Nathaniel Imel

Desire Semantics

Phil 199 – Carr

Logic/Possible Worlds Semantics

nimel@ucsd.edu

**Desire Semantics**

1. **Introduction**

Abstract: The purpose of this paper is to show why the desire verb, “want,” has an irregular semantics as a propositional attitude verb. Many attitude verbs, including “know,” “hope,” “doubt,” “be-glad,” and “wish” display a more or less fixed relation to belief compared to salient possibilities in a conversation. For example, in order for the sentence “I hope Elise is home” to be true, my beliefs must include the possibility that Elise is home. In contrast, the truth of “I want Elise to be home” does not require I believe it possible that Elise is home. Nevertheless, in a given context, what we believe to be possible plays an important role when we describe relative desirability. For example, a speaker can restrict salient believed possibilities in the sentence “Given that Elise isn’t home, I want her to be at the store” yet still want possibilities outside the believed circumstances in the same context: “If Elise isn’t home, I still want her to be home.” This supports a (common-sense) intuition that what’s desirable is independent of what’s believed. I will propose that the verb “want” has a *modal base* that is more circumstantially flexible than other attitude verbs.

The paper is structured as follows: **Section I** is an introduction to propositional attitude reports. **Section II** introduces possible worlds semantics and modality, and **Section III** explains some more technical semantics notation. In **Section IV**, I give a Hintikka-based propositional attitude semantics for “want.” **In Section V,** we contrast “want” with emotive doxastics, dubitatives, and other verbs of preference to bring out the relationship between attitude verbs and doxastic possibility. **Section VI** applies the naïve Hintikka-based semantics to a puzzle case, where we develop a more robust semantics to account for the fact “want” can quantify over the contextually salient possibilities, but also beyond them. **Section VII** introduces Kratzer’s conversational backgrounds and **Section VIII** applies them to a new semantics of “want.” I conclude in **Section IX** that “want” has a circumstantial modal base that is untied to doxastic possibility, and note that this is unusual for attitude verbs.

1. **Propositional Attitude Reports**

Formal semanticists are concerned with finding certain linguistic building blocks to understand and predict the constraints of meanings in natural language. The meaning of function words with clear logical properties (*yellow* **and** *blue,* ***there is*** *a capybara*) are fairly well understood. Others, such as verbs with argumentative structure, can also be analyzed productively in the syntax-semantic interface. But what about verbs describing mental state? And is there something distinct about the word “want?” This is a question that will require us to evaluate verbs using *intensional* semantics—a theory of the meaning of linguistic expressions that do not just talk about the actual world.

In this paper, we will mainly work with propositions, which we can think of as the content of sentences that are true or false. Examples would be *John is tall*, *if John is tall then Elise is short,* or *it’s not the case that there’s a monster*. But consider the following:

1. John **hopes** that it is raining.
2. I **want** Elise to be home.
3. The child **believes** there is a monster under her bed.

In (1)-(3), the words in bold are what make each sentence different from sentences of the form:

1. Elise is home.
2. It is raining.

We can gloss the truth conditions of “Elise is home” as true if and only if Elise is home, and “It is raining” as true if and only if it is raining.[[1]](#footnote-1) On the other hand, (1) – (3) contain an attitude verb that relates an individual to a proposition. We call sentences like those in (1) – (3) *propositional attitude reports* because they express an individual’s mental attitude towards a proposition. Attitude verbs are the verbs relating an individual’s mental state to a proposition.[[2]](#footnote-2) To see the relation between mental states to propositions, let’s return to the difference between (2) and (4). Suppose Elise is out grocery shopping. (4) is false on this assumption, but the falsity of “Elise is home” doesn’t entail the falsity of “I want Elise to be home.”[[3]](#footnote-3) After all, the assumption that Elise is out grocery shopping says nothing about the speaker’s desires. We need a way of evaluating the truth conditions of propositional attitudes that takes into account the mental attitude of the individual in the sentence, in addition to just the proposition expressed by the sentence found after the attitude verb (we will call this proposition the *prejacent*). Note that the psychology involved in hope, desire, doubt, and belief is irrelevant to our semantic account of the words “hope,” “want,” “doubt,” and so on. In this paper, what we are interested in is how the different ways the world can be matches up linguistically with an individual’s *wanting, doubting, believing*, etc. The notion of “the different ways the world can be” is critical to analyzing the truth conditions of propositional attitudes, and it is captured by the notion of *possible worlds*. As we will see, the truth conditions for (2) are more like: “I want Elise to be home” is true iff all the possible worlds (scenarios) the speaker wants are a subset of the possible worlds in which *Elise is home* is true. Before delving any deeper into this semantics, I will briefly summarize the notion of possible worlds and some technical notation.

1. **Possible Worlds, Compatibility and Truth Conditions**

One of this paper’s goals is to discuss possibilities that are contextually related to the familiar, actual world. Attitude verbs have semantics that deal with possibility, and we need possible worlds to show why several of these verbs differ from “want” in interesting ways with respect to relations *between* kinds of possibility.

The notion of “possible worlds” has a rich history in linguistics and philosophy, going back to Leibniz in the 17th century.[[4]](#footnote-4) More recently, Robert Stalnaker defined possible worlds as ways the world could be, as opposed to the way the world actually is.[[5]](#footnote-5) For instance, I could have written this paper on syntax, instead of semantics, in one or more possible worlds. However, it is not *necessary*—true in all possible worlds—that it be on syntax. After all, here it is in the actual world, on semantics. For our linguistic investigation, we can be agnostic about controversial metaphysical commitments about possibility. We are interested in the fact that we talk about and make sense of scenarios displaced from the actual here and now.

