

Graduate Seminar: Modality with Content

Johns Hopkins University, Spring 2014

Course Information

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Office Hours	Th 3:00pm-4:00pm & by appt
Class Code	AS.150.659
Class Time	F 11:00am-1:00pm
Class Location	Gilman 288

Course Description

Suppose that a card lies face down on a table and I tell you the following:

- (1) The card is the 4 of clubs.

On the familiar story, I have described our world as being a particular way—*viz.*, one in which the card on the table is the 4 of clubs. If the world is in fact this way, then I have spoken truthfully. If the card is some other card in the deck, then my report is inaccurate; the world is not as I have described it. In a possible worlds framework, we can identify the *propositional content* expressed using (1) with the set of possible ways the world might be that are compatible with what I have described to be the case.

But now suppose instead that I utter the following sentence where an *informational* necessity modal (or *epistemic* modal, if you prefer) operates on (1):

- (2) The card *must* be the 4 of clubs.

Can this speech act be understood in more or less the same way as before? In uttering (2), have I described our world as being a particular way? Have I even put forward propositional content? If I have uttered a sentence whose truth turns on how things are in the world, which aspect of reality is my modal claim sensitive to?

After some initial background readings, we consider some rival answers to these questions. On Kratzer's classic *contextualist* account of modality, the truth of (2) hangs on some body of evidence or epistemic state supplied by context. In uttering (2), I presumably report on my belief state, letting you know that this state rules out the possibility that the card on the table isn't the 4 of clubs. But there are a number of alternative semantic-pragmatic theories, including Yalcin's *expressivism*, MacFarlane's *relativism*, and von Stechow and Gillies' *cloudy contextualism*. We assess these proposals, with special focus on the kinds of content ascribed to modal sentences in context.

In the latter part of the course, we turn to the *evidentiality* of modal claims. Frege, Karttunen, and many other philosophers and linguists have appreciated that the necessity operator in (2) carries an inferential evidential signal, indicating that I have established the prejacent claim that the card is the 4 of clubs via an indirect inference rather than on the basis of an observation or report. If I know that the card is the 4 of clubs because I have directly perceived or been told that this is

so, then I can felicitously utter (1) but not (2). We consider some possible explanations of this evidential contrast.

Schedule

Here is the tentative seminar schedule. It is subject to revision as the semester progresses.

Jan 31 Selections from Frege's *Begriffsschrift*.

1. Background

- Feb 7 David Lewis. Index, context, and content. In Stig Kanger and Sven Öhman, editors, *Philosophy and Grammar*, pages 79–100. Reidel, 1980.
- David Kaplan. Demonstratives. In Joseph Almog, John Perry, and Howard Wettstein, editors, *Themes From Kaplan*, pages 481–563. Oxford University Press, 1989.
- Feb 14 Robert Stalnaker. Assertion. *Syntax and Semantics*, 9:315–332, 1978.
- Robert Stalnaker. Common ground. *Linguistics and Philosophy*, 25:701–721, 2002.
- Feb 21 Seth Yalcin. Introductory notes on dynamic semantics. Partially published manuscript.
- Feb 28 Seth Yalcin. Semantics and metasemantics in the context of generative grammar. Unpublished manuscript.

2. Theories of Modality

- Mar 7 Angelika Kratzer. What ‘must’ and ‘can’ must and can mean. *Linguistics and Philosophy*, 1:337–355, 1977.
- Angelika Kratzer. The notional category of modality. In H. J. Eikmeyer and H. Rieser, editors, *Words, Worlds, and Contexts*, pages 38–74. De Gruyter, 1981.
- Mar 14 John MacFarlane. Epistemic modals are assessment-sensitive. In Andy Egan and Brian Weatherson, editors, *Epistemic Modality*, pages 144–178. Oxford University Press, 2011.
- Mar 28 Kai von Fintel and Anthony S. Gillies. CIA leaks. *Philosophical Review*, 117(1):77–98, 2008.
- Kai von Fintel and Anthony S. Gillies. ‘Might’ made right. In Andy Egan and Brian Weatherson, editors, *Epistemic Modality*, pages 108–130. Oxford University Press, 2011.
- Apr 4 Seth Yalcin. Epistemic modals. *Mind*, 116(464):983–1026, 2007.
- Seth Yalcin. Nonfactualism about epistemic modality. In Andy Egan and Brian Weatherson, editors, *Epistemic Modality*, pages 295–332. Oxford University Press, 2011.

Joshua Knobe and Seth Yalcin. Epistemic modals and context: experimental data. Unpublished manuscript.

Apr 11 Frank Veltman. Defaults in update semantics. *Journal of Philosophical Logic*, 25(3):221–261, 1996.

Malte Willer. Dynamics of epistemic modality. *Philosophical Review*, 122(1):45–92, 2013.

