Who decides what a text means?

And what the answer implies for computational linguistics

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Acknowledgements

Stephen Regoczei  Jean-Pierre Corriveau
Jane Morris       Susan McRoy
Peter Heeman      David Traum
Philip Edmonds    Nadia Talent
Philosophically naïve

– like CL itself
Text-meaning

Any complete utterance

– Spoken or written
– Interactive or not
– Long or short
Text-meaning

Meaning of whole message, including implicatures, inferences, affect, subtext

– Not just word- or sentence-meaning

– Could be more than, or less than, sum of sentence-meanings
What is the locus of text-meaning?

1. Meaning is in the text itself
The text is all we have

We can’t read the writer’s mind

The New Criticism:
  W.K. Wimsatt, Monroe Beardsley, Cleanth Brooks, …

Facts about the writer aren’t relevant to the text’s meaning
What is the locus of text-meaning?

1. Meaning is in the text itself
2. Meaning is in the writer / speaker
Speaker’s intention is essential to the meaning of an utterance

John Austin, Paul Grice, John Searle, …

– *It’s cold in here* $\rightarrow$ *Turn up the heat*
– *That might be difficult* $\rightarrow$ *No!*
– *We must do lunch some time* $\rightarrow$ *I never want to see you again*

Take the hint, see the intent
What is the locus of text-meaning?

1. Meaning is in the text itself
2. Meaning is in the writer / speaker
3. Meaning is in the reader / hearer
The meaning of an utterance is the reader’s response to it

Stanley Fish, Roland Barthes, …

Different meaning for each reader?

Interpretive communities give stability to meaning of a text.
What is the locus of text-meaning?

1. Meaning is in the text itself
2. Meaning is in the writer / speaker
3. Meaning is in the reader / hearer

Or two of these, or all of these
We can ask the same question for lower levels of linguistic elements

Words
Sentences
Semantic roles
Lexical relations
...

The same three answers are possible

But they don’t have to be the same answer at each level
Maybe …

Effects of individual writer or reader are apparent only at text-meaning level, not below

Or maybe conversely …

Individual writer or reader’s lower-level idiosyncrasies are dampened at text-meaning level

Or maybe …
Views of text-meaning in CL and NLP

- My view here: Text is always a locus of meaning
- The issue: Reader and/or writer as additional loci?
Views of text-meaning in CL and NLP

- Dominance of each view in CL varies with era
- CL has become less sophisticated in its view
The history of the philosophy of text-meaning in computational linguistics

1970–2015
1970–1985
1970–1985

- Simple utterances
- All texts are massively ambiguous
  All texts are enthymematic (incomplete)
- Use knowledge of world and beliefs to interpret texts.
1970–1985

- Find the interpretation most consistent with what’s already known
- Construe input as best match to own prior knowledge

③ Meaning is in the reader / hearer
Example:

*The city councillors denied the demonstrators a permit because they were communists.*

Who were the communists?
1985–1995
1985–1995

- Interactive dialogues
- Gricean and pragmatic theories of “real” language use
- Determine real intent of user’s utterances through, e.g., abductive reasoning …
- … and hence the user’s goals and plans
1985–1995

PLAN RECOGNITION IN NATURAL LANGUAGE DIALOGUE

Sandra Carberry
1985–1995

Example:

Talking to domestic robot:
I’d like a beer
→ Bring me a beer and do it right now
A text means whatever the speaker thinks it means or intends it to mean

Meaning is in the writer / speaker

The computer’s job is to read the user’s mind
1995–2015
1995–2015

• Large, non-interactive texts
• Statistical and machine-learning methods
• NLP tasks as meaning-preserving statistical transformations
Texts regarded as *objets trouvés* (‘found objects’)

Meaning is “extracted” by “processing” the words and their context

Meaning is in the text

“The text is all we have.”
Examples:

Find articles on raptor migration in Colorado.

Find follow-ups to this news story.

Summarize this report.

Monitor this chat room.
Roles of the linguistic computer

1985–1995: Servant of the user
1995–2015: Reader and transformer of text
Computational linguistics vacillates between the three views of locus of text-meaning

But computational linguists don’t notice and don’t care

Philosophically naïve
Two types of system

- **Observer**: Reads external text on behalf of a user
- **Conversant**: Actively participates in a dialogue with a user
CL’s naïve assumptions about meaning

- User or writer is perfect language user
- Meaning is conveyed solely by positives
- No distinction between sentence-meaning and text-meaning or interpretation
CL’s naïve assumptions about meaning

- If observer: User’s knowledge and agenda are same as the writer’s
- If conversant: System’s knowledge and agenda are same as user’s
  - Same framework or understanding
2016–202X
2016–202X

• Elimination of assumption of identical agendas
• Interpretation distinguished from meaning
• User models and consideration of text provenance
• Return of in-reader and in-writer views
• Negotiated meaning
Google has turned everyone into researchers but with only an impoverished view of meaning
My meaning strings ≤ 2015

Their meaning strings

Text

Match?
By 202X

My meaning in text ➔ Match? ➔ Their meaning in text

① What does this mean for me?

