Go High or Go Low: Adaptation to Different Error Distributions in Sentence Processing
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Background & Question
- Processing draws on expectations based on previous experience (for review, see Kuperberg & Jaeger, 2016).
- When violated by the input, these expectations seem to be adaptable (Dell & Chang, 2013; Jaeger & Snider, 2013), e.g., reflected in lexical (Brown-Schmidt, 2009; Creel et al, 2008) and syntactic processing (Fine et al, 2013; Kaschak & Glenberg, 2004; Ryskin et al., 2017).
- But what determines to what level of the predictive process an unexpected observation is attributed?

Adaptation to Garden-path Sentences
Garden-path Sentences: Longer reading times for the disambiguation region when it does not confirm the expected parse (e.g. a Relative Clause parse when expecting a Main Verb)
- a) The experienced soldiers warned about the dangers before the midnight raid. (MV/Ambiguous)
- b) The experienced soldiers warned about the dangers conducted the midnight raid. (RC/Ambiguous)
- c) The experienced soldiers spoke about the dangers before the midnight raid. (MV/Ambiguous)
- d) The experienced soldiers who were warned about the dangers conducted the midnight raid. (RC/Ambiguous)

Garden-path (GP) Effect: Structure (MV vs. RC) * Ambiguity (Ambiguous vs. Unambiguous)

Adaptation in Garden-path Sentence Processing: With increasing exposure to RCs, the GP effect on RCs decreases.

Adaptation Effect: GP Effect * Item Order (number of critical trials read so far)

Predictions
Question: Do only syntactic expectations change or can comprehenders condition lexical expectations on these adapted syntactic expectations?
- Exp. 1:
  - Critical sentence (MV or RC) disambiguated with different words so that prediction error can only lead to adjustment at the level of syntactic processing.
  - Prediction:
    - Adaptation will more likely occur for second-pass but not first-pass reading times.

Exp. 2 & 3:
- Critical sentences (MV or RC) disambiguated with same words ('and' & 'became' in 2; 'before' & 'became', in 3).
- Prediction:
  - If comprehenders can adapt syntactically-conditioned lexical expectations to adaptation of first- and second-pass reading times.
  - If not only adaptation of second-pass reading times

Discussion
- Replicated (three times) syntactic adaptation during natural reading → syntactic adaptation not artifact of self-paced reading
- Even when prediction error informative about lexical statistics → no adaptation of first-pass reading times
- Why?
  - First-pass measures less malleable (but see Yan & Farmer, 2012)
  - Syntactically-conditioned lexical expectations are not adaptive either because
    - There are limits to adaptation (tractability)
    - The utility of such adaptation is low (low informativity, or variance in informativity, of syntactically-conditioned lexical expectation)
- Future directions: will increase in the need to rely on top-down predictions (e.g. with degraded stimuli) lead to adaptation in lexical/pre-lexical processing emerge with the same paradigm?