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## Mapping prosody to reference in L2

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How does CONTRASTIVE INTONATION/PROSODY affect native and non-native speakers' interpretation of ambiguous pronouns?

## Background & Motivation

- Contrastive intonation/prosody affects native-speaker processing, although its precise role in the interpretation of pronouns has received limited attention.
  - ...noticed a paramedic/PARAMEDIC calling the CAPTAIN/captain...  
Later Wendy bumped into him. (Balogh, 2003)
  - John hit Bill and then George hit HIM. (Akmajian & Jackendoff, 1970)
- Prosody presents challenges in L2 acquisition, which vary with factors such as the L1-to-L2 mapping and prosodic function. (Huang & Jun, 2011; Zubizarreta & Nava, 2011; Takeda, Schafer, & Schwartz, BUCLD40; Pennington & Ellis, 2000; Chen & Lai, 2011)
- Pronoun interpretation is challenging in L2. This has been attributed to the need to integrate information from multiple domains. (e.g., Roberts et al., 2008; Sorace, 2011) Previous work has shown a reduced effect of event structure, marked by grammatical aspect, on L2 speakers' reference choices. (see below)

The role of prosody in L2 pronoun resolution has not been investigated.

### Our goals:

- Test how contrastive intonation on potential antecedents (Exp1) and pronouns (Exp2) affects L1 and L2 speakers' reference choices.
- Compare effects of contrastive intonation and grammatical aspect.

### Predictions:

- IF prosody is generally challenging in L2, we expect L1-L2 differences in both Exp1 and Exp2. (NB: same L+H\* L-H% contour in both experiments)
- IF integrating information from multiple domains is generally challenging in L2, we expect L1-L2 differences in both Exp1 and Exp2.
- IF L2 speakers' ability to use prosodic information depends on the complexity of the mappings (L1 -> L2; prosody -> reference), we expect greater L1-L2 differences in Exp2 compared to Exp1.

## Event structure and pronoun interpretation in L1 & L2

(3) Emily<sub>Source</sub> brought/was bringing a drink to Melissa<sub>Goal</sub>. She \_\_\_\_\_

L1 speakers of English write more continuations with 'she' = SOURCE following imperfective vs perfective aspect (Kehler et al., 2008). This is not the case for L1-Japanese/Korean learners of English (Grüter et al., 2014, in press), even though (i) they reliably associate perfective/imperfective with completed/incomplete events in an independent task, (ii) aspect affects their choice of coherence relation in the continuation, and (iii) Japanese and Korean speakers show the same effect of aspect in their L1s (Ueno & Kehler, 2010; Kim et al., 2013).

## Experiment 1: Contrast on antecedents

### Participants

	Age (years)	Versant English Test <sup>#</sup> (overall score, range 20-80)	Self-rated English proficiency (out of 10)
L1 English (n=48)	23.4 (18-40)	---	9.6 (8-10)
L2 English (n=40)	25.6 (19-65)	51.2 (35-80)	6.1 (3-9)
L1 Japanese (n=23)	25.2 (19-45)	47.2 (35-62)	5.9 (3-8)
L1 Korean (n=17)	26.2 (21-65)	56.8 (37-80)	6.5 (3-9)

<sup>#</sup> Pearson (2011; www.versanttest.com)

### Method

- Story continuation: aural context sentence + written prompt (pronoun) + written completion
- 2 (contrast location) x 2 (aspect) design