One of the ways that a sentence can have an *intensional* meaning—that is, describing states of affairs beyond the actual world—is by containing a *modal*. This modal might be a verb (“can,” “must”) or adverb (such as “possibly”) or adverbial phrase (“it-might-be-that”). We can think of the adverb *possibly* as a kind of existential (*there-is-a-world*) quantifier over worlds, while *necessarily* can be the universal quantifier (*for-all-worlds*). It is also important to see that modals come in different flavors. An easy way to observe this is in the context-sensitivity of *must*. “You must see the Eiffel Tower,” “you must pay a fine,” and “Elise must be home” are sentences that each have different domains of universal quantification over possibility: in these cases, *teleological* (according to a goal or ends-oriented), *deontic* (according to some rules), *epistemic* (according to the evidence or one’s knowledge state). The epistemic flavor of modality is especially relevant for examining propositional attitudes such as “know,” since the domain of quantification will be those worlds compatible with what the individual knows at a particular world.

The concept of “compatibility with an individual’s attitude” is fairly important in semantics. Intensional semantics requires that we compute meanings of expressions about non-actual scenarios bearing some relevant information to the actual world. These non-actual scenarios will be all the possible worlds compatible with an individual’s attitude in the world where the attitude is held. We will express these connections using familiar logical notions, including quantification, functions, and sets. Later in this paper, we will formalize some possible world compatibilities in terms of *accessibility relations* that—just like mathematical relations—can exhibit behaviors like reflexivity and symmetry.

Semantics is about giving the truth conditions for linguistic expressions. One of the ways to do this is to use the [[.]] function, which is a function from linguistic expressions to their truth values. If 1 and 0 represent true and false, and we use the sentence “Elise is home,” then we can give the truth conditions as follows:

[[Elise is home]] = 1 iff Elise is home.[[6]](#footnote-6)

However, considering the fact that Elise is home is contingent, we must incorporate possible worlds into our truth conditions. There are many possible worlds in which Elise is home, and many in which she isn’t. Semanticists have historically attempted to assign meanings to sentences and predicates using sets and functions.[[7]](#footnote-7) In this spirit, we can think of a proposition of a sentence as a function mapping worlds to true or false, depending on whether the sentence is true in a world.

[[Elise is home]]*w* = 1 iff Elise is home in *w*.

In the 1969, Finnish logician Jaakko Hintikka pioneered a semantics framework for determining the truth of sentences with propositional attitudes, in terms of possible worlds.[[8]](#footnote-8) On his account, a propositional attitude report will map

1. an individual
2. the individual’s attitudes in a world of evaluation
3. and a proposition

to truth values (the set {0,1}). The way this works is that a function will check to see if all the possible worlds *compatible* with the individual’s attitude are worlds where a proposition is true. That is, a propositional attitude report is true iff all the possible worlds compatible with the individual’s attitudes in a world are a subset of all the possible worlds in which the prejacent is true. If I hate that *φ*, then I am describing my attitude towards something about every world in which *φ* is true. The following diagram illustrates this general Hintikka subset idea.[[9]](#footnote-9)

Logical space

set of worlds in which a prejacent is true

set of worlds compatible with the individual *x’*s attitude in *w*

If I said “I believe Elise is home” in the actual world, the truth conditions could be computed by (i) taking me as an individual, which allows us to determine (ii) all the possible worlds in which the facts are not at odds with any of my beliefs in the evaluation world, and (iii) the set of all possible worlds such that “Elise is home” is a true sentence. If (ii) is a subset of (iii), then the propositional attitude report is true. We will say more on this Hintikka-based semantics for propositional attitudes. At this point, it will help to introduce formal lexical entries as a way of looking precisely at verbs that quantify over worlds.

1. **Lexical Entries, Quantificational Force and Restricted Possibilities**

The lambda calculus was invented by Alonzo Church as a universal model of computation.[[10]](#footnote-10) The exact meanings of binding, application, conversion and reduction are beyond the scope of this paper, but I will use lambda notation to give precise semantic accounts of some verbs I analyze. A general understanding of functions is the most important thing for grasping the notation (i.e., as long as *f*(x) = *x* + 1 is familiar, along with the notions of domain, range, and sets).

In *f(x)* = *x* + 1 and *g(x)* = *x* + 1, we can see *f* and *g* denote the same function: the one that takes each element x from a domain (suppose it is the natural numbers), and maps it to a range (also the natural numbers) defined as *x* + 1. The idea behind lambda calculus is that of an *anonymous* function, so that we can do away with different names altogether, and just compute what we need to, one function at a time. *f(x)* = *x* + 1 can be written as:

λ*x*: *x* ∈ N. *x* + 1.

We can *curry* (chain) lambda terms one after another to compute more complicated things. For example, to find the length of the square of a hypotenuse *c2*, we need two arguments *a* and *b*.

λ*b*. (λ*a*. *a*2 + *b*2).[[11]](#footnote-11)

The idea of currying functions together is useful for modeling the intuition that linguistic meaning is *compositional*—that the meanings of discrete, smaller linguistic items combine to produce the meaning of utterances as a whole. Just as we did with the two sides of a right triangle to compute the squared length of a hypotenuse, we can curry functions to account for the argumentative structure in verbs. For example, the verb *eat* takes two noun phrases:

[[eat]] = λx ∈ D. λy ∈ D. (x eats y).

We could then apply Nathaniel to x, and a bagel to y, and then compute the meaning of *eat*, which would be true given these variable applications iff I eat a bagel. This is perfectly fine for computing meanings just about the actual world. But sometimes, we will compute the meaning of I *might* eat a bagel or I *have to* eat a bagel. For example, take the following:

1. Nathaniel eats a bagel.
2. It **might** be that Nathaniel eats a bagel.

The meaning of (7) is computed relative to a *world of evaluation*, which from context is often the actual world. In that case, the embedded instance of (6) will just be evaluated relative to other evidentially possible worlds.

