An Empirical Solution to the Puzzle of Macbeth's Dagger

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In this paper I present an empirical solution to the puzzle of Macbeth's dagger. The puzzle of Macbeth's dagger is the question of whether, in having his fatal vision of a dagger, Macbeth *sees* a dagger. I answer this question by addressing a more general one: the question of whether perceptual verbs are *intensional transitive verbs* (ITVs). I present seven experiments, each of which tests a collection of perceptual verbs for one of the three features characteristic of ITVs. One of these features is NONEXISTENCE: the failure of sentences involving transitive verbs to entail the existence of their direct objects. The experiments reveal that with respect to all three of these features, "see" behaves much more like a paradigmatically extensional verb than an intensional one. But surprisingly, unlike "see", "perceive" behaves much more like a paradigmatically *intensional* verb. This shows that the category of perceptual verbs is not uniform with respect to the features of intensionality; while Macbeth does not *see* a dagger, he may still *perceive* one.

1. Introduction

In the philosophy of perception, there is a debate going back to the beginning of the 20th century over whether we can perceive things that do not exist. The first person to address the question explicitly was G.E. Moore [1905], who argued that, at least in one sense of the word "perceive", we can perceive things that do not exist. Moore [1952] later went on to pose the question as one concerning Macbeth: in having his fatal vision of a dagger, does Macbeth *see* a dagger?

While this question is vivid, it is also vexed. After more than a century of debate, philosophers of perception are still largely divided over its answer. On the one hand, many philosophers of perception hold that we can see things that do not exist, and that Macbeth does in fact see a dagger, even while he

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is hallucinating.[1] But many other authors hold the contrary view, according to which seeing is a relation between a perceiver and a concrete object. Such relations entail the existence of their relata, and so seeing a dagger entails the existence of a dagger. Since there is no dagger for Macbeth to see, these theorists conclude that Macbeth does not see a dagger.[2] Given the scale and persistence of the disagreement over its answer, the question of what Macbeth sees in having his vision has acquired the status of a puzzle: the puzzle of Macbeth's dagger.

Insofar as we phrase the questions above with natural language perceptual verbs, the puzzle of Macbeth's dagger is first and foremost a puzzle concerning the semantics of our natural language perceptual vocabulary. Stated generally, the puzzle concerns whether natural language perceptual verbs—for instance, "see", "hear", "smell", "feel", "perceive", and "sense", among others—when used transitively, entail the existence of their direct-objects.[3,4] Stated more specifically, the puzzle asks this question about "see" in particular. The failure of a transitive verb to entail the existence of its direct-object—a feature that we can call NONEXISTENCE—is one of three traditional criteria for determining whether a transitive verb is *intensional*. The other two criteria are the availability of a non-specific reading for the direct-object noun phrase (NONSPECIFICITY), and the inability to substitute extensionally equivalent direct-object NPs without a change in truth-value (OPACITY).[5] In what follows, I will treat the puzzle of Macbeth's

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[1]Among the defenders of the view that we can perceive things that do not exist, whether by sight or otherwise, are Moore [1905, 1952], Ayer [1940, 1956], Smythies [1956], Anscombe [1965], Hintikka [1969], Lewis [1983], Harman [1990], Chomsky [1995], Brogaard [2014, 2015], Bourget [2017a,b].

[2]Defenders of this view include Austin [1962], Dretske [1969], Cartwright [1957], Soames [2003], and Jackson [1977]. Additionally, relationalists in the philosophy of perception, such as Brewer [2011], Campbell [2002], Fish [2009], and Logue [2012] often claim that their view can claim semantic orthodoxy, and so seem to endorse the view that direct-object perceptual reports are fully extensional.

[3]In what follows, I will use "direct-obect" as a term for the object answering to the NP in the direct-object position of a perceptual ascription. Thus, I take a direct-object noun phrase to be a piece of language, while the direct object is, potentially, an object, if it exists.

[4]Perceptual can also be used intransitively, but when they are, they are typically taken to report epistemic notions. See Chisholm [1956] for the original account of the different uses of perceptual verbs, and Johnston [2014] for a detailed account of why the intransitive uses of such verbs are not perceptual. Of course, representationalists in the philosophy of perception often define technical terms for the perceptual propositional attitude, but they acknowledge that these expressions are not present in natural language or folk perceptual psychology.

[5]Anscombe [1965] was the first person to generalize the question of Macbeth's dagger into a question concerning intensionality generally: are our perceptual verbs intensional transitive

dagger as a special case of the more general question of whether our perceptual verbs are intensional, and I will answer this more general question for a subset of the perceptual verbs listed above.

On the face of it, whether our perceptual verbs are intensional seems like an empirical question: it is a question concerning the meanings of these verbs in ordinary language. Yet in spite of the problem's empirical character, no systematic empirical methods have been employed in an attempt at a resolution.[6] This paper makes use of empirical methods to evaluate a range of perceptual verbs for the features of intensionality. I first present three studies that tested perceptual verbs for NONEXISTENCE. The first two of these studies compared three perceptual verbs, "see", "perceive", and "sense", to a paradigmatically intensional verb, "search for", and a paradigmatic extensional verb, "touch". The third study then tested a wider range of perceptual verbs—including "hear", "smell", and "feel"—for NONEXISTENCE. I then present two studies that tested perceptual verbs for NONSPECIFICITY, and two that tested them for OPACITY. In each case, the first of the studies tested "see", "perceive", and "sense" for the feature, while second tested the wider range of perceptual verbs for that property.

Since the results of these studies were given on a scale of intensionality associated with each property, the results fit somewhat uneasily into the standard framework for understanding intensionality, on which the features of intensionality are either wholly present or wholly absent. However, there were clear patterns that emerged across the studies. In each case, "see" received ratings that were, on average, much closer to fully extensional than those for "perceive", and in general, "see" was in a cluster of verbs whose ratings were close to paradigmatically extensional. By contrast, average ratings for "perceive" were much closer to paradigmatically intensional, and in three experiments, "perceive" did not differ statistically from "search for". Thus, while speakers most often judge that we cannot *see* what does not exist, they much more readily judge that we can *perceive* things that do not exist. Thus, the results appear to show that while Macbeth does not see a dagger, he may still perceive one. But beyond this solu-

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verbs? She answered the question in the affirmative.

[6]For the most part, contributors to the debate have relied on informally evoking readers' intuitions concerning example sentences, and generalizing from these examples to the entire category of perceptual verbs. For two notable examples, see Anscombe [1965] and Bourget [2017a], although there are many others.

tion to the puzzle, these results also explain why the puzzle of Macbeth's dagger has been so recalcitrant: the category of perceptual verbs is not uniform with respect to the features of intensionality—"perceives" is intensional while "see" is extensional—but neither is perfectly so.

2. Formulating the Puzzle

2.1. *Macbeth's Dagger*

Consider the scene from Shakespeare's famous play in which Macbeth, feverish with prospective guilt, hallucinates a dagger, and asks himself, in the grip of this hallucination, "Is this a dagger which I see before me // The handle toward my hand?" The question seems to admit of only two answers: yes or no. Roughly speaking, choosing one of these answers determines one's view on the puzzle of Macbeth's dagger.

What reasons can we offer in favor of giving an affirmative answer to Macbeth's question? First, it seems natural for us to describe Macbeth as seeing a dagger. Macbeth is certainly having a visual experience of a distinctive kind—one that can be distinguished from visual experiences of other things. For instance, Macbeth is not having a visual experience of an artillery rifle. Given the need for a word to describe Macbeth's visual experience, it seems natural to think that "see" can do the trick, and so to think that (1) says something true:

(1)   Macbeth sees a dagger, not an artillery rifle.

If (1) can be true, then presumably (2) can be true:

(2)   Macbeth sees a dagger.

If (2) is true, then "sees" does not entail the existence of what is seen. But since we are presuming that there is no dagger, (3) must be false, at least insofar as it entails the existence of a dagger:

(3)   There is a dagger is such that Macbeth sees it.

Further, (2) entails (4):

(4)   Macbeth sees something.

But given that (2) is not existence-entailing, (4) cannot be equivalent to the ordinary wide-scope quantification, as in (5):

(5)   Some thing is such that Macbeth sees it.

Thus we seem to have a *prima facie* case that there is one reading of "sees" on which Macbeth can see a dagger, and one on which he cannot. More generally, this seems to show that there is a reading of perceptual ascriptions involving "sees" on which we can see things that do not exist, and one on which we cannot. Call someone who holds that there is a reading of our perceptual ascriptions that is true in the absence of an object and admits of these two readings an *intensionalist* concerning our perceptual vocabulary.[7] Perhaps the first intensionalist was Macbeth himself. Macbeth's soliloquy continues with him saying to the dagger: "I have thee not, and yet I see thee still". But I doubt we can put much weight on this fact; who knows what Macbeth's views on perception would have been in a more collected state of mind.

But there are strong competing intuitions in favor of the idea that Macbeth does not actually *see* a dagger, and that the arguments that (2) has a true reading are specious. It is natural to think that in order to see a dagger, Macbeth must bear a relation to a particular, concrete dagger; in other words, there seems to be an intuition that "sees" is semantically on a par with relational expressions such as "is standing five feet from", which are fully extensional and existence-entailing. Since there is no dagger that can serve as a relatum of such a relation, Macbeth cannot, and so does not, see a dagger.[8]

One argument in favor of the extensionality of "sees" comes from its retraction behavior. If "sees" had a reading on which one could see what does not exist, we would be unable to account for retraction behavior in cases such as (6):

(6)   What did you see?

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[7]Importantly, saying that there are two readings of our perceptual verbs, and two readings of the ascriptions in which they figure, does not entail that these verbs have two different *senses*; perceptual verbs need not be lexically ambiguous. Rather, as we will see, in the manner of intensional transitive verbs more generally, the intensionalist can hold that perceptual verbs give rise to two different *scopal* readings of the same ascription, and treat the ambiguity as one in semantic structure.

[8]Instead, many authors claim that in this case, Macbeth merely *seems to see* a dagger.

> Oh nothing, I thought I saw a ghost, but my mind was just playing tricks on me.

This retraction behavior seems to illustrate the idea that every time we would be tempted to say that someone has seen a ghost, they could end up being convinced that there had been some sort of mistake. They did not *actually* see a ghost, they only thought they saw one, or seemed to see one. If we were to countenance a reading of "sees" that is not existence-entailing, we would be unable to explain the tendency to retract such reports as mistaken once further facts are revealed.

Call someone who holds that the only reading of a perceptual ascription is an existence-entailing one an *extensionalist* about our perceptual vocabulary. According to the extensionalist, the truth-conditions of a perceptual asciption like (2) are those of a straightforward, existential quantification:

(7) $\exists x$ (dagger(x) & sees(Macbeth,x))

Given that there is no dagger to be seen, (7) must be false. As a consequence, when we say that Macbeth sees a dagger, we are at best *conveying* something true. Macbeth was perhaps also the first to propose the extensionalist view. His monologue continues with him asking the dagger: "art thou but // A dagger of the mind, a false creation // Proceeding from the heat-oppressed brain?"

These two options, however, are not exhaustive; the negative answer to Macbeth's question can take two forms. The extensionalist, as I have characterized her, holds that since there is no dagger to be seen, there is nothing that Macbeth sees. However, one might hold that while Macbeth is not seeing a *dagger*, he is seeing something else: perhaps a sense-datum. The sense-datum theorist can thus hold that (8) is true:

(8)   Macbeth sees something,

even though (2) is false. The idea that perceptual ascriptions ascribe relations to sense-data is neither a strictly intensionalist nor strictly extensionalist view. Since it is not true, on the sense-datum theorist's view, that Macbeth sees a dagger, it is not an intensionalist view. But since it is likewise not true that there is a dagger such that Macbeth sees it, it is also not an extensionalist view.[9] In what

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[9]There is an approach to intentionality, and the semantics of intensional verbs, that comes

follows, I will restrict myself to considering what I have called the intensionalist and extensionalist answers to Macbeth's question, and ignore the view on which "sees" is fully relational, but relates Macbeth to something other than a dagger, such as a sense-datum. As I will construe the situation, quantifications such as (8) follow from perceptual reports such as (2), but are not generalizations over other kinds of objects.

