Languages as Mechanisms for Interaction

Ruth Kempson, Eleni Gregoromichelaki and Christine Howes
{ruth.kempson, eleni.gregor}@kcl.ac.uk; christine.howes@gu.se
King's College London; University of Gothenburg

Incremental interactions in dialogue

A: I'm afraid I've burnt the kitchen
B: Did you burn
A: myself? No fortunately not . . .

A: Is anyone coming from the US?
B: Sue, from Amherst, who we've promised we won't. . .
A: abandon?
B: so we are putting her on a plane from. . .
C: Gatwick

A: Will you choose your son as your executor, or
B: my wife.

A: They took my urine sample, and blood. The doctor
B: Chorlton? **A:** Yeah, he said I needed a biopsy.

These examples demonstrate that:

1. sentence (turn) processing is incremental
2. role-switch can split apart ANY syntactic/semantic dependency both late and early in clause
3. propositions, intentional attitudes and speech acts emerge over course of exchange

Can our grammars model these data ?

Challenges

Word/String-Based Grammars preclude incremental processing ⇒ Split utterance data inexpressible

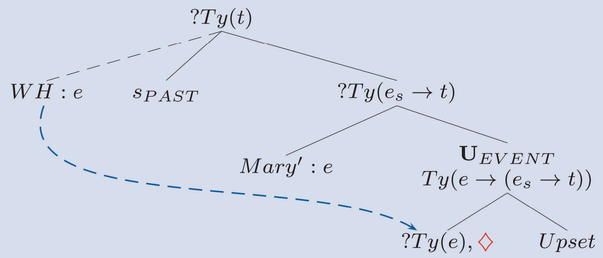
Unstructured Semantic Models exclusively bottom-up; incrementality sentence by sentence; ⇒ Fragments as "incomplete sentences"; massive homophony.

Dynamic Syntax eschews "syntax" as a level of representation, instead "syntax" ≈ set of actions that induce/develop partial contents directly

Dynamic Syntax derivations

- Syntax: goal-driven actions, incorporating context at each step
- Updating partial trees to yield propositional goal
- (discontinuity/anaphora/ellipsis)

Processing *Who did Mary upset?*



WH-term initially unfixed, subject locally unfixed,
AUX projects partial propositional template,
Verb expands template and fixes subject.
WH-term then unifies with object and goal derived.
Production/parsing coupled with goal-tree as subsumption check.

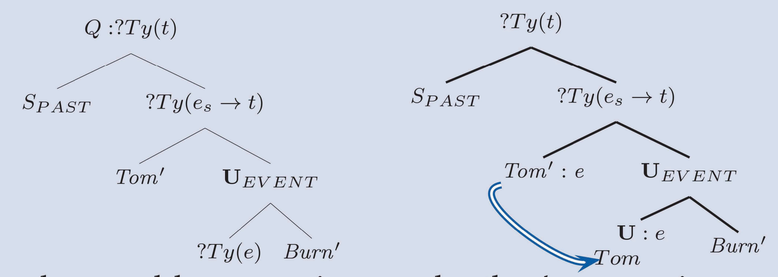
Grammar as actions: Novel prediction 1

Split utterances: hearer's prediction of upcoming input leads to lexical access; incremental licensing allows take-over with new goal:

$Burn(Tom)(Tom)(S_{PAST})$

Sue: Did you burn. . . Tom: myself?

SHARED CONTEXT AT SHIFT TEST/PARSE TREE AT SHIFT



Speakers and hearers mirror each other's processing, so role-shift licensed across all dependencies

Grammar as actions: Novel prediction 2

Mechanism for long-distance dependencies predicted to parallel anaphora:
both involve underspecification+update
Anaphora resolvable 3 ways: indexically, from previous and following linguistic content

A: (seeing John coughing). He shouldn't smoke
A: John coughed. **B:** He had been smoking
A: It's likely that I am wrong

Structural underspecification also resolvable 3 ways

- Long-distance dependency = forwards resolution

  A: The books, I'm told are not worth insuring.

- Stripping = Backwards resolution by re-running actions from context

  A: Jo needs to check her spelling. **B:** Sue too

- Pragmatic ellipsis (one-word utterances) = indexical resolution

  2-year-old on back of mother's bike pointing to empty mooring where he and father had been clearing out the boat the previous day:
  Eliot: Daddy
  Mother: That's right dear. You were here with him yesterday, clearing out the boat.

None of these processing choices require mind-reading. Choices triggered through mirroring each other's processing/context.

Conclusion

Syntax: an embodied skill consisting of coupled interlocutor actions for incremental processing in context, without necessary intention recognition.

Cann, R., Kempson, R, Marten, L. (2005). *The Dynamics of Language*. Elsevier.

Thanks:
The Dynamics of Conversational Dialogue (DynDial; ESRC-RES-062-23-0962)