

# L2 comprehension of English relative clauses: Resumption mitigates processing strain

Handout:



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# 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)

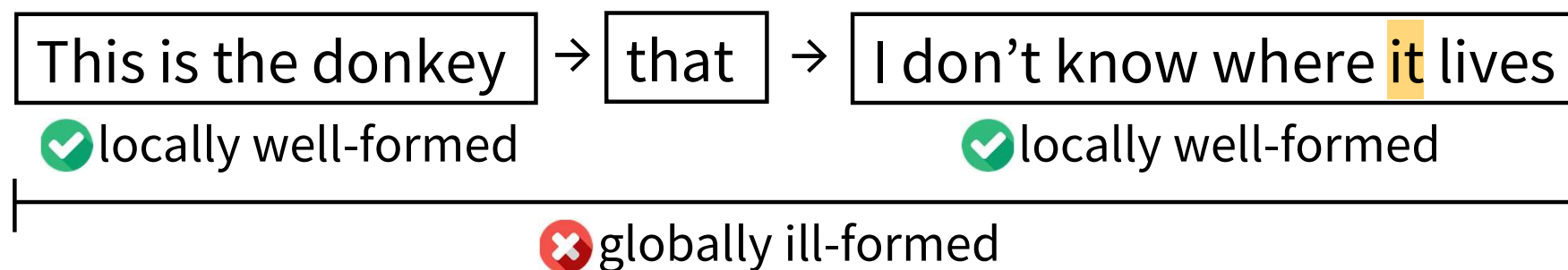
# Resumption facilitates processing by...

- 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

Ongoing debate about the distribution of resumptive RCs in Korean (see Han, 2013; Kwon, 2008; Song, 2003) and Mandarin (see Hitz & Francis, 2016; Pan, 2016)

# 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 man [that I wonder [which detectives 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 TL is important because the exact distribution of RPs in Korean and Mandarin is still not well understood (see Zenker & Schwartz, 2017)

# 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?**

- Extends previous L2 research by probing comprehension and by looking at a novel processing hierarchy
- Contributes to L1 English research by directly testing for accurate RC interpretation

