



Discourse-driven biases in native- vs non-native speakers' coreference processing

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Goals and Motivation

Is coreference processing in a **non-native language** driven by anticipation?

• Anticipation, or prediction, plays a critical role in native language (L1) processing (e.g., Altmann & Kamide, 1999; Federmeier, 2007), including the processing of co-reference (e.g., Arnold, 2001). Yet little is known about anticipatory effects in co-reference processing in a **non-native** language (L2).

• Non-native processing is generally subject to greater resource demands (e.g., Kilborn, 1992).

→ If, in non-native processing, resources are exhausted by the immediate task of information **integration**, little may remain for **anticipation**.

The RAGE hypothesis

Non-native speakers have **reduced ability** to **generate expectations** during language processing.

Our goal here:

Test the **RAGE** hypothesis by comparing native (L1) and non-native (L2) speakers' co-reference and coherence choices in a story continuation task manipulating verbal aspect.

Background: Native-Language Processing

• Semantic properties of the current sentence drive comprehenders' expectations about upcoming co-reference & coherence.

• Comprehenders update their expectations as they incrementally process available cues—both from event structure (e.g., grammatical aspect) and information structure (e.g., referential form).

Event Structure in Story Continuations: With transfer events, one sentence's event structure guides the next sentence's co-reference patterns.

• Events described as completed (**perfective** aspect) favor the referent associated with the end state.

• Events described as ongoing (**imperfective** aspect) favor the referent associated with the start state.

This has been shown in *English* (e.g., Kehler et al., 2008), *Japanese* (Ueno & Kehler, 2010) and *Korean* (Kim et al., CUNY poster yesterday).

Pronoun prompt/Free prompt: Co-reference with the preceding subject increases with an overt pronoun (e.g., Arnold, 2001; Rohde & Kehler, 2008; Stevenson et al., 1994).

(1) John_{Source} handed/was handing a book to Bob_{Goal} He _____ / _____
(pronoun prompt) (free prompt)

(2) Sample story continuations

- a. He took it and read it right away. He = Bob ('GOAL-continuation')
- b. He really wanted Bob to have it. He = John ('SOURCE-continuation')

Coherence: Completed events (**perfective**) favor continuations telling what happened next (Occasion/Result), whereas incomplete events (**imperfective**) favor continuations telling how or why (Elaboration/Explanation) (Kehler et al., 2008).

Altmann & Kamide (1999) Incremental interp. at verbs: Restricting the domain of subsequent reference. *Cognition*. Arnold (2001) The effects of thematic roles on pronoun use and frequency of reference. *Discourse Processes*. Brown (1980) Relative merits of four methods for scoring cloze tests. *Modern Language Journal*. Federmeier (2007) Thinking ahead: The role and roots of prediction in language comprehension. *Psychophysiology*. Gabriele (2009) Transfer and transition in the SLA of aspect. *Studies in Second Language Acquisition*. Kehler, Hayes & Barner (2011) Pragmatically-driven biases in children's pronoun interpretation. CUNY2011 poster. Kehler, Kertz, Rohde & Elman (2008) Coherence and coreference revisited. *Journal of Semantics*.

This Study

Participants

	Age (in years)	Cloze test ¹ (proportion acceptable responses)	Versant English Test ² (overall score, range 20-80)	Self-rated English proficiency (out of 10)
L1-English (n=39)	24 (18-66)	0.84 (.60-.98)	--	9.3 (7-10)
L2-English (n=34)	24 (17-51)	0.56 (.26-.80)	51 (34-80)	6.1 (2-9)
L1-Japanese (n=17)	26 (17-51)	0.54 (.36-.68)	48 (40-59)	6.3 (4-9)
L1-Korean (n=17)	23 (20-32)	0.58 (.26-.80)	55 (34-80)	6.0 (2-8)

¹ Brown (1980), ² Pearson (2011; <http://www.versanttest.com>)

Experimental tasks

A) Knowledge-of-aspect task: Do non-native speakers understand the semantics of grammatical aspect in English?

B) Written story continuations: Do non-native speakers use grammatical aspect to create discourse expectations?

