

What Words Really Mean: Exploring Possible Worlds in the Real World

Daniel Ross

University of Illinois at Urbana-Champaign
djross3@gmail.com — danielrosslinguist.com

Abstract

Lexical semantics is a notoriously difficult topic, with no consensus yet on the best method for categorization. In his famous Twin Earth thought experiment, Putnam (1975) showed extension by reference can prevail over assumed definitions: if cats were revealed as robots controlled from Mars (and not animals at all), we would likely change our definition of CAT to preserve reference rather than realizing cats do not exist. Thus cats cannot be defined as inherently being animals even in ordinary circumstances.

But we need not invoke imaginary possible worlds to investigate the limits of categories. In fact, we can observe real world changes in lexical usage patterns that reveal pre-existing bias in lexical meaning. For example, Putnam mentions two similar examples of words changing meaning following scientific advancement: GOLD and JADE. In the case of GOLD, once methods were discovered to distinguish fool's gold (pyrite) from GOLD, the narrower meaning prevailed. However, in the case of JADE, mineral analysis revealed that JADE in fact referred to two distinct minerals, and that wider meaning prevailed. We could consider these to be instances of semantic change, but another possibility is to view them as tests of the true, original lexical meaning. When circumstances change in the world, usage patterns adjust, but at least to some extent, it is the original meaning (or at least most salient aspects of that original meaning) that prevails. WHAT IF becomes WHAT NEXT?

This paper explores the extent to which we can study lexical meaning by observing changes in usage. By imagining plausible possible worlds, we may even be able to make predictions about future usage. In synchronic usage, even obvious components of definitions may turn out to be optional. Consider HUSBAND, defined in the first edition of the Oxford English Dictionary (1899) as: "a man joined to a woman by marriage. Correlative of WIFE." Only recently in the OED's third edition (2016) was the entry updated to account for new usage following legalized gay marriage: "male partner in a marriage." This paper considers the OED's first definition inaccurate: HUSBAND has always meant MALE SPOUSE rather than (MALE) SPOUSE OF WOMAN, but recognizing that nuance required changes in culture and law because earlier context did not disambiguate the definition. Similar lexical meanings are presented from the perspective of changing contexts, including a survey of speaker's judgments to refine assumed definitions, hinting at possible future usage and dictionary definitions.

Acknowledgments

This research began in the Beginning Researchers Discussion Group that I organized for undergraduates at the University of Illinois at Urbana-Champaign. We discussed various research topics such as writing an abstract, publishing, getting research approval, etc. In Spring 2015 we ended the year with a research project on lexical semantics, including the preliminary survey results presented here, which inspired this presentation. Undergraduates who participated in the group include *Kelsey Wise, Christian Wilks, Meredith Koch, Marilyn Jackson, Michelle Patiño, Jack Dempsey & Ryan Grunow*.

1. Introduction

What do words mean? That is an extremely difficult question to answer, and most advances in research on the topic have been critiques of earlier research introducing additional challenges for the problem, and no flawless, comprehensive theory has yet been produced. At the same time, humans can easily identify membership in lexical categories, despite linguists being as of yet unable to explain how we do it. This paper presents an additional complication for the study of lexical meaning, namely by pointing out that what we believe words mean, based on their usage, may not actually demonstrate the full picture or all nuances of their meaning. Instead, we must also consider how the words would apply in different contexts. Therefore, some instances of apparent semantic change are only illusory, and in fact a reflection of the established meaning we have known all along.

Let us briefly survey several earlier theories of lexical meaning. First, consider Necessary & Sufficient Conditions, one of the oldest approaches to word meaning, since Aristotle. By identifying a list of properties which are *individually necessary* and *jointly sufficient*, all members of a category would be included and non-members excluded. For example, it would seem trivial to list (at least some of) such conditions for a CAT, but as shown in Table 1, almost all apparently obvious properties have exceptions, and constructing an effective list is extremely difficult if not impossible.

Proposed conditions	Exceptions
Cats have four legs, and cats have tails	An injured, three-legged or tailless cat is still a cat, and many other animals also have four legs and tails
Cats have fur	A hairless cat is still a (non-typical) cat: see Figure 1
Cats meow	A quiet cat is still a cat
Cats eat meat	A vegetarian cat would be unhealthy but still a cat

Table 1: Some potential Necessary & Sufficient conditions for CAT



Figure 1: Sphynx breed cat, lacking fur of typical cats¹

¹ Dreamstime.com stock image (public domain).

