y∈C and y≠x, for all $z \leq_i y$: Max(λd. R(d)(x)) > Max(λd. R(d)(z)).

This interpretation is compatible with Observations 1 and 2. Still, we think that (8) can be improved upon. To appreciate why, consider (9) and (10).

(9) A: Who are the best students, John and Bill? Or John, Bill and Fred?
   B: I would say John and Bill. It's true that no student is better than Fred but worse than Bill an John, but c'mon! Fred has a D average!

(10) A: John and Bill are the tallest students.
   B: You are forgetting Fred; he is only half an inch shorter than Bill.
   A: My mistake. John, Bill and Fred are the tallest students.

The well-formedness of these discourses suggests that the context supplies a natural cut-off point on the relevant scale which determines a unique group of R-est individuals (see Herdan 2007). Determining the value of the cut-off point is a complicated matter and depends on various kinds of contextual information (some of which is supplied by the comparison class itself). The cut-off point is often vague, and often the speaker or hearer assumes that there is a unique cut-off point without knowing its value (in which case it can be said to be bound by a context-level existential). Like other contextual parameters, the cut-off point may be reset as speakers become more informed. The semantics in (8) ignores the cut-off point, and predicts that *John and Bill are the best students* and *John, Bill and Fred are the best students* can both be true in the same context (failing to account for (9)-(10)). We therefore offer (11) as the semantics for *–est* (C is a pair consisting of a comparison set (Comp(C)) and a cut-off point Cut-off(C)).

(11) ⟦-*est*⟧^{C}(R)(P)(x) is defined only if (i) x∈Comp(C), (ii) for all y∈Comp(C) s.t. y≠x: y doesn't overlap x, and (iii) for all y∈Comp(C): P(y) = True and there is a d such that R(d)(y) = True. When defined, ⟦-*est*⟧^{C}(R)(P)(x) = True iff for all y such that y∈Comp(C) and y≠x, for all $z \leq_i y$: Max(λd. R(d)(x)) > Cut-off(C) and Max(λd. R(d)(z)) ≤ Cut-off(C).

(12) When defined, ⟦*John be* [*tall-est student*] ⟧^{C} = True iff John's tallness exceeds the cut-off point of C and for every y∈C, y≠John: y's tallness does not exceed this cut-off point.

(13) When defined, ⟦ *John and Bill be* [[[***tall*]-*est*] **student*] ⟧^{C} = True iff for every d ∈ {John's-tallness, Bill's-tallness}: d exceeds the cut-off point of C; and for every singular y, y≠John, y≠Bill, and there is a z∈C s.t. $y \leq_i z$: y's tallness doesn't exceed this cut-off point.

The proposal is compatible with Observations 1 and 2 and with the discourses in (9)-(10).

A Model of Tolerance

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I want to address a foundational issue in the contemporary vagueness debate. This is very much dominated by three main approaches—*semantic*, *epistemic* and *psychological*—which, however distinct they may be in other respects, share a crucial common feature, namely that of characterizing vagueness in terms of the notion of *borderlineness*. These approaches "only" differ in their explication of borderlineness, which is given in their respective favourite terms, but agree in characterizing vagueness by means of substantial *non-logical* notions (be them related either to semantic indeterminacy, or to unknowability, or to partial belief). In so doing, they obliterate one of the main *phenomena* in which vagueness is manifest in natural language, namely the intuitive truth of the major premise of sorites paradoxes. Such a premise can be expressed in purely logical terms (save of course for the relevant vague predicate and for some functor or relational predicate expressing a suitable ordering), without need of non-logical expressions like 'borderline', 'definitely', 'roughly' etc. I want to provide some philosophical and technical support for a theory (the *naive theory of vagueness*) which takes very seriously this phenomenon (and in so doing is close to contextualist positions, especially to Hans Kamp's theory).

According to the naive theory of vagueness, the vagueness of an expression consists (a) in the existence of both positive and negative cases of application of the expression and (b) in the non-existence of a sharp cut-off point between them. The *sorites paradox* shows the naive theory to be inconsistent in most logics proposed for a vague language. I will explore the prospects of saving the naive theory by revising the logic in a novel way, placing principled restrictions on the structural property of *transitivity* of the consequence relation. To this end, I will propose and to some extent develop a lattice-theoretical semantics for a whole family of (0th-order) "*tolerant logics*".