[[It might be that Nathaniel eats a bagel]]*w* =

λ*x* ∈ D. λ*y* ∈ D. (∃*w’* : *w’* is compatible with the evidence in *w*: *x* eats *y* in *w*).

The existential quantifier in this lexical entry is important. It says *there exists a possible world* that is compatible with *the evidence* *in w*. “The evidence” here is a kind of epistemic flavor that restricts possible worlds, one of many ways to restrict the domain of the quantifier. One of the aims of this paper is to show that “want” will have a domain of worlds that is restricted differently from other verbs’ domains. As a result, it will be a good idea to formulate the precise meanings of two modal verbs that show up frequently in intensional semantics and modal logic: “may” and “must.” Here are their lexical entries, based on the Hintikka-semantics we have been working.[[12]](#footnote-12)

[[may]]*w* = [[can]]*w* = λp ∈ D< s, t > . λq ∈ D< s, t > . ∃*w* ∈ *W* [ *p(w)* = 1 ^ *q(w)* = 1 ].

(in the language of sets: p ∩ q ≠ ∅)

[[must]]*w* = [[have-to]]*w* = λp ∈ D< s, t > . λq ∈ D< s, t >. ∀*w* ∈ *W* [ *p(w)* = 1 ⊃ *q(w)* = 1 ].

(in the language of sets: p ⊆ q)

The different context-sensitive interpretations of modality (epistemic, deontic, etc.) for “may” and “must” result from the modal’s *quantificational force* and its *restriction*. The force is either the subset relation between sets of worlds, associated with universal quantification and necessity, or the non-disjointness relation, associated with existential quantification and possibility. The restriction on the quantifier’s domain is given by the covert variable (written above as q) that picks out the contextually salient set of worlds. “The circumstances,” “for all the individual knows,” or “according to the rules” are clearly huge categories, but they group together intuitively natural kinds of q-values for restriction. For example, we could supply the propositional content of “I am hungry” to q, and “I eat a bagel” to p, so that the sentences

1. I **have to** eat a bagel.
2. I **can** eat a bagel.

are evaluated in the set of possible worlds restricted by the contextual, circumstantial fact that I am hungry. Taking my hunger as a fact that restricts possibilities, I could say (8) or (9) depending on how I feel about eating a bagel—that is, whether I feel it is necessary given my state of hunger, or perhaps just possible given my state of hunger. Our semantics for necessity predicts that (8) means that every world in which I am hungry is a world in which I eat a bagel. And our semantics for possibility predicts that the meaning of (9) is that the intersection of those two sets is non-empty—there’s at least one possible world in which I’m hungry and I eat a bagel. Here is a diagram representing the difference between “I have to eat a bagel” and “I can eat a bagel” for a contextually salient circumstance restriction, *I am hungry*.

Logical space

Logical space

{w’:w’ is compatible with the fact: I am hungry}

{w’:w’ is compatible with the fact: I am hungry}

I eat a bagel

I eat a bagel

“I have to eat a bagel.” “I can eat a bagel.”

A modal verb brings with it a quantificational force over a restricted set of possible worlds. The upshot of this introduction to modals is that propositional attitude verbs do this, too: recall that Hintikka proposed an attitude verb is a universal quantifier over the possible worlds compatible with the individual’s attitude. In the next section, I’ll briefly define this semantics for “want.”

1. **Putting Together A Naïve Semantics For “Want”**

Let’s apply the Hintikka semantics to “want.” Our lexical entry for desire verbs can be:

[[desire]]*w* = [[want]]*w* = λp ∈ D< s, t > . λ*x* ∈ D. *Boul.*(*x*)(*w*) ⊆ p.

Above, *Boul.* is short for the function *Bouletic* which maps *x* and *w* to the set of worlds compatible with what *x* desires in *w*.

*Boul.* = λ*x*. λ*w*. {*w’* : *w’* is compatible with what *x* wants in *w*}.

Below is a diagram illustrating the set of worlds compatible with *x*’s desiresin *w* as a subset of the worlds in which the proposition p is true.

Logical space

{w’ : p(w’) = 1}

*Boul.*(*x*)(*w*)

As we will see, this account will be too naïve: it cannot express any contextual restriction of possibility. For the sake of comparing “want” to other propositional attitude verbs, however, we will use it as a heuristic that lets us visualize what “compatibility with *x*’s desires” looks like.

1. **“Want” Contrasted With Other Attitude Verbs**

*Belief*

1. Nathaniel **might** eat the bagel.

There are certain relevant circumstances in a given context. Suppose (10) was uttered in a

conversation. You probably would not infer that the reason it is possible I eat the bagel is that the *metaphysical possibility* of the situation permits it. With “might,” the restricted possibility we are thinking of is *doxastic*—worlds compatible with someone’s beliefs. We say a world is doxastically possible just in case that world is one of somebody’s candidate worlds for the actual one. In other words, *w’* will be compatible with *x’*s beliefs iff *x* believes they are living somewhere like *w’*. However, it is not always the case that belief-worlds are the only contextually relevant worlds in a conversation.[[13]](#footnote-13) For example, take:

1. Jim **shouldn’t** download that video.

Suppose the context in which we find (11) is such that Jim doesn’t realize (and so doesn’t believe) that the video he’s downloading is illegal. But according to deontic possibility (possibility according to the rules or laws), we still require (11) to be true. What is true of the relevant circumstances can be fairly independent from what we believe. Interestingly, what we believe seems to have various predictable relations to the truth conditions of propositional attitude reports.

