Syntactic Structures, Semantic Internalism

1928
Tarski
Turing
Church

1957
Syntactic Structures

1963
Katz & Fodor, “Structure of a Semantic Theory”

1964
Katz & Postal
“An integrated Theory of Linguistic Descriptions”

1965
Aspects
“Current Issues in Ling. Theory”

1967
Davidson,
“The Logical Form of Action Sentences”

Ross, “Constraints on Variables in Syntax”

Davidson,
“Truth and Meaning”

Paul M. Pietroski
Rutgers University
The goal of the descriptive study of a language is the construction of a grammar.

We may think of a language as a set of sentences, each with an ideal phonetic form and an associated intrinsic semantic interpretation.

The grammar of the language is the system of rules that specifies this sound-meaning correspondence.

...

The performance of the speaker or hearer is a complex matter that involves many factors.

One fundamental factor involved in the speaker-hearer's performance is his knowledge of the grammar that determines an intrinsic connection of sound and meaning for each sentence.
What is a language? Something which assigns meanings to certain strings of types of sounds or marks. It could therefore be a function, a set of ordered pairs of strings and meanings....

What could a meaning of a sentence be? Something which, when combined with factual information about...any possible world...yields a truth value. It could therefore be... a set of worlds....

A grammar, like a language, is a set-theoretical entity which can be discussed in complete abstraction from human affairs.

for Lewis, it was equally true that languages assign pronunciations to certain sets of possible worlds; grammars don’t determine any intrinsic sound-meaning connections; indeed, grammars don’t even generate expressions.
a grammar... a set-theoretical entity...  (grammars are not generative)
a meaning... a set of worlds...    (meanings are mind-independent)

Semantics with no treatment of truth conditions is not semantics (1970)

Like Donald Davidson, I regard the construction of a theory of truth—or rather, of the more general notion of truth under an arbitrary interpretation—as the basic goal of serious syntax and semantics; and the developments emanating from the Massachusetts Institute of Technology offer little promise towards that end.

--a suitably constructed, acquirable, and empirical truth theory for a natural language L can serve as the core of a theory of meaning for L

--“Recent work by Chomsky and others is doing much to bring the complexities of natural languages within the scope of serious theory.”
1968-1975

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Cut the pie any way you like, 'meanings' just ain't in the head!

“Still, when I think of the road we’re travelling on, I wonder what went wrong. Can’t help it, I wonder what went wrong.”
Large Project: History and a **Road not Taken**
(Dime Tour, 25 minutes...Full Tour, reservations required)

- Chomsky 1957, Syntax and Semantics
  --analyses (equivalence classes of derivations) and constructional homonymy
  --need for a supplementary account of lexical meanings

- Katz & Fodor 1963 (Internal Semantics, Take One)
  --insights mixed with a Bad Idea: *grammars generate meaningless formulae*
  --implausible conception of lexical meanings, homophony, and polysemy

- Chomsky 1964, Ross 1967
  --full tour includes Katz & Postal, Davidson,
  and hunting for unicorns

- Kripke’s 1973 Locke Lectures
  --Holmes was a detective, but a fictional one. London is real, Atlantis is not.
  --The Greeks worshipped Zeus, and the Romans deified Caligula.
  --Moral: even “proper” nouns are polysemous

- 1970s reply to Putnam, Lewis, Katz & Fodor (Internal Semantics, Take Two)
  --grammars as procedures that connect meanings with pronunciations
  --a plausible conception of lexical items, homophony, and polysemy
  --distinguish concepts of water from the meaning of ‘water’
Two kinds of Lexical Equivocality

**Homophony**

- One pronunciation, two or more lexical items, each with its own meaning
- Typically *arbitrary*: you/ewe, die/dye, no/you, so/sew
- Linguistically *accidental*
  - *cp.* French seau/sceau/saut

- bank_{NS} ← bare_{A} ← bear_{V} → bear_{N1} bear_{N2} ← bare_{A} ← bear_{V} → bear_{N1} bear_{N2}

**Polysemy**

- One lexical item, whose meaning supports a family of concepts/subsenses
- *Not* arbitrary
- Often common across languages
- *hold_{V}*
  - my hand, the door, a title, your temper, my calls, so much weight, an opinion, a seminar, a ridge, a course (of due east)
Polysemy is Ubiquitous

• He dropped the book he defaced, and plagiarized the book he bought.
  This$_1$ book was too heavy to carry, and this$_2$ book was too hard to read.
  \[ \text{BOOK:VEHICLE} \quad \text{BOOK:CONTENT} \]

• A thief knocked on the door and then broke a *window*.
  walked through the door and then opened a *window*.
  took the jewelry that was in the store *window*.
  approached the bank *window* and handed teller a note.