## **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

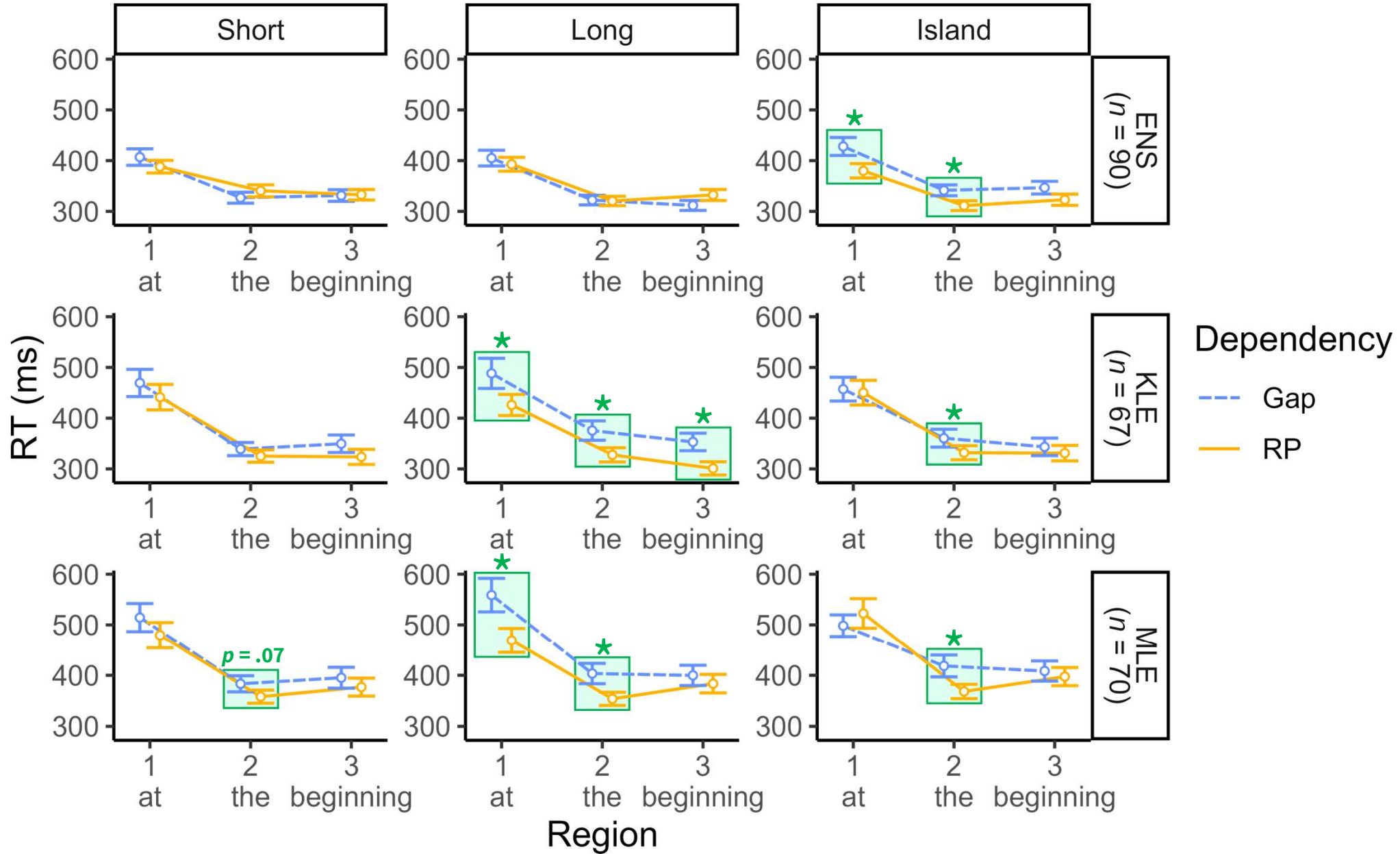
Environment	Example Stimulus
Short	I think Mary knows the man that these detectives arrested {  /*  him} <b><u>at the beginning</u></b> of the week.
Long	Mary knows the man that I think these detectives arrested {  /*  him} <b><u>at the beginning</u></b> of the week.
Island	Mary knows the man that I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