In particular, attitude verbs differ in how they relate their individual’s attitude-compatible worlds with the individual’s belief-compatible worlds. My argument is that desire verbs do *not* have a regular relation to belief-worlds. I aim to show that “hope,” “be-glad,” “wish,” and “know” share a regularity in their semantics that “want” does not in the way the former verbs relate to *doxastic* possibility. Before we examine further how what an individual believes is relevant for attitude verbs, let’s give the semantics of “believe.”

We define a function *Dox.* (short for doxastic)whichmaps an individual *x* and a world *w* to the set of worlds compatible with what *x* believes in *w*.

*Dox.* = λ*x*. λ*w*. { *w’* : *w’* is compatible with what *x* believes in *w* }.

[[believe]]*w* = λp ∈ D< s, t > . λ*x* ∈ D. *Dox.*(*x*)(*w*) ⊆ p.

This makes sense: suppose I say in the actual world *w*, “I believe Elise is home.” Any possible world compatible with my beliefs in *w* is a possible world where “Elise is home” is true.[[14]](#footnote-14) But not every possible world ∈ “Elise is home” is a world ∈ my beliefs in *w*, since in some possible worlds where Elise is home, there are unicorns—something incompatible with my beliefs in the actual world. For this account for “believe,” the possible worlds compatible with my beliefs in the actual world are a strict subset of the set of worlds compatible with the prejacent.

*Emotive Doxastics and Dubitatives*

What role does doxastic possibility play in the semantics of other attitude verbs? The importance of doxastic *alternatives* (worlds believed to be possible)emerges when we give a semantics for “hope.” At least on the surface, to hope that *φ* means the individual prefers *φ* to other alternative worlds that she believes might happen, in which *φ* is false. Additionally, I cannot hope for something that I know is already true, nor can I hope for something I believe is impossible—there is an aspect of uncertainty to the prejacent’s truth. Suppose my dad got a new car. Take the following sentences:

1. I **believe** my dad got a blue car.
2. \*I **hope** he got a blue car.
3. \*I **hope** he got a black one.
4. I **want** my dad not to have gotten a blue car.

This is our first peek into how “want” interacts with contextual alternatives in a different manner from other attitude verbs. It is infelicitous for me to utter (13) and (14) after I have uttered (12).[[15]](#footnote-15) However, (15) is still felicitous. “Hope” requires that the prejacent be true in possible worlds preferred to other possible non-prejacent worlds, and that all the prejacent worlds are not candidates for the actual world. “Want” does not have the latter restriction. I can want things I believe are true, and I can want things I believe are false. “Hope” is in a class of verbs called *emotive doxastics* that displays similar semantic behavior to *dubitatives* such as “doubt.”[[16]](#footnote-16) Suppose there’s an election coming up, and I am uncertain about which candidate will win, but I am confident that Candidate Y will. I say:

1. I **believe** it’s likely that Candidate Y will win.
2. I **doubt** Candidate X will win.
3. I **doubt** Candidate Z will, either—but I **want** her to.

Candidate Z’s victory precludes Candidate X’s victory, and also Candidate Y’s. This suggests that the prejacent proposition is not true throughout the doxastic domain of quantification for *doubt*.[[17]](#footnote-17)In contrast, that the prejacent be true in any of the doxastic alternatives does not seem to matter for “want.”

Dubitatives and emotive doxastics seem to have a semantics that is stricter in its relation to doxastic possibility than that of desire verbs. When verbs such as “hope,” “doubt,” and “fear” quantify over alternatives where the prejacent *φ* is true, we notice that these must be believed possible. Further, for an individual to “doubt” a proposition, it must not be believed that the proposition is true.[[18]](#footnote-18)

*“Wish” and “be-glad”*

Next, let us consider the semantics of verbs that quantify over worlds that bear another kind of relation to the doxastic alternatives. Take “be-glad,” as in:

1. I’m **glad** that I have coffee right now.
2. \*I’m not sure that Candidate Z will win, and I’m **glad** she will.
3. I’m not sure that Candidate Z will win, but I **want** her to.

It seems that “be-glad” quantifies over all the prejacent-worlds that are doxastically possible for the individual.[[19]](#footnote-19) That is, *x is glad that φ* means *x* prefers *φ* to ~*φ*, and that *φ* is true for all possible worlds compatible with her beliefs. We can’t be glad about something that isn’t happening. In contrast, one can want something that isn’t true of the believed circumstances.

We can think of “wish” as a kind of opposite of “be-glad.” Normally, one only can wish for things beyond what one considers to be the circumstances.

1. I **wish** I’d win the lottery.
2. I **wish** I had a unicorn.
3. \*I speak English, but **wish** I spoke English.
4. \*John is here, and I **wish** that John is here, too.[[20]](#footnote-20)
5. John is here, and I **want** that he is here, too.

We can see from (23) that an individual can wish for things that are not believed to be possible. I propose that on ordinary uses of “wish,” a requirement be that the prejacent-worlds be preferred by the individual to non-prejacent worlds, and that the prejacent is false in all worlds compatible with what the individual believes.[[21]](#footnote-21) This is different from the prejacent-worlds being *possible* from some possible world compatible with what the individual believes. If I believe that genies, fountains with coins, shooting stars, 8-balls, etc. have the ability to *make* a wish true, that is different from my believing what I wish for is true.

This summary of the contrasts between “want” and other attitude predicates leaves much to be examined, but it still reveals clear, intriguing differences in propositional attitude semantics. In particular, there are attitude predicates for which an individual’s beliefs are relevant to what possible worlds are quantified over. They include “doubt,” “hope,” “wish,” “be-glad,” and of course “believe,” which have a semantics that is more or less tied to what an individual believes. Not so for “want”—the set of worlds compatible with our desires is not determined by the set of worlds compatible with our beliefs.

