Don’t blame distributional semantics if it can’t do entailment

Matthijs Westera & Gemma Boleda
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What is an adequate model of *expression meaning*?
What is an adequate model of expression meaning?

Formal semantics

\[ \lambda P. P(j) \]

John

walks

walk'(j)

Distributional semantics

animal
dog
cat

red

house

flat
What is an adequate model of *expression meaning*?

**Formal semantics**

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\begin{align*}
\text{John} & \quad \text{walks} \\
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\end{align*}
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**Distributional semantics**

- dog
- cat
- house
- flat
- red
- animal
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**Distributional semantics**

- **animal**
- **dog**
- **cat**
- **house**
- **flat**
- **red**
Expression meaning vs. speaker meaning  (Grice ‘68)
Expression meaning vs. speaker meaning (Grice ‘68)

“Red”
Expression meaning vs. speaker meaning (Grice ‘68)
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Speaker meaning:
The speaker’s communicative intention (varies a lot).
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Why is DS *attractive* as a model of expression meaning?
DS as a model of expression meaning

Expression meaning.
DS as a model of expression meaning
DS as a model of expression meaning
DS as a model of expression meaning
DS as a model of concepts
DS as a model of concepts

• The vectors of DS are abstractions over occurrences.
DS as a model of concepts

- The vectors of DS are *abstractions over occurrences*.
- And so are *concepts* (e.g., Piaget).
DS as a model of concepts

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But what sort of concepts does DS model?
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But what sort of concepts does DS model?

"cat"
DS as a model of concepts of expressions
DS as a model of concepts of expressions

- Concepts represent our ability to make sense of the world (e.g., Dummett ‘93).
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DS as a model of concepts of expressions

• Concepts represent our ability to make sense of the world (e.g., Dummett ‘93).

• So: concepts of expressions represent our ability to make sense of expressions.
DS as a model of expression meaning
DS as a model of expression meaning
Is DS expected to model *entailment*?
Is DS expected to model *entailment*?
Is DS expected to model *entailment*?

“cat”

“animal”
Is DS expected to model *entailment*?
Is DS expected to model *entailment*?  No.

"cat"

"animal"
Is DS expected to model *entailment*?  

**No.**
Why can DS be *sufficient* as a model of expression meaning?
Recall:

**Formal semantics**

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\text{John walks} \\
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\text{John} \\
\lambda P. P(j) \\
\text{walks} \\
\text{walk}'
\]

**Distributional semantics**

`animal` `dog` `cat` `house` `flat`
Why doesn’t FS model expression meaning? (1/3)
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Unnecessary
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Unnecessary

Words don’t refer, speakers do.

(e.g., Strawson, Bach)
Why doesn’t FS model expression meaning? (1/3)

Unnecessary

Words don’t refer, speakers do.

(e.g., Strawson, Bach)
Why doesn’t FS model expression meaning? (2/3)
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Unfeasible
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The set of uses of a given expression resists definition.

(e.g., Wittgenstein; Rosch; Fodor; Kilgarriff)
Why doesn’t FS model expression meaning? (2/3)

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The set of uses of a given expression resists definition.

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Why doesn’t FS model expression meaning? (3/3)
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Mistaken
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Supposed intuitions about expression meaning in fact reflect stereotypical speaker meaning.

(e.g., Grice, Bach, Schwarz)
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The red cat chased a mouse.
Why doesn’t FS model expression meaning? (3/3)

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Supposed intuitions about expression meaning in fact reflect stereotypical speaker meaning.

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The red cat chased a mouse.
Conclusion
Summing up
Summing up

- DS is an adequate model of expression meaning.
Summing up

● DS is an adequate model of expression meaning.
Summing up

- **DS** is an adequate model of expression meaning.

- "cat"
- "animal"
Summing up

- DS is an adequate model of expression meaning.
  - it cannot do entailment (etc.), and isn’t supposed to.
Now what? (1/3)
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Now what? (1/3)
Now what? (2/3)

**Formal semantics**

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**Distributional semantics**

- animal
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Now what? (2/3)

Formal semantics

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Distributional semantics

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Now what? (3/3)

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