Goal: To know the meaning of a sentence is (at least) to know its truth conditions. From this (correct) dictum, one could infer that it suffices to know in what situations or 'possible worlds' a sentence is true to understand its meaning; if so, the meaning of a sentence could be identified with the set of possible worlds in which it is true. While this approach can take us relatively far, it turns out to be insufficient to analyze (i) egocentric thoughts and (ii) reports of egocentric thoughts. These suggest that meaning must be at least as fine-grained as sets of contexts.

References for Further Reading:

(i) Philosophical Foundations

(ii) Semantic Developments

Goal of Semantics: Give systematic rules that derive the truth conditions of every sentence from (a) the meaning of its parts and (b) the way they are put together

Note: In what follows, we concentrate on the meaning of 'propositional elements', i.e. clauses.
Meaning and Thought I: Possible Worlds

1.1 Meaning, Truth and Possible Worlds

What is Meaning?

Hypothesis I: Meaning is the truth value of a sentence.

Problem 1: Sentences with the same truth value have the same meaning!

1. a. Chirac is the President of France
   b. Bush is the President of the US
   c. Two plus two is four

Problem 2: Modal Statements and Belief attribution

2. a. It is necessary that Chirac is the President of France
   b. It is necessary that Bush is the President of the US
   c. It is necessary that two plus two is four

3. a. John believes that Chirac is the President of France
   b. John believes that Bush is the President of the US
   c. John believes that two plus two is four

Hypothesis II: Meaning is a function from possible worlds to truth values

Truth: Sentence S is true at world w* if and only if |S|(w*)=true (i.e. the function which is the meaning of S associates the value 'true' to the world w*).

How Problem 1 is solved: Although the sentences in (1) all have the same truth value in the actual world, they need not be true in the same possible worlds (for instance, there is a possible world in which Chirac is the President of France but Bush isn't the President of the US, for instance because the recount in Florida had lead to a different result).

How Problem 2 is solved: Since the meanings of 'Chirac is the President of France' and 'Bush is the President of the US' are different, John can stand in the 'believe' relation to the first one without standing in the 'believe' relation to the second.

Remark. This analysis raises obvious questions about what possible worlds are. Some are realists - for instance the philosopher David Lewis, cited below. Others are not. We need not take a stand on this issue to develop a linguistic theory of meaning.

"I believe that there are possible worlds other than the one we happen to inhabit. If an argument is wanted, it is this. It is uncontroversially true that things might be otherwise than they are. I believe, and so do you, that things could have been different in countless ways. But what does this mean? Ordinary language permits the paraphrase: there are many ways things could have been besides the way they actually are. On the face of it, this sentence is an existential quantification. It says that there exist many entities of a certain description, to wit 'ways things could have been'. I believe that things could have been different in countless ways; I believe permissible paraphrases of what I believe; taking the paraphrase at its face value, I therefore believe in the existence of entities that might be called 'ways things could have been'. I prefer to call them 'possible worlds'. " [David Lewis, Counterfactuals, p. 84]
1.2 An Analysis of modality and conditionals

Idea: Once possible worlds are introduced, we can talk about them. How do we talk about individuals? In two major ways:
(a) by counting them (in a broad sense: quantification): Every student is happy, some student is happy, etc.
(b) by referring to them using definite descriptions: The student is happy.

Once possible worlds are introduced in our linguistic ontology, we can explore the hypothesis that the same devices are available to talk about possible worlds as are available to talk about individuals.

- Modals as Quantifiers

(4) a. 'Possibly, Bush won't be re-elected' is true just in case some possible world compatible with what we know in which Bush is not re-elected.
b. 'Necessarily, Bush won't be re-elected' is true just in case in every possible world compatible with what we know, Bush is re-elected.

Logical Necessity = Truth in every possible world = A Priority

Note: If a statement is true in every possible world, it is true in particular in the actual world. Hence logically necessary statements are true.