3. Evidentiality

Apr 18 Lauri Karttunen. Possible and must. *Syntax and Semantics*, 1:1–20, 1972.

Kai von Stechow and Anthony S. Gillies. Must...stay...strong! *Natural Language Semantics*, 18(4):351–383, 2010.

Apr 25 Lisa Matthewson, Henry Davis, and Hotze Rullman. Evidentials as epistemic modals: evidence from St’át’imcets. *The Linguistic Variation Yearbook*, 7:201–254, 2007.

Kyung-Sook Chung. Spatial deictic tense and evidentials in Korean. *Natural Language Semantics*, 15:187–219, 2007.

May 2 Justin Bledin. Modality with content. Unpublished manuscript.

Requirements

There is only one requirement for this seminar. A ≤ 30 page double-spaced paper on a course-related topic of your choice is due on May 10.

Enjoy the seminar!

I. Lewis on Semantics

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1 A Grammar for English

For Lewis [1975] and [1980], the practice of English requires that certain regularities in action prevail in the community of English speakers—*viz.*, the conventions of *truthfulness-in-English* and *trust-in-English*. Roughly, the idea is that without any explicit agreement or planning, speakers will try to avoid uttering sentences that are not *true-in-English*, hearers will typically come to believe that what they hear is *true-in-English*, and these valuable regularities will be common knowledge among members of the community.¹

Of course, much needs to be said, and has been said, to fill in this picture. In particular, we need to know the conditions under which a declarative sentence is *true-in-English* since this concept is the linchpin around which our systematic restatement of our common knowledge of English will be organized:

Truth-in-English—what is that? A complete restatement of our common knowledge about the practice of language may not use this phrase without explaining it. We need a chapter which culminates in a specification of the conditions under which someone tells the truth-in-English. I call that chapter a *grammar* for English.
(p. 80-81)²

What Lewis calls a “grammar” is basically much of syntax and semantics.

According to Lewis, the task of the semantics module in a grammar is to assign *semantic values* (SVs) to parsed sentences that meet the following two constraints:

(i) SVs must determine which sentences are true in which contexts:

The semantic values of some expressions, the *sentences*, must enter somehow into determining whether truth-in-English would be achieved if the expression were uttered in a given context. (p. 83)

¹Compare Williamson [1996] and [2000] who argues for the stronger thesis that assertion is constitutively governed by the rule to assert only what you know.

²All references are to Lewis [1980] unless otherwise indicated.

(ii) SVs must be *compositional*:

The semantic value of any expression is to be determined by the semantic values of the (immediate) constituents from which it is built, together with the way it is built from them. (p. 83)

Semantic values can be anything that fills these roles. Note that Lewis does not say much to motivate the compositionality constraint (ii).³ But, as we will see, this constraint heavily constrains the structure of a semantic theory.

2 Context Dependence

A *context* is a world-bound spatiotemporal position where a sentence is said. Formally, a context can be explicated by a Lewisian *centered world* $c = \langle t, l, w \rangle$ consisting of a time t , spatial location l , and possible world w .

As Lewis observes, the truth of all English sentences, save for necessary truths and falsehoods, depends on context in some way or another. This is clear for sentences involving indexicals and demonstratives (cf. Kaplan [1989]):

- (1) I am here now.
- (2) That is a nice painting.

But consider also:

- (3) France is hexagonal.
- (4) Fred turned left.
- (5) Justin joined the Hopkins philosophy faculty in Fall 2013.

The truth of (3) turns on a contextually supplied standard of precision. The truth of (4) turns on a contextually supplied point of reference and orientation. Even the truth of (5) turns on the world of the context—things could have been otherwise. A famous Lewisian slogan: “Contingency is a kind of indexicality.” (p. 82)

N.B. Lewis is certainly correct that contingency is a kind of indexicality if a sentence is ‘indexical’ just in case its truth at a context depends on features of the context. However, some philosophers reserve the term ‘indexical’

³One popular motivation for (ii) is the *productivity* of language: competent English speakers can know the meanings of sentences that they have never encountered before.

for sentences whose *content* at a context (more on this later) depends on features of the context (cf. MacFarlane [2009]). Used in this tighter sense, contingent sentences needn't be indexical.

Lewis goes further and suggests that contexts must actually enter into our semantic apparatus. SVs must be relativized to c . Why? Because the truth of sentences can depend on a great many features of context—standards of precision, orientation, gustatory standards, salience relations between objects, similarity relations between worlds, and so on—and these are not specifiable in a finite list.

Minor aside: I must confess that I've always found this a bit confusing. Lewis says that all features of context “are given by the intrinsic and relational character of the time, place, and world in question.” (p. 85) Indeed, he explicates a context as $\langle t, l, w \rangle$ —a finite list of parameters. Isn't the point just that SVs must be relativized to *this* finite list of parameters?