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

Regions of interest



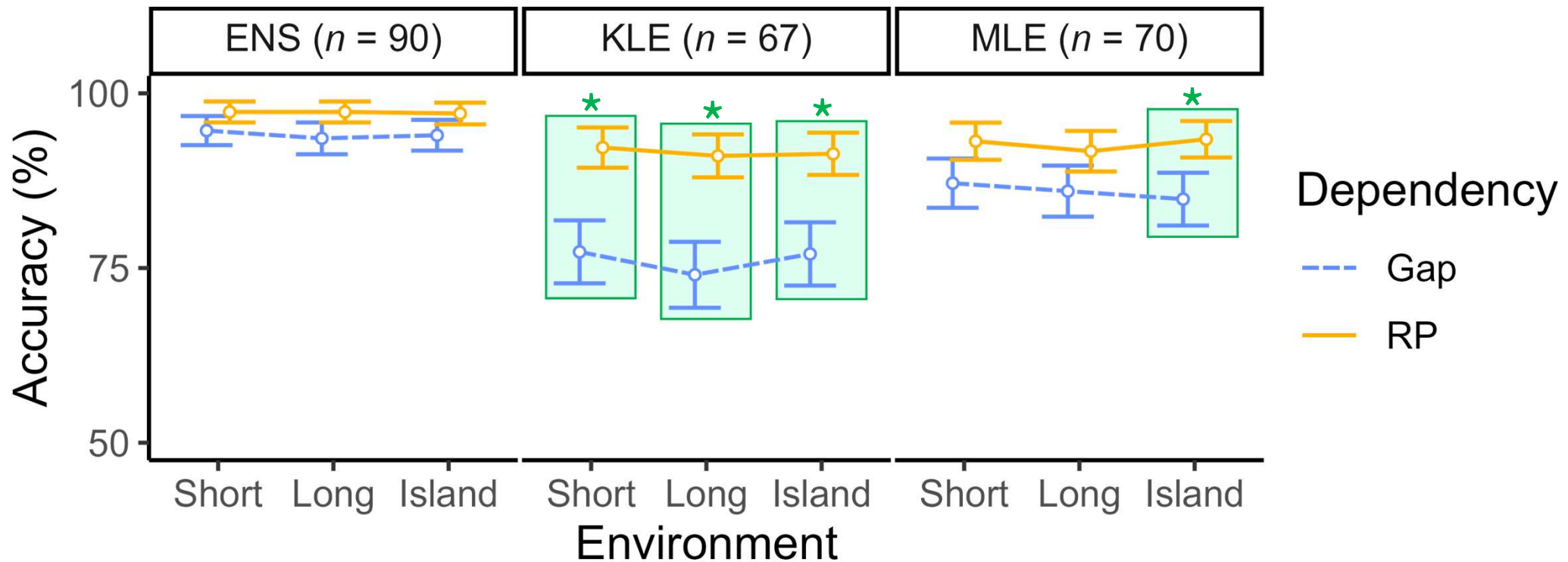
**Fig 1.** Mean RTs in the SPRT



Note. Error bars are 95% CIs; Region 1 model formula:  $\text{Log RT} \sim \text{Dependency} * \text{Environment} * \text{Group} + (1 + \text{Dependency} + \text{Environment} | \text{Participant}) + (1 + \text{Dependency} + \text{Environment} + \text{Group} | \text{Item})$  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
- 30 critical items (6 conditions  $\times$  5 tokens, Latin-squared) and 42 fillers (28 grammatical; 14 ungrammatical)
- English, Korean, and Mandarin versions

The diagram illustrates the experimental interface. A red arrow labeled "stimulus" points to the sentence "Mary knows the man that I wonder which detectives