Hear: DAVID served/was serving Paul a pint of beer. See: He \_\_\_\_\_

Hear: David served/was serving PAUL a pint of beer. See: He \_\_\_\_\_

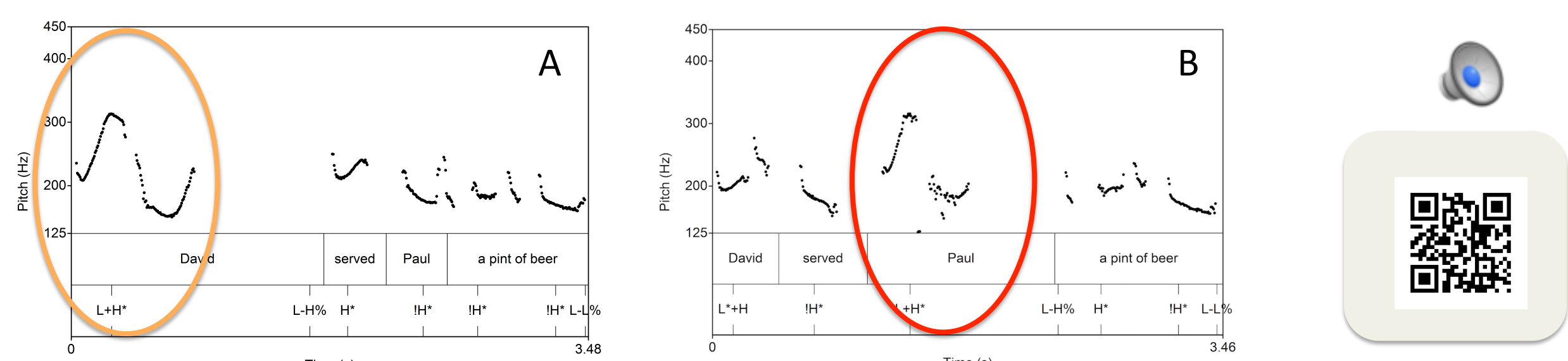


Figure 1. Context sentence with contrast on Source (A) and on Goal (B).

<http://www2.hawaii.edu/~aschafer/snds.html#GRS>

### Results

- Annotation for coreference by two trained coders.
  - He wanted Paul to get really drunk. (SOURCE)
  - He thanked David. (GOAL)
  - He insisted it was the best beer ever. (ambiguous: 6.8/8.8% of L1/L2 data) (missing: 0.7/2.3% of L1/L2 data)