<table>
<thead>
<tr>
<th>INDIVIDUAL QUANTIFICATION</th>
<th>WORLD QUANTIFICATION (=MODALS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[some dog] is barking</td>
<td>it might rain / possibly, it will rain</td>
</tr>
<tr>
<td></td>
<td>analyzed as some world compatible with what we believe is a world in which it rains</td>
</tr>
<tr>
<td>[every dog] is barking</td>
<td>it must rain / necessarily, it will rain</td>
</tr>
<tr>
<td></td>
<td>analyzed as every world compatible with what we believe is a world in which it rains</td>
</tr>
<tr>
<td></td>
<td>John believes that it is raining</td>
</tr>
<tr>
<td></td>
<td>analyzed as every world compatible with what J. believes is a world in which it rains</td>
</tr>
</tbody>
</table>

1.3 Conditionals and World Predication

- If-clauses as definite descriptions

Natural Language Conditionals Are Different From Material Implications

(5) Some Properties of Material Implication
a. Strengthening of the Antecedent: If \( \phi \) \( \rightarrow \) \( \psi \), then \( \phi \& \psi \) \( \rightarrow \) \( \psi \)
b. Contraposition: If \( \phi \rightarrow \psi \), then \( \neg \psi \rightarrow \neg \phi \)
c. Transitivity: If \( \phi \rightarrow \psi \) and \( \psi \rightarrow \chi \), then \( \phi \rightarrow \chi \)

(6) These Properties Do Not Hold of Natural Language Conditionals!

a. Failure of Strengthening of the Antecedent:
If this match were struck, it would light
\( \not=> \) If this match had been soaked in water overnight and it were struck, it would light (Stalnaker 1968)
b. Failure of Contraposition
(Even) if Goethe had survived the year 1832, he would be dead by now
\( \not=> \) If G. were not dead by now, he would not have survived the year 1832 (Kratzer)
c. Failure of Transitivity
If B. wins the election, S. will retire to private life. If S. dies tomorrow, B. will win the election

\[ \Rightarrow \] If S. dies tomorrow, S. will retire to private life.

Solution: if \( p \) means: the world most similar to the actual world in which \( p \) is true

Idea (Stalnaker 1968): if this match were struck means: the world most similar to the actual world in which this match is struck [chances are that this world -call it \( w_1 \)- is one in which the match has not been soaked in water!]

Similarly, if this match had been soaked in water overnight and it were struck means: the world most similar to the actual world in which this match has been soaked and is struck [this world -call it \( w_2 \)- is by definition one in which the match has been soaked in water]

Hence: If this match were struck, it would light does not entail: if this match had been soaked in water overnight and it were struck, it would light, since the first sentence is true just in case the match lights in \( w_1 \), whereas the second sentence is true just in case the match lights in \( w_2 \).

Definite descriptions: the \( P \) means: the most salient individual that satisfies \( P \)

It has sometimes been proposed that a definite description the dog can be used only if there is exactly one dog in the domain of discourse. However this might be incorrect. For it is felicitous to say: The dog got into a fight with another dog (McCawley). Clearly, the latter sentence is typically uttered in situations in which there are at least two dogs in the domain of discourse. One solution is to analyze the dog as referring to the most salient individual which is a dog in the domain of discourse. This makes definite descriptions particularly similar to conditionals (they too have a hidden superlative element: closests vs. most salient).

In fact, the point is more general. If the \( P \) means: the one and only \( P \) in the domain of discourse, we expect the following patterns to hold, contrary to fact (note their similarity to those in (5); see K. von Heusinger's recent work for further considerations on this topic). The problem disappears if the \( P \) means: the most salient \( P \) in the domain of discourse.

(7) Patterns that one could expect if the \( p \) meant: the one and only \( p \)
   a. If The [ dog ], then The [ & ]
   b. If The [ dog ], then The [ & ]
   c. If The [ dog ] and The [ dog ], then The [ ]

(8) These Patterns Don't Hold in Natural Language!
   a. The dog is barking \[ \Rightarrow \] the neighbors’ dog is barking.
   b. The professor is not Dean \[ \Rightarrow \] the Dean is not a professor
   c. The students are vocal. The undergraduates in Beijing are students
     \[ \Rightarrow \] The undergraduates in Beijing are vocal.

