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Ambiguity and the Representation Problem

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Abstract

I canvass eight possible approaches to representing ambiguity within truth-conditional semantics, and I argue that all are unsatisfactory. For example, it would be a mistake to hold that "x is a bank" is true iff x is a financial institution while "x is a bank" is true iff x is a slope, for then x would be a financial institution iff x is a slope. It would also be a mistake to hold that some tokens of "x is a bank" are true iff x is a financial institution while other tokens are true iff x is a slope, given the existence of punning and equivocation. My work may be taken either as a call for research on a neglected topic in truth-conditional semantics, or as a call for abandoning truth-conditional semantics.

1. Introduction

Ambiguity can be found in language: in affixes, words, sentences, extended discourse, and silence; it can be found in art and images (Atlas, 1989: ch 1); it can be found in live actions and states of affairs (Schick, 2003: ch 1); and it can be found in clues and evidence. In every case, so it seems, ambiguity involves multiple interpretations or multiple meanings. Such multiplicity, in turn, is naturally understood in terms of either conjunction or disjunction. If an expression Φ is ambiguous, colloquial formulations of that fact include (i) "Φ might mean P *and* might mean Q (and maybe R…)", (ii) "Φ does mean P *and* does mean Q", (iii) "Φ might mean P *or* Q", (iv) "Φ does mean P *or* Q". Now my question is this: how are such claims to be represented in truth-conditional semantics? This is what I call ambiguity's *representation problem*. It is distinct from what I call the *resolution problem*.[1]

My concern is with the representation problem. I shall argue that, of all the representational formats that suggest themselves, and of all those suggested in the literature, none is adequate. I begin by considering disjunctive truth-conditions and then turn to conjunctive truth-conditions: simple, token-relative, propositional, disquotational, and subscripted.[2]

2. Disjunctive Truth-Conditions

Pretend, for the sake of simplicity, that "x is a bank" is two-ways ambiguous. Assuming an extensional truth-conditional format, there are two obvious candidates for representing ambiguity by means of disjunction:

(1) WIDE-SCOPE DISJUNCTION

x is a bank ≡ x is a [certain kind of] financial institution *or* x is a bank ≡ x is a [certain kind of] slope.

(2) NARROW-SCOPE DISJUNCTION

x is a bank ≡
(x is a financial institution or x is a slope).

Disjunction (1) would be true even if "bank" univocally meant just 'financial institution', and it would be true even if "bank" univocally meant 'slope'. Asserting (1) implicates that we as analysts don't know which meaning uniquely belongs to "bank", which is different from saying that "bank" has two different meanings. Therefore wide-scope disjunction is not the correct format for representing ambiguity.

The problem with (2) is that it does not really claim that the word "bank" is ambiguous; it shows only that "bank" is *general*, that it labels a single concept whose denotation ranges over two different kinds of object, just as the definition below makes no claim about ambiguity:

(3) x is a parent (of y) ≡ x is a mother or father (of y).

This disjunction view of generality is rejected by Atlas, who correctly observes that "game" does not mean 'chess or baseball or pick-up-sticks...' (1989: §2.3). But the fact that generality is generally not due to disjunction fails to establish that generality *never* involves disjunction. What I would like to do is to argue that generality *can* involve disjunction, and that therefore, if narrow-scope disjunctive truth-conditions are to be used, they must be reserved for representing some cases of generality rather than ambiguity.

First, it accords best with the facts of developmental psychology to take 'mother' and 'father' as primitives and to define "parent" disjunctively as 'mother or father' (Wierzbicka, 1972). In other words, since children acquire the words "mother" and "father" before the word "parent", it is plausible to suppose that their concept 'parent' is more complex than the concepts 'mother' and 'father', a complexity that can be naturally captured in terms of disjunction. In reply one might observe that the juvenile concept behind "parent" differs from the mature concept, and that the juvenile concept, being disjunctive, is not general but rather ambiguous. But if this were the case then children would interpret "Where are your parents?" as meaning either 'Where are your fathers?' or 'Where are your mothers?' Instead they rightfully understand the question as meaning 'Where are your x's, where x is a mother or father?'

Second, consider technical terms like Chomsky's "governing category":

(5) x is a governing category of y ≡ (x is a governor of y,
and x is a minimal NP or S that contains y).