arrested him last week." Below the sentence is a 6-point rating scale. The scale is labeled "Completely Unacceptable" on the left and "Completely Acceptable" on the right. Between these labels are six numbered boxes (1 through 6). A red arrow labeled "6-point rating scale" points to the scale. Below the scale is the instruction "Press the zero key if you cannot rate the sentence". A red arrow labeled "'skip' option" points to this instruction.

stimulus

Mary knows the man that I wonder which detectives arrested him last week.

*Completely Unacceptable* 1 2 3 4 5 6 *Completely Acceptable*

Press the zero key if you cannot rate the sentence

6-point rating scale

'skip' option

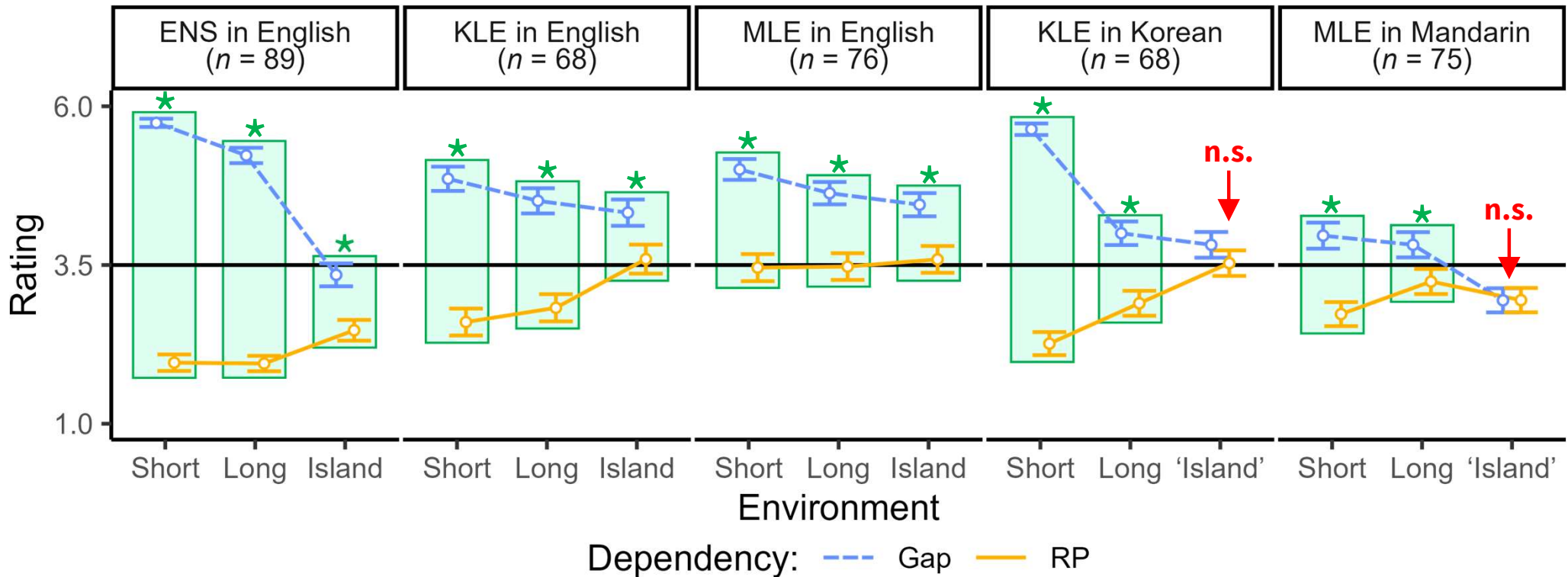
**Table 4.** Critical Conditions in the English Acceptability Judgment Task