Logic

If non-native speakers have **RAGE**, the aspect manipulation in the story cont. task should have weaker effects on discourse expectations, and therefore on

- the proportion of SOURCE reference
- the distribution of coherence relations (not reported here)

Knowledge-of-Aspect Task

Participants read descriptions of complete vs. incomplete events, and then gave truth-value judgments on sentences like (3) (adapted from Gabriele, 2009).

(3) Patrick is giving a towel to Ron. FALSE after Ron has received the towel. TRUE when Ron has not yet rec'd the towel.

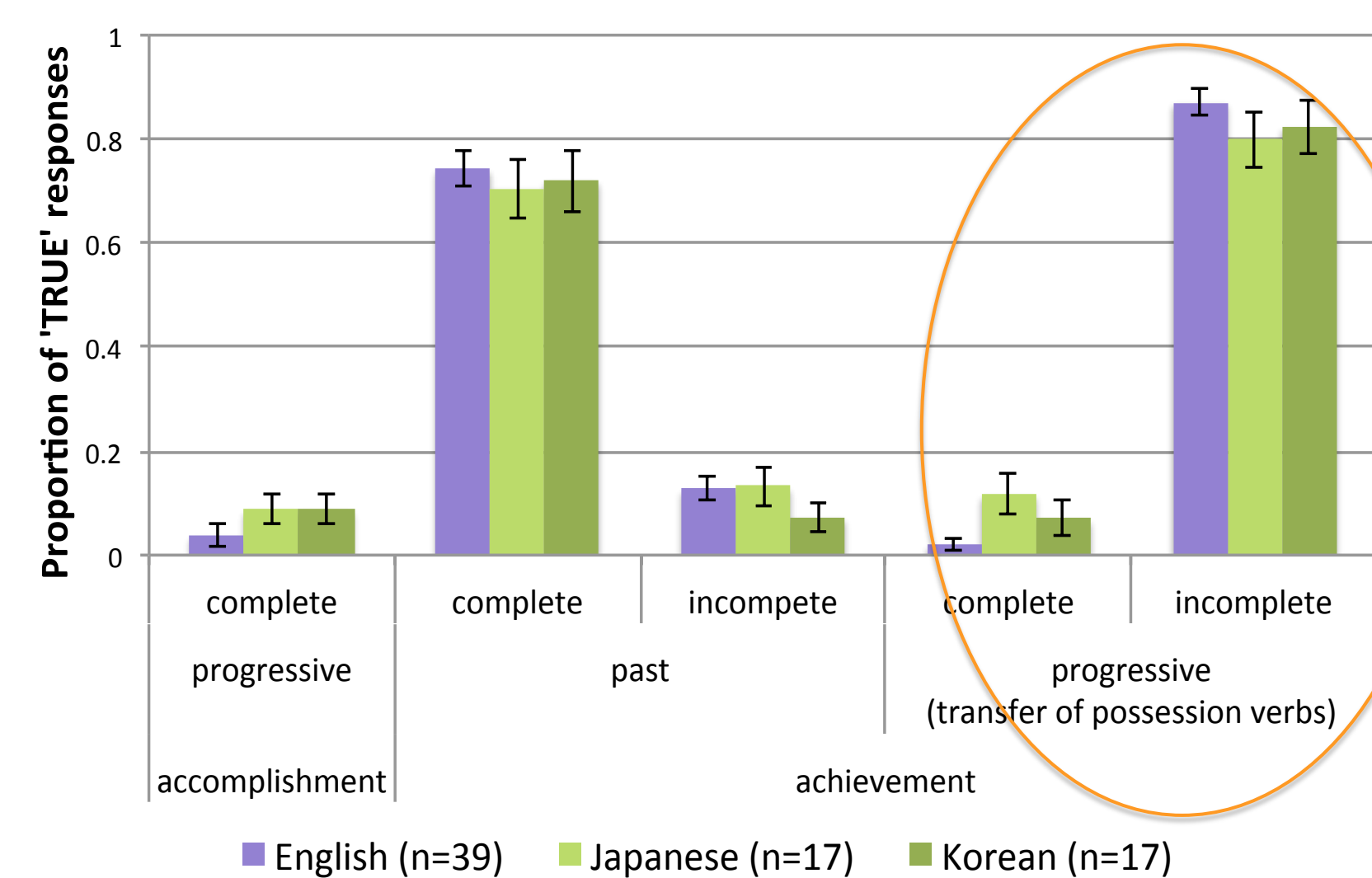


Figure 1. Proportion of TRUE responses by group.