The disjunction "NP or S" might very well one day receive a unified characterization, but in contemporary theories of syntax it remains a disjunction. Of course, independent of our ability to characterize something, speakers surely devise

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[1] The vast bulk of the literature on ambiguity comes from computer science and is devoted to the resolution problem. See Gorfein 1989 & 2002, Hirst 1992, Schutze 1997, Stevenson 2002, van Deemters & Peters 1996.

[2] Throughout, I shall focus on just declarative sentential ambiguity, although much of what I say is intended to ramify more generally.

covert, ineffable categorizations; that is, perhaps expert syntacticians possess an atomic concept "NP-or-S" in the language of thought which underpins the disjunctive concept "NP or S" in natural language. However, such a supposition is utterly implausible for novice syntacticians; and semantic theory must be able to represent the speech of neophytes as well as of experts.

3. Conjunctive Truth-Conditions: Simple and Token-Relative

The idea that "x is a bank" means that x is a certain kind of financial institution *and* it means that x is a certain kind of slope, needless to say, cannot be rendered by narrow-scope conjunctive truth-conditions. Can it, however, be rendered by WIDE-SCOPE CONJUNCTION, or equivalently a listing of T-sentences?[3]

(7)   x is a bank $\equiv$ x is a financial institution. [...and...]

(8)   x is a bank $\equiv$ x is a slope.

The problem, as first emphasized by Kathryn Parsons in 1973, is that T-sentences (7) and (8) mistakenly entail (9).

(9)   x is a slope $\equiv$ x is a financial institution.

Defenders of wide-scope conjunction might insist that the left-hand side of (7) says something about banks in the financial sense, and it occurs in a true biconditional, while the left-hand side of (8) says something about banks in the topographical sense, and *it* occurs in a true biconditional. Because they contain distinct tokens, they are able to have different meanings, the consequence being that the conjunction of (7) and (8) together says all that needs to be said about the meaning of "x is a bank". According to this TOKEN version of the conjunction theory, it would be more perspicuous to formulate simple (7) and (8) as existential quantifications:

(10)   Some tokens of "x is a bank" are true $\equiv$
        x is a financial institution.

(11)   Some tokens of "x is a bank" are true $\equiv$ x is a slope.

This move fails to work, however, for in some cases of ambiguity two readings of one token are equally in effect at the same time. As one example, consider the pun in the old slogan for Morton salt:

(12)   When it rains, it pours.

According to token conjunctive truth-conditionalism:

(13)   Token (12) is true $\equiv$ when it rains, it rains hard.

(14)   Token (12) is true $\equiv$ when it rains [and is humid],
        Morton's salt dispenses easily.

Together these entail that:

(15)   When it rains, it rains hard $\equiv$
        when it rains, Morton's salt dispenses easily.

However, the proverbial left-hand side, whether or not construed metaphorically, is a false exaggeration, while the right-hand side is presumably true.

It may be said that although the Morton company *played* on meaning (13), it seriously intended only (14). As a result, despite lurking in the consciousness of the audience, (13) is not asserted and is unavailable for the inference to (15).

However, sometimes punning genuinely invokes multiple meanings. Regarding my article "Quotation Matters", does the title mean to refer to issues relating to quotation, or refer to the kinds of material that get quoted, or assert that quotation is relevant...? I meant all simultaneously, without privileging one.

There is also simultaneous meaning in some commissions of the fallacy of equivocation. Suppose that we have an argument with premises A, B, and conclusion C, and suppose that its formal validity hinges on recurring term t. We could say (i) that t means one thing in A, switches meaning in B, and reverts back in C. Alternatively we could say (ii) that t holds constant meaning, but that premise B is obviously false. Which would the proponent of such an argument say? Adherents of (i) would never regard the argument valid; adherents of (ii) would never regard the argument sound. Because sincere proponents of equivocal arguments regard their arguments as valid and sound, explanations (i) and (ii) ought to be dropped in favor of (iii): that a single token of t possesses two meanings, one that licenses the acceptability of B and one that licenses inference in the given argument. I conclude that token conjunctive truth-conditionalism is untenable.