Another approach to define categories is through Prototypes (Rosch 1973, inter alia). Imagine an ideal member of a category, and then notice that all members of the category are somewhat similar to that prototype. Therefore, a CAT is to a prototypical cat, as in Figure 2.² Figure 1 depicts a cat relatively far removed from this prototype, but it is still a member of the class. With prototypes, then, the difficulty is shifted to defining the limits of the category, while including all potential members, which may differ in different ways.

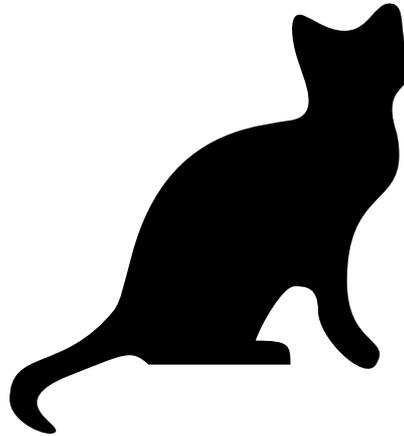


Figure 2: Hypothetical, ideal cat as a prototype³

Despite theoretical difficulties, humans can easily identify categorial membership, so how do we know these meanings? It is hard for a theory to determine category boundaries, yet we naturally do this all the time as speakers. We might ask then whether we really do know what words mean, or whether meaning is contained *within* one's mental lexicon. In fact, famously, Hilary Putnam (1975) argued against individual knowledge as the source for the meaning of words and instead emphasized a *social, ostensive* component of lexical meaning. Collectively, we know that a CAT is whatever we *point to* and say, "That's a cat!" Beyond this distributed, social meaning, an important social component is that we sometimes defer to *experts* (biologists, etc.). Rather than solving the problem of lexical meaning, however, Putnam's contribution actually only compounds the difficulties. For example, meaning now appears circularly based on membership rather than any extractable definition. We may not as individuals know what words mean, and the boundaries are still difficult to determine. However, there are good reasons to accept Putnam's critique of previous theories.

2. Thought experiments and beyond

Putnam (1962, 1975:162-3) asks: *What if it turns out that the things we call cats are actually robots remotely controlled from Mars?* There are two possible responses, either rejecting the category, that cats never existed to begin with, or to reinterpret the category: it turns out that cats actually are robots. If we accept the latter response (the "cats" still exist after all), we must reject the assumption that *cats are a kind of animal*. Thus no properties can be truly inherent in a definition, and our understanding of a category *may be incorrect*.

Putnam proposes extreme hypothetical situations to detect differences in meaning irrelevant in real life, or more technically we might say imagining possible worlds where the

² Note that the prototypes themselves are not merely averages of all members in a class, nor necessarily coherent, non-contradictory concepts. Prototypes are, rather than individuals, more like magnetic anchor points around which members of the category cluster. For example, we might imagine a prototypical cat with no fur color (but still covered in fur) for speakers whose category of CAT do not focus on color of fur, or the prototype might have black fur despite various other typical shades of fur being rated as equally close to the prototype.

³ Clker.com stock image (public domain).

terms would have different extensions (cf. Menzel 2013). Especially his Twin Earth thought experiment (1973, 1975) provides a context for inquiring about the meaning of words given circumstances relevantly different from reality, revealing problems in usage-based traditional definitions for categories. But we need no imaginary worlds to observe new contexts to see what words really mean. Crucially, intensions remain constant even when extensions shift in different possible worlds, and likewise meaning does not change as we explore changing reference in the possible worlds introduced by change of usage in the real world.