Environment	Example Stimulus
Short	I think Mary knows the man that these detectives arrested { <span style="background-color: #ADD8E6;">   </span> /* <span style="background-color: #FFD700;">him</span> } <span style="border: 1px solid red;">last week.</span> ← Shortened time phrase
Long	Mary knows the man that I think these detectives arrested { <span style="background-color: #ADD8E6;">   </span> /* <span style="background-color: #FFD700;">him</span> } <span style="border: 1px solid red;">last week.</span>
Island	Mary knows the man that I wonder which detectives arrested {* <span style="background-color: #ADD8E6;">   </span> /* <span style="background-color: #FFD700;">him</span> } <span style="border: 1px solid red;">last week.</span>

Korean and Mandarin AJTs:

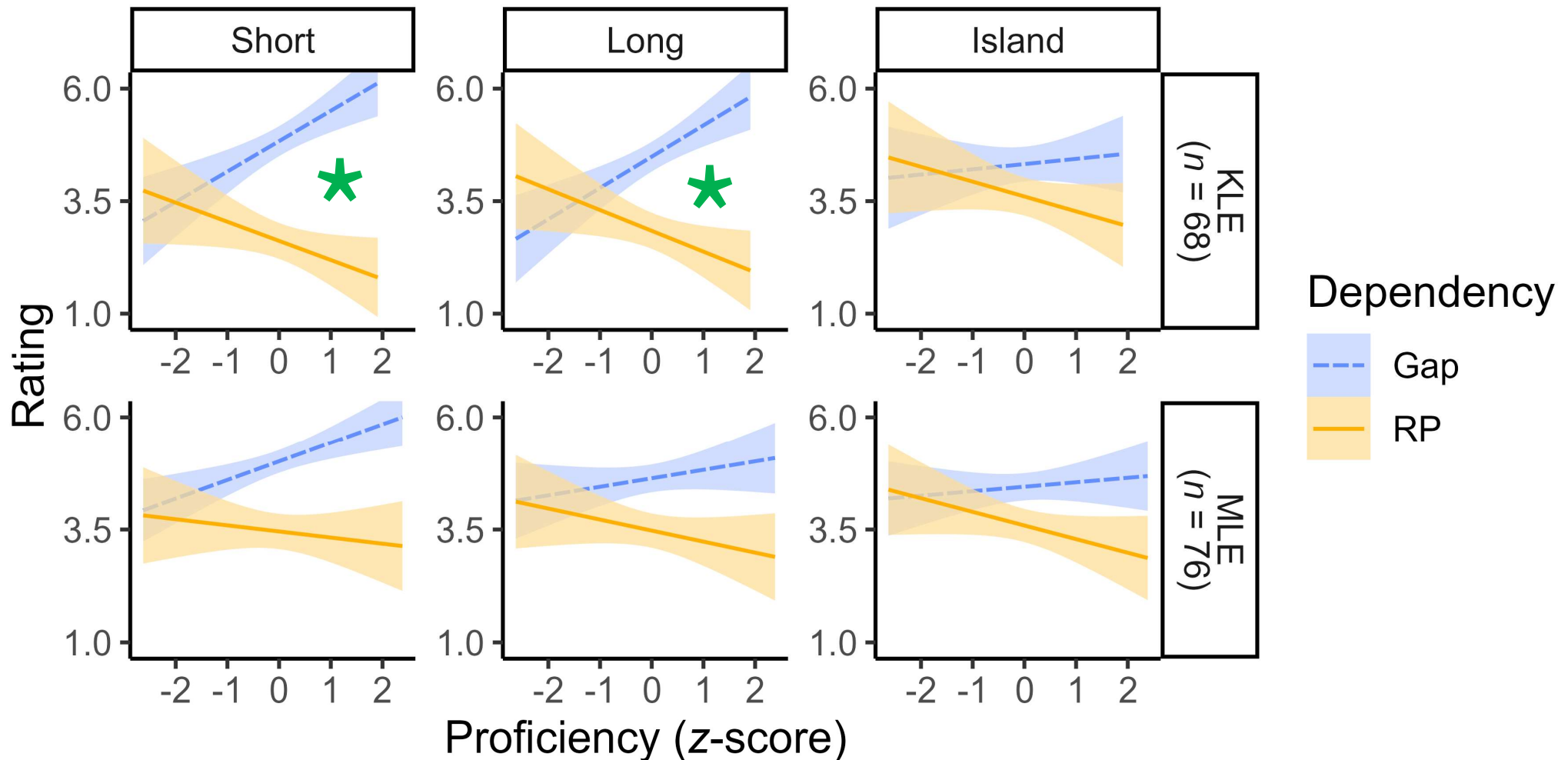
- Closely-translated versions of the English stimuli
- ‘Island’ conditions not assumed to be syntactic islands