3 Index Dependence

Lewis' next observation is that English contains various sentences whose truth in a context depends on the truth of some embedded sentence when some feature of the context is shifted. Specifically, Lewis recognizes the following kinds of *shiftiness*:

Temporal Operators. ‘There have been dogs’ = ‘It has been that...’ + ‘There are dogs.’

Locational Operators. ‘Somewhere the sun is shining’ = ‘Somewhere...’ + ‘The sun is shining.’

Modal Operators. ‘Aunts must be women’ = ‘It must be that...’ + ‘Aunts are women.’

Standard of Precision Operators. ‘Strictly speaking, France is not hexagonal’ = ‘Strictly speaking...’ + ‘France is not hexagonal.’

It is an empirical question which intensional operators are found in English. The list might be short (and perhaps empty).

According to the compositionality principle (ii), the SVs of the right-hand sentences like ‘There are dogs’ must help determine the SVs, and so the truth conditions, of the left-hand sentences like ‘There have been dogs.’ However, a left-hand sentence is true at c just in case the embedded right-hand sentence is true when some feature of c is shifted. So the SVs of

the right-hand sentences must provide information about how their truth values vary when contextual features are shifted.

As already mentioned, SVs must be relativized to c . Will this do the trick? No. Shifting one feature of context while holding the rest fixed will not generally result in a new context. So we need indices.

An *index* i is an n -tuple of features of context—importantly, these needn't be features of the *same* context. Though contexts are not generally one coordinate shift apart, indices are. If we start off with the index i_c of some context c and shift a parameter, then we end up with a new index i' . But i' needn't be the index of any context.

To give a compositional semantics for a language involving intensional operators, SVs must also be relativized to i where the indices we use must include the contextual coordinates that are shiftable by these operators. Since it is an empirical matter which intensional operators exist in English, it is an empirical matter which coordinates should be packed into the indices used in our semantics for English.

N.B. Lewis uses the following sentences to make the point that we often need to evaluate sentences for truth with respect to features that do not correspond to a context:

- (6) Forevermore, if someone is speaking here then I will exist.
- (7) Necessarily, if someone is speaking here then I must exist.

But the real lesson from (6) and (7), I take it, is that we often need to evaluate sentences relative to *multiple* time and world parameters. The time and world of the context of use continue to fix the extension of ‘I’ after ‘Forevermore’ or ‘Necessarily’ shift the time or world coordinate of the index. Lewis could have argued forcibly for his context-index double dependence thesis along these lines.

4 Semantic Values

Recap:

To do their first job of determining whether truth-in-English would be achieved if a given sentence were uttered in a given context, the semantic values of sentences must provide information about the dependence of truth on context. Dependence on indices won't do, unless they are built inclusively enough to include every feature that is ever relevant to truth. We have almost certainly overlooked a great

many features. So for the present, while the task of constructing an explicit grammar is still unfinished, the indices we know how to construct won't do. Indices are no substitute for contexts because contexts are rich in features and indices are poor.

To do their second job of helping to determine the semantic values of sentences with a given sentence as a constituent, the semantic values of sentences must provide information about the dependence of truth on indices. Dependence on contexts won't do, since we must look at the variation of truth value under shifts of one feature only. Contexts are no substitute for indices because contexts are not amenable to shifting. (p. 87-88)

Upshot:

Contexts and indices will not do each other's work. Therefore we need both. An adequate assignment of semantic values must capture two different dependencies of truth on features of context: context-dependence and index-dependence. We need the relation: sentence s is true at context c at index i . (p. 88)

Taking this to heart, we can introduce an *interpretation function* $\llbracket \cdot \rrbracket$ that maps an English sentence φ to a truth value, or *extension*, relative both to a context $c \in \mathcal{C}$ and to an index $i \in \mathcal{I}$:

$$\llbracket \varphi \rrbracket^{c,i} \in \{T, F\}.$$

The *intension of φ at c* is a function from indices to truth values (this is what Lewis calls “variable but simple”):

$$\llbracket \varphi \rrbracket^c : \mathcal{I} \mapsto \{T, F\}.$$

The *two-dimensional intension of φ* is a function from context-index pairs, or *points of evaluation*, to truth values (this is what Lewis calls “constant but complicated”):

$$\llbracket \varphi \rrbracket : \mathcal{C} \times \mathcal{I} \mapsto \{T, F\}.$$

Lewis argues that we can take the SV of a sentence to be either its intension or two-dimensional intension. Since both of these formal objects do the required work, the choice is superficial. Both objects afford a compositional semantics for sentences involving intensional operators. Moreover, we can complete our Grammar and define the notion of *truth-at-a-context* in terms of *truth-at-a-point*:

φ is true at context c iff $\llbracket \varphi \rrbracket^{c,i_c} = T$.