Putnam also discussed two historical examples where our understanding of lexical meaning changed due to scientific advancements, with different outcomes. Only after advances in chemistry could GOLD be distinguished from fool's gold (pyrite) by tests showing GOLD dissolves in *aqua regia*. Despite this, it seems reasonable to say that the meaning of GOLD has not changed since ancient times. In contrast, chemical analysis has shown JADE to actually be either of two distinct minerals, but usage of the term still applies to both. Even with Putnam's strong arguments that our individual lexicons do not necessarily contain full knowledge of how to *identify* these categories (e.g., via scientific tests), and despite changes in usage and knowledge, the meanings of GOLD and JADE appear to have actually remained constant. One way to mitigate the limitations ascribed to individual knowledge is to ask *why* the outcomes were different in those situations. In fact, individual knowledge may still be sufficient: GOLD and JADE are both *valuable*, and regardless of technical knowledge, speakers know that is due to scarcity. Thus GOLD remained a narrower category to exclude more common similar minerals (also due to tradition), while JADE maintained its joint reference because that was already established within its known scarcity.

Let us consider DIAMONDS, which today can be reproduced in laboratories (by putting carbon under intense pressure) but are *rejected* as "real diamonds"⁴ by consumers and jewelry experts. Why should this be the case? Technically, artificially produced diamonds lack the imperfections of natural diamonds and are thus distinguishable by experts. But shouldn't *perfect* diamonds be *better* exemplars? The odd outcome is due to the inherent understanding of DIAMONDS being scarce and expensive. This means that DIAMOND cannot be defined merely as 'highly compressed carbon (with certain physical properties)' but also a rare, naturally occurring substance found in the Earth, or at least this is what the diamond industry wants consumers to continue to believe, and consumers have apparently accepted. Perhaps if alchemy had been a success and methods for turning straw to gold were discovered, GOLD too would be restricted to the imperfect, naturally occurring variety.

We can consider more nuanced scenarios as well, such as the following. Historically, artificially producing diamonds was at first very expensive and therefore not a threat to scarcity. As that method of production became economical, a conflict in the definition was introduced, and that ambiguity had to be resolved. Furthermore, diamonds are much more abundant on other planets in the galaxy with different chemical compositions, although it would be far too expensive to harvest them with anything resembling modern technology. But if it were to become economical, would the *extension* of DIAMOND narrow to refer only to 'Earth diamonds' (as also opposed to artificial diamonds) or would the *meaning change* (forgoing scarcity) to permit any such materials to be considered "real diamonds"?

Putnam is correct that individuals do not know all of the technical details about lexical categories, yet speakers *do know* the nuances required for productive usage of terms. Furthermore, there seems to be general consistency across speakers, even in new contexts. This is our first hint that lexical categories may have internal *structure*, with some properties being more salient and important in determining usage in changing circumstances.

⁴ Of course this is in reference to the common usage of the term DIAMOND, while in technical contexts the term may apply equally to artificially created diamonds as well, such as for manufacturing tools or technology.

3. Shifting usage, same meaning

Even apparently fundamental components of lexical meanings may turn out to be incorrect. In 1899, the first edition of the *Oxford English Dictionary* defined HUSBAND as: “*a man joined to a woman by marriage. Correlative of WIFE.*” Only last year, in the online 3rd edition (2016) did the OED update that definition due to changes in contemporary usage: “*male partner in a marriage.*” But the OED’s new definition only reflects a change in *usage*. The original definition is, and *has always been*, incorrect!⁵

The new context of legalized gay marriage works like a hypothetical thought experiment: *What if men could marry other men, and women could marry other women? What would they be called?* Marriage as a social practice has changed. But the meanings of HUSBAND and WIFE have not. There has not even been a debate; even though various homophobic/sexist expressions like “Who wears the pants in that relationship?” or “He’s a sissy!”, it has not become conventional to insult gay marriage by calling married men “wives” (or women “husbands”), despite homophobic/sexist expressions being applied to gay individuals. Therefore, regardless of political stance and independently of political correctness, there is widespread awareness and agreement about the *meaning* of these terms.