• France$_1$ is hexagonal, but it$_1$ is also a republic.
  \[ \text{FRANCE:TERRAIN} \quad \text{FRANCE:POLIS} \]
  France is a *hexagonal republic*

• The lines of this triangle are not straight.
  The lines of a real triangle have no width.
  The man with lines in his face was in the line to buy fishing line.
Polysemy is Ubiquitous

• He dropped the book he defaced, and plagiarized the book he bought. This\_1 book was too heavy to carry, and this\_2 book was too hard to read.

• A thief knocked on the door and then broke a window. walked through the door and then opened a window. took the jewelry that was in the store window. approached the bank window and handed teller a note.

• France\_1 is hexagonal, but it\_1 is also a republic.

• The paint is green, and the bottle is green, and so are the apples.

Our house is brown, but each of its rooms is white

Being is said in many ways. Ditto for good, house, window, line, green, ...
Homographs: bank$_N^*$, bank$_N^\downarrow$, bear$_{N1}$, bear$_{N2}$, bow$_N$, bow$_V$, curate$_V$, curate$_N$

distinct expressions that share an ordinary spelling

Homophones: bare, bear, buy, by, bee, be, die, dye, so, sew

bɛr  baɪ  bi  bæɪ  soʊ

distinct expressions that share a pronunciation (IPA-homographs)

• lexical items (atomic π-µ pairs) connect pronunciations with meanings

< bæŋk, µ1 > ≠ < bæŋk, µ2 >  < bɛr, µ1 > ≠ < bɛr, µ2 >

$\text{BANK:BLDG} \leftarrow \rightarrow \text{BANK:INST}  \quad \text{CARRY-SUPPORT} \leftarrow \rightarrow \text{ENDURE-MANAGE}$

• if we treat $b^a^n^k^\$ as an intrinsically meaningless string of letters, we still need to contrast *Building-Uses* from *Institution-Uses of that string*
  – distinguishing $b^a^n^k^\$ from $b^a^n^k^\$ doesn’t do the job
  – the *Building/Institution* contrast differs from the *money/water* contrast
  – kids don’t add a lexical item each time a word-sound is used in a new way (and neither do lexicographers)
If we don’t know what meanings are, how can we evaluate proposals regarding (speakers’ knowledge of) how endlessly many meanings get connected with pronunciations in ways?

- Describing pronunciations as sounds isn’t ideal. But it indicates a ballpark.

- What are the semantic analogs of sounds?
  - Concepts? Extensions of ideal concepts?
  - Uses? Behavioral dispositions?

- There are also endlessly many cases of “Constructional Homonymity”
  
  /aneym/ $\Rightarrow$ an aim, a name

  referred to a star with a name $\Rightarrow$

  (a) referred to a star that has a name
  (b) referred to a star by using a name
If we don’t know what meanings are, how can we evaluate proposals regarding (speakers’ knowledge of) how *endlessly many* meanings get connected with pronunciations in ways that allow for homophony?

- The **phenomenon** of Constructional Homonymity invites a partial answer...
  
  (1) referred to stars with names
    (1a) referred to stars have names
    (1b) referred to stars by using names
  
  (2) was frightened by the new methods
    (2a), (2b)
  
  (3) found the boy studying in the library
    (3a), (3b)
    (4) might have been there
    (4a)
    (5) might been have there
    Æ
  
- If a generative procedure can connect a single sequence of phonemes with more than one meaning (via more than one derivation), maybe meanings correspond to equivalence classes of derivations
one equivalence class of derivations, even if the terminal nodes are polysemous deriva-
tions, but non-equivalent derivations can yield homophonous strings.
they referred to stars with names

Maybe *theorists* can use “collapsed PS-trees” as *initial proxies* for meanings.

Though of course, to *understand* sentences, *speakers* must know “much more” than each analysis of each sentence “on each linguistic level (p. 103)”
they painted unicorns with brushes

(p. 103, n. 10, reference to Goodman ‘49, ’53)

Even if expressions have extensions, extensions need not be determined “bottom up.”

So don’t fixate on ‘creature with a heart/kidney’.
they painted unicorns with brushes

If ‘painted (pictures of) unicorns’ and ‘painted (pictures of) ghosts’ have *different extensions*, then ‘unicorn’ and ‘ghost’ *differ in meaning*, even though there are no unicorns, no ghosts, and no possible worlds at which there are unicorns or ghosts.
A full synchronic description of a natural language is a grammatical and semantic characterization of that language (where the term 'grammatical' is construed broadly to include phonology, phonemics, morphology and syntax).