2.2. *Intensional Transitive Verbs*

Intensionalists hold that perceptual ascriptions are existence-neutral in their object positions and admit of an ambiguity between two readings: one that entails the existence of what is perceived and one that does not. They also hold that these two readings are accompanied by distinct kinds of quantification. However, these features are not specific to perceptual ascriptions; rather, they are a subset of the semantic features characteristic of *intensional transitive verbs (ITVs)*.[10] Since one of those three features of ITVs is the failure to entail the existence of the verb's direct-object, the question of whether Macbeth can see a dagger is a special case of the question of whether "see" is an intensional transitive verb.

Treating the puzzle of Macbeth's dagger as a special case of the question of whether our perceptual verbs are intensional has several advantages. First, since the category of intensional transitive verbs is relatively well-understood, it gives us clear, formal criteria for solving the puzzle of Macbeth's dagger. Second, since existence-neutrality is one of a family of related intensional features, addressing the more general question allows us to ask a broader range of questions concerning the semantics of perceptual verbs, and if a verb exhibits these other features of intensionality, it gives us stronger evidence that the verb exhibits NONEXISTENCE. Third, should it turn out that the intensionalist is correct, we can bring

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very close to the sense-datum theorist's position. Suppose that Ponce is searching for the fountain of youth. The fountain of youth does not exist. So what is he looking for? One possibility is that he is looking for an abstract object: he is looking for something, but it is not a fountain, and is does not have any properties that would render it concrete. Such a view is often associated with so-called "split readings" of intensional ascriptions, on which the determiner takes wide scope over the verb but leaves its restrictor inside. On such a view, Ponce is looking for something that he thinks is a fountain, but which is actually abstract, in the same way that Macbeth might be seeing a sense-datum that he thinks is a dagger, but turns out not to be.

[10]Anscombe [1965] was the first person to recognize this, and to argue explicitly that perceptual verbs are intensional. Anscombe laid out the three traditional features of intensional transitive verbs and argued that perceptual verbs exhibit these features.

the tools developed to provide a semantics for ITVs to bear on our perceptual ascriptions, which will better allow us to specify their truth-conditions. In light of these advantages, it will be valuable to lay out the features of ITVs more carefully, and show how Macbeth's question can be stated in terms of them.

A verb is transitive when it takes a noun phrase in its object position, occurring in sentences of the form **NP V NP'**. A transitive verb **V** is intensional when it occurs in sentences that exhibit at least one of the following three properties.

Nonexistence NP Vs NP' has a reading which fails to entail **NP' exists**, where **NP'** is a positive quantifier, bare plural, or proper name.[11]

Nonspecificity: NP Vs NP' has a reading that fails to entail **NP Vs a particular NP'**.

Opacity: NP Vs NP' has a reading that fails to entail **NP Vs NP***, where **NP'**, and **NP*** are extensionally equivalent.

To see these properties in action, let's consider a canonical example. We can see that the verb phrase "looking for" exhibits Nonexistence by noting that (9) has a reading that does not imply (10):

(9)   John is looking for the fountain of youth.

(10)   The fountain of youth exists.

This establishes that "looking for" exhibits Nonexistence. Further, (11) follows from (9):

(11)   John is looking for something.

But given that there is no fountain of youth, (11) is not equivalent to (12):

(12)   There is some thing for which John is looking.

The distinctive form of quantification that we observe in (11) is the same kind of quantification countenanced by the intensionalist: it is quantification over the

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[11]The restriction to positive quantifiers includes quantified NPs like 'a dog', 'the men who robbed him', 'four gorgons', and 'infinitely many numbers', while excluding negative NPs like 'no dogs', 'no one', 'at most three gorgons', *etc*.

complement of a perceptual verb used transitively, and is not existentially committing. This form of quantification has come to be known as *special quantification* [Moltmann, 1997, 2003, 2008, 2013].

"Looking for" also exhibits the second property of ITVs, NONSPECIFICITY. Consider a case where 'looking for' has an indefinite noun phrase in its object position, such as the following:

(13)   John is looking for a capable business partner.

Clearly, there is a reading of (13) that does not entail (14):

(14)   John is looking for a particular capable business partner.

John may merely be seeking to share his entrepreneurial tasks with someone he thinks will help his business, and he might be satisfied with a great number of different individuals. We can bring this out with the following continuation:

(15)   John is looking for a capable business partner—but no one in particular.

On this reading, we likewise observe special quantification: if John is looking for a capable business partner, he is looking for something, even if not a particular person. This is clearly not equivalent to the wide-scope quantification:

(16)   There is some thing for which John is looking.

Lastly, "looking for" exhibits OPACITY: given two coextensive NPs, substitution of one for another within its complement does not preserve truth:

(17)   John is looking for Ortcutt.

(18)   John is looking for the shortest spy.

In this case, John might not know that Ortcutt is the shortest spy, and so the goal of his search may be to find Ortcutt and not the shortest spy. Thus (17) may be true while (18) is false, which means that 'looking for' exhibits OPACITY.

These inferential tests indicate that there is a reading of sentences containing ITVs on which their object-position is not existence-entailing, can receive a nonspecific interpretation, and resists substitution of co-extensive expressions. However, there is also a reading that does not have these features. Consider

John's search for a capable business partner above. As we saw, John need not be looking for any particular person. However, he might be, and (13) can also be used to report just such a search. We can bring out this other kind of search with the following paraphrase:

(19)   There's a particular capable business partner for whom John is looking.

The truth-conditions of (19) differ from those of the reading which we brought out with (15) above. This indicates that (13) ambiguous between two readings. While these two readings go by many names in the semantic literature, I will officially call the reading brought out by (19) the *de re* reading of (13), and the reading brought out in (15) its *de dicto* reading. However, I will also sometimes use the terms "intensional" and "extensional", or the evocative Quinean terminology of "notional" and "relational", for the *de dicto* and *de re* readings. The key feature of the *de dicto*, or notional reading of an ascription involving an ITV is that it can be true whether or not the *de re* reading is true, which is why the *de dicto* reading is sometimes said to be "existence neutral". Importantly, the presence of the *de dicto* reading is posited as the best explanation for the failure of the three inferences above.

However, while paradigmatic ITVs exhibit all three of the features just outlined, along with the *de re/de dicto* ambiguity, the three features are not always present together. Many other verbs demonstrate that the three features are separable. Typically, Nonexistence and Nonspecificity are present together, while Opacity is sometimes seen as separable, and the result of a different phenomenon.[12] Further, semanticists differ on which of the three features they take as criterial for membership in the category of ITVs. For instance, Moltmann [1997, 2008, 2013] takes the presence of Nonspecificity to be the definitive feature of ITVs. In what follows, we will see that perceptual verbs differ in the features of the intensionality that they exhibit. Some perceptual verbs exhibit only some of features of intensionality, while others appear to exhibit all three

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[12]For instance, Forbes [2006] uses one mechanism to account for Nonexistence and Nonspecificity, and another to account for Opacity. The tendency to treat Opacity as distinct from the other two properties originated with Fodor [1970], who held that Nonspecificity and Opacity can vary independently, and four different readings are available, one corresponding to each of combination of the presence and absence of each of the properties. For subsequent responses to and defenses of Fodor, see Keshet [2008, 2011] and Szabó [2010, 2011].

features, and so appear to be paradigmatically intensional.

With these properties in place, we can now state the puzzle of Macbeth's dagger in terms of them. The basic puzzle, stated above, is whether "sees" exhibits Nonexistence. If it does exhibit nonexistence, then (20) has a reading on which it is true, even when there is no dagger to be seen:

(20) Macbeth sees a dagger.

This reading is the *de dicto* reading, which accounts for the features of intensionality when they are present. We also have a clear way of stating the intensionalist's position on the kinds of quantifiers that generalize over the complements of perceptual verbs: the intensionalist holds that these quantifiers are *special* quantifiers, whereas the extensionalist holds that they are ordinary, existential quantifications.

3. Nonexistence

In this section I present three studies that attempt to resolve the question of whether perceptual verbs exhibit Nonexistence. The initial two studies, Experiments 1 and 2, tested three perceptual verbs, "see", "perceive", and "sense" for Nonexistence, while Experiment 3 tested a wider range of verbs for this property.

3.1. Experiment 1

The first study tested "see", "perceive", and "sense" for Nonexistence using a simple methodology.

3.1.1. Methods

In the study, 202 participants filled out a brief questionnaire.[13] Each participant was asked five questions, in random order. The questions differed only in that

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[13]Participants in this study, and all of the studies presented here, were recruited using Amazon's Mechanical Turk. Participants in Experiment 1 were English speakers, 54.7% male, average age 34.5, with 45% having at least a bachelor's degree. However, one limitation of the study was that, while English fluency was a requirement to participate, it was not possible to verify that speakers were *native* speakers of English. This may have had some effect on the results, although since the sample size was relatively large for a study of this kind, there is reason to think that the results are still detecting a genuine pattern in English usage.

each involved a different one of the following five verbs: "touch", "see", "perceive", "sense", and "search for". Of the five verbs, one verb, "touch", is paradigmatically extensional, another, "search for", is paradigmatically intensional, and three verbs, "see", "perceive", and "sense", are perceptual verbs. To make sure that the results did not depend on the particular phrasing of the questions, participants were then assigned randomly to one of three vignettes: (*Elf*, *Panda*, or *Extra-terrestrial*).

To test for Nonexistence, each participant was asked to suppose that a certain kind of entity did not exist, and then asked whether John could touch, see, perceive, sense, or search for such an entity. For example, participants assigned to the first vignette, *Elf*, received the following five questions:

Touch Suppose that there are no elves. We want to know: is it possible for John to touch an elf?

See Suppose that there are no elves. We want to know: is it possible for John to see an elf?

Perceive Suppose that there are no elves. We want to know: is it possible for John to perceive an elf?

Sense Suppose that there are no elves. We want to know: is it possible for John to sense an elf?

Search for Suppose that there are no elves. We want to know: is it possible for John to search for an elf?

The other vignettes differed only in that they had a different indefinite NP in place of "an elf"; the other two vignettes used "a purple panda" and "an extraterrestrial", respectively. Participants responded to the questions on a 7-point Likert scale, with an answer of 1 indicating a response of "definitely not" and 7 indicating "definitely yes". Since the goal of the experiment was to determine whether there is an entailment between touching, seeing, perceiving, sensing, and searching for an elf and the existence of elves, the questions were posed modally. If a participant responded with a high number, it indicated that the participant took there to be a possible situation in which the premise of the Nonexistence inference is true and its conclusion is false, which is just to say that the participant took the verb to exhibit Nonexistence.

The study then investigated participant responses by comparing the average scores for the questions involving perceptual verbs to both the average scores of the questions involving the paradigmatically intensional and extensional verbs, and to the scores of the other perceptual verbs. Since paradigmatic intensional verbs exhibit all three features of intensionality, along with the *de re/de dicto* ambiguity, the closer a perceptual verb's ratings were to the paradigmatically intensional or extensional verb, the more evidence we have that the perceptual verb exhibits or lacks the relevant feature of intensionality, and gives rise to the reading that explains this feature. Given that the study also compared perceptual verbs to each other, we were also able to determine differences between the three perceptual verbs with respect to NONEXISTENCE. Thus it was not primarily the absolute scores of the perceptual verbs that mattered, but rather the degree to which they differed or failed to differ from the intensional and extensional verbs, and from each other.[14]

3.1.2. Results

The average rating for each of the verbs across the three vignettes can be found in Figure 1. The ratings for all three perceptual verbs were intermediate: they differed significantly from the paradigmatically intensional verb, "search", the paradigmatically extensional verb, "touch", and from each other.[15] However, the ratings for "perceive" were much closer to those for "search", while the ratings for "see" and "sense" were both closer to those for "touch". These results were

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[14]It is important that each pair of questions within each vignette is *minimal*: they differ only in the verb they involve. Thus, absent interaction effects, any differences in participant responses can be attributed to differences in meaning between the verbs. Thus, pointing out that certain noun phrases are more apt to lead to intensional or extensional readings does not account for the core data, which concern the differences between perceptual verbs and paradigmatically intensional and extensional verbs.

