

L2 comprehension of English relative clauses: Resumption mitigates processing strain

Handout:



fredzenker.com/gasla17.pdf



Fred Zenker (fzenker@hawaii.edu)
Department of Second Language Studies & LAE Labs
University of Hawai'i at Mānoa

GASLA-17
4 May 2024

Gapping vs. resumption in relative clauses (RCs)

Gapping (foot = unpronounced element) gap

The only class [that I'm thinking about dropping]

HEAD FOOT

_____ gapped RC dependency _____

Resumption (foot = overt nominal) resumptive pronoun (RP)

*The only class [that I'm thinking about dropping it]

HEAD FOOT

_____ resumptive RC dependency _____

Common in RCs produced by L2 learners (L2ers)

Grammatical resumptives vs. processing resumptives

Grammatical resumptives

- Licensed by the grammar
- Arabic, Cantonese, Hebrew, Irish, Mandarin, Persian, etc.



Processing resumptives

- Not licensed by the grammar
- Decreases processing load in difficult RC dependencies
- English, French, Italian, Korean, Spanish



(see Asudeh, 2004; McCloskey, 2017; Meltzer-Asscher, 2021; Sells, 1984)

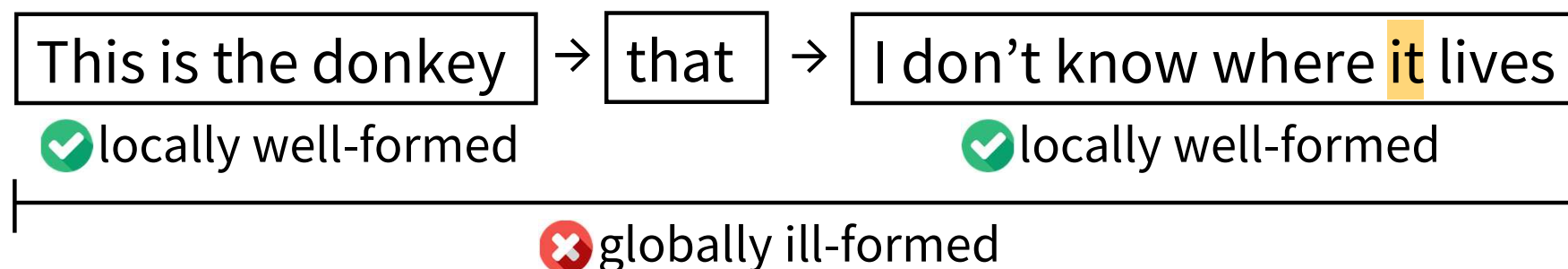
Resumption facilitates processing by...

- offering a means of establishing coreference when a gapped RC dependency breaks down

(Asudeh, 2004, 2012; see also Morgan & Wagers, 2018)

- ensuring local well-formedness, even if they cannot repair the global well-formedness of the sentence

(Asudeh, 2004, 2012; see also Morgan & Wagers, 2018)



(adapted from Asudeh, 2004, p. 315, (8.32))

Distribution of gapped and resumptive RCs

direct object RCs (ORCs)

Table 1. Distribution of grammatical gapping (–), resumption (+), and unrelativizable positions (0) in single-clause RCs

Language	SU	DO	IO	OBL	GEN	OCOMP
English	–	–	–	–	–	–
Korean	–	–	–	–	+	0
Mandarin	–	±	+	+	+	+

SU = subject; DO = direct object; IO = indirect object; OBL = oblique; GEN = genitive; OCOMP = object of comparison; adapted from Keenan & Comrie, 1977, p. 93, Table 2

Experimental research on adult L2 resumption

- L2ers produce resumptive RCs even when ungrammatical in both the L1 and the target language
(e.g., Gass, 1979; Hyltenstam, 1984; Pavesi, 1986)
- Production rates for resumptive RCs are higher in environments thought to be harder for relativization
(e.g., Algady, 2013; Gass, 1979; Hyltenstam, 1984; Maghrabi, 1997)

Taken as evidence that...

- Participants' interlanguages permit resumptive RCs
(e.g., Algady, 2013; Eckman, 2004; Gass, 1979; Hyltenstam, 1984; Pavesi, 1984)
 - ⚠ Assumes that performance patterns reflect representations licensed by the grammar
- Resumption facilitates L2 processing of RCs
(e.g., Algady, 2013; Eckman, 2004; Hyltenstam, 1984; Maghrabi, 1997)
 - ⚠ Has not been tested for real-time comprehension

Experimental research on adult L1 English resumption

- **Acceptability Judgment Tasks:**

Ratings for RPs low across conditions, suggesting that resumption is not a licit option for relativization


(e.g., Han et al., 2012; Heestand et al., 2011; Keffala & Goodall, 2011)

- **Self-Paced Reading Tasks:**

Reading times (RTs) following RPs faster than those following gaps under processing strain, suggesting that resumption may facilitate real-time RC comprehension

(e.g., Hammerly, 2022; Hofmeister & Norcliffe, 2013)

 **Faster RTs can also indicate abandonment of the parse, so it is important to test RC interpretation** (Morgan et al., 2020)

 **Almost no studies have done this, and those that have did not find that accuracy is higher with RPs** (Hammerly, 2022; Morgan et al., 2020)

Syntactic environments and processing difficulty

- SU > DO > IO > OBL > GEN > OCOMP

(Keenan & Comrie, 1977)

- Short-Distance > Long-Distance > *Wh*-Island

- **Short-Distance:**

the man [that these detectives arrested 

- **Long-Distance:**

the man [that I think [these detectives arrested 

- ***Wh*-island:**

*the man₁ [that I wonder [which detectives₂  arrested 

(Hawkins, 1999, 2004; Morgan & Wagers, 2018; O'Grady, 2012, 2022)