This raises a question: semantically, what does desire have to do with belief in the first place? A short, unrewarding answer is that belief-compatible worlds seem to be those picked out as salient in conversation. A better one will emerge in the next section, when we apply the semantics we have been developing to a puzzle case that requires updating contextual alternatives.

1. **Restricting Contextual Alternatives**

We need beliefs to interact with desires in order to understand what some of the best worlds are given a selection of circumstances. To motivate the idea of “best worlds,” consider the problematic inference pattern in the following example: I want to get well. In every world that I want where I get well, I have been sick. In every world that I want, I have been sick. Therefore, I want to have been sick—but I did not want to be sick in the first place.[[22]](#footnote-22)

We would like our semantics to be immune from this sort of problem. Suppose *φ* = *I am healthy all the time* and *β = I get well*. The ideal semantics would predict that I want *φ* and that I want *β,* even though every world in my doxastic alternatives where *β* is true is a world where *φ* is false. Generally, if I want *φ* but I know that *φ* is not possible given the circumstances, I want *β*—the next best thing to *φ*.

The Hintikka-based semantics I gave cannot yet express ordering of desires. In fact, when I want *φ*, we cannot even predict the truth of the sentence “I want *β*,” because all and only worlds compatible with my desires are *φ*-worlds. There is no way to talk about the contextually salient doxastic alternatives when they are less desirable than the worlds compatible with my desires. For the way we use “want” in ordinary conversation, this will be disastrous. It would usually predict the set containing worlds compatible with my desires and my beliefs as *empty*.

To clarify this issue, let us consider another example situation: one where an individual wants a proposition excluded by the contextually salient circumstances, but we still ought to order those salient circumstances in desirability.

*Sophie’s Choice*

Let us take a Sophie’s-Choice dilemma, in which Sophie has two children and one of them will be killed. She is allowed to choose one child to save. Assume she wants to maximize the number of her children’s lives that she saves, and that she desires to save them equally. Just as the “want” semantics should block my wanting to have been sick, it needs to block Sophie’s wanting to have to choose. Consider the following sentences:

1. Sophie **believes** she can’t save both children.
2. Sophie **wants** to save both children.
3. Sophie **believes** she can save one child.
4. Sophie **wants** to save some child or other.

On the Hintikka-based semantics for “want,” (30) is true, but only by virtue of the truth of (28). That is, Sophie does not want any worlds where she just saves one child even though those are the best salient worlds, given the facts about the situation. So far, it is semantically infelicitous for Sophie to want anything she believes is true. This is because the individual’s desire-worlds are predicted to have an empty intersection with the set of worlds compatible with her beliefs.

Suppose p represents the prejacent *Sophie saves child****1*** and q the prejacent *Sophie saves child2.* On the Hintikka view, attitude-compatible worlds are a subset of the prejacent worlds. So pand q are both propositions that characterize supersets of the worlds compatible with Sophie’s desires. That is, *Boul.*(*Sophie*)(*w*) ⊆ (*p* ∩ *q*). And we know from (27) that *Dox*.(*Sophie*)(*w*) ∩ (*p* ∩ *q*) = ∅. So, the set of possible worlds compatible with Sophie’s desires and beliefs is the empty set.

Here is a diagram illustrating the problem:

Logical space

child1

*Dox.*

*Boul.*

child2

In a way, the Hintikka-based semantics predicts correctly that Sophie does not want the horrific circumstances that she believes are happening. Nonetheless, we need to be able to predict that Sophie still wants some alternatives more than others within the doxastic possibilities. Clearly, a world where she saves one child is still more desirable than a world where she saves neither. But that is not predicted at all by the current semantics.

The most natural way forward would be to use an *ordering*. We observed a hint of this earlier, when comparing emotive doxastics and dubitatives. In particular, “I doubt *φ*” requires that *φ* have some uncertainty. I consider *φ*-worlds less plausible than I consider other possible alternatives where *φ* is false.

1. I **doubt** that Candidate X, who I believe has a 30% chance, wins the election.
2. I **doubt** that Candidate Y, who I believe has a 11% chance, wins the election.

In the above sentences, I am effectively using a plausibilityorder*.* That is, I order the worlds I consider to be least likely to be verified by facts in the actual world, as those worlds I most doubt. As it happens, we can build an ordering of alternatives right into the semantics of modals. The next section is dedicated to showing how this is done, and why it can solve the problems of the brittle Hintikka semantics. Additionally, we’ll see why ordering reveals an insight into why “want” is not tied to doxastic possibility like other attitude verbs.

1. **Kratzer’s Conversational Backgrounds**

Angelika Kratzer has developed several concepts that will be useful to our goal of ranking worlds based on desirability. She proposed that in a given context, there are *conversational backgrounds* that allows us to compute the meaning of intensional expressions. The conversational backgrounds are the *modal base* and an *ordering source*.

*The Modal Base*

The modal base is thought of as representing the salient circumstances. We define it as a function that assigns a set of propositions to a world—some contextually salient set of propositions taken to be true at a world, depending on the modal.[[23]](#footnote-23) So the modal base of “believe” will assign propositions that an individual believes in *w*. These “circumstances” are not necessarily true circumstances in the actual world, since the modal base of “know” will be only true propositions in *w*, but for the modal base of “believe,” the propositions will not be all true in *w*. What is the difference between the modal base and the phrase we have been using, “worlds compatible with the individual’s attitude in *w?*” They are very related. In fact, we will derive the latter from the former.

