Ling 5701: Lecture Notes 12
Semantic Surprisal

Previously we've looked at models of surprisal based on probabilistic context-free grammars.

- P(LexMatch, LexRule | . . .) – lexical match and lexical rule
- P(Word | . . .) – observed word
- P(GramMatch, GramRule | . . .) – grammatical match and grammatical rule

But this model offers no continuity between phrases or clauses. For example, in:

- [$_S$ Many people like dogs] because [$_S$ big ones usually bark at strangers]

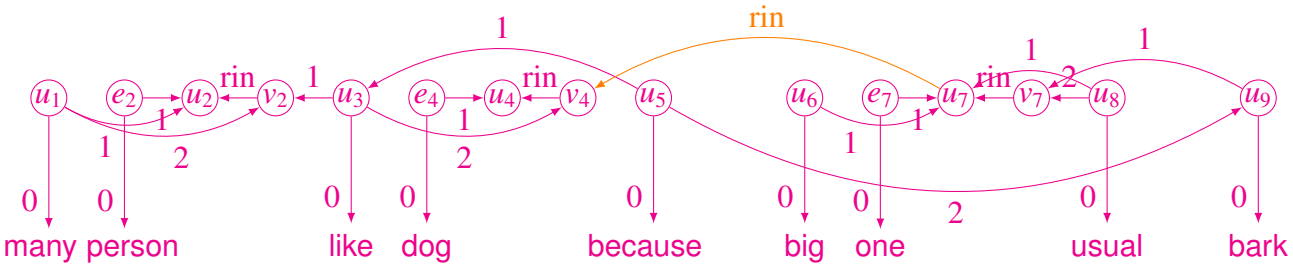
the word 'bark' should be unsurprising, because dogs tend to bark, but the PCFG just has 'ones.'

12.1 Semantic surprisal

Instead, calculate incremental probabilities as product of:

- P(Inheritance | . . .) – inheritance: new referent, old referent, new bridging to old
- P(LexMatch, LexRule | . . .) – lexical match and lexical rule (as before)
- P(Word | . . .) – observed word (as before)
- P(GramMatch, GramRule | . . .) – grammatical match and grammatical rule (as before)

Probabilities (e.g. for 'bark') now depend on *contexts* of referents, like 'first argument of BeingADog.'



12.2 Attention

Experimental probe words may be sensitive to distribution of Inheritance model:

- repeated name penalty (Gordon et al)
- MacDonald (break, not cookies)
- Glenberg (sweatshirt)

People also use (superposed) inference rules to simulate mental model:

- Zwaan (moment/year later)
- Bransford (turtles)