4. Conjunctive Truth-Conditions: Propositions and Disquotations

The appeal to tokens might be harnassed to formulate a PROPOSITIONALIST conjunction theory. The first step links tokens to propositions:

(16)   Some tokens of "x is a bank" express the proposition
        that x is a financial institution.

(17)   Some tokens of "x is a bank" express the proposition
        that x is a slope.

The second step links propositions to truth-conditions:

(18)   The proposition that x is a financial institution is true $\equiv$
        x is a financial institution.

(19)   The proposition that x is a slope is true $\equiv$ x is a slope.

This two-step structure keeps tokens from correlating directly with truth-conditions, thus enabling a single token to have two incompatible meanings without rendering self-contradictory the theory that describes it.

There is a problem, however, in explaining just what this theory amounts to. What does it mean "to express"? I have never seen any account. What is a proposition? A proposition is not identical to a set of truth-conditions, else (18) and (19) would be superfluous solecisms. A proposition cannot be a platonic object on pain of violating naturalism. A proposition cannot be construed as a sentence in a computational language of thought, at least in the context of truth-conditional semantics (to be discussed in §5).

Reference to propositions is avoided by Davidson's disquotational theory of meaning, according to which semantic axioms yield homophonic T-sentences. According to DISQUOTATIONAL CONJUNCTIONISM, the theory of meaning must separately generate (20) and (21) in order to treat both financial and topographical meanings.

(20)   "x is a bank" is true $\equiv$ x is a bank.

(21)   "x is a bank" is true $\equiv$ x is a bank.

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[3] Examples (7) and (8) are T-sentences because they are abbreviations for:

(a)   "x is a bank" is true $\equiv$ x is a financial institution.

(b)   "x is a bank" is true $\equiv$ x is a slope.

But which is which? Does (20) give us the financial sense, or the topographical? Notice that it does no good to trace their derivations: while (20) derives from axiom (20'), and (21) from *separate* axiom (21'), the fundamental axioms themselves do nothing to distinguish the two senses at issue.

(20')   "bank" denotes banks.

(21')   "bank" denotes banks.

Disquotatonalism moreover fails because it brings ambiguity from the object of inquiry into the inquiry itself, thereby violating a fundamental condition on adequacy for any theory whatsoever. Theories should be free from serious misunderstanding, hence free from any ambiguity that is unresolvable in its context. We can't evaluate any truth-theory entailing (20) and (21) because we have no way of knowing whether the following is being entailed instead:

(22)   "x is a bank", in the 'financial' sense, is true ≡
        x is a bank in the 'slope' sense.

Another point against disquotational semantics is that the meta-language should work for any language (except possibly itself, given the liar paradox), yet ambiguous expressions in other languages generally do not translate into ambiguous expressions of English.

5. Conjunctive Truth-Conditions: Subscripts

We have been considering ways to express a tenable wide-scope conjunctionism The simple case (7 & 8) falls to the absurd "slope = financial institution" deduction, token conjunctionism falls to puns and equivocations, disquotational conjunctionism does not actually *give truth-conditions*, and propositional conjunctionism is obscure.

One way to overcome the absurdity of simple conjunctionism, and to explicate a kind of propositionalism, is urged by Brendan Gillon. Gillon, who arguably repeats Davidson and Harman, points out that Davidsonian T-sentences do not, strictly speaking, use quotation names of sentences, they use *structural descriptions* or SDs. For Gillon, SDs specify lexical elements by spelling or pronunciation, with subscripts added where necessary to distinguish homonyms, and SDs also specify syntactic structure by means of labeled tree diagrams. Thus, sentence (23) has two SDs:

(23)   Enraged cow injures man with ax.

(23a)   [$_S$ [$_{NP}$ Enraged cow] [$_{VP}$ injures [$_{NP}$ man [$_{PP}$ with ax]]]]

(23b)   [$_S$ [$_{NP}$ Enraged cow] [$_{VP}$ injures [$_{NP}$ man] [$_{PP}$ with ax]]]

This structural difference allows us to formulate a separate T-sentence for each reading: the sentence specified by (a) is true iff the man with an ax was injured by the cow, *and* the sentence specified by (b) is true iff the cow injured, with an ax, the man.