Since...in comparison to semantics, the nature of grammar has been clearly articulated...by studying the contribution that semantics will be required to make to a synchronic description of a language we can clarify the...methodological constraints upon a semantic theory.

I don’t think K&F confused their methodology with their metaphysics. But I do think they made a mistake that helped others get confused.
The Structure of a Semantic Theory (Katz & Fodor ’63)

“an adequate transformational grammar of a language PARTIALLY solves the projection problem for the language….semantics takes over the explanation of the speaker's ability to produce and understand new sentences at the point where grammar leaves off.”

“…a semantic theory interprets the syntactic structure which the grammatical description of a language reveals. This conception gives content to the notion that a semantic theory of a natural language is analogous to a model which interprets a formal system.”

K&F treat sentences (even relative to analyses) as intrinsically meaningless

• so they can’t allow for lexical homophones of the same grammatical type
  
  since the bill was large, I ran to the bank and back
  the /bɛrz/ on Wall Street couldn’t /bɛr/ their arms

• so their “dictionaries” conflate homophony with polysemy
  
  – play, honest, take X back (to the zoo) on the full tour,
  – door, window, book, bɛr the weɪt, … we’d pause here for lunch
The duck was eager/reluctant to eat.

The duck was eager/reluctant to be an eater.
The duck was eager/reluctant to be eaten.

The duck was easy/tough to eat.

It was easy/tough for the duck to be an eater.
It was easy/tough for relevant parties to eat the duck.

The duck was ready to eat.
The duck was ready to dine.
The duck was fit for consumption.

The duck was eager ___ to eat ___.

|____________________|
The duck was ready ___ to eat ___.

The duck was easy ___ to eat ___.

|_____________________|
(6) the boy saw the woman walking towards the church
(6a) The boy saw the woman while (he was) walking towards the church.
(6b) The boy saw the woman who was walking towards the church.
(6c) The boy saw the woman walk towards the church.

(7) this is the church such that the boy saw the woman walking towards it
(7a) The boy saw the woman while (he was) walking towards it.
(7b) The boy saw the woman who was walking towards it.
(7c) The boy saw the woman walk towards it.

(8) this is the church the boy saw the woman walking towards
(8a) The boy saw the woman while (he was) walking towards it.
(8b) The boy saw the woman who was walking towards it.
(8c) The boy saw the woman walk towards it.

(9) which church is such that he saw her walking towards it (a), (b), (c)

(10) which church did her see her walking towards (a), (b), (c)
they referred to stars with names

it’s worth asking how the field would have developed if Davidson had explicitly connected his 1967 “event analyses” with examples of this kind (cp. Higginbotham 1983)
1967: Ross-style examples

The hiker who was lost kept walking in circles.  

The hiker who was lost kept walking in circles. 

Was the hiker who was lost kept walking in circles? 

Yes or No: The hiker who was lost kept walking in circles? 

The guest who was fed waffles fed the parking meter. 

The guest who was fed waffles fed the parking meter. 

Was the guest who was fed waffles fed the parking meter? 

Yes or No: The guest who was fed waffles fed the parking meter? 

The only available meaning corresponds to the anomalous question.
the goal of the descriptive study of a language is the construction of a grammar...that specifies a set of sentences, each with an ideal phonetic form and an associated intrinsic semantic interpretation.

In Retrospect: K&F’s analogy between “a semantic theory of a natural language” and “a model which interprets a formal system” was past its use-by date in 67. At a minimum, the limitations of this analogy should have been obvious.

1968-1975

a grammar is a set-theoretical entity...
a meaning is a set of worlds...
Semantics with no treatment of truth conditions is not semantics.

the construction of a theory of...truth under an arbitrary interpretation is the basic goal of serious syntax and semantics.

Cut the pie any way you like, 'meanings' just ain't in the head!
Don’t Blame Kripke

• In his 1970 *Naming and Necessity* Lectures
  – he argued that there are no worlds at which there are unicorns
  – he didn’t say that ‘Hesperus’ and ‘Phosphorus’ have the same meaning
  – he didn’t identify meanings with functions from worlds to extensions

• In those lectures, he did motivate
  – a “causal picture” of reference for typical uses of names like ‘Aristotle’
  – an analogous picture for analogous uses of ‘gold’ and ‘water’
  – the claim that water is not contingently identical with $H_2O$, and that necessary truths (e.g., that water is $H_2O$) need not be known a priori

• But in his 1973 Locke Lectures, he offered a view according to which
  – a noun is not a univocal denoter for a single “reference magnet”
  – nouns and modifiers--e.g., ‘Napolean’, ‘Holmes’, ‘detective’, ‘unicorn’, ‘fictional’ and ‘real’--can be used *polysemously*
    in various episodes of *telling* stories or *talking about* stories.
Unintentional Transitives

The Greeks worshiped Zeus.  
Zeus is the tenth god on Smith’s list.  
The Greeks worshiped the tenth god on Smith’s list.