[15]The results were analyzed using a 5 (verb: touch vs. see vs. perceive vs. sense vs. search) $\times$ 3 (vignette: elf vs. panda vs. extra-terrestrial) mixed ANOVA. As expected, there was a significant effect of verb, $F(4, 796) = 215.34, p < .001$, but no significant effect of vignette, $F(2, 199) = .661, p = .518$, and no significant interaction, $F(8, 796) = .862, p = .549$. To explore the differences between the verbs, I compared the verbs pairwise, correcting for multiple comparisons with Bonferroni's adjustment. Unsurprisingly, participants gave higher ratings for "search" ($M = 5.47, SD = 2.26$) than for "touch" ($M = 1.34, SD = .985$), $p < .001$. Ratings for "perceive" ($M = 3.89, SD = 2.27$) were significantly higher than the ratings for "touch", $p < .001$, and significantly lower than those for "search", $p < 001$. The ratings for "sees" ($M = 1.94, SD = 1.73$) and "sense" ($M = 2.28, SD = 1.78$) also differed significantly from both "touch" and "search", in both cases with $p < .001$.
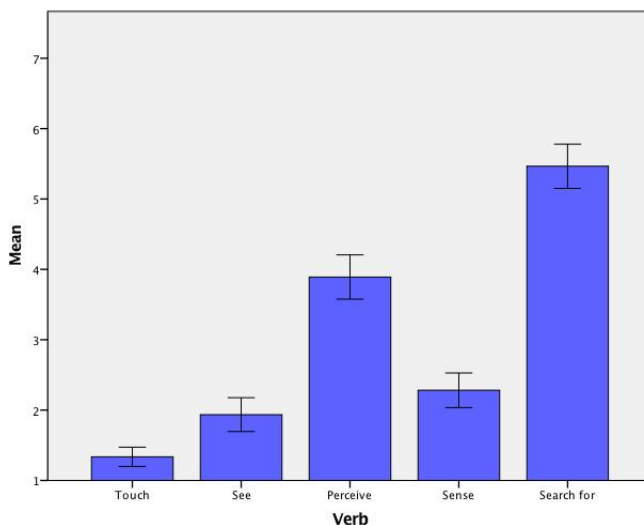
Figure 1: Mean ratings by condition in Experiment 1. Error bars show 95% confidence interval.

consistent across the three vignettes.

3.1.3. Discussion

The results above show that there are statistically significant differences between all of the verbs. If we rank that verbs from least intensional to most intensional, as expected, "touch" is the most extensional, "see", "sense", and "perceive", are intermediate, and "search for" is the most intensional. The largest jump between verbs occurs between "sense" and "perceive", and the midpoint between paradigmatically intensional and paradigmatically extensional occurs between these two verbs.

There is an important question to address before drawing any conclusions from these results. The features of intensionality are ordinarily treated as binary notions: the features are either present or absent. But the results above are given on a scale; they are not binary. What can we conclude from the fact that perceptual verbs fall closer to paradigmatically intensional or extensional verbs on such a scale, but still differ statistically from them? One possibility is that this data cannot be accommodated in the standard framework for thinking about intensionality, and requires a new framework. On this view, instead of treating the presence of a feature of intensionality as best explained by the availability of

an intensional reading, each feature of intensionality would be associated with a scale, and verbs that differ from each other statistically with respect to that feature would occupy different groups or tiers along that scale.

While I will not settle this issue completely here, and I am open to the idea that there is a scale of intensionality, I do not think that the results presented in this paper require a drastic departure from the standard framework. Two facts count in favor of remaining semantically conservative in this way.

First, there is an important difference between many speakers rating verbs as intermediate on a scale, and speakers rating verbs as either intensional or extensional in ways that average out to an intermediate rating. We need to investigate whether the mean scores for "see", "perceive", and "sense" are the result of many speakers giving intermediate scores, or whether they are the result of averaging a bimodal distribution. If the distribution is bimodal, we can conclude that the intermediate ratings are due the fact that some speakers hear intensional readings while others do not, while maintaining that, relative to a speaker, intensionality is binary.

This question is partially addressed in Appendix A, which contains the histograms for each verb in the initial studies for each property. In the case of Nonexistence, these histograms reveal that while the mean for "see" differed statistically from that for "touch", this is not the result of speakers providing intermediate ratings for "see". Rather, it is the result of averaging the large majority that rated "see" as perfectly extensional with the minority that did not. Further, as one can see, the distributions for "touch" and "see" were remarkably similar. The histograms also reveal that the higher mean for "perceive" is the result of a bimodal distribution in which the probability mass leans toward the intensional: many people hold that "perceive" exhibits Nonexistence, while some do not. While there are some intermediate readings, the higher mean observed for "perceive" is the result of a high proportion of speakers rating it as fully intensional.

Second, even if a verb differs statistically from another due to speaker variation, as "see" did from "touch" in Experiment 1, this does not entail that we need an altogether new intensional status for the verb. Rather, in giving a semantic theory for English, we are trying to give the best explanation and summary of the inferential patterns that speakers endorse, perhaps together with the strength

of their endorsement. The best explanation may hold that a verb is extensional—and lacks an intensional reading in English—even while there is variation among speakers concerning a particular inference, or while some speakers are not perfectly confident of this. Thus, we can see the fact that a majority of speakers take the verb to be fully extensional, while some do not, as evidence for the extensionality of the verb in English, rather than as constituting a new tier of intensionality for that property. With this view in hand, nothing requires us to draw the boundary between intensional and extensional verbs at the lowest point on the scale.

Adopting this explanatory approach allows us to take the proximity of a verb to the paradigmatically intensional or extensional case as a piece of data that needs to be explained by a semantic theory. Even when a verb differs statistically from such paradigmatic cases, if its overall distribution of scores across a range of experiments is close to that of a paradigm case, this fact can be explained by positing or not positing an intensional reading. Going forward, I will assume this strategy. I will treat the proximity of a perceptual verb's scores to a paradigm case as a datum that needs to be explained by positing or not positing an intensional reading. While I recognize that a more drastic departure from the standard semantic approach might provide a more fine-grained classification, I preserve the standard semantic view for simplicity and ease of explanation.

3.2. Experiment 2

The second study tested "see", "perceive", and "sense" for Nonexistence, but made use of a different prompt.[16] The variation in the prompt was intended to address the worry that Experiment 1 did not call attention to the fact that many people in fact do believe in various kinds of non-existent or imagined objects. Experiment 2 brought this fact to salience.

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[16]I am grateful to an anonymous referee for *Erkenntnis* for suggesting this follow-up variation on the experiment.

3.2.1. Methods

In the study, 213 participants filled out a brief questionnaire.[17] Each participant was asked five questions, in random order. The questions differed only in that each involved a different one of the following five verbs: "touch", "see", "perceive", "sense", and "search for". Of the five verbs, one verb, "touch", is paradigmatically extensional, another, "search for", is paradigmatically intensional, and three verbs, "see", "perceive", and "sense", are perceptual verbs. To make sure that the results did not depend on the particular phrasing of the questions, participants were then assigned randomly to one of three vignettes: (*Elf*, *Panda*, or *Extra-terrestrial*).

To test for Nonexistence, participants assigned to the *Elf* vignette were given the following prompt:

Elf Suppose there are actually no elves, but some people believe in their existence, and there are occasional reports of people encountering them, though these reports are in fact just due to people's vivid imaginations.

Each participant was then asked to answer the following five questions, in random order:

Touched In light of these circumstances, it is possible that your friend Sally touched an elf today?

Saw In light of these circumstances, it is possible that your friend Sally saw an elf today?

Perceived In light of these circumstances, it is possible that your friend Sally perceived an elf today?

Sensed In light of these circumstances, it is possible that your friend Sally sensed an elf today?

Searched for In light of these circumstances, it is possible that your friend Sally searched for an elf today?

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[17]Participants were English speakers, 56.5% of whom were male, average age 29.8, with 79.8% having at least a bachelor's degree.
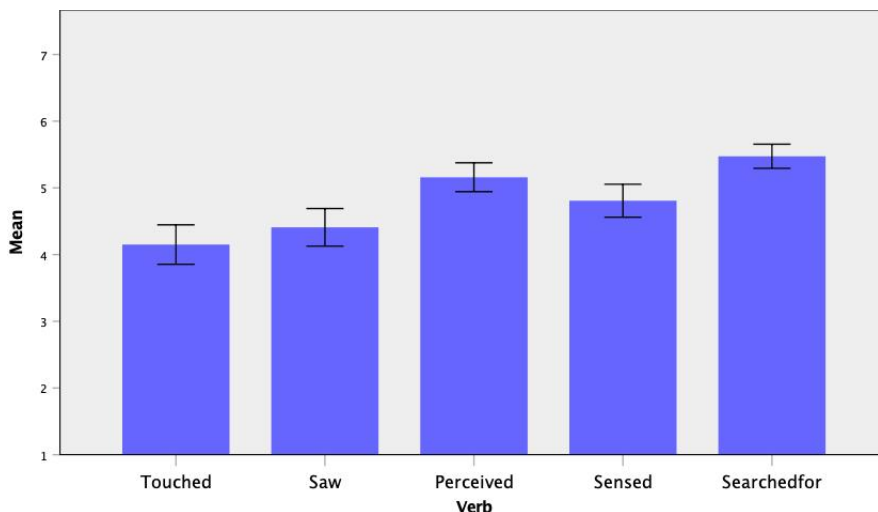
Figure 2: Mean ratings by condition in Experiment 2. Error bars show 95% confidence interval.

The other vignettes differed only in that they had a different indefinite NP in place of "an elf"; the other two vignettes used "a purple panda" and "an extraterrestrial", respectively. Participants responded to the questions on a 7-point Likert scale, with an answer of 1 indicating a response of "definitely not" and 7 indicating "definitely yes". Again, since the goal of the experiment was to determine whether there is an entailment between touching, seeing, perceiving, sensing, and searching for an elf and the existence of elves, the questions were posed modally. If a participant responded with a high number, it indicated that the participant took there to be a possible situation in which the premise of the NONEXISTENCE inference is true and its conclusion is false, which is just to say that the participant took the verb to exhibit NONEXISTENCE.

3.2.2. Results

The average rating for each of the verbs across the three vignettes can be found in Figure 2. The ratings for all three perceptual verbs were again intermediate, and they differed significantly both from the paradigmatically intensional verb, "search", the paradigmatically extensional verb, "touch", and from each other.[18]

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[18]The results were analyzed using a 5 (verb: touch vs. see vs. perceive vs. sense vs. search) × 3 (vignette: elf vs. panda vs. extra-terrestrial) mixed ANOVA. As expected, there was

These results were consistent across the vignettes.

3.2.3. Discussion

As in Experiment 1, we observed statistical differences between each of the verbs.[19] However, the differences in the means between each verb were significantly attenuated; the difference between the highest and lowest mean score was only 1.32. Thus, bringing imagination to salience, and mentioning that there are reports that such things exist, decreased the differences between the verbs dramatically. But in spite of these changes, the ordinal ranking of intensionality for the verbs remained constant; "touch" was least intensional, followed by "see", "sense", and "perceive", with "search for" being the most intensional. This provides us with some evidence that the results from the previous experiment—at least the patterns of statistical difference and the ordinal ranking with respect to NONEXISTENCE—were not due to peculiarities of experimental design. The next experiment provides further evidence for this conclusion.

3.3. *Experiment 3*

The third study tested seven perceptual verbs—"see", "hear", "smell", "touch", "feel", "perceive", and "have a sensation of"—for NONEXISTENCE.[20] Unlike in the previous experiments, this study provided participants with a brief description of the goals of the study, along with examples of paradigmatically intensional and extensional verbs, and of how such verbs behave with respect to the questions participants were asked to answer. These additions were made with the intention of forestalling misunderstandings of the task, solidifying participants'

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a significant effect of verb, $F(4, 840) = 36.64, p < .001$, but no significant effect of vignette, $F(2, 210) = .496, p = .610$, and no significant interaction, $F(8, 840) = .671, p = .718$. To explore the differences between the verbs, I compared the verbs pairwise, correcting for multiple comparisons with Bonferroni's adjustment. Unsurprisingly, participants gave higher ratings for "searched for" ($M = 5.47, SD = 1.341$) than for "touched" ($M = 4.15, SD = 2.186$), $p < .001$. Ratings for "perceived" ($M = 5.16, SD = 1.603$) were significantly higher than the ratings for "touch", $p < .001$, and significantly lower than those for "search", $p = .049$. The ratings for "saw" ($M = 4.41, SD = 2.087$) differed significantly from "touched" ($p = .001$) and "searched for" ($p < .001$), as did the rating for "sensed" ($M = 4.81, SD = 1.826$), in both cases with $p < .001$.

[19] Although "perceived" and "searched for" differed only with $p = .049$.

[20] Participants were English speakers, 58.7% male, average age 33.3, with 67.5% of participants having at least a bachelor's degree.

grasp of the categories of intensional and extensional verbs, and providing them with clear paradigm cases of verbs in each category.