Unfortunately Gillon's use of SDs runs up against several problems. First, it falls to the same pun objection levied against token conjunctionism. Second, it overlooks ambiguity that is neither structural nor lexical (§6). Third, even in the case of lexical ambiguity it fails to individuate readings, as I shall now explain.

Subscripts cannot be taken too literally; if little numbers actually appeared on words there would be no such thing as lexical ambiguity. No, Gillon presumably means for us to construe subscripts as distinguishing marks that we as analysts impose for our own convenience. The problem is that there is

a difference between representing lexical ambiguity by means of subscripts and representing structural ambiguity by means of brackets. Brackets depict or *specify* differences in structure -- a bare modicum of syntactic training, if even that, suffices for revealing which structure goes with which reading. Subscripts, in contrast, do not really specify words; were subscripts reversed, no one would be the wiser. In other words, Gillon's alleged structural descriptions *do not describe*.

Subscripts merely signal that lexical differences are at hand. But this is not sufficient, for otherwise mere subscripts would take care of structural ambiguity as well. Why bother figuring out the correct bracketing in (23) when we could equally as well say (24)?

(24a)   [Enraged cow injures man with ax]$_1$

(24b)   [Enraged cow injures man with ax]$_2$

Just as subscripts neither describe nor genuinely distinguish the multiple readings due to structural ambiguity, so too they fail to do the job for lexical ambiguity. The use of subscripts only labels or defers or disguises the problem and does nothing to solve it.

To be sure, subscripts have been used in the literature as stand-ins for something substantive -- namely to signify processing paths, individuated either computationally (Field, 1994: §10) or physically. But if meaning can be reduced in this way, it would be hard to see what purpose the truth-theory served. We could just as well skip the T-sentences and go directly to correlating linguistic expressions with the computational or physical state of the language users.

Even if subscripts did individuate lexemes, there would *still* be a representation problem for truth-theoretic semanticists. The reason is that much ambiguity is neither structural nor lexical. There is polysemy, speech-act ambiguity, the referential indeterminacy of demonstratives, vagueness, and much else (Saka, forthcoming, b). Establishing that these phenomena count as ambiguity is the burden of my next section.

6. An Ambiguity Test

Gillon (2004) surveys a variety of ambiguity tests and concludes that ultimately the only good one is the contradictory test. It essentially goes like this:

If there is some state of affairs according to which statement token P would both seem true and seem false, then it is reasonable to treat P as ambiguous.

This contradictory test follows from any truth-conditional semantics. Here is my argument.

(a)   If P has multiple truth-values under a single condition, then P has distinctive sets of truth-conditions.

(b)   If P has distinctive sets of truth-conditions then P has multiple meanings.

(c)   If P has multiple meanings then P is ambiguous.

(d)   If P has multiple truth-values under one condition, then P is ambiguous.

Premise (a) follows from the concept of truth-condition, (b) from the assumption of truth-conditional semantics, (c) by definition, and (d) as a logical consequence of (a-c).

It follows that some indexicals are ambiguous. Mind you, I do not mean that "me" is ambiguous because some tokens of it

refer to me while others refer to you. I mean that even when we focus on a particular token of "it" or "this", and take full account of context, there will sometimes be ambiguity in the mind of the audience.

Nor does the speaker's intention decide matter, of course. First, the speaker's intention is not always authoritative. Just as a speaker can be mistaken in thinking that "the man with the martini" denotes Dean, one can be unreasonable in thinking that "this" denotes something prominent in one's own mind that is in fact obscure to everyone else. Second, if speaker's intention blocks ambiguity in the case of "this", it would do so in other cases. Ambiguity would hardly exist at all!

It may be objected that the objective context of utterance fixes the semantic values of indexicals; that if you and I disagree about the denotation of "this" then one of us is wrong; and that the contradictory test can be revised to reflect as much. I disagree, but I won't argue the point. Instead I observe that appeals to context cannot serve as a *general* response to my argument -- my argument against using SDs as an adequate representation of ambiguity in general -- because they do not apply to cases of vagueness:

(25) Parachuting is dangerous.

One and the same person in one and the same situation may respond to "Is it (25) true?" with "Well, it is and it isn't". Therefore, from the truth-conditional point of view, *cases of vagueness are cases of ambiguity*.