5 Content

Kaplan [1989] calls the two-dimensional intension $\llbracket \varphi \rrbracket$ of φ its *character*, and the intension $\llbracket \varphi \rrbracket^c$ its *content* in c . But the content of an expression is then a function from indices to truth values, or sets of indices. It is not at all clear that this formal object, motivated by the presence of certain shiftable operators in a language, should model the object of illocutionary acts. The notion of informational content plays its own distinct role at the semantic-pragmatic interface, helping to explain how communication works (and plays other theoretical roles in an account of propositional attitudes and action).

As Lewis stresses, we needn't equate the compositional SV (intension or two-dimensional intension) of a sentence with its content. It is enough that we can systematically recover the content of a declarative sentence in context from its SV.

There are actually a few different notions of content that we can bring into play. The *horizontal propositional content* $[\varphi]^c$ of sentence φ in c is the following set of possible worlds:

$$\{w : \llbracket \varphi \rrbracket^{c,i_{c/w}} = T\}$$

where $i_{c/w}$ is the index obtained from i_c by shifting its world coordinate to w . Note that if indices include only a world parameter (i.e., if all shiftiness except the kind that shifts worlds can be explained away), this becomes the more familiar set:

$$\{w : \llbracket \varphi \rrbracket^{c,w} = T\}$$

The *diagonal propositional content* of φ in c is the following set of worlds:

$$\{w : \llbracket \varphi \rrbracket^{c^w,i_{c^w}} = T\}$$

where c^w is the context in w that is indistinguishable from c by the speaker (if there is one).

References

- David Kaplan. Demonstratives. In Joseph Almog, John Perry, and Howard Wettstein, editors, *Themes From Kaplan*, pages 481–563. Oxford University Press, 1989.
- David Lewis. Languages and language. In Keith Gunderson, editor, *Minnesota Studies in the Philosophy of Science, Volume VII*, pages 3–35. University of Minnesota Press, 1975.

David Lewis. Index, context, and content. In Stig Kanger and Sven Öhman, editors, *Philosophy and Grammar*, pages 79–100. Reidel, 1980.

John MacFarlane. Nonindexical contextualism. *Synthese*, 166(2):231–250, 2009.

Timothy Williamson. Knowing and asserting. *Philosophical Review*, 105(4):489–523, 1996.

Timothy Williamson. *Knowledge and its Limits*. Oxford University Press, Oxford, 2000.

II. Stalnaker on Assertion

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1 Assertion, Informally

Stalnaker’s seminal theory of assertion [1978] is based on the following four “truisms” (p. 78):

First, assertions have content; an act of assertion, is among other things, the expression of a proposition—something that represents the world as being a certain way.

Second, assertions are made in a context—a situation that includes a speaker with certain beliefs and intentions, and some people with their own beliefs and intentions to whom the assertion is addressed.

Third, sometimes the content of the assertion is dependent on the context in which it is made, for example, on who is speaking or when the act of assertion takes place.

Fourth, acts of assertion affect, and are intended to affect, the context, in particular the attitudes of the participants in the situation; how the assertion affects the context will depend on its content.

Note the two-way interaction between context and content. By the third truism, context can help determine content—philosophers like MacFarlane [2009] call a sentence *indexical* just in case its content at a context depends on features of this context. By the fourth truism, making an assertion with a particular content will affect a context in particular ways. Content plays an important role at the semantic-pragmatic interface, helping to explain how communication works.

How does successful assertion affect context exactly? Roughly: acts of assertion eliminate possibilities from consideration that are incompatible with what is described to be the case.

2 Assertion, Formally

This can all be made more precise in a formal possible worlds framework.

Let \mathcal{W} designate a set of *possible worlds*. The notion of a possible world is treated as primitive in Stalnaker’s abstract theory of speech.

A *proposition* $X : \mathcal{W} \mapsto \{T, F\}$ is a function that maps each world $w \in \mathcal{W}$ to a truth value (alternatively, a proposition is a set of worlds $X \subseteq \mathcal{W}$). These formal mathematical objects explicate the content of speech acts and propositional attitudes:

The intuitive motivation for this analysis is something like the following. A proposition—the content of an assertion or belief—is a representation of the world as being a certain way. But for any given representation of the world as being a certain way, there will be a set of all the possible states of the world which accord with the representation—which are that way. So any proposition determines a set of possible worlds. And, for any given set of possible worlds, to locate the actual world in that set is to represent the world as being a certain way. So every set of possible worlds determines a proposition. Furthermore, any two assertions or beliefs will represent the world as being the *same* way if and only if they are true in all the same possible worlds. If we assume, as seems reasonable, that representations which represent the world as being the same way have the same content (express the same proposition), then we can conclude that there is a one-to-one correspondence between sets of possible worlds and propositions. Given this correspondence, it seems reasonable to use sets of possible worlds, or (equivalently) functions from possible worlds into truth-values, to play the role of propositions in our theory. The analysis defines propositions in terms of their essential function—to represent the world. (p. 79-80)

A *propositional concept* $\mathcal{X} : \mathcal{W} \mapsto 2^{\mathcal{W}}$ is a function that maps each world $w \in \mathcal{W}$ to a proposition $X \subseteq \mathcal{W}$ (alternatively, a propositional concept is a function $\mathcal{X} : \mathcal{W} \times \mathcal{W} \mapsto \{T, F\}$ that maps an ordered pair of worlds $\langle w, v \rangle$ to a truth value). Each sentence φ can be associated with a propositional concept \mathcal{X}_φ that helps determine its communicative impact.