3.3.1. Methods

In the study, 219 participants filled out a brief questionnaire. Each participant was asked nine questions, in random order. The questions differed only in that they each involved a different one of the following nine verbs: "see", "hear", "smell", "touch", "feel", "perceive", and "have a sensation of", "kick", or "search", where "kick" is paradigmatically extensional, "search for" is paradigmatically intensional, and the remainder of the verbs are perceptual verbs.[21] To make sure that the results did not depend on the particular phrasing of the questions, participants were then assigned randomly to one of four vignettes: *Panda*, *Extraterrestrial*, *Dragon*, or *Dodo*.

To test for NONEXISTENCE, participants in the *Dragon* vignette were given the following instructions:

> This study concerns the meanings of certain verbs in English.
>
> Some verbs can only relate people to things that exist. Others do not have this restriction. Consider two examples:
>
> Since unicorns don't exist, it is *not* possible for John to ride a unicorn, but it *is* possible for him to *want* a unicorn. We are trying to determine whether a specific collection of verbs behaves more like "ride" or more like "want".
>
> In order to determine this, **suppose that you know that dragons don't exist, but your friend John doesn't.**

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[21]Experiment 3—like, as we will see, Experiments 5 and 7—involved a broader range of perceptual verbs. The goal of testing this broader range was first to locate "perceive" and "sense" within this broader category. Doing so allows us to compare "see" and "perceive" to other perceptual verbs, in the hope of gleaning additional insights. But studying a broader range of perceptual verbs also has intrinsic interest for those interested in sensory modalities other than vision. Additionally, Experiments 3, 5, and 7 differed from the other studies in that they made use of "have a sensation of" as opposed to "sense". The reason for this change is that "sense" has a strong cognitive, non-perceptual interpretation, which dominates its perceptual use. Of course, other perceptual verbs likewise have cognitive readings, but the goal of switching from "sense" to "have a sensation of" was to restrict attention to sensations, which are only present in conscious perceptual states.

Then answer the following questions:[22]

> Is it possible for John to see a dragon?
>
> Is it possible for John to hear a dragon?
>
> Is it possible for John to smell a dragon?
>
> Is it possible for John to touch a dragon?
>
> Is it possible for John to feel a dragon?
>
> Is it possible for John to perceive a dragon?
>
> Is it possible for John to have a sensation of a dragon?
>
> Is it possible for John to search for a dragon?
>
> Is it possible for John to kick a dragon?

The other vignettes differed only in that they had a different indefinite NP in place of "an dragon"; the other three vignettes used "a purple panda", "an extra-terrestrial", and "a dodo", respectively. Participants responded to the questions on a 7-point Likert scale, with an answer of 1 indicating a response of "definitely not" and 7 indicating "definitely yes". As with experiments 1 and 2, the questions were posed modally. If a participant responded with a high number, it indicated that the participant took there to be a possible situation in which the premise of the Nonexistence inference is true and its conclusion is false, which is just to say that the participant took the verb to exhibit Nonexistence.

3.3.2. Results

The average rating for each of the verbs across the four vignettes can be found in Figure 3. Beginning with the paradigmatically extensional case, the results show that two verbs did not differ significantly from "kick": "smell" and "touch". Shifting our attention to "see", we found that while "see" did differ statistically from "kick", it did not differ statistically from "hear", "smell", or "feel". Thus, "see" was in a cluster of verbs some of which did not differ statistically from fully extensional verbs such as "kick" and "touch", and whose means were close to that of the paradigmatically extensional verb "kick". By contrast, "perceive"

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[22]After being presented with the instructions, participants were presented with the questions all at once, but in a random order. The instructions and examples remained on the screen.
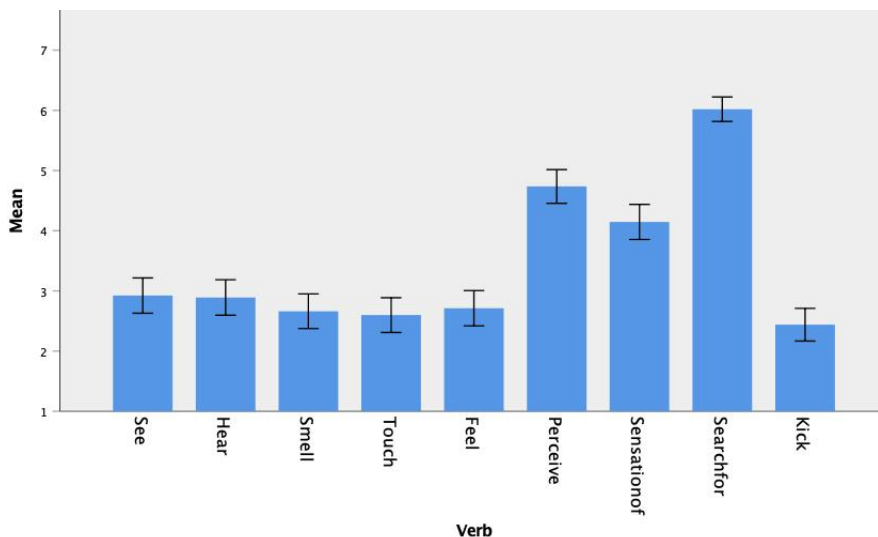
Figure 3: Mean ratings by condition in Experiment 3. Error bars show 95% confidence interval.

had a much higher mean, and differed statistically from every other verb in the experiment, including "search for".[23]

3.4. Discussion

Since this experiment did not involve the verb "sense", but instead made use of a closely related verbal lexeme, "have a sensation of", the results cannot be directly compared to those of Experiments 1 and 2. However, with respect to "touch", "see", "perceive", and "search for", this study replicated the results that we observed in the previous two experiments. All of these verbs differed statistically

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[23]The results were analyzed using a 9 (verb: see vs. hear vs. smell vs. touch vs. feel vs. perceive vs. have a sensation of vs. search for vs. kick) $\times$ 4 (vignette: dragon vs. panda vs. extra-terrestrial vs. dodo) mixed ANOVA. As expected, there was a significant effect of verb, $F(8, 1720) = 147.44, p < .001$, but no significant effect of vignette, $F(3, 215) = .387, p = .762$, and a significant interaction, $F(24, 1720) = 1.57, p = .04$. To explore the differences between the verbs, I compared the verbs pairwise, correcting for multiple comparisons with Bonferroni's adjustment. As expected, the highest mean was for "searched for" ($M = 6.02, SD = 1.52$) while the lowest was for kick ($M = 2.44, SD = 2.04$). Ratings for "perceived" ($M = 4.74, SD = 2.01$) were significantly higher than the ratings for "kick", $p < .001$, "touch" ($M = 2.60, SD = 2.168$), $p < .001$, and "have a sensation of" ($M = 4.15, SD = 2.19$), $p = .003$, and significantly lower than those for "search for" ($p < .001$). The ratings for "see" ($M = 2.92, SD = 2.20$) differed significantly from "kicked" ($p < .001$) and "searched for" ($p < .001$), but not from "hear" ($M = 2.89, SD = 2.215$), $p = 1.000$), "smell" ($M = 2.66, SD = 2.16$), $p = .140$) or "feel" ($M = 2.71, SD = 2.20$), $p = 1.000$.

from one another, and we observed the same ordinal ranking of Nonexistence scores. Further, "have a sensation of" behaved very much like "sense" did in the previous two experiments: it occupied the same place in the ordering, and differed statistically from the other verbs in the exact same ways. Further, like in Experiment 1, but unlike in Experiment 2, we observed large differences between the means of each of the verbs. Again, while "see" was not perfectly extensional, its mean (2.92) was much closer to the mean for "kick" (2.44) than the mean for "search for" (6.02). Likewise, the mean for "perceive" (4.74) was much closer to the mean of the paradigmatically intensional verb "search for" than it was to the mean for "kick". Thus, the results of Experiment 3 offer further support for the general pattern we observed in Experiments 1 and 2: scores for "see" are much closer to those of the paradigmatically extensional than intensional verb, while the opposite is the case for "perceive".

4. Nonspecificity

4.1. *Experiment 4*

The fourth study tested "see", "perceive", and "sense" for Nonspecificity using a simple methodology.

4.1.1. Methods

In the study, 222 participants filled out a brief questionnaire.[24] Each participant was asked five questions, in random order. The questions differed only in that they each involved a different one of the following five verbs: "touch", "see", "perceive", "sense", and "look for".[25] Of the five verbs, one verb, "touch", is paradigmatically extensional, another, "look for", is paradigmatically intensional, and three verbs, "see", "perceive", and "sense", are perceptual verbs. To make sure that the results did not depend on the particular phrasing of the questions, participants were then assigned randomly to one of three vignettes (*Dog*, *Car*, or *Mouse*).

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[24]Participants were English speakers, 46.9% male, average age 32.3, with 65.2% having at least a bachelor's degree.

[25]Experiments 2 and 3 differed slightly from Experiment 1 in that they made use of the paradigmatically intensional verb + preposition combination "look for", as opposed to "search for".

To test for NONSPECIFICITY, we asked participants whether they could touch, see, perceive, sense, or search for an object of the relevant kind, without touching, seeing, perceiving, sensing, or searching for a particular object. For instance, participants assigned to the first vignette, *Dog*, received the following five questions:

Touch Suppose that John is touching a dog. Is it possible that John is touching a dog, but not a particular one?

See Suppose that John sees a dog. Is it possible that John sees a dog, but not a particular one?

Perceive Suppose that John perceives a dog. Is it possible that John perceives a dog, but not a particular one?

Sense Suppose that John senses a dog. Is it possible that John senses a dog, but not a particular one?

Look for Suppose that John is looking for a dog. Is it possible that John is looking for a dog, but not a particular one?

The questions associated with the other vignettes differed from the above questions only in that they had a different NP in place of "a dog"; the other vignettes, *Car* and *Mouse*, made use of "a car" and "a mouse", respectively. Participants responded to the questions on a 7-point Likert scale, with an answer of 1 indicating a response of "definitely not" and 7 indicating "definitely yes". Thus, if a participant responded with a high number, it indicated that the participant took there to be a possible situation in which the premise of the NONSPECIFICITY inference is true and its conclusion is false, which is just to say that the participant took the verb to exhibit NONSPECIFICITY. A low score indicated the opposite.

As with the previous study, Experiment 2 investigated participant responses by comparing the average scores for the questions involving perceptual verbs to both the average scores of the questions involving the paradigmatically intensional and extensional verbs, and to the scores of the other perceptual verbs. Again, the closer a perceptual verb's ratings were to the paradigmatically intensional or extensional verb, the more evidence we have that the perceptual verb exhibits or lacks the relevant feature of intensionality—in this case, NONSPECIFICITY. As with the last study, the absolute scores of the verbs mattered less than
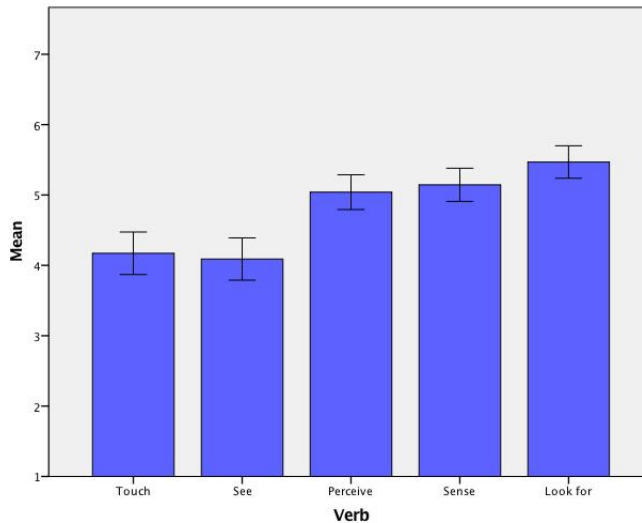
Figure 4: Mean ratings by condition in Experiment 4. Error bars show 95% confidence interval.

the comparisons to the paradigmatically intensional and extensional verbs and to each other.