<table>
<thead>
<tr>
<th>INDIVIDUAL REFERENCE (=DEFINITE DESCRIPTIONS)</th>
<th>WORLD REFERENCE (=IF-CLAUSES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[the dog] is barking analyzed as the most salient element in the domain of discourse which is a dog is barking</td>
<td>[if John came] Mary would be happy analyzed as the most similar world to the actual world in which John comes is a world in which Mary is happy</td>
</tr>
</tbody>
</table>
Then as a world pronoun

(9) Bhatt & Pancheva 2003; Cf. also Bittner 2001

(from Pandharipande (1997))

a. (dzar) tyane abhyas kela tar to pa hoil
   if he-ag studying do Pst.3MSg then he pass be Fut.3S
   ‘If he studies, he will pass (the exam).’

b. dzo māṇuṣ tudzhā āśedzāri rāhto to māṇuṣ which man your neighborhood-in live-Prs.3MSg that man lekhak āhe writer is

The man who lives in your neighborhood is a writer.
(Lit. ‘Which man lives in your neighborhood, that man is a writer.’)

<table>
<thead>
<tr>
<th>INDIVIDUAL PREDICATION</th>
<th>WORLD PREDICATION (=CONDITIONALS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[the dog] is barking</td>
<td>[if it rains], Mary will be happy</td>
</tr>
<tr>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Subject</td>
<td>Subject</td>
</tr>
<tr>
<td>Predicate</td>
<td>Predicate</td>
</tr>
<tr>
<td>analyzed as</td>
<td>analyzed as</td>
</tr>
<tr>
<td>the most salient</td>
<td>the closest world in which it</td>
</tr>
<tr>
<td>individual that is a</td>
<td>rains is a world in which</td>
</tr>
<tr>
<td>dog is barking</td>
<td>Mary is happy</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>[(As for) the dog:] it</td>
<td>[if it rains], then Mary will be</td>
</tr>
<tr>
<td>is barking</td>
<td>happy</td>
</tr>
<tr>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Subject Predicate</td>
<td>Subject Predicate</td>
</tr>
</tbody>
</table>

2 Meaning and Thought II: Contexts

Problem 1: Essentially Indexical Thoughts

Example 1. An amnesiac is lost in the Stanford library

Perry writes:

“An amnesiac, Rudolf Lingens, is lost in the Stanford library. He reads a number of things in the library, including a biography of himself, and a detailed account of the library in which he is lost... He still won’t know who he is, and where he is, no matter how much knowledge he piles up, until that moment when he is ready to say, “This place is aisle five, floor six, of Main Library, Stanford. I am Rudolf Lingens.” [Perry 1977]

Lewis comments:

“It seems that the Stanford library has plenty of books, but no helpful little maps with a dot marked “location of this map.” Book learning will help Lingens locate himself in logical space. (...) But none of this, by itself, can guarantee that he knows where in the world he is. He needs to locate himself not only in logical space but also in ordinary space”. [Lewis 1979 p. 138]
Example 2. 'My pants are on fire'

(10) ‘If I see, reflected in a window, the image of a man whose pants appear to be on fire, my behavior is sensitive to whether I think, ‘His pants are on fire’, or ‘My pants are on fire’, though the object of thought may be the same (i.e. the proposition expressed may be the same, P.S.)’. (Kaplan 1990)

Conclusion: Lingens knows everything there is to know about the world, and yet he cannot assert the sentence: 'I am Lingens'. If our foregoing analysis were correct, however, knowledge about the world would suffice to determine the truth of every possible sentence! We have missed something.

Kaplan may assert: 'His thoughts are on fire', but initially not 'My pants are on fire'. And yet the two sentences are true in exactly the same possible worlds - those worlds in which Kaplan's pants are on fire! So if our foregoing analyses were correct, the two sentences should have the same meaning. But they don't, since it is possible to believe one without believing the other.

Problem 2: A Priority vs. Necessity

(11) a. 'I am here now' is a priori true (because in any context in which it is uttered, it is true)
    b. 'I exist' is a priori true (because in any context in which it is uttered, it is true)
    c. 'I am necessarily here now' is not true
    d. 'I necessarily exist' is not true

2.2 Contexts-Dependency

Contexts

Main Idea: Sentences do not just tell us something about the world, but also about the context in which they are uttered.