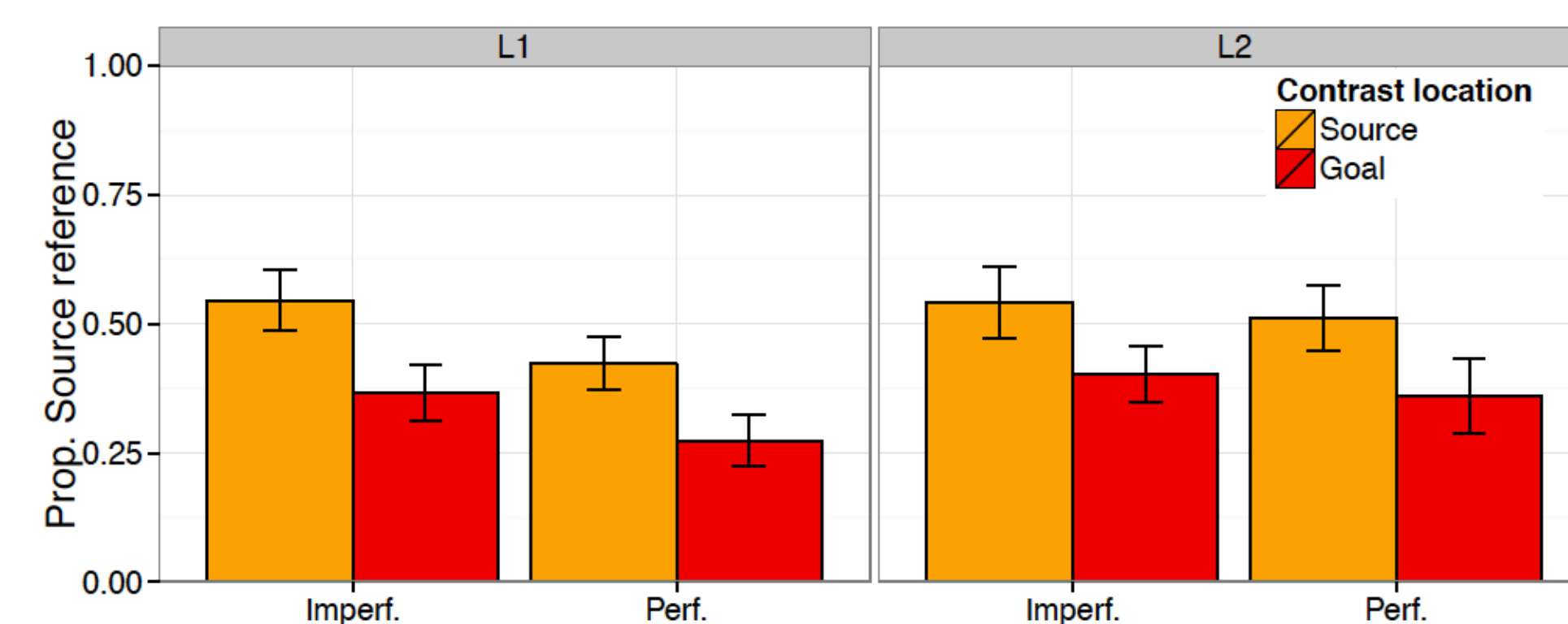


Figure 2. Exp1: Mean proportion of SOURCE-reference in continuations; 95% CIs

### Mixed-effect logistic regression (LMER)

isSource ~ Aspect \* ContrLoc \* Group + (1 + Aspect + ContrLoc | Subject) + (1 + Aspect + ContrLoc | Item)

- Main effect of Contrast Location ( $b = .89, p < .001$ ), no interaction with Group ( $b = .14, p = .63$ )
- Main effect of Aspect ( $b = .42, p < .005$ ), marginal Aspect x Group interaction ( $b = .40, p = .09$ ); effect of Aspect in L1 ( $b = .60, p < .001$ ), but not in L2 ( $b = .25, p = .26$ ).

→ More reference to accentuated antecedents in both groups: Contrastive intonation on antecedents affects reference choices in L1 and L2.

→ Reduced effect of aspect in L2; replicates results from written task.

Akmajian, A., & Jackendoff, R. (1970). Coreferentiality and stress. *Linguistic Inquiry*.  
 Balogh, J. E. (2003). Pronouns, prosody, and the discourse anaphora weighting approach. (Unpublished doctoral dissertation). UCSD.  
 Chen, A., & Lai, V. T. (2011). Comb or coat: The role of intonation in online reference resolution in a second language. In *Sound and Sounds. Studies presented to M.E.H. (Bert) Schouten on the occasion of his 65th birthday*. Uil OTS.  
 Grüter, T., Rohde, H., & Schafer, A. J. (in press). Coreference and discourse coherence in L2: The roles of grammatical aspect and referential form. *Linguistic Approaches to Bilingualism*.  
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 Huang, B. H., & Jun, S.-A. (2011). The effect of age on the acquisition of second language prosody. *Language and Speech*.  
 Kehler, A., Kertz, L., Rohde, H., & Elman, J. L. (2008). Coherence and coreference revisited. *Journal of Semantics*.  
 Kim, K., Grüter, T., & Schafer, A. J. (2013). Effects of event-structure and topic/focus-marking on pronoun reference in Korean. CUNY Poster.  
 Pennington, M.C. & Ellis, N.C. (2000). Cantonese speakers' memory for English sentences with prosodic cues. *The Modern Language Journal*.  
 Roberts, L., Gullberg, M., & Indefrey, P. (2008). Online pronoun resolution in L2 discourse: L1 influence and general learner effects. *Studies in Second Language Acquisition*.  
 Sorace, A. (2011). Pinning down the concept of 'interface' in bilingualism. *Linguistic Approaches to Bilingualism*.  
 Ueno, M., & Kehler, A. (2010). The interpretation of null and overt pronouns in Japanese: Grammatical and pragmatic factors. *Proceedings of the 32nd Annual Meeting of the Cognitive Science Society*.  
 Zubizarreta, M. L. & Nava, E. (2011). Encoding discourse-based meaning: Prosody vs. syntax. Implications for second language acquisition. *Lingua*.