**Fig 3.** Mean ratings by group in the AJTs



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

**Fig 4.** 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)

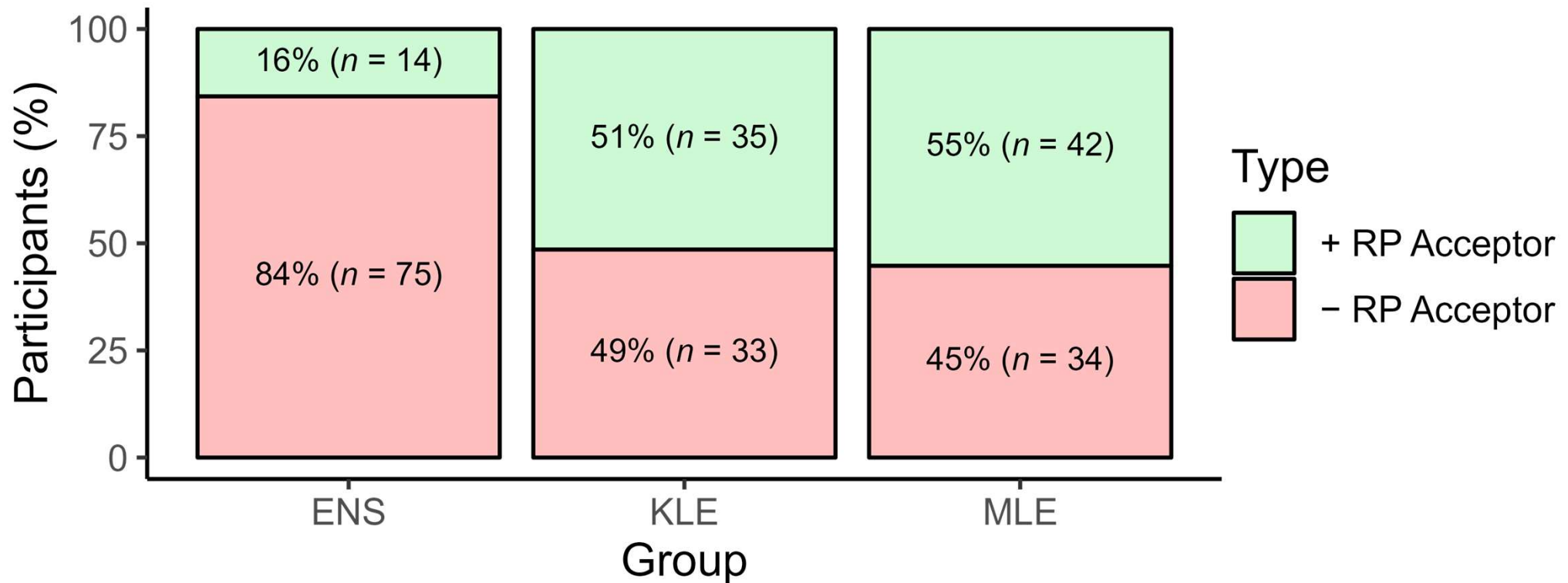
# Reanalysis of the SPRT data

*Remove consistent RP acceptors to test whether processing effects depend on RP acceptance*

# Identification of consistent RP acceptors

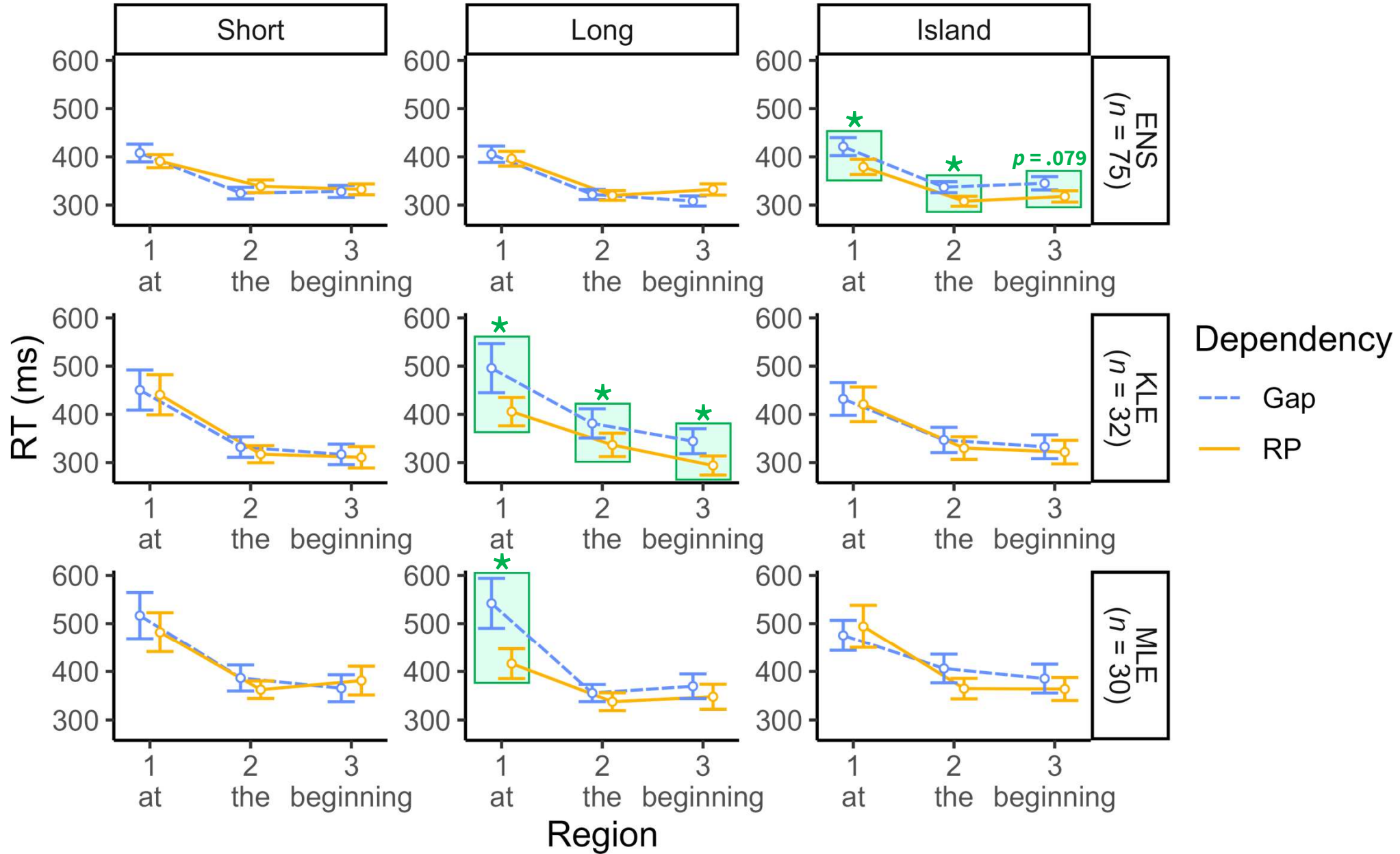
→ Participants who gave “acceptable” ratings (4, 5, or 6) to  $\geq 80\%$  of RP trials in at least one condition