The *horizontal proposition* associated with φ at w is $\{v : \mathcal{X}_\varphi(w, v) = T\}$.

The *diagonal proposition* associated with φ is $\{w : \mathcal{X}_\varphi(w, w) = T\}$.

N.B. This should all seem very familiar to readers of Lewis [1980]. The propositional concept \mathcal{X}_φ is a crude pass at the *two-dimensional intension* or *semantic value* $\llbracket\varphi\rrbracket$ of φ where worlds play the role of contexts and indices only include a world parameter.

Another key notion required for Stalnaker’s account of assertion is *speaker presupposition*:

Roughly speaking, the presuppositions of a speaker are the propositions whose truth he takes for granted as part of the background of the conversation. A proposition is presupposed if the speaker is disposed to act as if he assumes or believes that the proposition is true, and as if he assumes or believes that his audience assumes or believes that it is true as well. Presuppositions are what is taken by the speaker to be the *common ground* of the participants in the conversation, what is treated as their *common knowledge* or *mutual knowledge*. The propositions presupposed in the intended sense need not really be common or mutual knowledge; the speaker need not even believe them. He may presuppose any proposition that he finds it convenient to assume for the purpose of the conversation, provided he is prepared to assume that his audience will assume it along with him. (p. 84)

Speaker S ’s presuppositions can be explicated by a *context set* $CS_S \subseteq \mathcal{W}$ where proposition X is presupposed by S iff $CS_S \subseteq X$. Intuitively, the members of CS_S are taken by S to be the “live options” in the conversation.

A context is *nondefective* if $CS_S = CS_{S'}$ for any participants S and S' . Otherwise, the context is *defective*. Since discrepancies between speaker presuppositions can lead to communication failure—and so will tend to vanish over time—Stalnaker assumes that nondefective or mildly defective contexts are the norm. Usually, we can speak of the context set CS of the conversation.

When someone makes an assertion, this affects the context in the trivial sense that the context set will come to incorporate that this very assertion was made. An assertion, like a power outage or an elephant walking into the room, is a “manifest event” (Stalnaker [2002]). However, if assertion is successful, then it will have its further “essential effect”:

Once the context is adjusted to accommodate the information that the particular utterance was produced, how does the *content* of an assertion alter the context? My suggestion is a very simple one: To make an assertion is to reduce the context set in a particular way,

provided that there are no objections from the other participants in the conversation. The particular way in which the context set is reduced is that all of the possible situations compatible with what is said are eliminated. To put it a slightly different way, the essential effect of an assertion is to change the presuppositions of the participants in the conversation by adding the content of what is asserted to what is presupposed. This effect is avoided only if the assertion is rejected. (p. 86)

That is, if CS is the initial context set that accommodates the information that φ was uttered with assertoric force in w , and the assertion of the horizontal proposition is not rejected, then the updated context set is $CS' = CS \cap \{v : \mathcal{X}_\varphi(w, v) = T\}$.

One may think of a nondefective conversation as a game where the common context set is the playing field and the moves are either attempts to reduce the size of the set in certain ways or rejections of such moves by others. The participants have a common interest in reducing the size of the set, but their interests may diverge when it comes to the question of how it should be reduced. (p. 88)

An assertion can have secondary effects, such as causing one’s audience to accept that one accepts the asserted content, but these secondary effects can be explained in terms of the assertion’s essential effect.

3 Common Ground Revisited

Stalnaker [2002] presents a much more sophisticated treatment of speaker presupposition. Recall that a speaker presupposes something iff she takes it for granted, or acts as if she takes it for granted, as common ground among the participants in a conversation. Speaker presupposition is a public or social propositional attitude: one presupposes that others presuppose. But what kind of attitude is this exactly?

3.1 Belief About Common Belief

First pass: Common ground is common or mutual belief, and speaker presupposition is belief about common belief. A proposition X is common belief iff everyone believes X , everyone believes that everyone believes X , and so forth.

To model this, we can use a Kripke-Hintikka-style relational semantics. Consider a formal polymodal language with belief operators Bel_S for each

conversational participant S and a common belief operator $CBel$. A model for this language includes a *doxastic accessibility relation* \mathcal{R}_S between worlds for each S where $w\mathcal{R}_Sv$ just in case v is doxastically possible for S in w —that is, S 's belief state in w leaves open v .