Table 3. Expected distribution of gapping (–) and resumption (+) and unrelativizable positions (0) in the relevant ORC environments

Language	Short-Distance	Long-Distance	‘ <i>Wh</i> -Island’
English	–	–	0
Korean	–	–	–
Mandarin	±	±	±

Based on judgments of Korean and Mandarin language consultants; for English, see also Ross (1967); for Korean, see also Han (2013); for Mandarin, see also Pan (2016)

Including both L1-Korean and L1-Mandarin participants allows us to observe how having an L1 with vs. without grammatical resumption in the relevant environment affects performance

Scope of the current project

2 Sub-Studies

- Direct Object RCs (ORCs)
- Subject RCs (SRCs)

4 Main Tasks (in the following order)

1. Elicited Production (English) → processing (production)
2. Self-Paced Reading (English) → processing (comprehension)
3. Acceptability Judgment (English & Korean/Mandarin) → acceptability
4. C-test (English) → proficiency

Testing L2ers in both the L1 and the target language in the AJTs is important because it allows us to check our assumptions about the acceptability of the relevant sentence types in the L1

Research questions (RQs)

For adult L1-English controls and L1-Korean and L1-Mandarin adult L2ers of English...

RQ1: Do RPs facilitate real-time ORC comprehension?

- Contributes to L1 English research by directly testing for accurate RC interpretation
- Extends previous L2 research by probing comprehension and by including long-distance and *wh*-island RCs

RQ2: If so, does this hold for individuals who do not consistently accept RPs?

- Tests the traditional L2 assumption that performance patterns reflect representations licensed by the grammar

RQ3: Does L2 English proficiency affect ratings for RPs?

- Investigates whether L2ers can become sensitive to English's disallowance of resumption in RCs

Participants



Adult English native speakers (ENSs)



Adult L1-Korean L2ers of English (KLEs)



Adult L1-Mandarin L2ers of English (MLEs)

Table 4. Participant information (means and ranges)

Group	<i>n</i>	Age at Testing	C-test Score	Age of Onset	Years in Anglosphere
ENS	90	26.98 (18–71)	42.79 (22–50)	—	—
KLE	69	26.29 (18–41)	32.64 (7–46)	9.35 (8–15)	0.32 (0–7)
MLE	76	28.14 (18–45)	28.83 (7–49)	9.71 (8–14)	0.04 (0–1)

50-item C-test (Zenker, in prep.) used to measure English proficiency

Self-Paced Reading Task (SPRT)







*Probed the processing of gaps vs. RPs
during real-time ORC comprehension*

Experimental design

- 2 × 3 design crossing DEPENDENCY (gap vs. RP) and ENVIRONMENT (short-distance vs. long-distance vs. *wh*-island)
- 30 critical items (6 conditions × 5 tokens, Latin-squared) and 42 fillers (28 grammatical; 14 ungrammatical)

----- For critical trials, correctly answering the question
relied on accurate dependency resolution -----

Table 3. Critical Conditions in the Self-Paced Reading Task

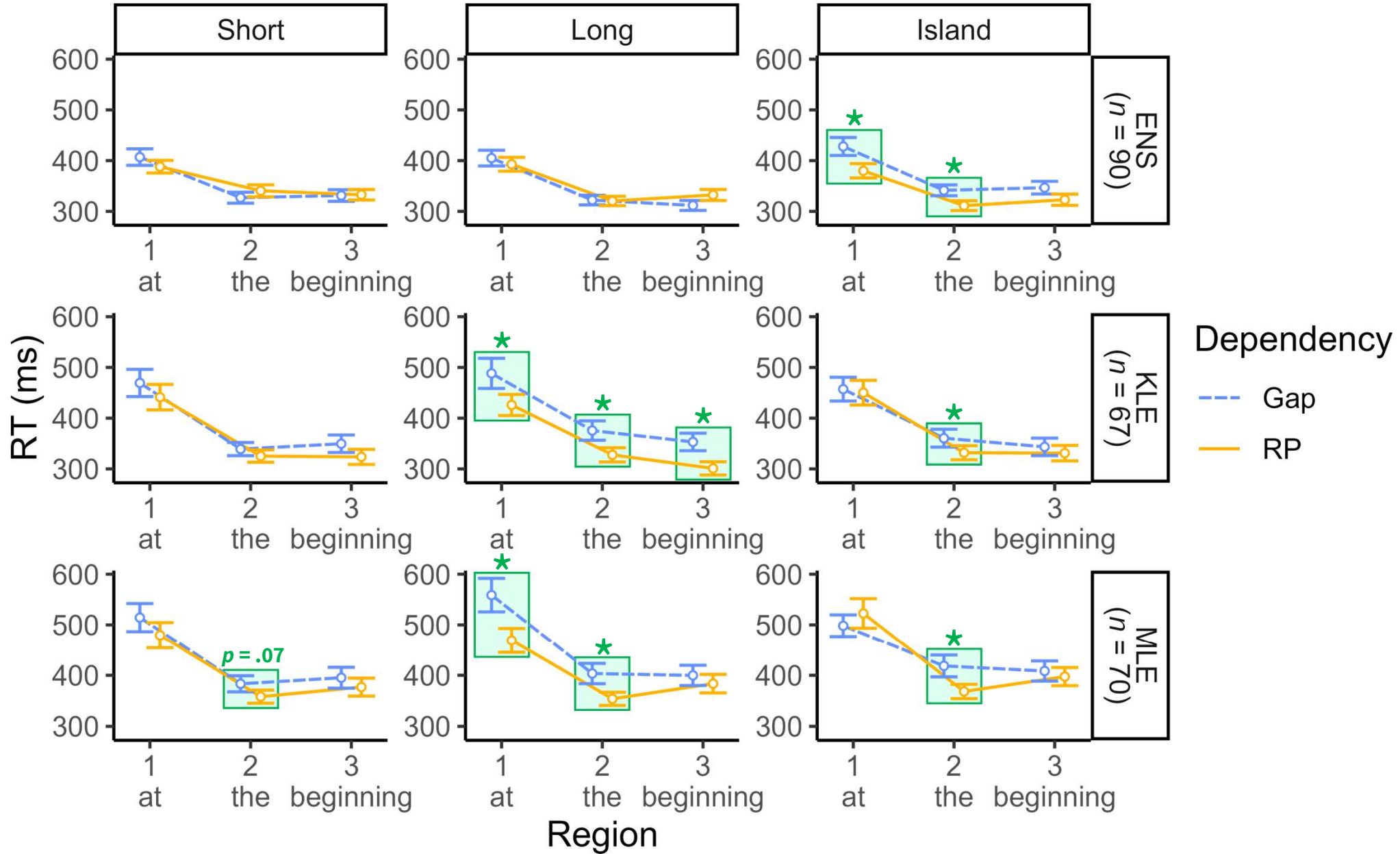
Environment	Example Stimulus
Short	I think Mary knows the man that these detectives arrested {  /*  him} <u>at the beginning</u> of the week.
Long	Mary knows the man that I think these detectives arrested {  /*  him} <u>at the beginning</u> of the week.
Island	Mary knows the man that I wonder which detectives arrested {*  /*  him} <u>at the beginning</u> of the week.