The OED’s original definition was *contextually* appropriate, defining HUSBAND as: MALE SPOUSE OF WOMAN. However, the refined definition reveals that it was redundant: (MALE SPOUSE) & (SPOUSE OF WOMAN). The ‘new’ definition has in fact *always been* the definition: MALE SPOUSE. It is possible to imagine another language where the original meaning really was *SPOUSE OF WOMAN*, so that two married women would be called the same thing as a man married to a woman. But that was obviously never the meaning in English. Even in 1899, if a man were to have hypothetically married another man, they would have been MALE SPOUSES and therefore HUSBANDS.⁶

3.1 How meanings change

There is a distinction between the *meaning* of a word and the actual contexts in which it is used. This matches the traditional dichotomy between Semantics and Pragmatics (or Intension and Extension). Even in frameworks where such distinctions are less important (such as Cognitive Linguistics), the contrast is still important to explore for methodological reasons. It is difficult to determine when a word has actually *changed* its meaning, versus a new context of usage: consider robot cats from Mars, artificial diamonds, two husbands married to each other, and so forth. There are two natural consequences of this observation: (1) lexical meanings change less than we might assume; and (2) lexical meanings may be different from what we first assume. In fact, even apparently fundamental properties may not apply at all (“cats are animals”; “husbands have wives”, etc.).

So then when *do* words actually change meanings? Consider the origin of *Indian* as applied to Native Americans. In the first place, its usage in North America was not a change in meaning, but a geographic *error*. What marked the *change* in meaning was the continued usage of the label after discovering that America was not in fact India. This is also of course why the term was sociopolitically inappropriate, indicating indifference to identity. There *never was* a meaning of INDIAN such that anyone in any unknown land could be incorporated under that label, so what was first a geographic error *became* a lexical error, and the *change* in meaning was the *conventionalization* of that error. Of course some quite

⁵ In fact, we observed this in the research group in 2015, before the OED was updated, as if we predicted this change. Of course other dictionaries had already been updated, and there were social pressures for recognition, so we were of course not the first to observe new usage. However, it is our assertion that this is not a change at all, but a correction of an error in the first edition, revealed by usage in a new context, not a new meaning.

⁶ This should not be surprising at all, because English has no kinship terms based on the gender of the relative (‘PARENT OF DAUGHTER’ vs. ‘PARENT OF SON’, etc.)

reasonably still consider it to be a lexical error and reject such usage, while others, including some Native Americans, have accepted it as a new and distinct label no longer referring to people from India. Similar mis-usages and extensions are not uncommon for flora and fauna either (e.g., American vs. European ROBIN are distinct birds). In a sense, this zero-derivation is then parallel to overt modification of terms for new categories such as French *pomme de terre* for ‘potato’ (lit. ‘earth apple’).

3.2 How far usage can shift

The ‘motion’ verb GO is a typical example of metaphorical extension and grammaticalization, frequently used cross-linguistically beyond the domain of physical motion. However, based on the perspective presented here, we might maintain a unified analysis of the lexical semantics of GO across several domains. Consider the following examples, as discussed in detail in Ross (2016):

- (1) *The road goes north.* (‘fictive motion’)
- (2) *We went to see a movie.* (physical motion)
- (3) *We’re gonna see a movie.* (future)
- (4) *Look at what he went and did this time!* (unexpectedness)

Although at first the meanings of GO in (1-4) appear disconnected, they all share a common theme: change in dimension(s) away from the deictic center. The change exemplified is *not* in the core *meaning* of GO, but in the *dimensions* which it describes.

More generally, we might consider metaphorical extensions, as commonly assumed in Cognitive Linguistics, to be related to this sense of an unchanged meaning, or to a *structured* meaning, with an unchanged core. Metaphorical extension is the process by which some aspect(s) of the meaning of a word are applied to a different domain, such as a *movie star* being STAR-like because they *shine* (stand out) on screen (and as a celebrity), or even calling a badly-behaved child the name of a pet: “Stop it, Rex!”

Where, then, do we draw the line between inherent properties (as in the Necessary & Sufficient Conditions approach) and ubiquitous contextual associations? Would the Prototype approach be better for understanding meaning, and would it correctly predict which properties speakers will retain or set aside in novel circumstances? Conventionalization also of course plays a part as new usages spread through society, but in other cases speakers seem to already know what sort of variation in usage would be appropriate.

Similar to the example of HUSBAND, other words have been shown historically to have unexpected interpretations that dictionaries might not predict. The South American water-dwelling rodents capybaras (and later beavers) were considered as FISH for religious purposes, a decision approved by the Pope in the 16th century. And tomatoes were determined to be VEGETABLES (not FRUIT) by the U.S. Supreme Court (Nix v. Hedden 1893), despite biological classification (cf. Goldman 2013). Therefore, deference to experts, as emphasized by Putnam, is at least in some cases less important than conventional usage, based on common knowledge.