Let \mathcal{R}^* designate the transitive closure of \mathcal{R} . Then $\{v : w(\bigcup_S \mathcal{R}_S)^*v\}$ is the set of worlds reachable from w in a finite number of steps along any participant's accessibility relation.

$Bel_S(\varphi)$ is true at w iff for any world v such that $w\mathcal{R}_Sv$, the embedded sentence φ is true at v .

$CBel(\varphi)$ is true at w iff $Bel_S(\varphi)$ is true at w for each S , $Bel_S(Bel_{S'}(\varphi))$ is true at w for each S and S' , and so forth.

Equivalently, $CBel(\varphi)$ is true at w iff for any world v such that $w(\bigcup_S \mathcal{R}_S)^*v$, the embedded sentence φ is true at v .

S presupposes that φ is true iff $Bel_S(CBel(\varphi))$.

Stalnaker assumes that the logic of belief is KD45.¹ The following belief principles hold:

(4) **Positive Introspection.** $Bel_S(\varphi) \supset Bel_S(Bel_S(\varphi))$.

(5) **Negative Introspection.** $\neg Bel_S(\varphi) \supset Bel_S(\neg Bel_S(\varphi))$.

(D) **Consistency.** $Bel_S(\varphi) \supset \neg Bel_S(\neg\varphi)$.

Only 4 and D hold for $CBel$.

The logic of Bel_SCBel and $CBel$ are the same.

$\mathcal{CB}_w = \{v : w(\bigcup_S \mathcal{R}_S)^*v\}$ explicates the common belief in w .

$CS_{S_w} = \{u : \exists v(w\mathcal{R}_Sv \wedge u \in \mathcal{CB}_v)\}$ explicates speaker S 's presupposition state in w .

Given the logic of belief, $\mathcal{CB}_w = \bigcup_S CS_{S_w}$. So $CBel(\varphi)$ iff $Bel_S(CBel(\varphi))$ for all S . Also, the context set of a nondefective conversation is \mathcal{CB}_w (i.e., a nondefective context is one in which all of the participant's beliefs about the common ground are accurate).

3.2 Informative Presupposition

Thinking about common ground and speaker presupposition in this way allows us to make sense of *informative presupposition*. Suppose Alice says:

¹That is, he assumes that each conversational participant's doxastic accessibility relation is *transitive*, *Euclidean*, and *serial*.

(1) I have to pick up my sister at the airport.

If this sentence is appropriately used only if the speaker is presupposing that she has a sister (φ), then after the manifest event of Alice's assertion, the common ground will incorporate that Alice presupposes that she has a sister. That is, it becomes common belief that Alice believes that it is common belief that she has a sister— $CBel(Bel_A(CBel(\varphi)))$.

If Bob, the only other conversational participant, comes to believe that φ is true, then it becomes common ground that φ is true. Why? Because $CBel(Bel_A(CBel(\varphi)))$ and $Bel_B(\varphi)$ imply $CBel(\varphi)$.

So if it is reasonable for Alice to believe that Bob will come to believe that she has a sister as a result of the manifest event of her assertion, then Alice's presupposition that she has a sister is reasonable; moreover, it is appropriate for Alice to utter (1) since doing so makes it reasonable for her to have the belief that makes this action appropriate.

3.3 Speaker Presupposition Generalized

Stalnaker's more general model of common ground and presupposition involves *acceptance*:

Acceptance, as I have used the term, is a category of propositional attitudes and methodological stances toward a proposition, a category that includes belief, but also some attitudes (presumption, assumption, acceptance for the purposes of an argument or an inquiry) that contrast with belief, and with each other. To accept a proposition is to treat it as true for some reason. One ignores, at least temporarily, and perhaps in a limited context, the possibility that it is false.

Second pass: Common ground is common belief about what is accepted. A proposition X is common ground iff everyone accepts X , everyone believes that everyone accepts X , everyone believes that everyone believes that everyone accepts X , and so forth. Speaker presupposition is still belief about common ground.

References

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Robert Stalnaker. Assertion. In P. Cole, editor, *Syntax and Semantics 9: Pragmatics*, pages 315–332. Academic Press, 1978.

Robert Stalnaker. Common ground. *Linguistics and Philosophy*, 25:701–721, 2002.

III. Dynamic Semantics

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1 Review: Static Semantics

Recall that according to Lewis [1980], the semantics module in a grammar must assign *semantic values* (SVs) to sentences that meet the following two constraints:

- (i) SVs must be compositional.
- (ii) SVs must determine the truth conditions for sentences in context.