The Romans deified Caligula.  
Caligula was a crazy but human emperor.  
The Romans deified a crazy but human emperor.

The Greeks worshiped Zeus.  
Zeus was a mythical god.  
The Greeks worshiped a mythical god.

Some people who prayed to Caligula were wrong about his nature.  
Some people who prayed to Zeus were wrong about his nature.  

ZEUS: WHATEVER-HE-IS \leftrightarrow ZEUS: DEITY-OR-BUST

Zeus didn’t exist.  
Zeus was a fictional character.  
They worshiped Zeus, but he didn’t exist.

Lots of stuff relevant to ‘big ants’, ‘toy ducks’, ‘fake diamonds’ and ‘crossing the street’.

France is hexagonal, and it is a republic.
The Meaning of ‘Meaning’ (1975)

- the “idealization” that words have extensions is “very severe”
  - vagueness
  - multiple “senses” for a single “term”
    - but no homophony/polysemy distinction
    - and only one (weird) example: ‘rabbit\textsubscript{1}’ - animal of a certain kind
      ‘rabbit\textsubscript{2}’ - coward
- ‘water’ has a meaning that determines an extension
- water is H\textsubscript{2}O
- we can imagine a planet like Earth, except that in place of all the H\textsubscript{2}O, there is a superficially but distinct substance (XYZ)
- on that planet, there is no water
- the extension of ‘water’ is the set of samples of H\textsubscript{2}O (modulo impurities)

“Find an Argument”
Let \( \{\text{H}_2\text{O}\} \) be the set of samples of \( \text{H}_2\text{O} \)

P1. local samples of water are (modulo impurities) samples of \( \text{H}_2\text{O} \)
P2. samples of \( \text{H}_2\text{O} \) are examples of natural a kind
P3. ‘water’ can be used to express a kind-concept
C1. ‘water’ can be used to express a kind-concept whose extension is \( \{\text{H}_2\text{O}\} \)

This argument may not be valid. But let’s not quibble. Let’s also grant that ‘water’ is often used to express a kind-concept whose extension is \( \{\text{H}_2\text{O}\} \). Let’s even grant P4.

P4. if ‘water’ has an extension, and ‘water’ is often used to express a kind-concept, then the extension of ‘water’ is the extension of that kind-concept

P5. ‘water’ has an extension
C2. the extension of ‘water’ is \( \{\text{H}_2\text{O}\} \)

But P5 is a “severe idealization,” as arguments against C2 reveal.
“Language and Nature” (*Mind* 1995)

Suppose cup-1 is filled from the tap. It is a cup of water, but if a tea bag is dipped into it, that is no longer the case. It is now a cup of tea, something different. Suppose cup-2 is filled from a tap connected to a reservoir in which tea has been dumped (say, as a new kind of purifier). What is in cup-2 is water, not tea, even if a chemist could not distinguish it from the present contents of cup-1....

In cup-2, the tea is an “impurity” in Putnam’s sense, in cup-1, it is not, and we do not have water at all (except in the sense that milk is mostly water, or a person for that matter). If cup-3 contains pure H20 into which a tea bag has been dipped, it is tea, not water, though it could have a higher concentration of H20 molecules than what comes from the tap or is drawn from a river.
# Percentage of $\text{H}_2\text{O}$

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
<th>Source/Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Club Soda</td>
<td>99.9</td>
<td>data from ndb.nal.usda.gov/ndb/foods</td>
</tr>
<tr>
<td>Diet soda, not cola</td>
<td>99.8</td>
<td></td>
</tr>
<tr>
<td>Tea</td>
<td>99.7</td>
<td></td>
</tr>
<tr>
<td>Diet Cola</td>
<td>99.54</td>
<td></td>
</tr>
<tr>
<td>stuff from my well (in Abiquiu, NM)</td>
<td>&lt; 99.4</td>
<td>“Quality Water Analysis” from National Testing Laboratories, Ltd. (I defer to experts)</td>
</tr>
<tr>
<td>Coffee</td>
<td>99.39</td>
<td></td>
</tr>
<tr>
<td>Espresso</td>
<td>97.8</td>
<td></td>
</tr>
<tr>
<td>Michelob Ultra</td>
<td>95.4</td>
<td></td>
</tr>
<tr>
<td>Ocean Water</td>
<td>96.5</td>
<td>average salinity</td>
</tr>
<tr>
<td>Bud Light</td>
<td>95.0</td>
<td></td>
</tr>
<tr>
<td>Distilled vinegar</td>
<td>94.78</td>
<td></td>
</tr>
</tbody>
</table>
## Percentage of H₂O