I will start by delineating the semantics of a very weak tolerant logic (the system **T**), which can be seen as providing a common basis for a very wide class of tolerant logics. Every element ("value") of a lattice V is associated with a tolerance function tol, which, for every $v \in V$, picks out an upper subset of V containing v (intuitively, tol maps each value v to the set of values deemed acceptable by v). Every lattice also comes with a designated upper set D (the set of "designated values"). We can then define a conditional operation on the lattice which assigns to any two values v_0 and v_1 an element of D iff $v_1 \in \mathrm{tol}(v_0)$. Standard lattice-theoretical operations can be defined as usual: negation as an order-inverting operation, conjunction as glb and disjunction as lub.

The key to the failure of transitivity resides in the definition of the consequence relation. Given tol, every lattice V can be associated with a set of values $T \subseteq V$ st $T = \bigcup_{d \in D} \mathrm{tol}(d)$. A set of wffs C is then defined to be a consequence of a set of wffs P iff, for every model $\mathfrak{M}$, if, for every $\varphi \in P$, $\mathrm{val}_{\mathfrak{M}}(\varphi) \in D_{\mathfrak{M}}$, then, for some $\psi \in C$, $\mathrm{val}_{\mathfrak{M}}(\psi) \in T_{\mathfrak{M}}$ (where val is a valuation function from sentences of the language into V). Such a definition is aimed at capturing the intuitive idea underlying the naive theory of vagueness—namely, that information obtained *via* valid inference, though good enough for truth if truth attaches non-inferentially to the premises, may fail to yield truth if used in turn as a premise for further (valid) inferences. I will claim that this idea is underwritten by a distinction we make in assertoric and inferential practices with a natural language (and which is crucial in probabilistic reasoning) between, on the one hand, a sentence's accuracy being so good as to be used as a starting point for further reasoning (modelled by D) and, on the other hand, a sentence's accuracy being good enough as to be worthy of acceptance (modelled by T). It's easy to see that, given the foregoing definition of the consequence relation, the minimal constraints put on the semantics already suffice to yield failure of transitivity for modus ponens (such a failure is thus achieved in a way different from that of most of the few other non-transitive logics).

As far as vagueness is concerned, my favoured approach is, to speak somewhat loosely, to validate the full fragment of classical logic consistent with the naive theory of vagueness. In particular, I will argue that speakers' acceptance of "*exhaustive penumbral connections*" (such as the claim that a patch on the borderline between red and orange can only be either red or orange) lends great support to the law of excluded middle. By adding further constraints on the semantics of **T**, I will thus proceed to define a suitable non-transitive counterpart **CT** to classical logic. On the one hand, **CT** validates adjunction, abjunction, the law of excluded middle, the law of non-contradiction, modus ponens and the deduction theorem; on the other hand, **CT** invalidates many classical rules which enshrine the transitivity of the classical consequence relation (and are unsurprisingly so crucial in the proofs of usual cut-elimination theorems), such as the rules of conditional in the premises, of disjunction in the premises and the various affixing rules (in many of these respects, the framework is importantly different from that of fuzzy logics). I will then show, using a model with *partially ordered* values, how an appropriate regimentation of the naive theory of vagueness is consistent in **CT**.

I will finally sketch some directions for future research: (a) extension of the semantics to 1st-order languages (with identity), and, consequently, extension of the consistency proof to the naive theory of vagueness plus "*naive abstraction principles*" abstracting on a non-transitive relation (eg the principle that that two objects have the same colour iff they are indiscriminable in colour from one another); (b) development of an alternative, possible-world semantics, and proof of the extensional equivalence of the consequence relations thus generated with those of the algebraic semantics studied in this paper; (c) proof of soundness, completeness and computational properties for a suitable cut-free sequent calculus.

SORITIC SERIES AND PHENOMENAL TYPES

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Uses of phenomenal predicates and phenomenal identity statements presuppose some form of phenomenal type-identity. But for phenomenal type-identity to be defended, an adequate response has to be found to the problem of non-transitive matching and the soritic arguments that non-transitivity can give rise to. One possible response to such soritic arguments is to question their assumption that "that there could be a sorites series of colour patches for which 'looking the same as' is not transitive" (Fara 2001). This would involve denying, for instance, that in a colour spectrum, small enough regions can look homogeneous.

