Introduction

An intonational contour includes a pitch accent, a phrase accent, and a boundary tone. Boundary tones are thought to be meaningful on their own (e.g. distinguish question from statement), but their meanings are also context-dependent and interact with other prosodic, lexical, and syntactic cues.

- How are boundary tones incorporated during online sentence comprehension?
  - Previous research suggests that listeners need the full contour to come to an interpretation. Structural confounds however may have obscured evidence of earlier online processing.
  - When do listeners distinguish rising from falling intonation?
    - At (1) the pitch accent, (2) the transition from pitch accent to boundary tone (the “turning point”), or (3) after the full contour?

Methods

- **Procedure:** Participants played a card game against a computer
  - **Goal:** get rid of one’s playing cards by matching them with a “match” card
  - **Current player:** announce a match or ask the opponent to make a match
  - **Opponent:** attempt to block the match (if a “blocking card” also matches) or check own playing cards to make a match

- **Computer’s utterances on critical trials**
  - Same sentence with statement vs. question indicated by intonation only
    - Scenario A: Got an armadillo. Scenario B: Got an armadillo?

- **Eyetracking**
  - Participants’ fixations to playing cards vs. blocking card reflect their online interpretation of the computer’s utterance as a question or a statement

- **Filler sentences add variety:**
  - e.g. “I’ve got an armadillo.” or “Do you have an armadillo?”

- **Participants:** Monolingual native speakers of American English (N=24)

- **Equipment:** Head-mounted EyeLink II eyetracker (sampling at 250Hz)

Analysis and Results

- **Condition of interest:** Statements (L%, red)
  - Breakpoint analysis: determine when changes in fixation proportions occur

Three major results:

- **Result A:** Participants initially fixate playing cards
  - “Got a X” construction is biased toward question interpretation

- **Result B:** Participants look toward target (blocking card, red solid)
  - 180 ms after stressed syllable onset (1), 50 ms after F0 turning point (2)

- **Result C:** Participants look away from competitor (playing cards, red dashed)
  - 440 ms after stressed syllable onset (1), 320 ms after F0 turning point (2)

- **Interpretation:** With 200 ms delay for a change in fixations:
  - Result B may be driven by the pitch accent at (1)
  - Result C is most likely driven by the F0 turning point at (2)
  - All changes are driven by information prior to sentence offset (3)

Conclusion

When do listeners infer a question vs. statement interpretation?

- Near turning point where pitch accent transitions to boundary tone:
  - Earliest acoustic evidence indicative of upcoming boundary tone
  - Listeners need not wait and hear full contour (as previously suggested)

Future research using this paradigm:

- Explore when boundary tone information is integrated with other information, e.g. expectations based on prior lexical, syntactic, and prosodic information

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