- Learners understand perfective vs. imperfective aspect in English.
- Critically, they know that, in English, (transfer-of-possession) verbs with progressive marking: (i) indicate an incomplete event, and (ii) cannot have a resultative meaning.

Kilborn (1992) On-line integration of grammatical info. in a second lg. In Harr (Ed.), *Cognitive Processing in Bilinguals*. Elsevier. Kim, Grüter & Schafer (2013) Effects of event-structure and topic/focus-marking on pronoun ref. in Korean. CUNY2013 poster. Rohde & Kehler (2008) The Bidirectional influence between coherence establishment and pronoun interp. CUNY2008 poster. Stevenson, Crawley & Kleinman (1994) Thematic roles, focusing and the representation of events. *LCP*. Ueno & Kehler (2010) The interp. of null and overt pronouns in Japanese: Grammatical and pragmatic factors. *CogSci 32*.

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Written Story Continuations

Patrick gave/was giving a towel to Ron. He _____ (pronoun prompt) / _____ (free prompt)

2 (aspect) x 2 (prompt type) Latin square design; 5 items/condition + 20 fillers (2 x 10 verbs: bring, feed, give, mail, pass, push, roll, serve, take, throw)

Annotation: co-reference and coherence (by two trained coders)

He made sure to give him a clean dry one. (SOURCE, Elaboration)
He said "Thank you." (GOAL, Result)
He did not notice the puddle of water on the floor. (ambiguous: 8/12% of L1/L2 data)
The towel was still warm from the drying machine. (other: 12/11% of L1/L2 data)