4. Preliminary survey on lexical meaning

Given that the usage of words seem to naturally extend in some ways (but not others), can we *predict* which extensions might occur? Do speakers agree about salient aspects of lexical meaning? Consider HUSBAND again: had gay marriage been legalized in 1900, almost certainly HUSBAND would have meant MALE SPOUSE (not SPOUSE OF WOMAN) as it does now. Are the most salient aspects of lexical meaning part of general speaker knowledge?

The following preliminary survey was conducted as part of a project in the Beginning Researchers Discussion Group, Spring 2015, at the University of Illinois at Urbana-Champaign, and I thank the participants for their involvement (see acknowledgements).

The survey was presented online, with 24 questions (2 practice items, 20 core items, and 2 fillers), as an explicit judgment task regarding lexical usage. Responses were on a scale from 1 (unacceptable) to 5 (acceptable), based on the specific word in context. The items were presented in pseudo-random order with counterbalancing across subjects, and most items were presented in near-minimal pairs (not adjacent in the order). 91 English speakers completed the survey, which was approved by the UIUC Institutional Review Board.

For all items, the variance was high (1-5 range for every sentence, including practice items and fillers). The results may be biased by number of questions answered and patterns in questions, as well as the low number of fillers. Still, we found some interesting patterns that suggest this line of research is worth exploring. The mean scores and statistical significance for target sentences are reported, for the selected results that follow.

4.1 Results

NAP

*During finals week, some students are busy and can only take a **nap** every night from 2am-4am. [3.7/5]*

*Mark works the night shift as a security guard, and he usually takes a **nap** from 10am-8pm because of his schedule [2.2/5]*

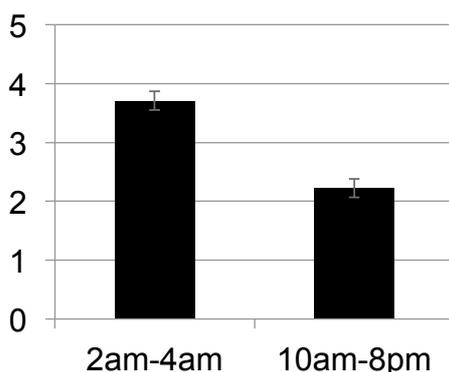


Figure 3: NAP survey results

This result is statistically significant ($p < 0.0001$, *t*-test). We can conclude that *NAPS* are short. Compare the OED: “a short or light sleep, esp. one taken during the day.” This definition is pragmatically-based and redundant in normal contexts but contradictory in atypical contexts, much like the earlier one for HUSBAND. For NAP, the salient feature to English speakers is shortness, not time of day.

Mealtimes

Similarly, mealtimes are redundantly defined by both their sequence (or purpose), and also the typical time of day when they occur. Consider the following OED definitions:

BREAKFAST: “That with which a person breaks his fast in the morning; the first meal of the day.”

DINNER: “The chief meal of the day, eaten originally, and still by the majority of people, about the middle of the day, but now, by the professional and fashionable classes, usually in the evening.”

LUNCH: "A synonym of luncheon ... Also: a light meal at any time of the day."

Luncheon: "Originally, a slight repast taken between two of the ordinary meal-times, esp. between breakfast and mid-day dinner...; with those who 'dine' in the evening, luncheon denotes a meal (understood to be less substantial and less ceremonious than dinner) taken usually in the early afternoon."

As these OED definitions refer to traditional (and especially British) usage of the terms, we can simplify the content (and adjust for our American survey respondents) to defining BREAKFAST as FIRST & MORNING, LUNCH as MIDDLE & AFTERNOON, and DINNER as LAST & EVENING. We would generally expect these meals to pattern together in any changes in usage, especially when a prototypical day consists of three meals at different times, known by these names. However, the results are surprising in this regard and suggest that the symmetry of these meals is only *contextual* based on a typical schedule.