I do not mean to suggest that vagueness and indexicality have entirely the same nature as homonymy and structural ambiguity, only that they do have this in common, that they lend variable contributions to truth-conditions. If we assume truth-conditional semantics then linguistic ambiguity would include much that cannot be treated by lexically individuated phrase structures.

7. Conclusion

I have canvassed eight possible approaches to representing ambiguity within truth-conditional semantics, and I have argued that all are unsatisfactory. This may be taken as either a call for new research in truth-conditional semantics or a call for abandoning truth-conditional semantics, take your pick. Even if I am mistaken, however, I hope that I have convinced you that the problem of representing ambiguity is not trivial. There is no warrant for the current widespread practice in the literature of acknowledging the phenomenon of ambiguity only to airily dismiss it.

8. Addenda

My readers have raised questions and objections that I shall now try to answer. (1) What do I mean by generality (section 2)? A term is general when it labels a single concept whose denotation ranges over two different kinds of object. (2) Do I fail to distinguish among lexico-syntactic ambiguity, polysemy, and vagueness? On the one hand, I do recognize differences; on the other hand, there is an argument for regarding them as falling under one genus (section 6). This argument cannot be refuted simply by insisting that I fail to recognize a traditional distinction. (3) In response to the claim that no one takes ambiguity as a trivial issue, I cite examples of prominent books in semantics, ostensibly exhaustive or at least far-ranging in coverage, that do not index ambiguity: textbooks such as Simon Blackburn's *Spreading the Word* and Alexander Miller's *Philosophy of Language*, monographs such as Robert Brandom's *Articulating Reasons* and Michael Devitt's *Coming to Our Senses*, and collections such as Michael Dummett's *Seas of Language*. Even works that index ambiguity typically spend only a page or two on the topic, e.g. Alex Barber's *Epistemology of Language*. (4) If I reject truth-conditional semantics, what then would I propose instead? I advocate a psychologized semantics whose details do not fit here; see Saka (forthcoming, b). (5) How does my work count as cognitive science? Because the term is vague, ambiguous, and open to contention, and again because of space limits, I will say only this: being on meaning, my work relates to the mind; being falsifiable, it is scientific; and citing both linguists and philosophers, it is interdisciplinary, which distinguishes cognitive science from the special fields that it brings together.

References

Atlas, J. (1989). *Philosophy without Ambiguity*. Oxford: Oxford University Press.

Davidson, D. (1967). Truth and meaning. In *Inquiries into Truth and Interpretation*, 1984. Cambridge, MA: Harvard University Press.

Davis, S. & B. Gillon, editors. (2004). *Semantics*. Oxford: Oxford University Press.

Gillon, B. (1990a). Truth theoretical semantics and ambiguity. *Analysis* 50: 178-82.

----. (1990b). Ambiguity, generality, and indeterminacy. *Synthese* 85: 391-416.

----. (2004). Ambiguity, indeterminacy, deixis, and vagueness. In Davis & Gillon (2004).

Gorfein, D., ed. (1989). *Resolving Semantic Ambiguity*. Dordrecht: Springer.

----, ed. (2002). *On the Consequences of Meaning Selection*. American Psychological Association.

Hirst, G. (1992). *Semantic Interpretation and the Resolution of Ambiguity*. Cambridge, UK: Cambridge University Press.

Lycan, W. (1984). *Logical Form in Natural Language*. Cambridge, MA: MIT Press.

Parsons, K. (1973). Ambiguity and the truth definition. *Nous* 7: 379-94.

Saka, P. (forthcoming, a). Quotation matters, *or*, the demonstrative and identity theories of quotation. *Journal of Philosophy*.

---- (forthcoming, b). *How to Think about Meaning*. Dordrecht: Springer.

Schick, F. (2003). *Ambiguity and Logic*. Cambridge, UK: Cambridge University Press.

Schutze, H. (1997). *Ambiguity Resolution in Language Learning*. Stanford, CA: CSLI.

Stevenson, M. (2002). *Word Sense Disambiguation*. Stanford, CA: CSLI.

van Deemter, K. & S. Peters. (1996). *Semantic Ambiguity and Underspecification*. Stanford, CA: CSLI.

Wierzbicka, A. (1972). *Semantic Primitives*. Frankfurt: Athenaeum.