4.1.2. Results

The average rating for each of the verbs across the three vignettes can be found in Figure 4. The results of this study were more decisive: the perceptual verbs split into two groups. "Perceive" and "sense" differed significantly from "touch", but did not differ significantly from "look for". By contrast, "see" did not differ from "touch", but differed significantly from "perceive", "sense", and "look for". This pattern was consistent across the three vignettes.[26] This indicates that "perceive"

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[26]The results were analyzed using a 5 (verb: touch vs. see vs. perceive vs. sense vs. search) × 3 (vignette: dog vs. car vs. mouse) mixed ANOVA. As expected, there was a significant effect of verb, $F(4, 876) = 28.26, p < .001$, but no significant effect of vignette, $F(2, 219) = .907, p = .518$, and no significant interaction, $F(8, 876) = .862, p = .952$. To explore the differences between the verbs, I compared the verbs pairwise, correcting for multiple comparisons with Bonferroni's adjustment. Unsurprisingly, participants gave higher ratings for "search" ($M = 5.47, SD = 1.75$) than for "touch" ($M = 4.17, SD = 2.29$), $p < .001$. Ratings for "perceive" ($M = 5.04, SD = 1.87$) were significantly higher than the ratings for "touch", $p < .001$, but did not differ significantly from those for "search", $p = .084$. The ratings "sense" ($M = 5.14, SD = 1.78$) also differed significantly from "touch", $p < .001$ "search", but did not differ from "search", $p = .249$. Contrarily, the average rating for "sees" did not differ from that of "touch", $p = 1.000$, but did differ significantly from "search", $p < .001$.

and "sense" are as apt to receive nonspecific readings as "look for", but in the case of "see", such readings are not available.

4.1.3. Discussion

If we restrict ourselves to considering only "see" and "perceive", then the results of Experiment 2 are consonant with the results of Experiments 1 and 2. Experiment 1 showed that "see" was close to paradigmatically extensional with respect to Nonexistence, while "perceive" behaved much more intensionally. The results of Experiment 2 likewise show that "perceive" exhibits intensional behavior, while "see" does not. However, "senses" behaved differently with respect to Nonspecificity than it did with respect to Nonexistence. In Experiment 1, "senses" patterned with "touch", while in this experiment, "sense" patterned with "search for". Thus, this experiment gives us further evidence for our conclusions concerning "see" and "perceive" from the Nonexistence studies, but revealed that "sense" exhibited different behavior with respect to Nonspecificity than it did with respect to Nonexistence.[27]

4.2. *Experiment 5*

The fifth study broadened the scope of the fourth by testing seven perceptual verbs—"see", "hear", "smell", "touch", "feel", "perceive", and "have a sensation of"—for Nonspecificity. Unlike in Experiments 1, 2, and 4, but like Experiment 3, this study provided participants with a brief description of the goals of the study, along with examples of paradigmatic intensional and extensional verbs, and how they behave with respect to the questions participants were asked to answer. Again, these additions were made with the intention of forestalling misunderstandings of the task, solidifying participants' grasp of the categories

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[27]The behavior of "sense" is somewhat strange, given that nonexistence and nonspecificity are often explained by the same mechanism (see, for instance, Forbes [2006]). However, there are some existence-entailing verbs that do not require specificity. These verbs have an "incorporated" semantics: indefinites in their object positions take obligatory narrow scope, and are nonspecific, but are existence-entailing. Examples of such constructions are incorporated VPs such as "mouse-caught" or "salmon-ate". The incorporated status of the nominal gives it a nonspecific interpretation, but the extensionality of the verb entails that there must be something that was caught or eaten. See Dayal [2003, 2011] and van Geenhoven [1998] for further discussion. The connection between intensional transitive verbs and semantic incorporation is discussed at length by van Geenhoven and McNally [2005].

of intensional and extensional verbs, and providing them with clear paradigm cases of verbs in each category.

4.2.1. Methods

In the study, 214 participants filled out a brief questionnaire.[28] Each participant was asked nine questions, in random order. The questions differed only in that they each involved a different one of the following nine verbs: "see", "hear", "smell", "touch", "feel", "perceive", and "have a sensation of", "search for", or "kick", where "kick" is paradigmatically extensional, "search for" is paradigmatically intensional, and the remainder of the verbs are perceptual verbs. To make sure that the results did not depend on the particular phrasing of the questions, participants were then assigned randomly to one of three vignettes: *Cow*, *Pig*, or *Chicken*.

To test for NONSPECIFICITY, participants in the *Cow* vignette were given the following instructions:

> This study concerns the meanings of certain verbs in English.
>
> Some verbs relate people only to specific objects, while others do not require such specificity.
>
> For example, if John is *riding* a horse, he must be riding a particular horse. But if John *wants* a horse, he might not want a *particular* horse. He might just want any old horse, or simply a horse that canters well.
>
> Keeping these examples in mind, please answer the following questions:[29]
>
>> Is it possible for John to see a cow, but not a particular one?
>>
>> Is it possible for John to hear a cow, but not a particular one?
>>
>> Is it possible for John to smell a cow, but not a particular one?
>>
>> Is it possible for John to touch a cow, but not a particular one?
>>
>> Is it possible for John to feel a cow, but not a particular one?

---

[28]Participants were English speakers, 59.2% male, average age 33, with 66.8% having at least a bachelor's degree.

[29]After being presented with the instructions, participants were presented with the questions all at once, but in a random order. The instructions and examples remained on the screen.

Is it possible for John to perceive a cow, but not a particular one?

Is it possible for John to have a sensation of a cow, but not a particular one?

Is it possible for John to search for a cow, but not a particular one?

Is it possible for John to kick a cow, but not a particular one?

The other vignettes differed only in that they had a different indefinite NP in place of "a cow"; the other two vignettes used "a pig", "a chicken", respectively. Participants responded to the questions on a 7-point Likert scale, with an answer of 1 indicating a response of "definitely not" and 7 indicating "definitely yes". As with the previous experiments, the questions were posed modally. If a participant responded with a high number, it indicated that the participant took there to be a possible situation in which the premise of the NONSPECIFICITY inference is true and its conclusion is false, which is just to say that the participant took the verb to exhibit NONSPECIFICITY.

4.2.2. Results

The average rating for each of the verbs across the four vignettes can be found in Figure 5. The most notable result is that "see" did not differ statistically from "touch", "feel", or "kick". Meanwhile, "perceive" did not differ statistically from "hear", "smell", or "have a sensation of". However, "see" did differ statistically from, and had a lower rating than, "hear", "smell", "perceive", "have a sensation of", and "search for".[30]

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[30] The results were analyzed using a 9 (verb: see vs. hear vs. smell vs. touch vs. feel vs. perceive vs. have a sensation of vs. search for vs. kick) × 3 (vignette: pig vs. cow vs. chicken) mixed ANOVA. As expected, there was a significant effect of verb, $F(8, 1688) = 59.14, p < .001$, but no significant effect of vignette, $F(2, 211) = .898, p = .409$, and no significant interaction, $F(16, 1688) = .617, p = .873$. To explore the differences between the verbs, I compared the verbs pairwise, correcting for multiple comparisons with Bonferroni's adjustment. As expected, the highest mean was for "searched for" ($M = 5.57, SD = 1.87$) while the lowest was for kick ($M = 2.98, SD = 2.362$). Ratings for "perceived" ($M = 5.04, SD = 2.02$) were significantly higher than the ratings for "kick" ($p < .001$) and "touch" ($M = 3.2, SD = p < .001$), significantly lower than those for "search for", $p < .001$, but did not differ statistically from "hear" ($M = 4.62, SD = 2.342$), $p = 1.000$, "smell" ($M = 4.93, SD = 2.178$), $p = 1.000$, or "have a sensation of" ($M = 4.7, SD = 2.105$), $p = 1.000$. The ratings for "see" ($M = 3.31, SD = 2.33$) differed significantly from "kicked" ($p < .001$) and "searched for" ($p < .001$), but not from "touch" ($M = 3.2, SD = 2.436$), $p = 1.000$, "feel" ($M = 3.03, SD = 2.296$), $p = 1.000$, or "kick", $p = 5.17$.
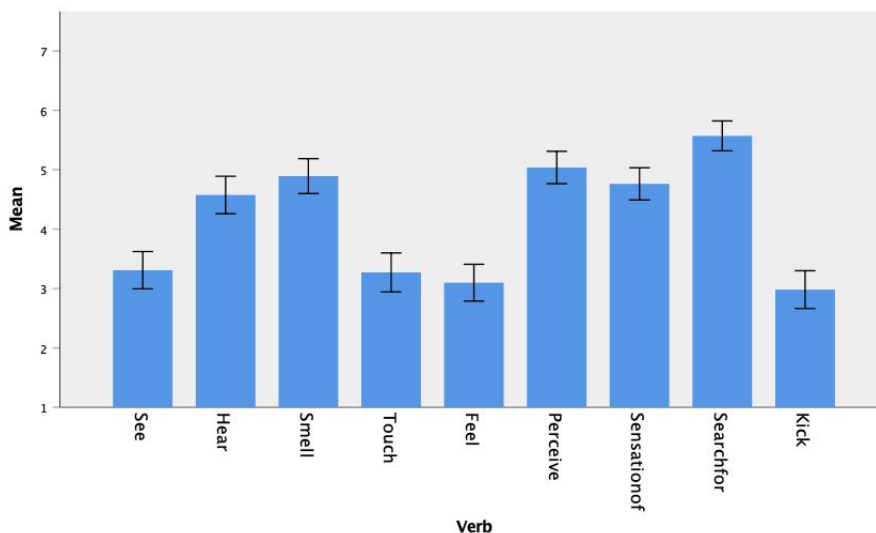
Figure 5: Mean ratings by condition in Experiment 5. Error bars show 95% confidence interval.

4.2.3. Discussion

These results are consistent with the results of our previous experiment, and broadly reinforce the results of the three NONEXISTENCE experiments. Here we find that there is a cluster of verbs—including "see"—that behave like paradigmatically extensional verbs with respect to NONSPECIFICITY—they can only be interpreted specifically in their object positions. Every verb in this cluster contrasts with every verb in the more intensional cluster, which included "hear", "smell", "perceive", and "have a sensation of". This reinforces the idea that "see" behaves extensionally, but "perceives" is much more like an intensional verb. While "perceive" did differ statistically from "search for", its mean (5.04) was much closer to that of "search for" (5.57) than "kick" (2.98). Thus, as in every previous experiment, "perceive" falls on the intensional side of the spectrum. Also, in this experiment, "have a sensation of" behaved roughly like "sense" did in Experiment 3: it was more intensional, but still differed significantly from "search for".

5. Opacity

5.1. *Experiment 6*

The sixth study tested "see", "perceive", and "sense" for Opacity using a simple methodology.

5.1.1. Methods

In the study, 199 participants filled out a brief questionnaire.[31] Each participant was asked five questions, in random order. The questions differed only in that they each involved a different one of the following five verbs: "touch", "see", "perceive", "sense", and "search for". Of the five verbs, one verb, "touch", is paradigmatically extensional, another, "search for", is paradigmatically intensional, and three verbs, "see", "perceive", and "sense", are perceptual verbs. To make sure that the results did not depend on the particular phrasing of the questions, participants were then assigned randomly to one of three vignettes (*Spy*, *Butler*, or *Wife*).

For instance, participants assigned to *Butler* received the following five questions:

Touch Suppose that John is touching the butler, say by shaking his hand. But unbeknownst to John, the butler is the murderer. Is it possible that John isn't touching the murderer?

See Suppose that John sees the butler in the kitchen. But unbeknownst to John, the butler is the murderer. Is it possible that John doesn't see the murderer in the kitchen?

Perceive Suppose that John perceives the butler in the kitchen. But unbeknownst to John, the butler is the murderer. Is it possible that John doesn't perceive the murderer in the kitchen?

Sense Suppose that John senses the butler in the kitchen. But unbeknownst to John, the butler is the murderer. Is it possible that John doesn't sense the murderer in the kitchen?

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[31]Participants were English speakers, 54.7% male, average age 33.4, with 67.1% having at least a bachelor's degree.

Look for Suppose that John is looking for the butler. But unbeknownst to John, the butler is the murderer. Is it possible that John isn't looking for the murderer?

The questions associated with the other vignettes differed from the above questions only in that they had different NPs in place of "the butler" and "the murderer". The *Spy* vignette made use of "Ortcutt" and "the shortest spy", while the *Wife* vignette made use of "his wife" and "the most dangerous Russian spy". Participants responded to the questions on a 7-point Likert scale, with an answer of 1 indicating a response of "definitely not" and 7 indicating "definitely yes". Thus, if a participant responded with a high number, it indicated that the participant took there to be a possible situation in which the premise of the OPACITY inference is true and its conclusion is false, which is just to say that the participant took the verb to exhibit OPACITY. A low score indicated the opposite.