Yalcin [2013] replaces (ii) with this more general constraint (ii'):

The semantic values of sentences should play a central role in explaining how speakers *communicate*, and in particular, *transfer information*, by using the sentence. (p. 3)

He also adds this third constraint (iii):

The semantic values of sentences should play a central role in explaining which sentences follow from which, and which sentences are incompatible with which. (p. 3)

On a static semantics, the *intension* $\llbracket \varphi \rrbracket^c : \mathcal{I} \mapsto \{T, F\}$ of a sentence $\varphi \in S_{\mathcal{L}}$, a function from indices to truth values, arguable meets these three desiderata (alternatively, we can work with the *two-dimensional intension* $\llbracket \varphi \rrbracket : \mathcal{C} \times \mathcal{I} \mapsto \{T, F\}$, a function from context-index pairs to truth values).

So long as we pack enough parameters into the indices in \mathcal{I} , we can compositionally handle all manner of shiftiness in our language (again, since it is an empirical question which intensional operators exist in a language, it is an empirical question which coordinates are part of indices appropriate to this language).

We can also define the notion of truth-at-a-context and different notions of propositional content in terms of $\llbracket \]^c$ (I present only the horizontal here):

φ is true at context c iff $\llbracket \varphi \rrbracket^{c, i_c} = T$

The *horizontal propositional content* $[\varphi]^c$ of φ in c is $\{w : \llbracket \varphi \rrbracket^{c, i_{c/w}} = T\}$

where i_c is the index of context c and $i_{c/w}$ is the index obtained from i_c by shifting its world coordinate to w .

These notions can then be used in our wider theory of speech acts, helping to explain how communication works. Recall that on Stalnaker's [1978] theory of assertion, successful assertion updates the common ground of a conversation. If the common ground of a nondefective conversation right after an assertion of $[\varphi]^c$ —that is, after the manifest event of the assertion but before it has been accepted or rejected—is modeled with the context set CS of worlds still presupposed to be open by the interlocutors, and this assertion is accepted, then the updated common ground can be modeled with $CS' = CS \cap [\varphi]^c$. The essential communicative impact of assertion, then, is to eliminate possible ways the world might be from consideration that do not conform to what is described to be the case.

Moreover, consequence and consistency can arguably be explicated in terms of $\llbracket \]^c$. On the standard truth preservation view, the argument from $\varphi_1, \dots, \varphi_n$ to ψ is valid if and only if it is impossible for each of $\varphi_1, \dots, \varphi_n$ to be true and for ψ to be false. Relatedly, the sentences $\varphi_1, \dots, \varphi_n$ are jointly consistent if and only if it is possible for all of $\varphi_1, \dots, \varphi_n$ to be true. Formalizing these notions with the technical notion of truth-at-a-context gives us:

The argument from $\varphi_1, \dots, \varphi_n$ to ψ is valid, $\{\varphi_1, \dots, \varphi_n\} \models \psi$, just in case there is no context c such that $\varphi_1, \dots, \varphi_n$ are all true at c but ψ is false at c .

That is, $\{\varphi_1, \dots, \varphi_n\} \models \psi$ just in case there is no context c such that $\llbracket \varphi_1 \rrbracket^{c, i_c} = \dots = \llbracket \varphi_n \rrbracket^{c, i_c} = T$ but $\llbracket \psi \rrbracket^{c, i_c} = F$.

$\varphi_1, \dots, \varphi_n$ are consistent just in case there is some context c such that $\llbracket \varphi_1 \rrbracket^{c, i_c} = \dots = \llbracket \varphi_n \rrbracket^{c, i_c} = T$.

2 Rival: Dynamic Semantics

In dynamic semantics—as we'll understand this term here—SVs are rather operations on bodies of information.

The central notion behind this alternative semantics is that of the *context change potential* (CCP) of a sentence—roughly, a rule for updating the context of a conversation. Though more sophisticated representations of discourse contexts have been suggested (by Stalnaker [2002], Yalcin [2012], and Rawlins [2010], among many others), let us continue to model such a context with a single set of possible worlds. The CCP of a sentence is a

function from context sets to context sets.

CCPs already appeared in our static picture. We mentioned how asserting $[\varphi]^c$ shifts the conversational background from CS to $CS \cap [\varphi]^c$. But dynamic semanticists differ from static semanticists in equating $SV=CCP$. CCPs are now assigned to embedded sentences and the CCP of a complex sentence is determined compositionally from the CCPs of its constituent sentences together with syntactic structure:

The idea that a sentence has a CCP is thus not proprietary to DYNAMIC. How then does DYNAMIC differ from STATIC[?] The core difference is that on a dynamic view, the CCP of a complex sentence is determined *compositionally* from the semantic values of its parts. Ancillary pragmatic assumptions are not required. And correspondingly, the compositional contribution of an *embedded* sentence—the semantic ingredient the sentence contributes to the larger linguistic expressions in which it occurs—is itself taken to be a CCP. Thus the CCP of a conjunction, for instance, is literally a function of the context change potential of its parts. That is quite different than the static version of the story, where the context change potential of a sentence is only determined with the help of pragmatics, and applies only in connection with *unembedded*, asserted sentences.