For modal bases, we obtain the set of possible worlds compatible with an individual’s attitude by taking the intersection of all the propositions it assigns to *w*. Applying this to “want,” we see that the big intersection of the set containing every proposition *x* wants in *w* is just one strong proposition, and it is the subset of the modal base containing every world compatible with all of *x*’s desires. We can spell this out more formally: for a modal base *f* containing every proposition that *x* wants in *w*, the domain of quantification of “want” is:

∀*w’* ∈ ∩ *f* (*x*)(*w*) : *w’* is compatible with what *x* wants in *w.*

*The Ordering Source*

The other part of Kratzer’s conversational background is the *ordering source*, and it is also a set of propositions*.* The ordering source of Sophie’s desires in the Sophie’s Choice scenario might go something like this:

Ordering Source Set = {*No one is killed*, *Anyone that is killed is the only person killed*, *Anyone who is killed is killed because it is better to kill that person but not someone else,* ... [[24]](#footnote-24) }

The idea is that some possible worlds will come closer to desire-ideal worlds in virtue of satisfying a greater number of these propositions. So, for instance, any world where no one dies is better than a world where somebody dies. Likewise, any world where a person is killed rather than some other person for adequate reason is better than any world such that someone is chosen to be killed on no grounds whatsoever. For *want*, then, we can introduce a *partial ordering* on the worlds in the modal base’s big intersection.[[25]](#footnote-25)

Let the big intersection of a modal base *f* be a set of worlds F. Let a set of ordering source propositions be G, such that we define a strict partial order <G:[[26]](#footnote-26)

∀*w*1, *w*2 ∈ F: *w*1 <G *w*2 iff {p ∈ G : p(*w*1) = 1} ⊃ {p ∈ G : p(*w*2) = 1}.[[27]](#footnote-27)

Let us define a selection function that selects the “best of all possible worlds” for a given strict partial order <G on worlds, from any modal base F in the set of all possible worlds W:

∀F ⊆ W: maxG (F) = {*w* ∈ F: ~∃*w’* ∈ F: *w’* <G *w*}.

Now we can formulate the lexical entry for want, where *f* and *g* are the modal base and ordering source, respectively.[[28]](#footnote-28)

[[want]]*w* = λ*f*<s, <st, t>>. λ*g*<s, <st, t>>. λq < s, t >. ∀*w’* ∈ maxg(*w*)( ∩*f*(*w*) ) : q(*w’*) = 1.

This is our new and improved semantics for “want,” with a modal base and ordering source to handle relative desirability of worlds. At this point, the best way to understand this semantics is to use it—and this is what we’ll do in the next and penultimate section. We will also evaluate how this semantics deals with doxastic possibility, and check it against other attitude verbs.

1. **Applying Conversational Background to “Want” Semantics**

This new Kratzer-based theory for “want” provides a modal base (which is circumstantial), and an ordering source (which is not). An important requirement of the modal base is that it not be limited to doxastic possibility, so that the ordering source can deem desirable some worlds that are not an individual’s candidates for the actual world. At this point, although we know the modal base describes *what we want*,it is not clear in exactly what way these circumstances can be restricted. In other words, the modal base for “want” remains somewhat opaque. For this reason, I have not represented it explicitly in the following diagram—neither the modal base nor its intersection are illustrated as a particular set. What is represented in the diagram is an ordering of desire-worlds and the individual’s doxastic alternatives.

. *w1*

Logical space

*Dox.*(*Sophie*)(w0)

ordering *g*(*w0*)

. *w2*

. *w*3

In particular, let us use the above diagram to walk through the Sophie’s Choice dilemma. Suppose *w*1,*w*2 ∈ *Dox.*(*Sophie*)(*w0*) and the proposition p *Sophie saves a child* ∈ ordering source G such that p(*w*2) = 1 and p(*w*3) = 0.[[29]](#footnote-29) In this case we say *w*2 <G *w*3. Additionally, suppose that *w*1 ∉ *Dox* and the proposition q *Sophie saves both children* ∈ G such that q(*w*1) = 1 but q(*w*2) = 0 and q(*w*3) = 0. So *w*1 <G *w*2 <G *w*3. Our new semantics for “want” can quantify over alternatives in and outside Sophie’s doxastic alternatives, and it ranks some worlds better than others in desirability.

This Kratzer-based semantics is an upgrade from the Hintikka-based one, which did not quantify over worlds where anything is undesirable to the individual, including what is believed in *w*. Now “want” can quantify over doxastic alternatives, though they may be less desirable than non-doxastic alternatives. Worlds are supplied from the modal base and determined in ordered desirability by the ordering source. The modal base can include doxastic alternatives, but it is not restricted to them. If it were, it would predict “Sophie wants to save both children” to be false.

Moreover, if the modal base were a kind of doxastic possibility, we should be able to restrict its domain by updating the individual’s beliefs via adding new information. The easiest way to do this would be with an “if”-clause or a “given-that” clause.[[30]](#footnote-30) In particular, “want” would behave like “hope” in the following example.

1. I **hope** to be a doctor.
2. **If** it’s impossible I become a doctor, then I **hope** I become be a lawyer.
3. **\*Given that** I cannot be a doctor, I still **hope** to be a doctor.
4. **Given that** I cannot be a doctor, I still **want** to be a doctor.

In this example, the circumstantial modal base for “hope” was restricted by the doxastic alternatives. This is not true of “want.” Let us apply this theory of non-restriction to the Sophie’s Choice example. If “want” has a circumstantial modal base that is not doxastic, we should observe that the information restrictors do not affect the domain of possibility.

1. Sophie **wants** to save both her children.
2. **If** Sophie can’t save both her children, she **wants** to save one of them.
3. **Given that** Sophie can’t save both children, she still **wants** to save both children.