Similarly to the studies above, this study compared the average scores for the questions involving perceptual verbs to both the average scores of the questions involving the paradigmatically intensional and extensional verbs, and to the scores of the other perceptual verbs, and drew conclusions concerning the intensionality of the perceptual verbs by comparison.

5.1.2. Results

The average rating for each of the verbs across the three vignettes can be found in Figure 6. Similarly to the results concerning NONSPECIFICITY, neither "perceive" nor "sense" differed from the paradigmatically intensional verb + preposition combination "look for", while both differed significantly from the paradigmatically extensional verb "touch".[32] Somewhat strangely, "see" also did not differ

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[32]The results were analyzed using a 5 (verb: touch vs. see vs. perceive vs. sense vs. look for) × 3 (vignette: spy vs. butler vs. wife) mixed ANOVA. As expected, there was a significant effect of verb, $F(4, 784) = 21.55, p < .001$. Somewhat strangely, there was also an effect of vignette, $F(2, 196) = 7.699, p = .001$, although there was no significant interaction, $F(8, 784) = 1.294, p = .243$. One of the vignettes had overall lower scores, perhaps due to the fact that one set of descriptions used perceptually available properties: the *Spy* vignette made use of an NP "the shortest spy", one component of which—"height"—was perceptually available, in contrast to the other NPs. However, in this study, there was also variation between vignettes in the kinds of NPs used. Perhaps the combination of a proper name "Ortcutt" and a definite description "the shortest spy" combined to yield noticeably lower scores for that vignette. To explore the differences between the verbs, I compared the verbs pairwise, correcting for multiple comparisons with Bonferroni's adjustment. Unsurprisingly, participants
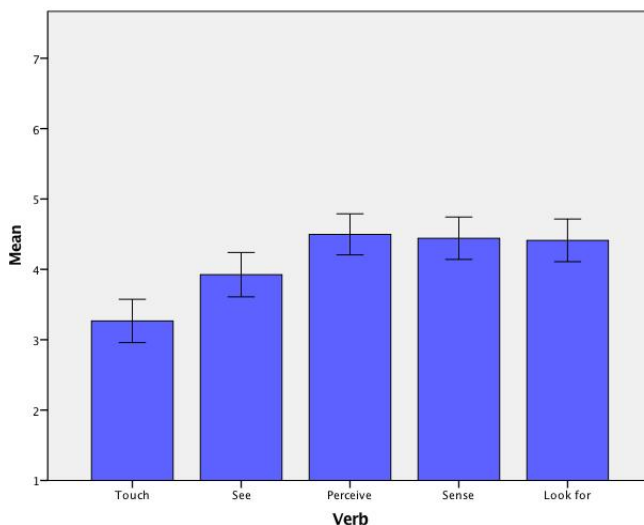
Figure 6: Mean ratings by condition in Experiment 6. Error bars show 95% confidence interval.

significantly from "look for", but it did differ significantly from "touch", "perceive", and "sense". Thus, while "see" had an intermediate rating with respect to OPACITY, the fact that it did not differ statistically from "look for" indicates that "see" exhibits OPACITY.

5.1.3. Discussion

The results of this experiment seem to show that all three of the perceptual verbs—"see", "sense", and "perceive"—pattern with the paradigamtically intensional verb "search for", and so appear to resist substitution within their complements. In contrast to the previous two experiments, "see" did not differ statistically from the paradigmatically intensional verbs "look for", but did differ significantly from "touch". It also did not differ statistically from "perceive" or "sense". Thus, "touch" seems to be alone among the fully allowing for substitu-

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gave higher ratings for "search" ($M = 4.41, SD = 2.17$) than for "touch" ($M = 3.27, SD = 2.2$), $p < .001$. Ratings for "perceive" ($M = 4.5, SD = 2.09$) were significantly higher than the ratings for "touch", $p < .001$, but did not differ significantly from those for "look for", $p = 1.000$. The ratings for "sense" ($M = 5.14, SD = 1.78$) also differed significantly from "touch", $p < .001$, but did not differ from "search", again with $p = 1.000$. The ratings for "see" ($M = 3.92, SD = 2.26$) differed significantly from those for "touch", $p < .001$, but did not differ significantly from "search", $p = .094$.

tion. But what is clear is that "perceive" does not allow for substitution within its complement; of all five of the verbs, "perceive" was rated as the most opaque—it was even more opaque than "look for", although it did not differ from it in a way that was statistically significant. This provides initial data that direct-object perceptual locutions are not fully transparent within their complements: what we see, sense, and perceive is individuated in a way that is finer-grained than mere extension. Thus, there is evidence that perceptual verbs, this time including "see", exhibit one more property characteristic of verbs that report representational states: the objects of perception are individuated more finely than mere extension.

One possibile explanation for this behavior is that seeing, sensing, and perceiving may, to varying degree, have a reading that requires recognition. "Recognize" is highly opaque within its complement. If I recognize Superman, it does not follow that I have recognized Clark Kent. If perceptual verbs require or entail recognition, then this would explain their opacity.[33]

5.2. *Experiment 7*

The seventh study broadened the scope of the sixth by testing seven perceptual verbs—"see", "hear", "smell", "touch", "feel", "perceive", and "have a sensation of"—for Opacity. Unlike in Experiments 1, 2, 4, and 6, but like Experiments 3 and 5, this study provided participants with a brief description of the goals of the study, along with examples of paradigmatic intensional and extensional verbs, and how they behave with respect to the questions participants were asked to answer. Like in Experiments 3 and 5, these additions were made with the intention of forestalling misunderstandings of the task, solidifying participants' grasp of the categories of intensional and extensional verbs, and providing them with clear paradigm cases of verbs in each category.

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[33]However, even if perceptual verbs have a reading that requires recognition, they also have one that does not. This makes it perfectly felicitous to say things such as "I saw John's new invention, but had no idea what I was looking at". The higher scores for Opacity simply make it plausible that there is such a recognition-requiring reading.

5.2.1. Methods

In the study, 213 participants filled out a brief questionnaire.[34] Each participant was asked nine questions, in random order. The questions differed only in that they each involved a different one of the following nine verbs: "see", "hear", "smell", "touch", "feel", "perceive", and "have a sensation of", "search for", or "kick", where "kick" is paradigmatically extensional, "search for" is paradigmatically intensional, and the remainder of the verbs are perceptual verbs. To make sure that the results did not depend on the particular phrasing of the questions, participants were then assigned randomly to one of four vignettes: *Spy*, *Butler*, or *Novelist*.

To test for OPACITY, participants in the *Spy* vignette were given the following instructions:

> This study concerns the meanings of certain verbs in English.
>
> Sometimes, when a verb is used in a sentence, it makes the truth of that sentence sensitive to how objects are described. For example, even though George W. Bush is the 43rd president of the United States, Janet may *admire* the 43rd President of the United States without admiring George W. Bush, because she *doesn't know* that George W. Bush is the 43rd President of the United States.
>
> However, she cannot *kick* the 43rd president of the United States without also kicking George W. Bush. In this case, it doesn't matter whether she knows that he is the 43rd president.
>
> Keeping these examples in mind, please answer the following questions:[35]
>
> > Suppose that Janet sees James, and James is the spy. Is it possible that Janet doesn't see the spy?
>
> > Suppose that Janet hears James, and James is the spy. Is it possible that Janet doesn't hear the spy?

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[34]Participants were English speakers, 57.8% male, average age 34, with 64.7% having at least a bachelor's degree.

[35]After being presented with the instructions, participants were presented with the questions all at once, but in a random order. The instructions and examples remained on the screen.

Suppose that Janet smells James, and James is the spy. Is it possible that Janet doesn't smell the spy?

Suppose that Janet touches James, and James is the spy. Is it possible that Janet doesn't touch the spy?

Suppose that Janet feels James, and James is the spy. Is it possible that Janet doesn't feel the spy?

Suppose that Janet perceives James, and James is the spy. Is it possible that Janet doesn't perceive the spy?

Suppose that Janet has a sensation of James, and James is the spy. Is it possible that Janet doesn't have a sensation of the spy?

Suppose that Janet searches for James, and James is the spy. Is it possible that Janet doesn't search for the spy?

Suppose that Janet kicks James, and James is the spy. Is it possible that Janet doesn't kick the spy?

The other vignettes differed only in that they had a different NPs in place of "James" and "the spy"; the *Butler* vignette made use of "the murderer" and "the butler", while the *Novelist* vignette made use of "her history teacher" and "the best American novelist". Participants responded to the questions on a 7-point Likert scale, with an answer of 1 indicating a response of "definitely not" and 7 indicating "definitely yes".

5.2.2. Results

The average rating for each of the verbs across the four vignettes can be found in Figure 7. Again, the results were complex. The results show that "see" does not differ statistically from "hear", "smell", or "feel", but differs statistically from all of the rest of the verbs tested. By contrast, neither "perceive" nor "have a sensation of" differed statistically from "search for", or from each other, but they differed significantly from all of the other verbs. Thus there again appear to be two separate clusters of verbs, one including "see", "hear", "smell", and "feel", and another including "perceive", "have a sensation of", and "search for", that differ from each other with respect to OPACITY.[36] However, even the verbs in the

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[36] The results were analyzed using a 9 (verb: see vs. hear vs. smell vs. touch vs. feel vs. perceive vs. have a sensation of vs. search for vs. kick) $\times$ 3 (vignette: spy vs. butler vs. novelist)
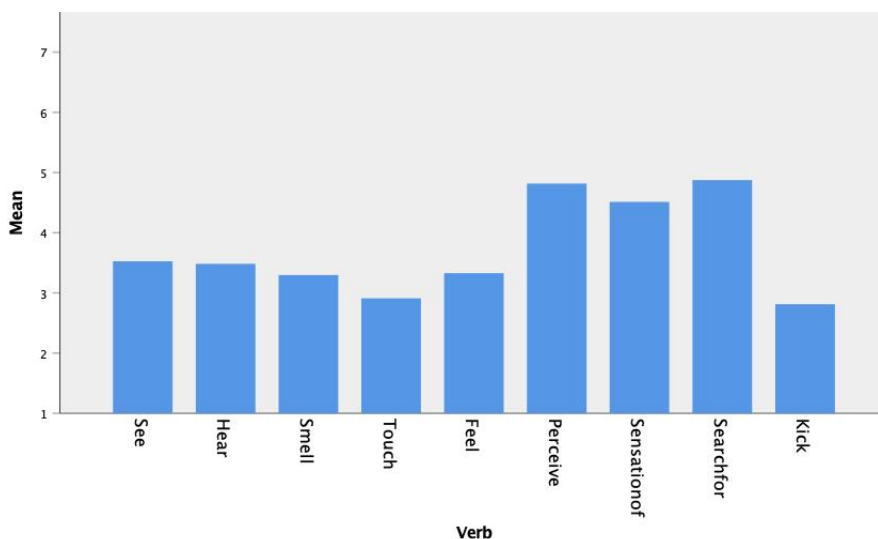
Figure 7: Mean ratings by condition in Experiment 7. Error bars show 95% confidence interval.

more extensional cluster had scores that were significantly higher than "kick".

5.2.3. Discussion

These results are not completely consistent with the results of the previous Opac-ity experiment, but align more closely with the results of the first five experiments. In this experiment, "see" again behaved mostly extensionally, with a mean (3.31) that was much closer to that of "kick" (2.81) than that of "search for" (4.87). This contrasts with the results of Experiment 6, in which "see" behaved intensionally. But as in the last experiment, "perceive" did not differ statistically from the search verb with respect to Opacity, nor did "have a sensation

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mixed ANOVA. As expected, there was a significant effect of verb, $F(8, 1680) = 52.93, p < .001$, but no significant effect of vignette, $F(2, 210) = .646, p = .525$, and no significant interaction, $F(16, 1680) = 1.52, p = .084$. To explore the differences between the verbs, I compared the verbs pairwise, correcting for multiple comparisons with Bonferroni's adjustment. As expected, the highest mean was for "search for" ($M = 4.87, SD = 2.01$) while the lowest was for kick ($M = 2.81, SD = 2.185$). Ratings for "perceived" ($M = 4.82, SD = 2.05$) were significantly higher than the ratings for "kick", $p < .001$, but did not differ statistically from the ratings for "search for" ($p = 1.000$) or "have a sensation of" ($M = 4.51, SD = 2.05 \ p = .665$). The ratings for "see" ($M = 3.31, SD = 2.33$) were significantly higher than "kick" ($p < .001$) and "touch" ($M = 2.91, SD = 2.168$), $p = .001$, significantly lower than "searched for" ($p < .001$), but did not differ statistically from "hear" ($M = 3.48, SD = 2.215$), $p = 1.000$, "smell" ($M = 3.3, SD = 2.160$), $p = 1.000$ or "feel" ($M = 3.33, SD = 2.20$), $p = 1.000$.

of". Thus the results of the experiments did not agree on whether "see" resists substitution within its complement, but agreed that "perceive" does. However, given that subjects were given more explicit instructions in Experiment 7, and the methodology was somehwat more refined, I think it is reasonable to give some extra weight to the result that "see" behaved mostly extensionally with respect to OPACITY.