(cf. Hammerly, 2022; Hofmeister & Norcliffe, 2013)

Regions of interest

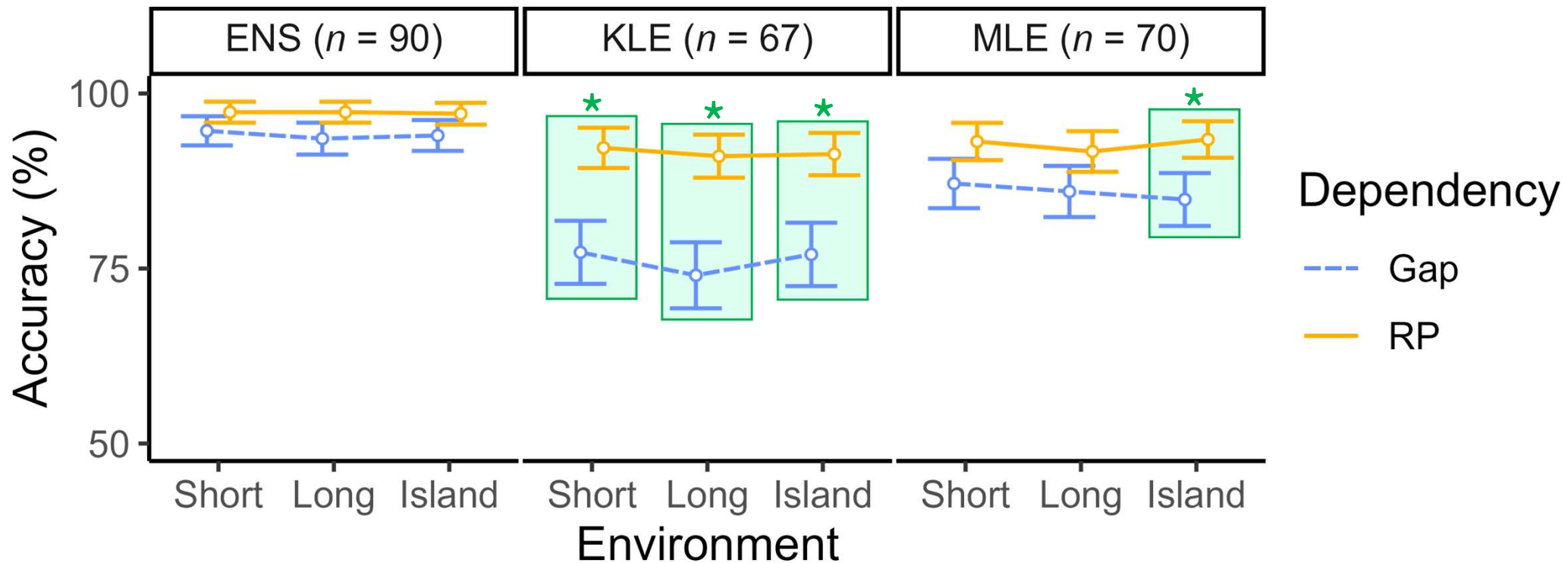


Fig 1. Mean RTs in the SPRT



Note. Error bars are 95% CIs; Region 1 model formula: $\text{Log RT} \sim \text{Dependency} * \text{Environment} * \text{Group} + (1 + \text{Dependency} + \text{Environment} \mid \text{Participant}) + (1 + \text{Dependency} + \text{Environment} + \text{Group} \mid \text{Item})$ 16

Fig 2. Comprehension-question accuracy in the SPRT



Note. Error bars are 95% CIs; model formula: Accuracy ~ Dependency * Environment * Group + (1 + Dependency + Environment | Participant) + (1 + Dependency + Environment + Group | Item)

Acceptability Judgment Task (AJT)

*Tested the offline acceptability
of gaps vs. RPs in ORCs*

Experimental design

- Same design as self-paced reading task
- English, Korean, and Mandarin versions

The diagram illustrates the experimental design interface. It features a central box containing the following elements:

- Stimulus:** The sentence "Mary knows the man that I wonder which detectives arrested him last week." is displayed at the top. A red arrow labeled "stimulus" points to this sentence.
- Rating Scale:** Below the sentence is a 6-point rating scale. It starts with the text "Completely Unacceptable" on the left and "Completely Acceptable" on the right. In between are six numbered boxes (1 through 6). A red arrow labeled "6-point rating scale" points to the left side of this scale.
- 'Skip' Option:** Below the numbered boxes is the instruction "Press the zero key if you cannot rate the sentence". A red arrow labeled "'skip' option" points to this instruction.