BREAKFAST

*Joe works the night shift as a security guard, and he eats **breakfast** when he gets home at 7am. [4.3/5]*

*Rob works the night shift as a security guard, and he eats **breakfast** when he wakes up at 8pm. [3.5/5]*

LUNCH

*Mary works the night shift as a security guard, and she eats **lunch** during her break at 3am. [3.8/5]*

*Beth works the night shift as a security guard, and she eats **lunch** when she wakes up at 2pm. [3.6/5]*

DINNER

*Sam works the night shift as a security guard, and he eats **dinner** when he gets home at 7am. [3.4/5]*

*Bill works the night shift as a security guard, and he eats **dinner** when he wakes up at 8pm. [3.6/5]*

The result show divergent acceptability for BREAKFAST, with IN-THE-MORNING more central than FIRST-MEAL-OF-THE-DAY, and this is statistically significant. The contrasts for LUNCH and DINNER are not statistically significant, suggesting that these categories may be more strongly associated with both order and time of day, although of course usage of all three terms would vary based on social context (if others are eating the meal at the typical time) and the type of food served. In general, however, it appears that the English vocabulary for mealtimes does not naturally shift to reversed schedules, even though in normal usage, in typical circumstances, it appears symmetrical and logical. For example, there is no term that easily fits for a meal in the middle of the night, even if functioning as a typical lunch, and a third meal eaten in the morning after a night shift might be potentially called either BREAKFAST or DINNER. Despite its etymology and being associated with specific foods, BREAKFAST is the most likely candidate for a possible shift in usage in the future, to a morning meal, regardless of schedule, and a nocturnal schedule would require a *change in meaning* to still have three meals in sequence.

We can also look at particular words that seem to have changed their meanings in contemporary usage, to try to identify the extent and way in which they have changed. Two examples from the survey are discussed here. Usage of PREDICT is not always limited to the future: it is sometimes found in reference to the past, but when? TYPO is not always limited to keyboarding errors, sometimes referring to orthographic errors in general, but when?

PREDICT

Scientists **predicted** that Egyptians were buried in pyramids, and then an explorer found the first mummy and confirmed this. [3.8/5]

The detective **predicted** that his brother-in-law was the murderer, and the judge agreed that the evidence supported this conclusion. [3.0/5]

A meaning of PREDICT as ‘hypothesize (then test)’ is statistically significantly ($p < 0.001$) more acceptable than generally ‘know the past’. The etymology of *predict* helps to explain this: Latin *prae-* ‘before’ + *dicere* ‘tell’. The OED defines PREDICT as “*To state or estimate, esp. on the basis of knowledge or reasoning, that (an action, event, etc.) will happen in the future or will be a consequence of something; to forecast, foretell, prophesy.*” This description generally applies, without the restriction to a *future event*, and more accurately to *future knowledge*.

TYPO

Ancient manuscripts often contain **typos** because they were hand-copied by monks who did not always have literary training. [3.0/5]

Optical Character Recognition software automatically converts scanned images to text, but the results often contain **typos** due to imperfect algorithms. [4.3/5]

The etymology of *typo* is ‘typographical error’ in the late 1800s, but today TYPO has apparently extended to technology in general but not other human orthographic errors,⁷ and this difference is statistically significant ($p < 0.0001$).

5. Conclusions

This exploratory discussion leaves us with more questions than answers. However, we can conclude that we must be careful when making assumptions about what words mean based on their usage in context, or when claiming that meanings have changed when contexts have also changed. The preliminary survey results suggest we can observe changes in progress, or to a limited extent even predict potential future changes in usage. Context-based usage changes can be observed in the real world, as if imagining extension shifts in possible worlds. We are not limited to thought experiments in exploring the real meaning of words.

From a theoretical perspective, meanings appear to be structured. Either some properties are more important than others, or we commonly use false heuristics, despite knowing lexical meanings. Having structured meanings also seems relevant for understanding the process of metaphorical extension in general. These results suggest some validity to the idea of the feature-based approach of Necessary & Sufficient Conditions, although with more structure. Despite their advantages as identified in previous literature, Prototypes then are unlikely to be entirely abstract, but instead have structure including specific features that are more salient than others. These observations may be one step in the right direction toward solving some of Putnam’s objections to individual lexical competence in favor of socially determined meaning: if lexical meanings are sufficiently general, we *can* know them despite deferring to experts for specific technical tests. Regardless, speakers easily know an impressive amount about lexical meaning, and theory has yet to catch up.

⁷ However, I have observed rare usage in reference to handwriting, so there may be a further change in progress.

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