When it comes to conversational update, the dynamic view rolls into the semantics what, on a static view, would be parceled to pragmatics. The compositional contribution of a sentence is just identified with an instruction for updating the informational context, or common ground, of a conversation. (Yalcin [2013], p. 4)

Dynamic semantics fuses semantic considerations (compositionality) with a Stalnakerian pragmatics of assertion. To give a toy semantics for a simple language \mathcal{L} containing only sentence letters, negation \neg , and conjunction \wedge , let a model $\mathcal{M} = \langle \mathcal{W}, \mathcal{V} \rangle$ consist of a set of possible worlds \mathcal{W} and an interpretation function $\mathcal{V} : At_{\mathcal{L}} \times \mathcal{W} \mapsto \{T, F\}$ that sends each atom $p \in At_{\mathcal{L}}$ and world $w \in \mathcal{W}$ to a truth value in $\{T, F\}$. Using this model, we can recursively define the semantic value $\llbracket \varphi \rrbracket : 2^{\mathcal{W}} \mapsto 2^{\mathcal{W}}$ of each sentence $\varphi \in S_{\mathcal{L}}$ as follows (going forward, i will designate an information state in $2^{\mathcal{W}}$ rather than an index):

$$\begin{aligned} i[\llbracket p \rrbracket] &= i \cap \{w : \mathcal{V}(p, w) = T\} \\ i[\llbracket \neg \varphi \rrbracket] &= i \setminus i[\llbracket \varphi \rrbracket] \\ i[\llbracket \varphi \wedge \psi \rrbracket] &= i[\llbracket \varphi \rrbracket] \cap i[\llbracket \psi \rrbracket] \end{aligned}$$

Dynamic SVs meet the compositionality constraint (i) in addition to (ii'). What about the constraint (iii) concerning consequence and consistency?

We can actually define a number of different formal consequence relations in terms of CCP.

Let us say that i *supports* φ just in case $i[\llbracket \varphi \rrbracket] = i$ —that is, an information state supports a sentence just in case this information state is a *fixed point* of the sentence (note that in the toy semantics, the SV of any sentence maps any context set to a fixed point of the sentence). Then one possible dynamic consequence relation preserves not truth but support (cf. Veltman [1996], Yalcin [2007]):

$\langle \varphi_1, \dots, \varphi_n \rangle \models \psi$ just in case there is no information state i such that $i[\llbracket \varphi_1 \rrbracket] = \dots = i[\llbracket \varphi_n \rrbracket] = i$ but $i[\llbracket \psi \rrbracket] \neq i$.

Here is another dynamic relation (cf. Veltman [1996]):

$\langle \varphi_1, \dots, \varphi_n \rangle \models' \psi$ just in case there is no information state i such that $i[\llbracket \varphi_1 \rrbracket] \dots [\llbracket \varphi_n \rrbracket] = i$ but $i[\llbracket \psi \rrbracket] \neq i$. (I use an ordered sequence here because the order of premises can matter.)

We can also define different notions of compatibility in terms of support. For instance, $\varphi_1, \dots, \varphi_n$ are jointly consistent just in case there is some information state i such that $i[\llbracket \varphi_1 \rrbracket] = \dots = i[\llbracket \varphi_n \rrbracket] = i$.

3 Static or Dynamic?

Static and dynamic semantics are on the surface quite different. But many ‘dynamic’ notions can be introduced in a static framework. After all, the notion of a CCP is still available to the static semanticist. Moreover, many ‘static’ notions can be introduced in a dynamic framework. For instance, the dynamic semanticist can also provide truth conditions for sentences (see Yalcin [2013] for some discussion).¹ It might seem that the only significant difference between static and dynamic semantics is one of

¹Yalcin suggests that the dynamic semanticist must reject the idea that sentences typically express propositions:

The indirect relation between sentences and truth conditions is what makes it the case that talk of sentences expressing propositions often lacks clear sense in a dynamic setting. Similarly for the traditional distinction between a sentence’s informational content and its force. The reason, again, is that the chief locus of information on a dynamic picture is not the sentence, but rather the conversational states of the participants in the discourse. Sentence meanings are not themselves items of informational content, but are rather tools for manipulating a shared body of information. (p. 7)

But there is, I’ll argue, a way to associate sentences with representational content even if these sentences aren’t, properly speaking, true or false.

emphasis.

However, some philosophers of language and linguists argue that certain linguistic phenomena recommend going dynamic—in particular, anaphora, presupposition projection, and informational modals. We will consider the dynamic treatment of informational modality later in the seminar.

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