## Experiment 2: Contrast on pronoun

### Participants

	Age (years)	Versant English Test <sup>#</sup> (overall score, range 20-80)	Self-rated English proficiency (out of 10)
L1 English (n=48)	24.2 (18-49)	---	9.6 (6-10)
L2 English (n=42)	31.1 (20-56)	51.0 (37-72)	5.9 (1-9)
L1 Japanese (n=24)	35.5 (20-56)	50.0 (37-69)	5.5 (1-8)
L1 Korean (n=18)	25.3 (20-48)	52.6 (40-72)	6.4 (3-9)

### Method

- Story continuation: aural context sentence + 750ms silence + aural prompt (pronoun + adverb, to provide natural truncation point) + written completion
- 2 (pronoun stress) x 2 (aspect) design

Hear: David served/was serving Paul a pint of beer. He/HE obviously See: \_\_\_\_\_

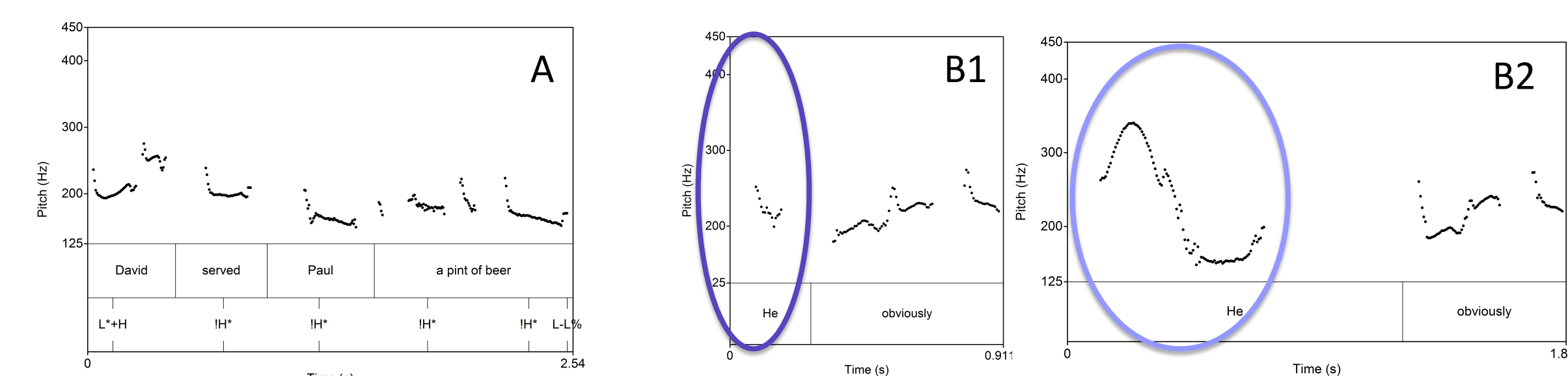


Figure 3. Broad-focus context (A) and continuation with unstressed (B1) and stressed (B2) pronoun.

- Annotation for coreference by two trained coders. (ambiguous: 7.3/8.9% of L1/L2 data; missing: 0.3/3.0% of L1/L2 data)