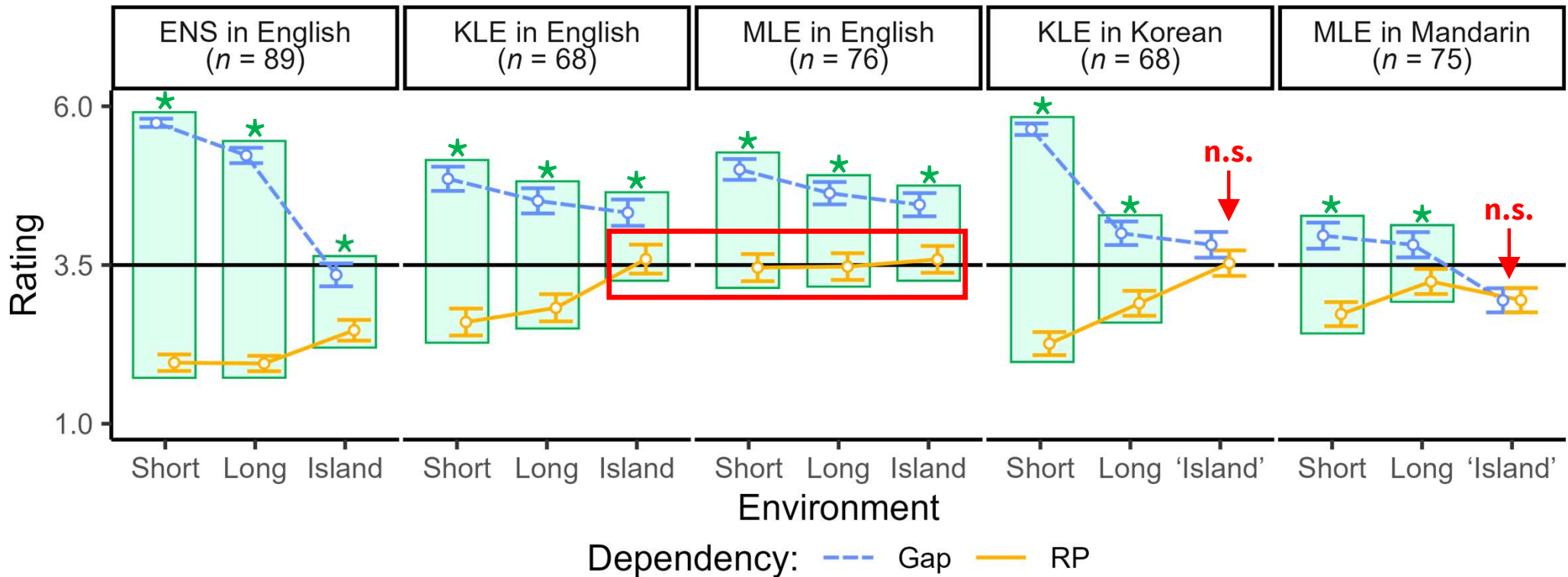
Table 4. Critical Conditions in the English Acceptability Judgment Task

Environment	Example Stimulus
Short	I think Mary knows the man that these detectives arrested { /* him } last week. ← Shortened time phrase
Long	Mary knows the man that I think these detectives arrested { /* him } last week.
Island	Mary knows the man that I wonder which detectives arrested {* /* him } last week.

Korean and Mandarin AJTs:

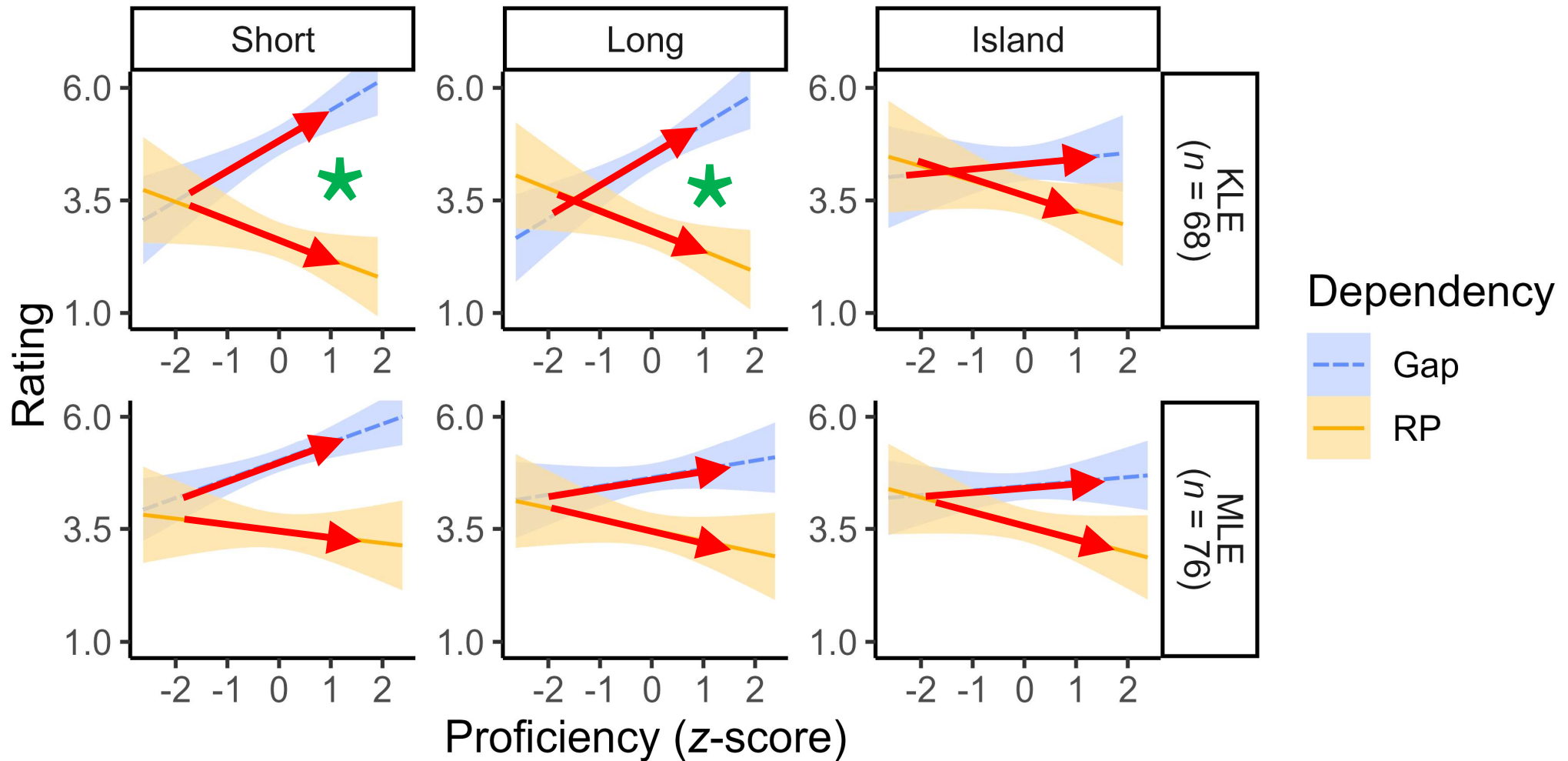
- Closely-translated versions of the English stimuli
- ‘Island’ conditions not assumed to be syntactic islands

Fig 3. Mean ratings by group in the AJTs



Note. Error bars are 95% CIs. Center line represents midpoint on rating scale; model formula: $\text{Rating} \sim \text{Dependency} * \text{Environment} * \text{Group} + (1 + \text{Dependency} + \text{Environment} | \text{Group}) + (1 + \text{Dependency} + \text{Environment} + \text{Group} | \text{Item})$

Fig 4. L2 proficiency effect on ratings



Note. Error bars are 95% CIs; model formula: Accuracy ~ Dependency * Environment * Group + (1 + Dependency + Environment | Participant) + (1 + Dependency + Environment + Group | Item)

Is processing facilitation limited to participants who accept resumptive RCs?

Reanalysis of the SPRT Data

Remove consistent RP acceptors to test whether facilitation effects remain

Identification of consistent RP acceptors

→ Participants who gave “acceptable” ratings (4, 5, or 6) to $\geq 80\%$ of RP trials in at least one condition