What is a Context? c=<speaker, addressee, time of utterance, place of utterance, world of utterance>

Indexicals

(12) a. 'I' uttered in a context c denotes the speaker of c
    b. 'you' uttered in a context c denotes the addressee of c
    c. 'now' uttered in a context c denotes the time of c
    d. 'here' uttered in a context c denotes the location of c

(13) a. 'I am here now' is true in every context in which it is uttered, because for every context c, the speaker of c is located at the place of c at the time of c.
    b. 'I exist' is true in every context in which it is uttered
    c. 'Necessarily I am here now' is not true because it is not the case that in every possible world, the speaker of the c is located at the place of c at the time of c
    d. 'Necessarily I exist' is not true because it is not the case that in every possible world, the speaker of c exists.
3 Attributions of Propositional Attitudes: From Worlds to Contexts

3.1 Apparently, thought attribution is done in terms of possible worlds, not contexts

(14) John thinks: 'My pants are on fire'  \(\text{True}\)

John thinks: 'His pants are on fire' \(\text{True}\)

(where 'his' refers to John)

Apparently, we report a thought by preserving what it says about the world but not about the context. Note that it won't do to report the first sentence above by: 'John thinks that my pants are on fire'!

3.2 But appearances are deceptive!

□ Attitudes De Se

(15) Situation: John is so drunk that he has forgotten that he is a candidate in the election. He watches someone on TV and finds that that person is a terrific candidate, who should definitely be elected. Unbeknownst to John, the candidate he is watching on TV is John himself.

John hopes: 'I should be elected' \(\text{True}\)

John hopes: 'He should be elected' \(\text{FALSE}\)

(where 'his' refers to John)

Solution: Make the semantics of attitude reports more fine-grained. John hopes to be elected means that John stands in a certain relation to a set of contexts, namely those whose agent (i.e. speaker/thinker) is elected, rather than simply to a set of worlds.

or to put it differently: John hopes to be elected is true if and only if each context \(c\) compatible with John's hope is one whose agent is elected (rather than: ... if and only if each world \(w\) compatible with John's hope is one in which John is elected)
3.3 A typological puzzle: shifted indexicals

Russian Tense

(16) a. petjaštisказал, c#нотоони плачет [Russian]
   Petja said that he is-crying
   ‘Petja said that he was crying [at the time of his utterance]’
   b. petjaštivстретил c#нолoveka, kotoryj плачет [Russian]
   Petja met person, who is-crying
   ‘Petja met a person who is crying / cries’
   NOT: ‘Petja met a person who was crying [at the time of the meeting]’
   [Similar examples in Kondrashova 1999. See also Kusumoto 1998]

(17) a. c#асто слуц#алоись, c#ното мис#аплакет / *плачет (Janssen 1996)
   often happened, that Misha cried / is-crying
   b. It often happened that Misha cried / *is crying

Amharic 1st and 2nd person pronouns

(18) Situation: John says: ‘I am a hero’
   [D. Petros, p.c.]
   John hero be.PF-1SO3M.say-AUX.3M
   “John says that he is a hero”

   Solution: Indirect discourse verbs establish relations between individuals and sets of contexts rather than set of possible worlds. Thus the embedded clauses have a hidden context parameter, which corresponds - intuitively- to the context of the reported speech or thought act. What we see is that in Russian an embedded tense can be evaluated with respect to this context parameter; the same holds in Amharic of an embedded first or second person pronoun.

3.4 Another typological puzzle: logophoric pronouns

“(i) logophoric pronouns are restricted to reportive contexts transmitting the words or thought of an individual or individuals other than the speaker or narrator”; (ii) the antecedent does not occur in the same reportive context as the logophoric pronoun; (iii) the antecedent designates the individual or individuals whose words or thoughts are transmitted in the reportive context in which the logophoric pronoun occurs.” (Clements 1975, about Ewe)

(19) a. wu sat нм  чи nas an
   he₁ said that he-LOG¹ beat me
   b. wu sat нм wu nas an
   he₁ said that he₂ beat me (Frayzingier 1993, Mupun)

Solution: The distinction between English and Amharic 1st person pronouns shows the need for a morphological distinction between indexicals that only depend on the actual context (+actual) and indexicals that have no specification. Logophoric pronouns are the missing slot in that typology: -actual indexicals.