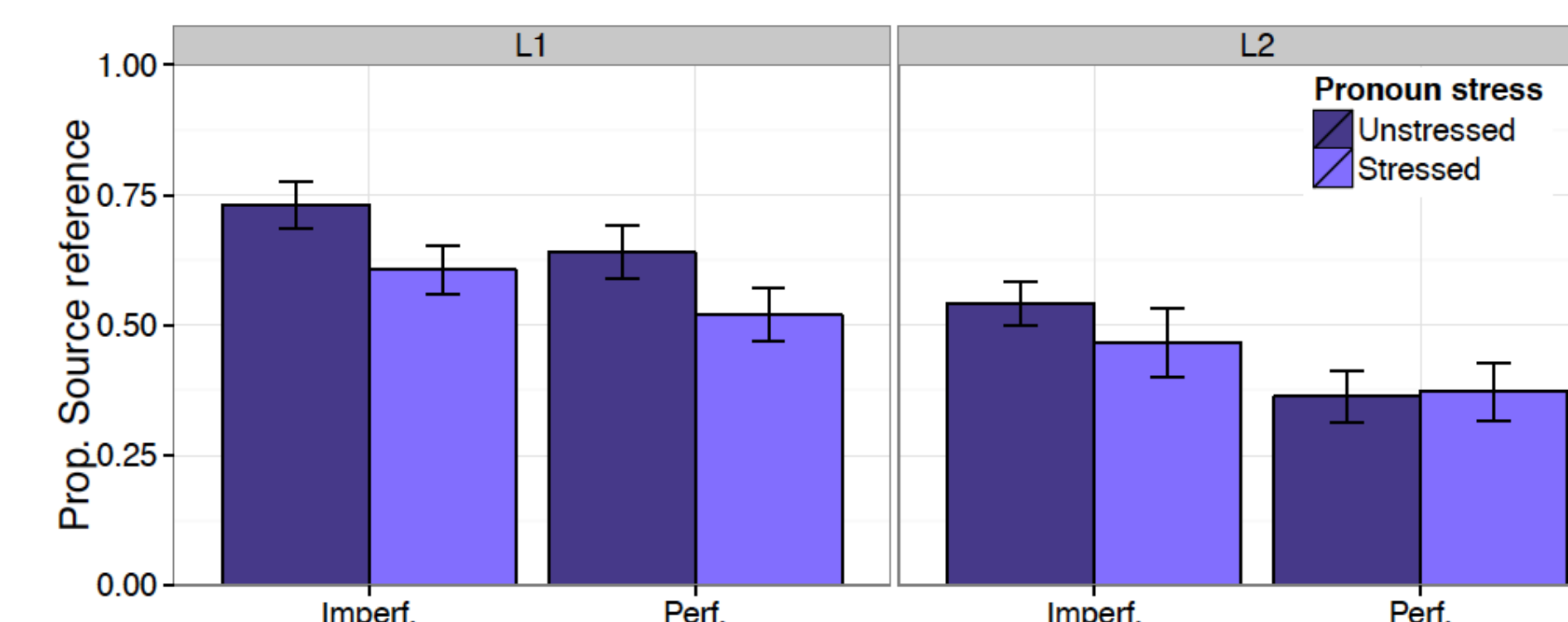


Figure 4. Exp2: Mean proportion of SOURCE-reference in continuations; 95% CIs

### Mixed-effect logistic regression (LMER)

isSource ~ Aspect \* ProStress \* Group + (1 + Aspect + ProStress | Subject) + (1 + Aspect + ProStress | Item)

- Main effect of Pronoun Stress ( $b = -.49, p < .001$ ), Pronoun Stress x Group interaction ( $b = .72, p < .01$ ); no effect of Pronoun Stress in L2 group alone ( $b = .10, p = .69$ )
- Main effect of Aspect ( $b = .60, p < .001$ ), no interaction with Group ( $b = .27, p = .28$ ); effect of Aspect in L2 group alone ( $b = .81, p < .001$ ); Aspect x Pronoun Stress interaction in L2 group ( $b = .81, p < .05$ )
- Main effect of Group ( $b = 1.14, p < .001$ )

→ More reference to the Goal with stressed pronouns in L1 only.

→ Effect of Aspect emerges in L2 when continuation point is moved after the adverb.

## Conclusions

- L2ers' show significant use of contrastive intonation on antecedents (Exp1), but not pronouns (Exp2) to determine pronoun reference.
- L2ers' success in using prosody may depend on the number, complexity and timing of steps required to make the relevant mappings:

Exp1: L+H\* on referent → referent is salient → select as antecedent

Exp2: L+H\* on pronoun → establish set of potential antecedents → identify most salient member of set → select other member of set as antecedent