Fig 5. Proportion of RP acceptors in the English AJT

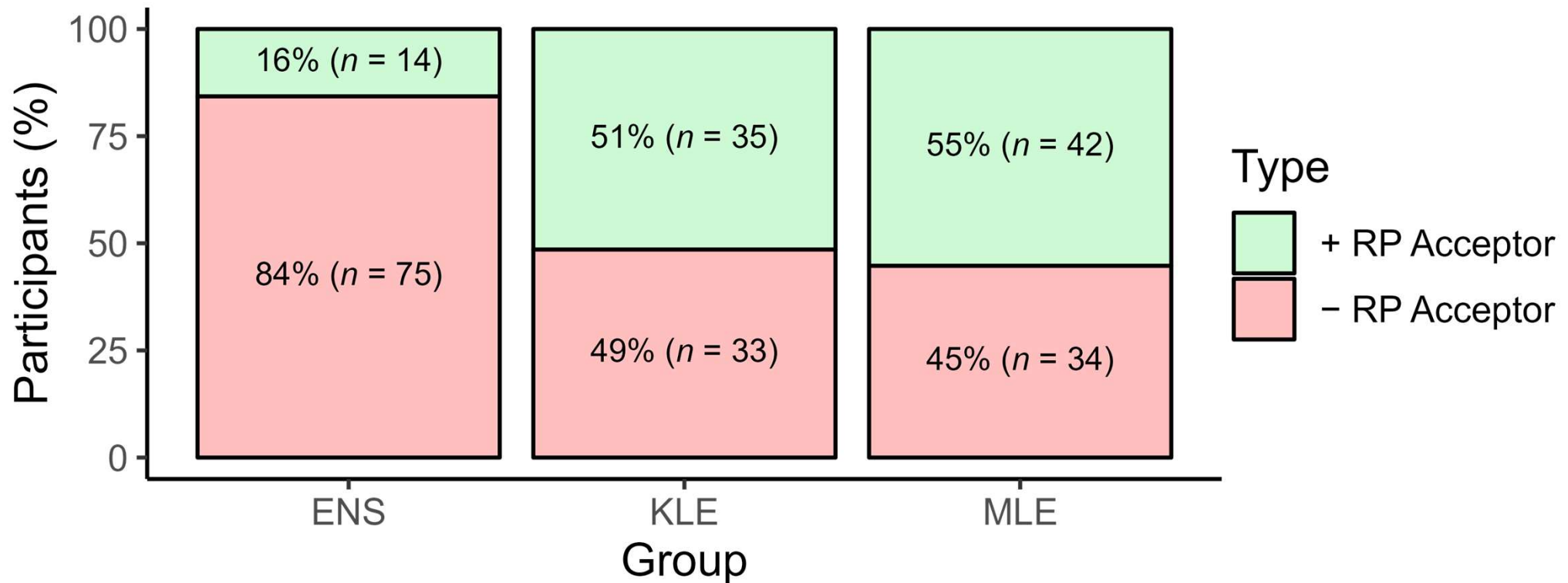
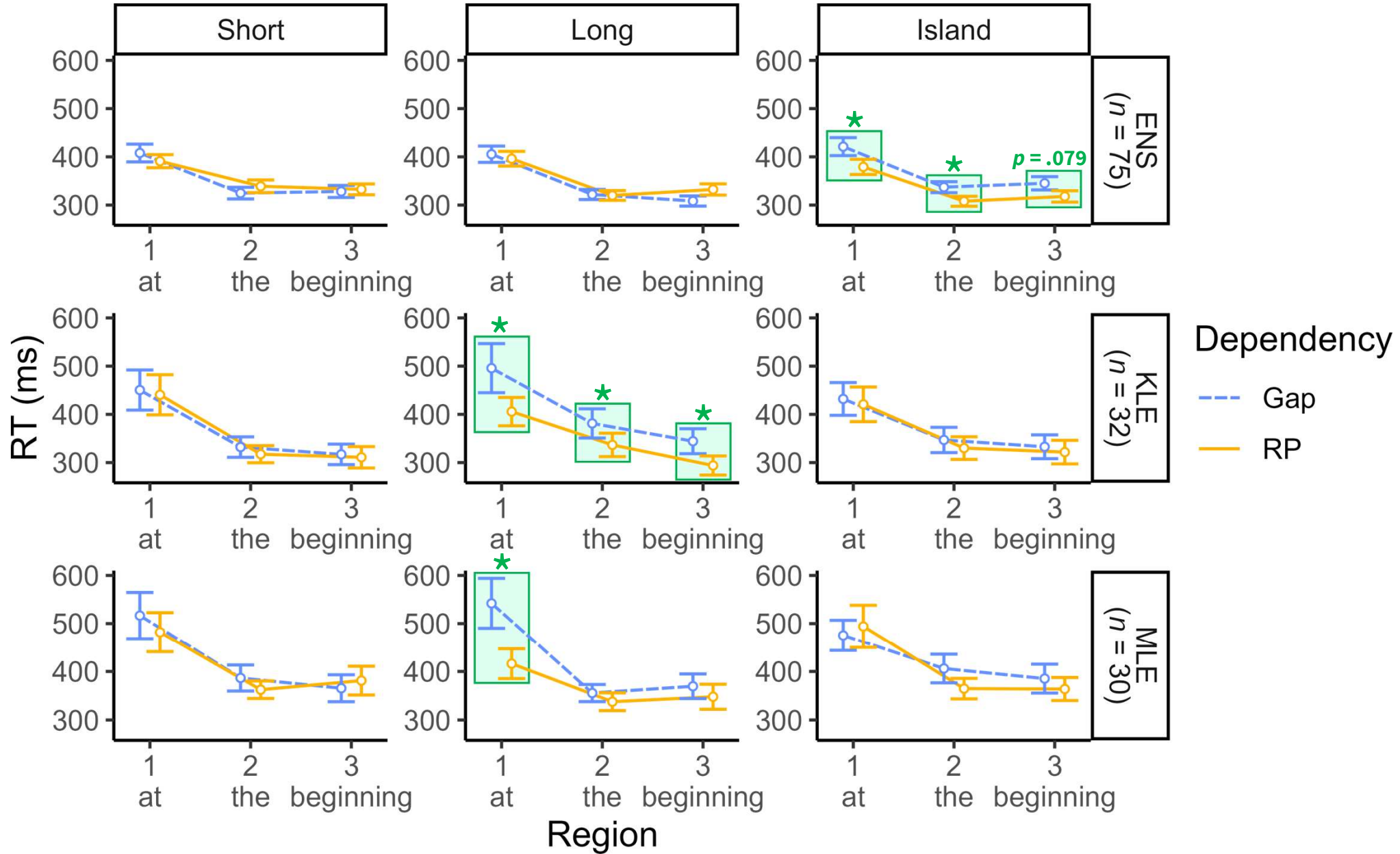
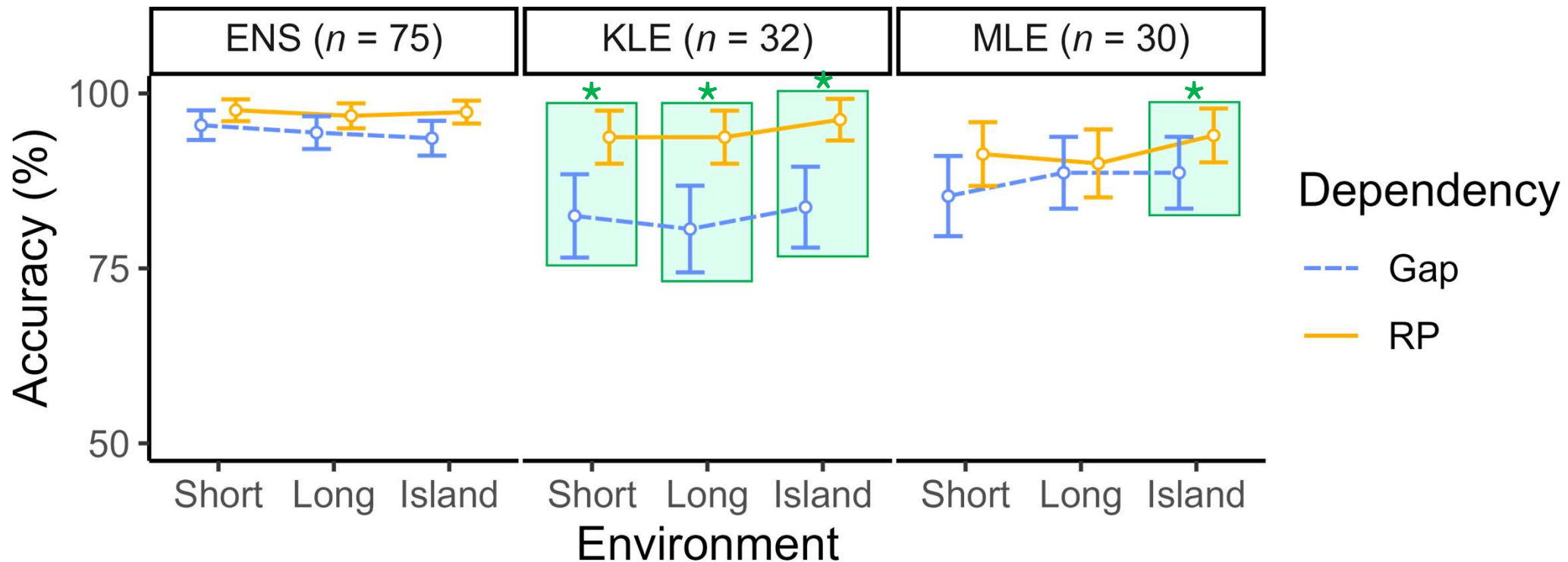