All three of the above sentences are felicitous, and the domain of Sophie’s desirable worlds has not changed. We also understand that worlds where Sophie saves both children are more desirable than ones where she just saves one. The semantics of “want” needs an ordering, and its modal base must not be tied to doxastic possibility.

1. **Conclusion**

The verb “want” doesn’t have a fixed relationship to belief in the same way that is true of other attitude verbs. Specifically, the modal base of “want” is independent from the set of propositions an individual believes. In a sense, the idea that desire and belief don’t match up isn’t news. We want what we cannot have. We also want what we can have, and what we do have. The point is, this is strange behavior for an attitude verb.[[31]](#footnote-31)

I proposed an explanation: “want” has a modal base allowing more kinds of possible worlds than that of “doubt,” “hope,” “wish,” “be-glad,” and “believe.” Those verbs that I compared with “want” are a dusting on the proverbial iceberg, but they are intended to show how attitude verbs interact with belief in a *fixed* manner. They quantify over doxastic possibility, or else they quantify over non-doxastic possibility, but they do not tend to quantify over both doxastic and non-doxastic possibilities. We would ideally delve deeper into their precise semantics, and test more of them—but that is beyond the space of this discussion. Whatever the semantics of the other verbs are, they clearly have a different relationship to doxastic possibility than does “want.”

It was stated in the beginning that formal semantics is concerned with modeling and predicting the constraints on possible meanings of linguistic expressions. Within that project, I had one specific goal in this paper: to bring out the permissive circumstantial possibilities that “want” takes for its modal base. I hope to have at least illuminated this irregularity. At best, I hope to have potentially contributed to understanding a surprising disunified semantics for propositional attitude verbs.

**Bibliography**

Ananda, Pranav and Valentine Hacquard. “Epistemics and Attitudes.” *Semantics and Pragmatics,*

vol. 6, Article 8: pp 1-59, 2013.

Heim, Irene. “Presupposition Projection and the Semantics of Attitude Verbs.” Journal of

Semantics, 9, pp. 183-221, 1992.

Heim, Irene and Angelika Kratzer. *Semantics in Generative Grammar*. Blackwell Publishers, 1998.

Heim, Irene and Kai von Fintel. *Intensional Semantics*. MIT Spring 2011 Edition (Lecture Notes):

<<http://web.mit.edu/fintel/fintel-heim-intensional.pdf>>

Kratzer, Angelika. 1986. Conditionals. Chicago Linguistics Society 22(2). 1–15.

Lewis, David. 1975. Adverbs of quantification. In Edward Keenan (ed.), Formal semantics of

natural language, 3–15. Cambridge University Press.

Look, Brandon C., "Leibniz's Modal Metaphysics", *The Stanford Encyclopedia of*

*Philosophy* (Spring 2013 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/spr2013/entries/leibniz-modal/>.

Prior, A. N. 1958. Escapism: “The logical basis of ethics.” In A. I. Melden (ed.), Essays in moral

philosophy, 135–146. Seattle: University of Washington Press.

Rojas, Raúl. *A Tutorial Introduction to the Lambda Calculus*, (FU Berlin, WS-97/98):

<<https://personal.utdallas.edu/~gupta/courses/apl/lambda.pdf>>

Stalnaker (1976). “Possible Worlds,” *Noûs*, 10(1): 65–75.

1. “To know the meaning of a sentence is to know its truth conditions” say Heim and Kratzer in *Semantics in Generative Grammar* (1998). Their idea is that in order know that (4) were true, you would need to know if, for example, Elise is in her room, the kitchen, upside down in the garage, etc. There are plenty ways Elise can be home. As long as she is, (4) will be a true sentence.

   From now on, I will abbreviate *if and only if* as *iff*. The phrase *just in case* is equivalent. [↑](#footnote-ref-1)
2. Attitude verbs are those that sound like everyday attitudes, such as *hate, love, and worry,* but this class also includes *know, believe,* and *think*. [↑](#footnote-ref-2)
3. However, for the attitude verb “know,” the falsity of the prejacent does entail the falsity of the propositional attitude report. If *φ*  is false, then *I know φ* is false. [↑](#footnote-ref-3)
4. In *Discourse on Metaphysics,* Leibniz discusses contingency, necessity, and possibility. His ideas on possible worlds are regarded as widely influential on epistemology, theology, and modal logic. [↑](#footnote-ref-4)
5. Stalnaker (1976). ‘Possible Worlds’, *Noûs*, 10(1): 65–75. [↑](#footnote-ref-5)
6. When linguistic expressions are inside the [[.]] notation in this paper, they are being mentioned, not used. [↑](#footnote-ref-6)
7. Specifically, after the logician Gottlob Frege invented a predicate calculus modeled after the idea that sentences in language are built from composed functions. In a sense, the meaning of “the ball is red” is true iff (*there exists an x in the domain of discourse*)[*isABall(x)* & *isRed(x)*]. [↑](#footnote-ref-7)
8. *Intensional Semantics*, “Hintikka’s Idea.” pp. 19-22. [↑](#footnote-ref-8)
9. Why logical space? We only want to quantify over possible worlds that are metaphysically possible. In all metaphysically possible worlds, there are no contradictions—i.e. a = a but not a ≠ a. [↑](#footnote-ref-9)
10. Raúl Rojas declares in the beginning of *A Tutorial Introduction to the Lambda Calculus*, (FU Berlin, WS-97/98):

    “The λ calculus can be called *the smallest universal programming language of the world.* The λ calculus consists of a single transformation rule (variable substitution) and a single function definition scheme.” [↑](#footnote-ref-10)
11. Notice I have omitted the domain specification for each side length.