**Fig 5.** Proportion of RP acceptors in the English AJT



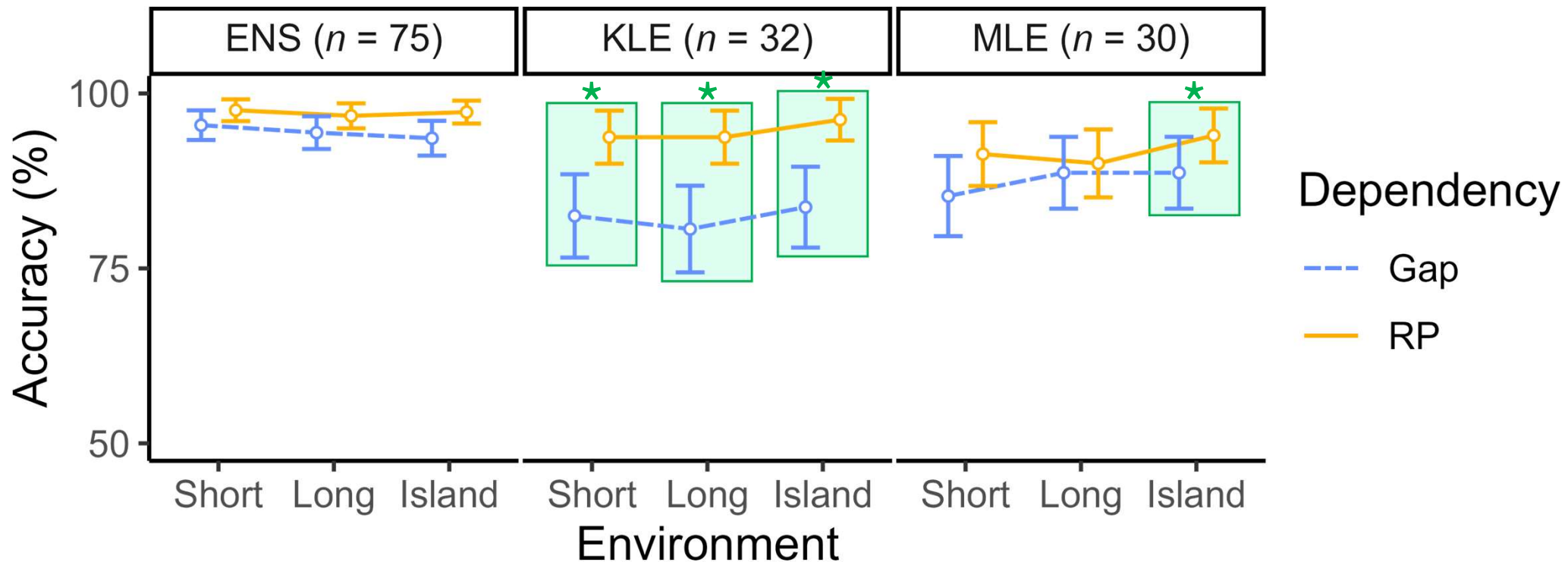


**Fig 6.** RT data with RP acceptors removed



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


**Fig 7.** Accuracy data with RP acceptors removed



*Note.* Error bars are 95% CIs; Model formula: Accuracy  $\sim$  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 appear 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 structural distance in L1 vs. target language RCs (head position, etc.) contribute to performance?

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Mahalo for your kind attention!

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