However, it has not been established that there cannot be any such soritic phenomenal series; and if there are, then it remains in principle feasible that there is a collapse of phenomenal types. Moreover, the existence of soritic phenomenal series is supported by the existence of discrimination thresholds: given that there are phenomenally non-detectable objective differences, small enough regions of a colour spectrum (or property space) should be phenomenally homogeneous; and given that the cumulation of such objective differences can pass discrimination thresholds, the ordering of such regions into a series should lead to phenomenal differences, resulting in a sorites series.

I propose an alternative defence of uses of appearance predicates and phenomenal identity statements, which consists in arguing that phenomenal types can be defined notwithstanding the existence of soritic phenomenal series. My position is based on an examination of the relation between objective and phenomenal size types. A summary of my argument follows.

Following some preliminaries concerning the similarity orderings of objective and phenomenal sizes, and an argument to the effect that objective (super-determinate) sizes cannot be discriminated, I state my key argument: that Goodman's definition of the identity of phenomenal types (Goodman 1977, Clark 1985) amounts to a definition of objective, not phenomenal, types. Threewise matching tests detect sub-phenomenal differences, and the only objects which could pass *all* such tests (as required by Goodman) would be super-determinately identical in the objective sense. The only remaining criterion for phenomenal type-identity is indiscriminability. Therefore, if we want to uphold phenomenal types and identity, we have to interpret the non-transitive nature of indiscriminability as permitting an inference about the presence of an objective, not a phenomenal, difference. I also provide some new arguments against simply denying that there are phenomenal types. One involves showing that we can define and know, prior to any verification, groupings of objective sizes for which phenomenal identity *is* transitive; so it cannot be denied that there is such a thing as phenomenal type-identity.

Since the groupings described preserve transitivity, and since non transitivity emerges from three-wise matching tests with objective sizes from *outside* the groupings (in the way described by Goodman's definition), the groupings provide sufficient objective conditions for appurtenance to a phenomenal type. We can approximate necessary-and-sufficient objective conditions for phenomenal type-appurtenance with varying degrees of precision; this involves use of sub-phenomenal means to discriminate more highly determinate groupings of objective sizes. The increasingly precise types defined do not collapse because they preserve transitivity.

The extension of linguistic phenomenal predicates, however, is not precisified by using sub-phenomenal discrimination, and is therefore less precise. But this imprecision is subject to limitations which can be known phenomenally and defined objectively, and which suffice to sustain the use of phenomenal predicates. The reason for this is that discrimination thresholds prevent phenomenal types from being densely ordered (from being such that between any two types, however close in the ordering, there are always further types). On the definition described further up, phenomenal types are not densely ordered, but instead form overlapping types. This is borne out by an interpretation of the threewise matching test, under which both token experiences of y come under two phenomenal types, or are both in the overlap between two phenomenal types. On this account, there is no need to conclude (with Jackson and Pinkerton 1973) that y presents a different quale when compared to x and when compared to z: we do not *see* that (x,y) are different testing them threewise with z. This is because there are no further types between any two phenomenal types, and the ordering of phenomenal types is not dense.

Thus described, phenomenal predicates are not worse off than the familiar class of vague predicates which designate properties supervening on discrete objective orderings: 'is bald', 'is a heap', 'is expensive (in dollars for an *F*)'. Phenomenal predicates are substantially similar to those predicates because, although phenomenal types form continua in the sense that they overlap, they do not form continua in the sense required by density.

In another respect, phenomenal predicates are better off than other predicates for discretely ordered properties. Where there is phenomenal vagueness, it affects use of predicates for experience-types. But which experience-types we can have is a function of discrimination thresholds. In threewise matching, y is in the overlap of two fully determinate similarity groupings, P_n and P_{n+1} ; but it does not belong to P_{n-1} or P_{n+2} , because it is *disjoint* from such groupings. Discrimination thresholds ensure this disjointness: cumulated objective differences eventually pass the thresholds so that we can detect phenomenally – ie, without inference and threewise matching tests – the falsity of identity statements containing phenomenal predicates. In other words, phenomenal predicates, though vague, are already precisified as they stand, because of the lack of density in phenomenal similarity orderings. Beyond this, vagueness in the extension of phenomenal predicates can be limited by sub-phenomenal precisification. If there are contexts in which this is not required, this is because the extension of phenomenal predicates is already sufficiently precise for many of our purposes.

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