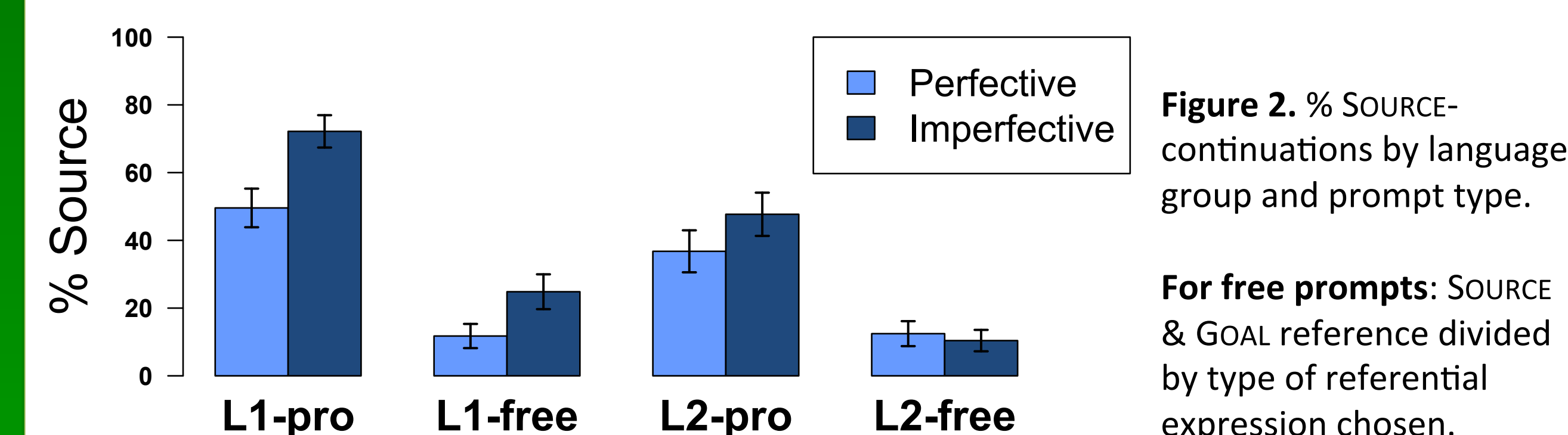
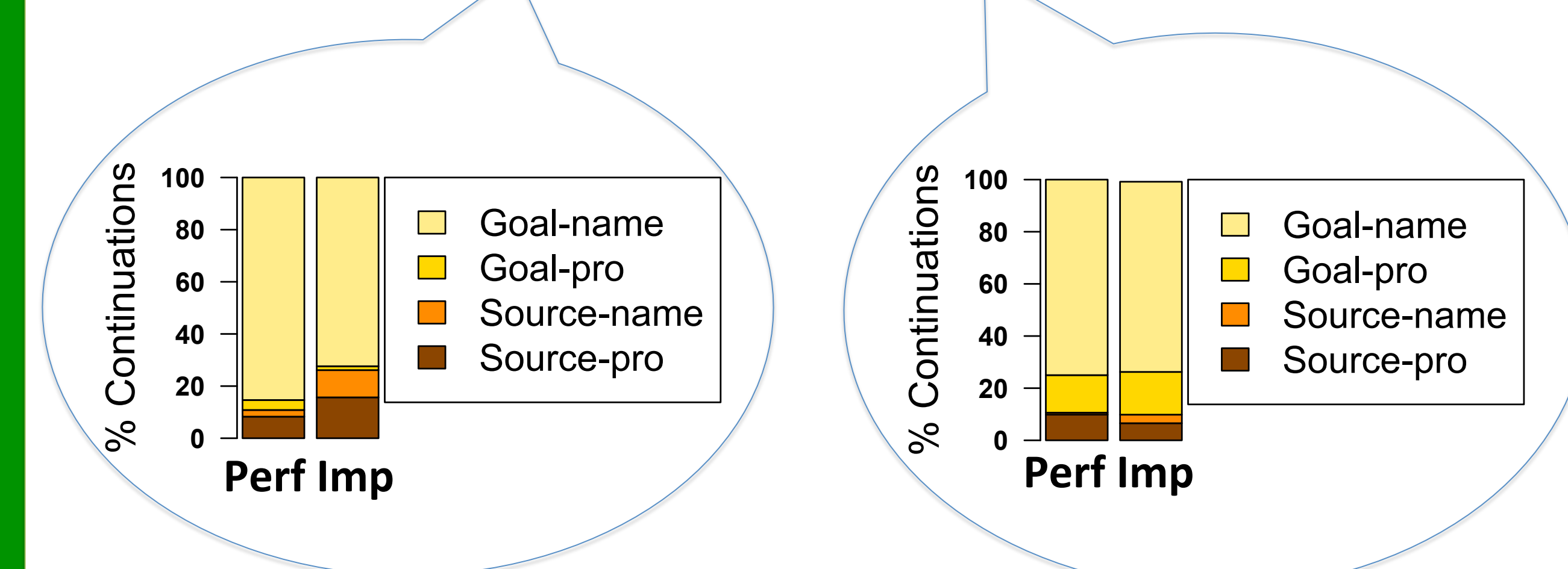


Figure 2. % SOURCE-continuations by language group and prompt type.

For free prompts: SOURCE & GOAL reference divided by type of referential expression chosen.



Replications:

• **Effect of Aspect:** More SOURCE continuations with **imperfectives** $F_1(1,70)=12.2, p<.001, F_2(1,19)=12.2, p<.001$

• **Effect of Prompt:** More SOURCE continuations with **pronoun** prompts $F_1(1,70)=101.2, p<.001, F_2(1,19)=191.5, p<.001$

Role of language background:

• **Effect of Group:** Fewer SOURCE continuations from **L2** speakers $F_1(1,70)=8.0, p<.01; F_2(1,19)=20.6, p<.001$

• **Interaction Group X Aspect:** Aspect effect is stronger for **L1** speakers $F_1(1,70)=4.6, p<.01; F_2(1,19)=3.7, p=0.07^*$ (No other interactions were significant.)

Summary and Conclusions

- The effect of aspect on the proportion of SOURCE/GOAL continuations was weaker in the L2 group, consistent with the **RAGE** hypothesis.
- The L2ers showed an overall GOAL bias, suggesting *recency* may play a stronger role in non-native processing (see Kehler et al., 2011, for similar findings from native-speaking children).

Future work:

- Relation between coherence relations and co-reference in both groups
- Role of proficiency and L1-background
- *Aural* story continuations
- *Online* measure of anticipatory co-reference processing (Visual World)