<table>
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<tr>
<th>Beverage</th>
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</tr>
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<tr>
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Examples of --very high H₂O content

Examples of --but not water

Examples of --lower H₂O content

Examples of --and yet water

A *single* concept of water would have to impose *two* kinds of restrictions

--predominantly H₂O

--plays the right human/social role
Water is $H_2O$.
The water from my well has a high mineral content.

The $H_2O$ from my well has a high mineral content. 😞

Water is $H_2O$.
The water in Boston Harbor is polluted.

The $H_2O$ in Boston Harbor is polluted. 😞

Upon arriving at the lake, he got a room with hot water, walked along the water’s edge, jumped in, and ducked under the water.

At the local saloon on Twin Earth, they watered their horses, while the bartender watered some plants and watered down the whiskey.
Conceptual Equivocality is Ubiquitous

• He dropped the book he defaced, and plagiarized the book he bought. This$_1$ book was too heavy to carry, and this$_2$ book was too hard to read.

  ➔ BOOK:VEHICLE ➔ BOOK:CONTENT ➔

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took the jewelry that was in the store $\textit{window}$.
approached the bank $\textit{window}$ and handed teller a note.

• That isn’t water. It’s tea. But here’s some water from my well on Twin Earth.

  ➔ WATER:FUNCTIONAL ➔

• Samples of water are samples of dihydrogen oxide, modulo impurities.

  ➔ WATER:KIND ➔ MEANING:KIND

• Meanings don’t determine extensions.

  ➔ MEANING:KIND

$\textit{Water}$ is said in many ways. Ditto for $\textit{meaning}$.
Putnam combined an important point with a big mistake

- We can use ‘star’ and ‘water’ to express kind-concepts that
  - let us think about stars and water in theory-neutral ways
  - can be acquired via exposure to paradigm cases
  - apply to (and only to) instances “of the same sort” as the paradigm cases

- But when asking what meanings are
  - don’t assume that meanings determine extensions
  - don’t assume that lexical items are not polysemous
  - don’t ignore the possibility that we can use ‘meaning’ to express a kind-concept that applies to intrinsic features of linguistic expressions

- Analogy:
  - it’s OK to pretend that gas molecules are chargeless point masses ($PV = kT$)
  - but don’t adopt this idealization when asking what gas molecules are, and dismiss reasons for modifying the “gas laws”
    \[
    [P + a \left( \frac{n}{V} \right)^2] \left( \frac{V}{n} - b \right) = RT
    \]
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• And if word meanings don’t determine extensions, then...
  – we shouldn’t expect sentence meanings to be sets of possible worlds
  – we shouldn’t dismiss arguments against truth-conditional semantics
  – we should be looking for alternatives that preserve the virtues of current theories without the unjustified externalism
two plus two is four
there are infinitely many prime numbers

(a) some chase of a unicorn by a ghost was a chase from Hesperus to Mars
(b) some chase of a ghost by a unicorn was a chase from Phosphorus to Mars
(a’) some chase of a unicorn from Hesperus by a ghost was a chase to Mars
(b’) some chase of a ghost by a unicorn from Phosphorus was a chase to Mars

some odd number precedes every prime number
(a) some odd number is such that it precedes every prime number ✓
(b) every prime number is such that some odd number precedes it ✓

Whatever the merits of temporarily ignoring such examples in order to simplify proposals about other constructions, theorists don’t get to ignore facts about what expressions (do not) mean in debates about what meanings are.
the goal of the descriptive study of a language is the construction of a grammar...that specifies a set of sentences, each with an ideal phonetic form and an associated intrinsic semantic interpretation.

In Retrospect: K&F’s analogy between “a semantic theory of a natural language” and “a model which interprets a formal system” was past its use-by date in 67. At a minimum, the limitations of this analogy should have been obvious.

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Thanks...

Recursive thanks to Valeria, Tom, Massimo, and especially Noam for much over many years...