Fig 6. RT data with RP acceptors removed



Note. Error bars are 95% CIs; Region 1 model formula: $\text{Log RT} \sim \text{Dependency} * \text{Environment} * \text{Group} + (1 + \text{Dependency} + \text{Environment} | \text{Participant}) + (1 + \text{Dependency} + \text{Group} | \text{Item})$

Fig 7. Accuracy data with RP acceptors removed



Note. Error bars are 95% CIs; Model formula: Accuracy ~ Dependency * Environment * Group + (1 + Dependency + Environment | Participant) + (1 + Dependency + Environment + Group | Item)

Discussion

RQ1: Do RPs facilitate real-time ORC comprehension?



Yes, analysis of the RTs and comprehension-question accuracy scores indicated that RPs assist with ORC comprehension under processing strain

→ Challenges claims that resumption only helps with production (e.g., Ferreira & Swets, 2005; Morgan et al., 2020)

RQ2: If so, does this hold for individuals who do not consistently accept RPs?



Yes, the same general pattern of results was observed in the SPRT data even with RP acceptors removed

- Suggests that for ENSs and many L2ers, resumptive ORCs are purely processing resumptives
- Challenges the traditional L2 assumption that performance reflects representations licensed by the grammar (e.g., Algady, 2013; Hyltenstam, 1984; Eckman, 2004)

RQ3: Does L2 English proficiency affect ratings for RPs?




- ✓ Yes, higher proficiency scores were associated with lower ratings for RPs and higher ratings for gaps
 - Indicates that L2ers can become sensitive to English's prohibition on resumption in RCs
 - This sensitivity appears to develop fastest where processing is easiest

Future directions

RP too close to head noun?

- Why didn't MLEs consistently accept RPs in Mandarin?

Mandarin Stimulus in 'Island' Environment

黃	麗	認識	那	個	我	好奇	哪	些	偵探
Huang	Li	renshi	na	ge	wo	haoqi	na	xie	zhentan
Huang	Li	know	DEM2	CL	1s	wonder	which	CL	detective
上	個	星期	逮捕	{  /他}	的	男人。			
shang	ge	xingqi	daibu	{  /ta}	de	nanren			
last	CL	week	arrest	{  /3MS}	REL	man			

'Huang Li knows the man that I wonder which detectives arrested *(*him) last week.'

- Do RPs facilitate RC processing in Korean and Mandarin?
- How does linguistic distance in L1 vs. target language RCs (head position, etc.) contribute to performance?

Acknowledgments

My sincere thanks to:

- Yu-Tzu Chang, In Ji Chun, Kamil Deen, Shin Fukuda, Theres Grüter, Haerim Hwang, Li 'Julie' Jiang, Hyunwoo Kim, Jieun Kim, Kitaek Kim, Eunsun Lee, William O'Grady, Akari Ohba, Hajime Ono, Anu Reddy, Amy Schafer, Bonnie D. Schwartz, Rex A. Sprouse, Jue Wang, Hong Ri Zenker, Jing 'Crystal' Zhong
- The Language Acquisition Research Group at UH
- The Bilinski Dissertation Fellowship from the Department of Second Language Studies at UH
- *A Language Learning* Dissertation Grant
- An NSF Linguistics Doctoral Dissertation Research Improvement Grant (Award #2141214)
- All my participants



Handout:



fredzenker.com/gasla17.pdf

Mahalo for your kind attention!