② What are they trying to say?
Goal: Research intermediaries that can interpret from the user’s perspective

To get at reader’s meaning, system first needs to understand their purpose and viewpoint

Sophisticated user model

What does this mean for me?
What does this mean for me?

- Abstract, wide-ranging, or unusual information needs and query-oriented multi-document summarization
- “Learning by reading”
  - Integrating content of new document into existing knowledge base
“The text is all we have.”

We also know what the user knows and wants
What are they trying to say?

- **Goal**: Research intermediaries that can interpret text from the writer’s perspective
- Published models of writers
- Hermeneutic (interpretive) task
- Intelligence gathering
What are they trying to say?

- Sentiment analysis and classification
- Opinion extraction and ideological analysis
- Detecting verbal deception
- Learning by reading: answering test questions
- Semantic / knowledge-based machine translation
“The text is all we have.”

We may know the writer and the context
2016: User speaks, system might act.

Negotiated meaning — collaboratively constructed by speaker and hearer
Misunderstanding and not-understanding
Computers don’t understand very well

ASR and software limitations
People don’t understand very well

Inattentiveness, mishearing, misreading

Difficult material

Poor expression
People don’t understand very well

But people succeed anyway

Notice and recover from problems in understanding

Computers should too
Not-understanding

No unique interpretation found by hearer

Hearer is aware of the failure
Misunderstanding

Hearer finds interpretation unintended by speaker

Hearer is *not* immediately aware of the failure

Self-misunderstanding vs other-misunderstanding
Recovery requires negotiation of meaning

Collaboration on the construction of a meaning ...

... that works for both

Unifies reader-based view and writer-based view
Recovering from not-understanding
Example

Collaboration on referring expressions

A: What’s that weird creature over there?
B: In the corner?
A: Uh-huh.
B: It’s just a fern plant.
A: No, the one to the left of it.
B: That’s the television antenna. It pulls out.

Data from Svartvik & Quirk 1980, S.2.4a:1–8
Collaborative repair of non-understanding

- Repair of text-level non-understanding
- Speaker and listener negotiate and refine description of object
- Integrates speaker-based and listener-based views of meaning
- Computational models of this process
Plan-based model of collaboration on referring

- Speaker has goal of referring; plans a description
- Listener tries to infer plan, identify referent
- If unsuccessful, rejects some or all of plan; may suggest an improvement to it

Heeman & Hirst 1995
Plan-based model of collaboration on referring

- Two copies of the model (each with own beliefs and goals) can perform simplified version of fern-plant dialogue

Heeman & Hirst 1995
Example
Collaboration on referring expressions

A: You just stay on 2A until you get to Lowell Street.

B: Is it marked?

A: Yeah, I think there’s a street sign there, it’s an intersection with lights.

B: Okay.

Data from Psathas 1991
Extending the plan-based model

- Add beliefs about visual salience of attributes
- Add notion of confidence in referring expression
Recovering from misunderstanding
If the present text is unexpected or uninterpretable
then hypothesize a present or earlier misunderstanding
by self or other

Re-interpret or clarify
**Example**

**MOTHER:** Do you know who’s going to that meeting?
Pragmatic ambiguity of *Do you know…?*

1. Asking for information.
   - Yes, *it’s Sara and Nadia*.

2. Asking whether the hearer knows.
   - Yes, *don’t worry, I have the full attendance list*.

3. Testing the hearer.
   - *It’s Sara and Nadia, right?*
   - No, you’re wrong, it’s *Martin and Tim*.

4. Making a *pre-announcement* for some surprising information.
   - *Who??*
   - *The Rector, that’s who!!*
Example

MOTHER: Do you know who’s going to that meeting?

RUSS: Who?

MOTHER: I don’t know.

RUSS: Oh. Probably Mrs McOwen and some of the teachers.

Data from Terasaki 1976
Collaborative repair of misunderstanding

- Repair of text-level misunderstanding
- Speaker and listener negotiate and refine meaning of prior utterance
- Integrates speaker-based and listener-based views of meaning
- Abductive-reasoning models of this process (McRoy and Hirst 1995)
There’s more …

- Many more situations for negotiation of meaning
  - All kinds of misunderstanding, misalignment of interpretations, misconceptions
- Elicitation and construction of knowledge
  (Regoczei and Hirst 1991)
Negotiated meaning wasn’t useful in CL in the 1990s

By 202X it will be necessary
Future roles of the linguistic computer

– **Servant** of the user
– “Neutral” **reader** and **transformer** of text
– **Proxy** for the **world**
– **Proxy** for the **user** in the world
Future roles of the linguistic computer

- **Mediates** between the user and the world
- Interprets the world to me
- Interprets me to the world
Conclusion

- Three loci of text-meaning
  - in text, in writer, in reader
- CL varies in its view
  - but has lately forgotten the writer and reader
- New applications will bring them back
Conclusion

• Further sophistication in text-meaning
  – Searching for and reconciling different interpretations of text
  – Collaborative construction of meaning in interaction and elicitation of knowledge
Future role of the linguistic computer

- Mediation and reconciliation
- Worldwide love and peace