6. Solving the Puzzle

The above results provide us with evidence of how a range of perceptual verbs behave with respect to the three features of intensionality. Here I will focus primarily on the conclusions that we can draw for "see" and "perceive", and the bearing that these conclusions have on the puzzle laid out above, although I will discuss the other perceptual verbs briefly.

First, the seven experiments above give us a relatively clear picture of the behavior of "see" with respect to the three features of intensionality. Focusing on NONEXISTENCE in particular, the data from Experiments 1-3 seem to show that "see" behaves much more like paradigatically extensional verbs such as "touch" and "kick" than like intensional verbs such as "search for", or perceptual verbs like "perceive". This makes it reasonable to conclude that "see", like verbs such as "touch" and "kick", does not exhibit NONEXISTENCE, and so there is no reason to posit an intensional, *de dicto* reading for sentences in which it figures.

However, one might challenge this conclusion on the grounds that "see" did differ statistically from "touch" and "kick" in these experiments—it was significantly more intensional. We could explain this difference, along with the even larger differences between "see" and paradigmatically intensional verbs, by positing degrees of NONEXISTENCE. However, holding that there is no *de dicto* reading is a more plausible, and simpler explanation for the patterning data in the NONEXISTENCE experiments. There is no theoretical framework available for explaining degrees of intensionality; typically, intensional readings are explained in terms of scope, which is not a graded notion. Further, the statistical differences between "see" and "touch" can be explained by holding that there is reasonable variation among speakers, while also maintaining the best overall summary of speaker judgments is that "see" does not have an intensional reading.

Alternatively, we might explain the differences between "see" and "touch" by holding that "see" uniformly has an intensional reading, but that for pragmatic reasons, the majority of speakers disprefer this reading to the extensional one. I agree that this explanation is not conclusively ruled out by the data. However, I maintain that a better explanation is to hold that "see" is extensional, but that this judgment of extensionality tolerates statistically significant variation. There are two reasons for this. First, given that the questions in the NONEXISTENCE studies were phrased modally, if an intensional reading for "see" were uniformly available, it would yield the prediction that all, or at least most, speakers would answer the question affirmatively. But the fact that the majority of speakers answered the question negatively counts against the availability of such a reading. It is possible that the speakers are hearing the modal as restricted, or that speakers have settled on the extensional reading in advance. But while these interpretations are possible, they seem significantly more complicated than the view that there is some lexical variation among speakers. Further, these explanations confront the problem that they provide no clear explanation of the differences between "see" and "perceive". If either of these factors serves to hide the notional reading of ascriptions involving "see", why is the same not true of "perceive"? The fact that the questions in each study are minimal, and differ only in their verbs, gives us reason to think that differences in response are traceable to lexical semantic differences between the verbs, which in turn counts in favor of the hypothesis of lexical variation.[37]

Thus, while I grant that this is not the only explanation, I conclude that best explanation of the NONEXISTENCE data yields a victory for the extensionalist: there does not seem to be a reading of perceptual ascriptions involving "sees" that is true when the direct-object of the ascription fails to exist. Accordingly, the answer to the puzzle of Macbeth's dagger, as originally formulated, appears to be "no": Macbeth cannot see a dagger.

The results of the NONSPECIFICITY and OPACITY studies confirm this view. Overall, in six out of the seven experiments, "see" behaved much more like the paradigmatically extensional verb than the paradigmatically intensional one. The exception was in Experiment 6, in which "see" did not differ statistically from

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[37]This argument is closely related to the argument, given in the next section, that the notional readings of perceptual verbs are not due to pragmatic factors.

"search for" with respect to OPACITY. However, in that same experiment, the mean for "see" was significantly lower than that for "perceive", and in Experiment 7, which also tested for OPACITY but included more explicit instructions, ratings for "see" were again much closer to paradigmatically extensional than intensional. Insofar as the features of intensionality have a higher probability of being present or absent jointly, the fact that "see" behaved more extensionally in six out of seven studies provides us with extra evidence that "see" was extensional with respect to each individual property, including NONEXISTENCE. Thus the results for NONSPECIFICITY and OPACITY reinforce our conclusion that "see" does not exhibit NONEXISTENCE. While again, the studies did show that there is sufficient variation among speakers to yield statistical differences, the best overall explanation of the data is to hold that "see" is extensional, and does not have an intensional reading.

However, this victory for the extensionalist is not decisive, because the results above also appear to show that that "perceive" patterns with the paradigmatically intensional verb in terms of all three features of intensionality. In Experiments 4, 6, and 7, "perceive" did not differ statistically from "search for", while in the remainder of the experiments, "perceive" was the second most intensional verb tested, and always fell on the intensional side of the spectrum. Insofar as these features of the behavior of "search for" are explained by the presence of a *de dicto* reading, this conclusion gives us very strong evidence that, like "search for", "perceives" has a *de dicto* reading. Further, insofar as the three features of intensionality tend to be present together, and have a higher probability of occurring together, the fact that "perceive" was consistently more intensional across the seven studies gives us additional evidence that "perceives" exhibits each individual property. In other words, the seven studies are mutually reinforcing. If this is correct, we can extend these results to Macbeth's case and conclude that while Macbeth cannot see a dagger, he can *perceive* one.

In addition to these results, there is a further key result that warrants explanation. Not only do the results above show that "see" patterns with paradigmatically extensional verbs, while "perceives" patterns with paradigmatically intensional verbs. Rather, they also reveal that there is a sharp contrast between "see" and "perceive". The ratings for "see" were significantly lower than those for "perceive" in all seven experiments, and in most cases, the mean rating for "per-

ceive" was much higher than that for "see". This is a striking fact: "see" appears to fall nearly on the opposite side of the intensional spectrum from "perceive".

At first these results may seem paradoxical, since seeing is a form of perceiving—it is just to visually perceive. How, then, is it possible for "perceive" to exhibit NONEXISTENCE while "see" fails to exhibit it? This tension is merely apparent. It is true that to see is just to visually perceive—seeing is the visual form of *relational* or *de re* perceiving. The differences between "see" and "perceive" are most plausibly explained by the presence of an additional, notional reading of "perceive" that "see" altogether lacks.[38] Thus, the presence of a *de dicto* reading of reports involving "perceives"—a reading that is not present in reports involving "see"—accounts for all of the results above. It accounts for why "see" patterns with "touch", why "perceive" patterns with "search for", and why "perceive" and "seek" contrast with one another.

Moreover, there are important syntactic differences between "see" and "perceive" that give us reason to expect these semantic differences. It has often been noted that perceptual verbs such as "see" and "hear" take small clauses as complements. For example, both (21) and (22) are syntactically well-formed:

(21)   John saw Bill fall.

(22)   John heard Mary sing.

These constructions are often taken to provide evidence that perceptual verbs are fully extensional, and express relations to situations [Barwise, 1981, Barwise and Perry, 1999]. But "perceives" does not accept small clauses, as we can see from (23) and (24):

(23)   ?John perceived Bill fall.

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[38]One might object as follows: what accounts for the difference between "sees" and "perceives" is that "perceives" has a cognitive or epistemic use which is not existence entailing. For instance, one can perceive that John was in distress, or perceive the wisdom in someone's statement. However, "see" likewise has cognitive and epistemic uses: one can see that John is in distress, and see the wisdom in someone's statement. Thus there is no difference available. But further, when these verbs are used transitively, it is the perceptual reading that is dominant—it is extremely difficult to hear "John perceives a unicorn" as cognitive or epistemic, unless by "cognitive" or "epistemic" one simply means "has a reading that is not existence-entailing." Cognitive and epistemic readings are much more salient when the verbs take "that"-clauses as complements.

(24)   ?John perceived Mary sing.

Rather, the only way to make (24) and (23) acceptable is to inflect the verb, giving it aspect:

(25)   John perceived Bill falling.

(26)   John perceived Mary singing.

Thus there are some important selectional differences between the types of complements that "see" and "perceive" can accept. This is the first indication that they may also behave differently semantically.

Finally, there are important asymmetries between "perceive" and "see" that are easily explained once we recognize that "perceive" has an intensional reading while "see" does not. Consider a sentence such as (27):

(27)   What I *perceived* was a ghost, but what I *saw* was actually just a sheet on the clothesline.

This seems like a perfectly reasonable thing to say. But if we reverse the order of the verbs, it sounds much worse:

(28)   What I *saw* was a ghost, but what I *perceived* was a actually just a sheet on the clothesline.

Why does (28) sound worse than (27)? The approach proposed here offers a straighforward explanation. If "see" has no intensional reading, the first clause in (28) is predicted to be anomalous, while the second clause in (27) is predicted to be perfectly acceptable. Thus, the presence of an intensional reading for "perceive" and the absence of such a reading for "see" explains the acceptability of (27) and the anomalousness of (28).

Finally, the results of Experiments 3, 5, and 7 us some indication of how verbs other than "see", "perceive", and "sense" behave with respect to the three features of intensionality. With respect to NONEXISTENCE, Experiment 3 showed that "hear", "smell", and "feel" are approximately extensional: they did not differ statistically from "see". Much the same was true for the OPACITY results: "see" did not differ statistically from "hear", "smell", or "feel". The means for all of these verbs differed statistically from, but were still close to, those for

"touch" and "kick". However, in the Nonspecificity study, "hear" and "smell" behaved quite differently: they did not differ statistically from "perceive" or "have a sensation of", and their means were much closer to that of "search for" than "kick" or "touch". Thus "hear" and "smell" appear to allow for nonspecific readings, but are still existence-entailing and transparent. This is an interesting finding, but not one that I will attempt to explain here.

7. Semantics or Pragmatics?

Historically, one of the major sources of disagreement in the debate over Macbeth's dagger has concerned whether the purported intensional readings of perceptual ascriptions have their source in the semantics or the pragmatics of perceptual verbs. The extensionalist often attributes the purported intensional behaviors to pragmatic factors, while the intensionalist holds that such features are semantic, and are due to the truth-conditions of perceptual ascriptions.

Extensionalists often argue that when a speaker seems to think that a perceptual verb exhibits Nonexistence, the proposition to which the speaker is assenting, or which the speaker is conveying, is not the proposition expressed by the perceptual ascription itself. Rather, the speaker has latched onto a nearby proposition that is free of existential commitments. A natural candidate for such a proposition is the one expressed by a perceptual ascription prefixed by "seems to", or a similar operator which relieves the proposition of its ordinary existential commitments. For example, when speakers assent to the claim that John can perceive an extraterrestrial even though there are no extraterrestrials, as they did in Experiment 1, what they are really assenting to is the proposition that John *seems* to perceive an extra terrestrial. Evidence that seems to point in favor of perceptual ascriptions having intensional readings can then be reinterpreted as evidence that fully extensional perceptual ascriptions *convey* propositions that are true, but do not express them. As a result, the debate over the intensionality of our perceptual vocabulary is intertwined with more general disputes over the boundary between semantics and pragmatics.[39]

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[39]There are a number of pragmatic views of how such propositions might be conveyed. One might, for instance, treat them as expressed via loose talk, or pragmatic halos, or via conversational implicatures.

Since participants in the studies largely indicated that "see" is fully extensional, the question concerning the locus of intensional behaviors does not arise for "see". However, these question can be raised for "perceive". Given that "perceive" seems to have a reading that is intensional, what guarantee do we have that ascriptions involving "perceives" do not merely convey existence-neutral propositions, rather than expressing them semantically? Participants in the studies may be responding in ways that reflect systematic pragmatic effects, rather than ways that reflect the semantic content of perceptual ascriptions. However, there is a decisive response to this objection. If the results obtained for "perceive" were a consequence of pragmatics, rather than semantics, there would be no reason that we would not observe the same phenomenon for "see" as well. Surely, if John can seem to perceive something, he can seem to see it. But there was a large contrast between "see" and "perceive" with respect to NONEXISTENCE; this contrast is inexplicable if we think that that speakers are asserting to propositions that are merely conveyed pragmatically rather than expressed semantically.