    Semanticists often condense notation, which might include omitting domain specifications when it is obvious (i.e., *λw* is always from the domain of possible worlds)and not using parentheses when unnecessary. Common domains include

    D< s, t >, the domain of propositional functions which map a world to a truth value, and D, the domain of individuals.

    The *s* in <s, t> represents *worlds*, not *sentences*. [↑](#footnote-ref-11)
12. These lexical entries are reproduced verbatim from the chapter on Modality, p. 35 in *Intensional Semantics*. [↑](#footnote-ref-12)
13. Much thanks to J. Carr for this particular example. [↑](#footnote-ref-13)
14. As a reminder, a world “compatible with my beliefs” means there’s nothing in that world that contradicts what I believe to be true about that world. [↑](#footnote-ref-14)
15. I will use “infelicitous” in this paper to mean grammatical, but not right to say for semantic or pragmatic reasons. The \* star before a sentence indicates its infelicity. [↑](#footnote-ref-15)
16. Anand and Hacquard, *Epistemics and Attitudes*, p. 24-36. [↑](#footnote-ref-16)
17. It is clear that in a dubitative or emotive doxastic attitude report, there are possible alternatives to the prejacent that are also felicitous as prejacents in *doubt* reports within the same context. However, this does not prove that attitudes like *doubt* have an existential meaning—only that they don’t seem to have a universal meaning. [↑](#footnote-ref-17)
18. Interestingly, the prejacent of *doubt* attributions also is not usually false throughout the doxastic alternatives, perhaps for pragmatic reasons. It is strange to say “I doubt *φ*”after saying “I believe *~φ*.” Since the speaker’s doubting *φ* seems literally true, I do not commit to proposing *doubt* requires the prejacent not to be false throughout the doxastic alternatives. [↑](#footnote-ref-18)
19. Actually, the reason “be-glad” entails prejacent-truth throughout doxastic possibility is that “glad that *φ”* implies “know that *φ.”* Individuals believe everything they know. [↑](#footnote-ref-19)
20. It might be possible to force (25), given a scenario where somebody asks if you would prefer that John leave. You could say in response, “I wish that John be here.” But I think this would be a case of proposing a counterfactual situation, *from which* you wish that the circumstances were different—in fact, you wish for the circumstances as they are in the actual world. Another explanation for why (25) sounds not horrible is that “wish” is ambiguous and sometimes its usage is synonymous with “want,” as in “you can have anything you wish from the fridge.” [↑](#footnote-ref-20)
21. In some worlds where I have a pet unicorn, I die five minutes from now, but in others where I don’t have a pet unicorn I live a long and happy life. Consequently, for the semantics of “wish,” there would also need to be the requirement that the wishable worlds be most similar to the actual world.

    In fact, they would probably need to be *maximally similar*—this kind of requirement is built into the semantics Heim proposes for “want” in 1992, “Presupposition Projection and Semantics of Attitude Verbs.” That work was helpful for many of the ideas in this paper, but her precise formulation is actually not very important for the higher level account of “want” I give. [↑](#footnote-ref-21)
22. This is Stalnaker’s “want” variant on the original version, which used the modal “ought.” That version is from Prior, A. N. 1958. This is not the only similarity between “ought” and “want” that will become visible in this paper—I suspect the technology developed for the semantics of “ought” is useful for “want.” [↑](#footnote-ref-22)
23. But we can’t just assign *all* the propositions true at the world. To compute what worlds are compatible from the modal base, we will take the big intersection of all of its propositions. But the big intersection of every propositions true at a world can only describe *that* world—and this would make quantification over possibilities pretty uninteresting! [↑](#footnote-ref-23)
24. But not anything that would make Sophie rank her desire to save one child more than the other. The stipulation was that any world where she saves one child is no better than another world where she saves the other. [↑](#footnote-ref-24)
25. A partial ordering captures the intuitive idea of ordering. It’s a relation with antisymmetry, among other properties. For any partial order R with two distinct elements *a,b* such that *a* ≠ *b*, if R(*a,b*) is true then R(*b,a*) is false. Think of the ‘less-than’ operator: 2 < 3, 1 < 2, and 1 < 3 holds, but not 2 < 1. [↑](#footnote-ref-25)
26. Strict means for any element *a, a < a* cannot hold. Also, the conventional notation < is somewhat confusing in that the *better* world is on the left of the < operator. This is because the strict partial order must have a minimal element. [↑](#footnote-ref-26)
27. The symbol used is a superset symbol, not the material implication horseshoe. [↑](#footnote-ref-27)
28. Note the semantic type <s, <st, t> > of conversational backgrounds *f* and *g*, which map possible worlds to sets of sets of possible worlds. They take a world and assign it a set of propositions. [↑](#footnote-ref-28)
29. G represents *g*(*w0*). [↑](#footnote-ref-29)
30. I am not using the sentential-connective meaning of “if.” According to Kratzer (1986) and David Lewis (1975), “if” just marks a restriction of the domain of quantification for an operator to those worlds where the antecedent is true. For example, “if it rains, the sidewalk must be wet” is true when all the possible worlds where it is raining are a subset of those where the sidewalk is wet. The sentential-connective meaning predicts the sentence true when there is clear weather, but the sprinklers are wetting the sidewalk. [↑](#footnote-ref-30)
31. That “want” has a modal base that is circumstantial, but its ordering source is not, and it quantifies over worlds in and outside doxastic possibility, suggests desire verbs resemble deontic modals in certain ways. “Ought” universally quantifies over worlds that are then ordered. With such necessity modals, too, we can also describe worlds that are not believed. For example, I can say “I believe you won’t do the laundry, but you still ought to.” [↑](#footnote-ref-31)