References

- Algady, D. (2013). *The acquisition of relative clauses: How do second language learners of Arabic do it?* Doctoral dissertation, University of Wisconsin-Milwaukee.
- Asudeh, A. (2004). *Resumption as resource management*. Doctoral dissertation, Stanford University.
- Asudeh, A. (2012). *The logic of pronominal resumption*. Oxford University Press.
- Eckman, F. R. (2004). Optimality Theory, markedness and second language syntax: the case of resumptive pronouns in relative clauses. *Studies in Phonetics, Phonology, and Morphology*, 10, 89–110.
- Ferreira, F., & Swets, B. (2005). The production and comprehension of resumptive pronouns in relative clause “island” contexts. In A. Cutler (Ed.), *Twenty-first century psycholinguistics: Four cornerstones* (pp. 263–278). Lawrence Erlbaum.
- Gass, S. M. (1979). Language transfer and universal grammatical relations. *Language Learning*, 29, 327–344.
- Hammerly, C. (2022). The pronoun which comprehenders who process it in islands derive a benefit. *Linguistic Inquiry*, 53, 823–835.
- Han, C. (2013). On the syntax of relative clauses in Korean. *Canadian Journal of Linguistics*, 58, 319–347.
- Han, C., Elouazizi, N., Galeano, C., Görgülü, E., Hedberg, N., Hinnell, J., Jeffrey, M., Kim, K., & Kirby, S. (2012). Processing strategies and resumptive pronouns in English. In N. Arnett & R. Bennett (Eds.), *Proceedings of the 30th West Coast Conference on Formal Linguistics* (pp. 153–161). Cascadia Press.

References (continued)

- Hawkins, J. A. (1999). Processing complexity and filler-gap dependencies across grammars. *Language*, 75, 244–285.
- Hawkins, J. A. (2004). *Efficiency and complexity in grammars*. Oxford University Press.
- Heestand, D., Xiang, M., & Polinsky, M. (2011). Resumption still does not rescue islands. *Linguistic Inquiry*, 42, 138–152.
- Hitz, J., & Francis, E. J. (2016). On the usefulness of formal judgment tasks in second-language research: The case of resumptive pronouns in English, Turkish, and Mandarin Chinese. *Linguistics*, 54, 1241–1280.
- Hofmeister, P., & Norcliffe, E. (2013). Does resumption facilitate sentence comprehension? In P. Hofmeister & E. Norcliffe (Eds.), *The core and the periphery: Data-driven perspectives on syntax inspired by Ivan A. Sag* (pp. 225–246). CSLLI Publications.
- Hyltenstam, K. (1984). The use of typological markedness conditions as predictors in second language acquisition: The case of pronominal copies in relative clauses. In R. W. Andersen (Ed.), *Second languages: A cross-linguistic perspective* (pp. 39–58). Newbury House.
- Keenan, E. L., & Comrie, B. (1977). Noun phrase accessibility and universal grammar. *Linguistic Inquiry*, 8, 63–99.

References (continued)

- Keffala, B. & Goodall, G. (2011). *Do resumptive pronouns ever rescue illicit gaps in English?* Poster presented at the 2011 CUNY Conference on Human Sentence Processing, Stanford University, Stanford, CA.
- Kwon, N. (2008). *Processing of syntactic and anaphoric gap-filler dependencies in Korean: Evidence from self-paced reading time, ERP and eye-tracking experiments.* Doctoral dissertation, University of California, San Diego.
- Maghrabi, A. A. (1997). *The roles of psycholinguistic constraints and typological influence in the acquisition of pronominal copies in relativization by Arabic and English learners.* Doctoral dissertation, Georgetown University.
- McCloskey, J. (2017). Resumption. In M. Everaert & H. Van Riemsdijk (Eds.), *The Blackwell companion to syntax* (2nd ed.). Blackwell.
- Meltzer-Asscher, A. (2021). Resumptive pronouns in language comprehension and production. *Annual Review of Linguistics*, 7, 177–194.
- Morgan, A. M., von der Malsburg, T., Ferreira, V. S., & Wittenburg, E. (2020). Shared syntax between comprehension and production: Multi-paradigm evidence that resumptive pronouns hinder comprehension. *Cognition*, 205, Article 104417.
- Morgan, A. M., & Wagers, M. W. (2018). English resumptive pronouns are more common where gaps are less acceptable. *Linguistic Inquiry*, 49, 861–867.

References (continued)

- O'Grady, W. (2012). Three factors in the design and acquisition of language. *Wire's Cognitive Science*, 3, 493–499.
- O'Grady, W. (2022). Natural syntax: An emergentist primer (3rd ed.). University of Hawai'i at Mānoa. <http://ling.hawaii.edu/william-ogradyl>
- Pan, V. J. (2016). *Resumptivity in Mandarin Chinese: A minimalist account*. De Gruyter.
- Pavesi, M. (1986). Markedness, discoursal modes, and relative clause formation in a formal and an informal context. *Studies in Second Language Acquisition*, 8, 38–55.
- Ross, J. R. (1967). *Constraints on variables in syntax*. Doctoral dissertation, MIT.
- Sells, P. (1984). *Syntax and semantics of resumptive pronouns*. Doctoral dissertation, University of Massachusetts, Amherst.
- Song, J. J. (2003). Resumptive genitive pronouns in Korean relative clauses: Distribution and explanation. *SKY Journal of Linguistics*, 16, 139–160.
- Zenker, F. (in prep.). *Development and validation of a C-test for the assessment of general English ability*.
- Zenker, F., & Schwartz, B. D. (2017). Topicalization from adjuncts in English vs. Chinese vs. Chinese-English Interlanguage. In M. LaMendola & J. Scott (Eds.), *Proceedings of the 41st annual Boston University Conference on Language Development* (pp. 806–819). Cascadilla Press.