Further, given that the ratings for "perceive" were much closer to those of the paradigmatically intensional verb in all seven of the experiments, if we think that speakers are asserting to a proposition that is merely conveyed by perceptual ascriptions involving "perceives", then there is no reason that we should not say the same for the paradigmatically intensional verb "search". Very few semanticists would accept that the intuitions we have concerning paradigmatically intensional verbs such as "seek", "want", "need", "hope", *etc.* are to be accounted for pragmatically. But given that "perceive" exhibits similar behavior to these verbs across the board, the extensionalist has no grounds to claim that it is in fact fully extensional, unless she also wishes to hold that *all* intensional transitive verbs are actually fully extensional. That is to say: "perceive" has an intensional reading if anything does.

These considerations do not totally rule out the possibility that the effects observed are pragmatic; it may be that certain semantic facts interact with pragmatic facts in ways that could explain the contrasts between "see" and "perceive". One possible explanation of this kind is that "perceive" is more apt for reporting hallucinations and anomalous perceptions because it is a less common word. On this alternative explanation, the difference in frequency of use between "see" and "perceive" explains the differences they exhibit with respect to the three

properties.[40] However, this explanation does not generalize to the intensional features of ordinary intensional transitive verbs. If the explanation of the presence of intensional readings in "perceive" is a matter of relative frequency of use, then why do apparently high-frequency verbs such as "want" also exhibit these features? Providing an explanation in terms of an extra, *de dicto* reading in the case of "want" and an explanation in terms of frequency in the case of "perceive" seems like an *ad hoc* attempt to explain away unwanted intensional behaviors.

8. Explaining the Recalcitrance

The fact that "see" appears to be extensional while "perceive" is intensional provides a simple explanation for why the debate over Macbeth's dagger has been so difficult to resolve in spite of its empirical character. For the most part, the literature on Macbeth's dagger has treated the category of perceptual verbs as monolithic, and has failed to make distinctions between verbs that, as we have seen, behave very differently. Given that authors often fail to draw this distinction, the intensionalist's insistence that "see" exhibits intensional behaviors can be explained by thinking that they really hear the intensional reading that is genuinely available for "perceive". Conversely, the extensionalist's insistence that perceptual verbs do not exhibit intensional features may be due to their tendency to articulate the puzzle of Macbeth's dagger with "see", which is extensional, as opposed to "perceive", which is not.

Of course, some intensionalists may resist this explanation, and claim that people often do assent to uses of "sees" such as the following:

(29)   John sees shapes and colors.

(30)   John saw a bright flash of light.

(31)   John sees a red square in his field of vision.

Further, they may hold that this is not the result of a tacit slide from reports involving "perceives" to ones involving "sees". I do not deny that such utterances are sometimes acceptable—I think that "see" is flexible enough to figure into sen-

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[40]This alternative explanation was suggested to me independently by Zoltán Gendler Szabó and an anonymous reviewer for *Erkenntnis*. Thanks to both of them for raising this possibility.

tences of this kind, and that we need an explanation of why such sentences are not anomalous. One alternative explanation is that philosophers who hold that "see" has an intensional reading may genuinely be among the very few for whom this reading is available. There is clearly variation within speakers of English as to whether perceptual verbs have intensional readings, and it is perfectly possible that some speakers hear verbs as having intensional readings while others do not. While the number of speakers who hear "see" as exhibiting Nonexistence is very small, it is possible that the participants indicating that they hear such a reading are not just making a mistake.

But there are still other possibilities. It may be that "see" has a "core meaning" that is extensional, and that there are certain kinds of fringe cases, such as those above, in which characterizing the subject as "seeing" stars, or colored patches, is acceptable. This could be thought of as a form of linguistic coercion, in which the semantic features of "see" are tweaked to allow it to figure into true reports even though its direct-object does not exist, or alternatively, perhaps there is simply an extended, non-standard usage of the word.

Alternatively, it may be that "see" and other perceptual verbs exhibit what some call an "open texture". On the one hand, one aspect of our use of "see" seem to be that it requires the existence of the thing seen. But on the other hand, another aspect of our usage seems to require only that we are having a visual experience with a distinctive phenomenal character. Hallucinations are unexpected cases in which only the latter requirement is satisfied, and so hallucinations bring out a tension in the parameters implicit in our usage of perceptual language. If such a picture is true, the experiments here indicate that for some verbs, the dominant strand or dimension of usage is the one that requires a relation to a piece of the environment, while for others, the dominant strand or dimension is an experience's phenomenal character. The connection between open-texture, multi-dimensionality, and perceptual language warrants further exploration, but such exploration extends well beyond the scope of this paper.

9. Conclusion

The above results serve as an important step in settling the debate over Macbeth's dagger. Insofar as the puzzle concerns whether Macbeth, in having his fatal

vision, sees a dagger, the results count in favor of the extensionalist view: they indicate that Macbeth does not see a dagger. However, the results also indicate that the intensionalist view may be correct concerning a nearby perceptual verb: "perceive". This provides a partial vindication of both sides in the dispute, and a plausible explanation of why the debate has proved so intractable.

Further, the above results also serve as a first step in providing a typology of our perceptual vocabulary in terms of the features of intensionality. The results show that there is at least one major division within the category of perceptual verbs, and that "see" and "perceive" fall on opposite sides of this division. Further, "hear", "smell", and "feel" pattern with "see" in terms of NONEXISTENCE and OPACITY, but with "perceive" in terms of NONSPECIFICITY. Thus, empirical semantic investigation reveals important semantic distinctions between perceptual verbs, which have until now been seen as semantically uniform. These results may also indicate the need for a more general theoretical framework to capture the fact that perceptual verbs exhibit the features of intensionality selectively.

Appendix A: Histograms

Below are the histograms for each verb in Experiments 1, 4, and 6, fifteen in total. Each histogram graphically illustrates the frequency with which each verb received a particular response: for each rating on the Likert scale, 1-7, the histogram shows how many participants chose that score when asked if a particular verb exhibited a particular feature. In all of the studies, higher scores indicate more intensionality. Thus, the further to the right the scores are distributed, the more intensional the verb was with respect to that feature. Each column corresponds to one of the studies, while each row corresponds to one of the verbs. Column (a) gives the histograms for each verb in the NONEXISTENCE study, column (b) the histograms for NONSPECIFICITY, and column (c) presents OPACITY.
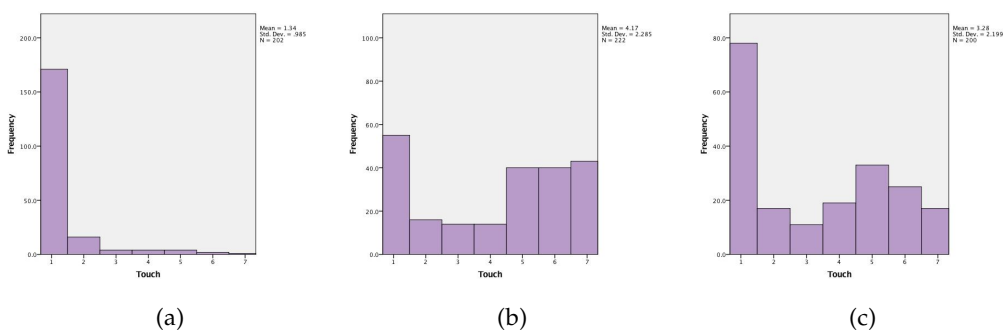

(a) (b) (c)

Figure 8: Histograms for "touch": (a) Nonexistence, (b) Nonspecificity, and (c) Opacity
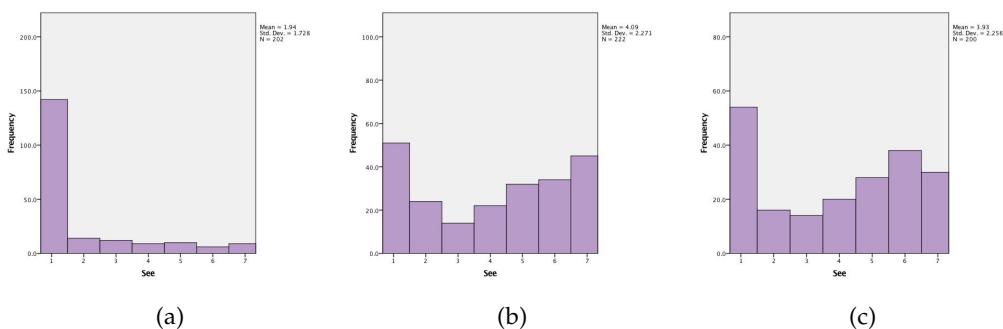
.

(a) (b) (c)

Figure 9: Histograms for "see": (a) Nonexistence, (b) Nonspecificity, and (c) Opacity
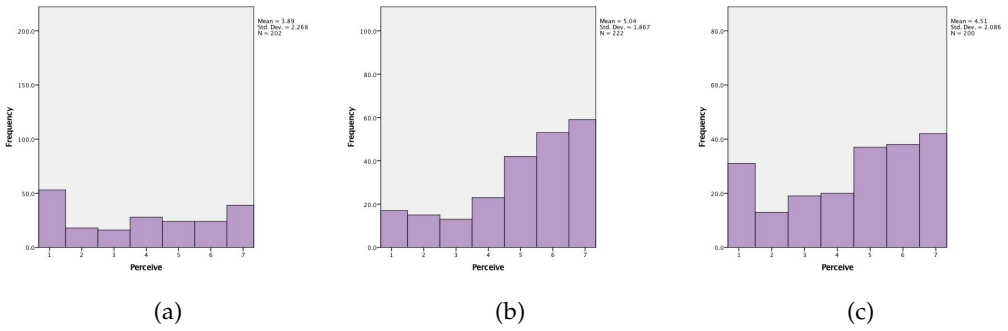
.

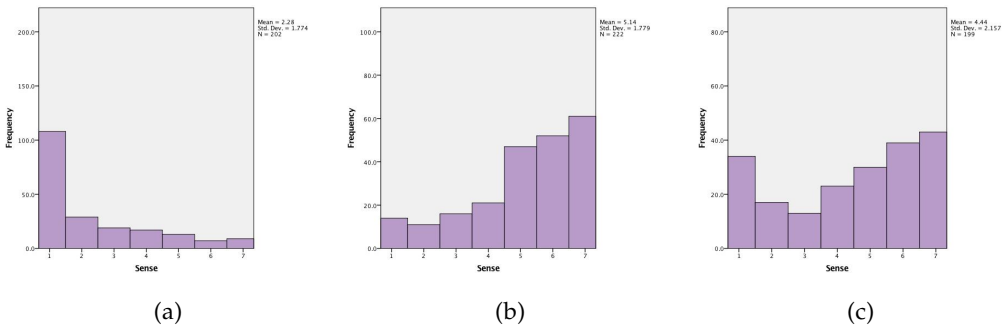Figure 10: Histograms for "perceive": (a) Nonexistence, (b) Nonspecificity, and (c) Opacity

.

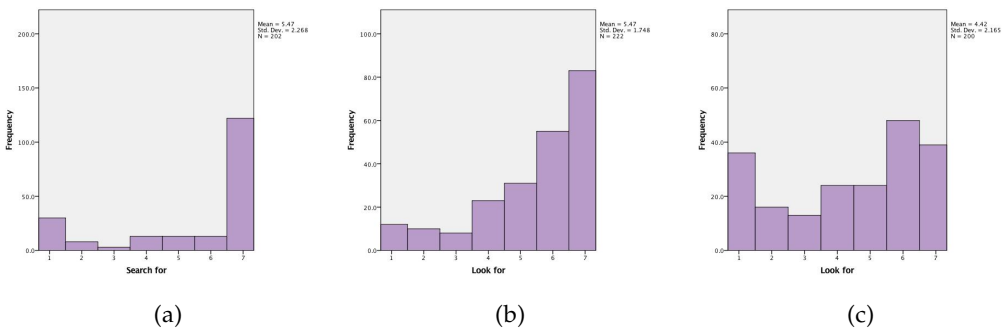Figure 11: Histograms for "sense": (a) Nonexistence, (b) Nonspecificity, and (c) Opacity

.

Figure 12: Histograms for "search for" in (a) Nonexistence, and "look for" in (b) Nonspecificity, and (c) Opacity

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