

# Processing Variable Number Agreement: Evaluating /s/-lenition in comprehension

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## Background

### Incremental Processing and Variability

People comprehend language incrementally, using lexical, morphological and phonological cues to interpret linguistic input.

Comprehenders rely most heavily on cues that are *frequent*, *consistent*, and *valid* (e.g., MacWhinney, Bates & Kliegl, 1984).

How do listeners process cues that are frequently available and consistent in meaning, but variable in form?

### Sociolinguistic Variability

Sociolinguistic variation is probabilistic variation in form that does not alter meaning (Labov, 1969).

The likelihood of each variant depends on both linguistic (morphological status, phonological context) and extra-linguistic factors (speaker age, gender, SES, region of origin).



### Eastern Andalusian Spanish: /s/-lenition

In EAS, syllable-final /s/, including the plural affix, is frequently lenited or omitted (Lipski, 2012; Villena-Ponsoda, 2008).

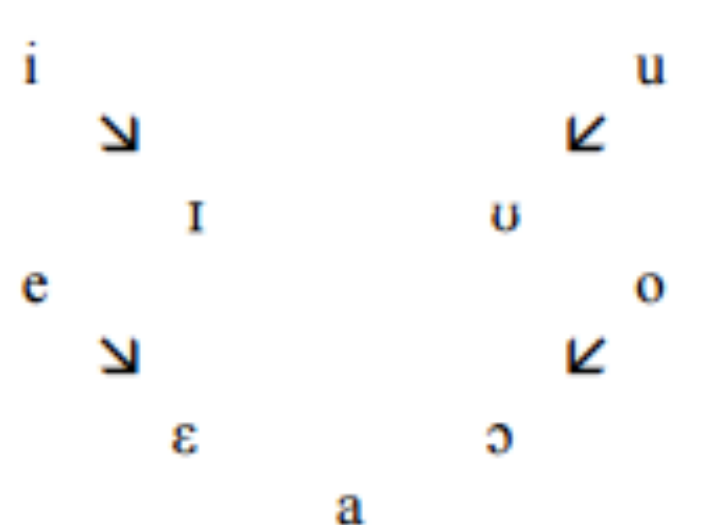
When syllable-final /s/ is lenited, a variety of cues may mark its underlying presence.

/s/ or /h/: some portion of the segment may be retained (Ruch & Harrington, 2014).

vowel quality: vowels in (formerly) closed syllables may remain lax (Corbin, 2006).

Vowels may show breathy voicing (Gerfen, 2002).

gemination: consonant beginning the following syllable may be lengthened (longer closure, longer VOT; Gerfen, 2002).



Laxing of Spanish Vowels (from Corbin, 2006)

### Research Questions

Do speakers of EAS process full and reduced forms of the plural affix differently?

Does the salience of the cue to plurality matter? (e.g., *el* vs. *lo(s)*, *la* vs. *la(s)*)

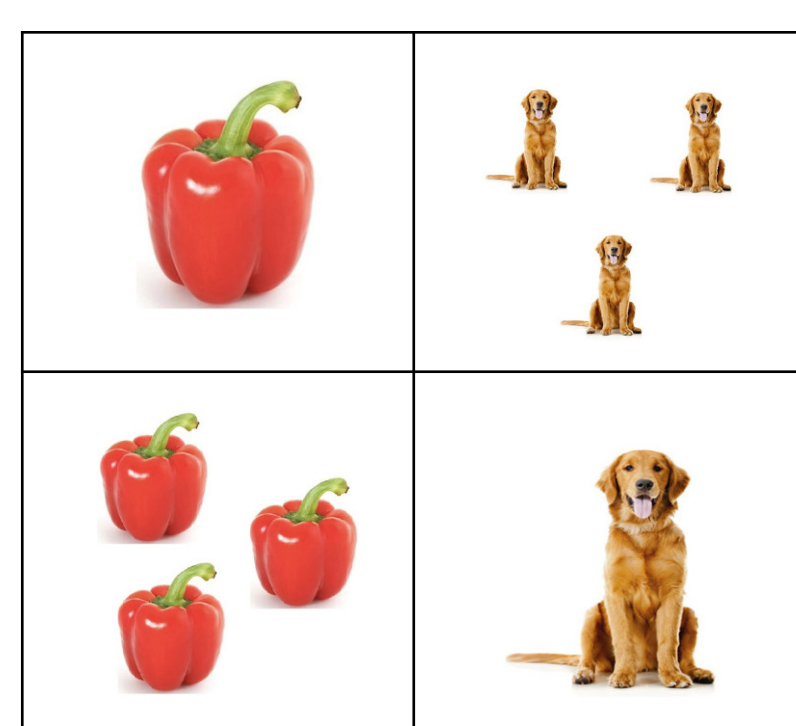
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## Methods

### Task

4-picture visual-world paradigm



"pincha en los perros."

click.IMP on the.M.PL dog.M-PL

"click on the dogs"

All item pairs matched in gender.

### Trial Types

		singular	plural
def	masc	el perro the dog	los perros the dogs
	fem	la cama the bed	las camas the beds
otr	masc	otro perro another dog	otros perros other dogs
	fem	otra cama another bed	otras camas other beds

### Participants

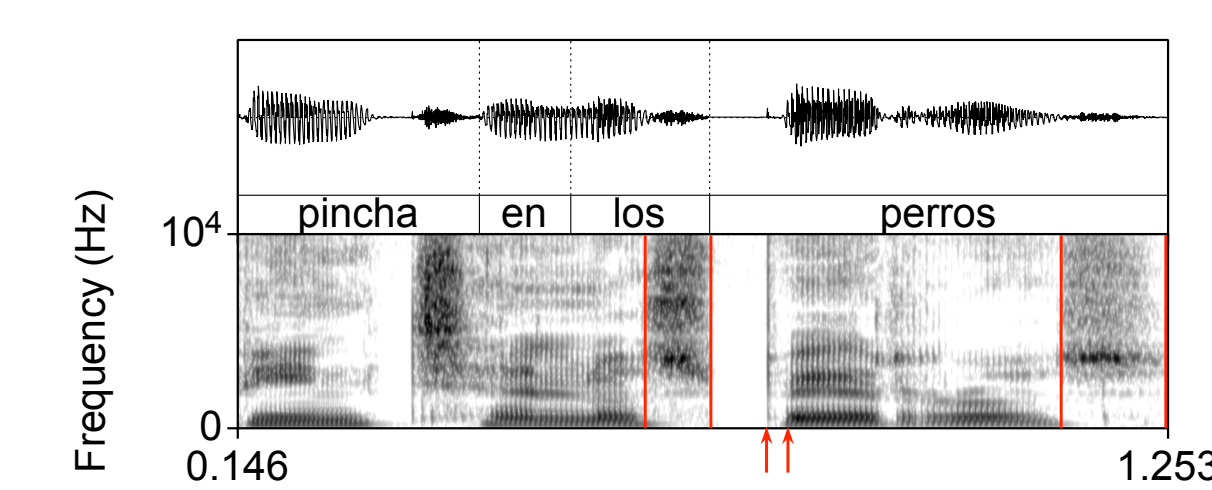
42 native speakers of Eastern Andalusian Spanish, recruited and tested in Granada, Spain.

Each saw 96 trials: 12 of each of the 8 types at left.

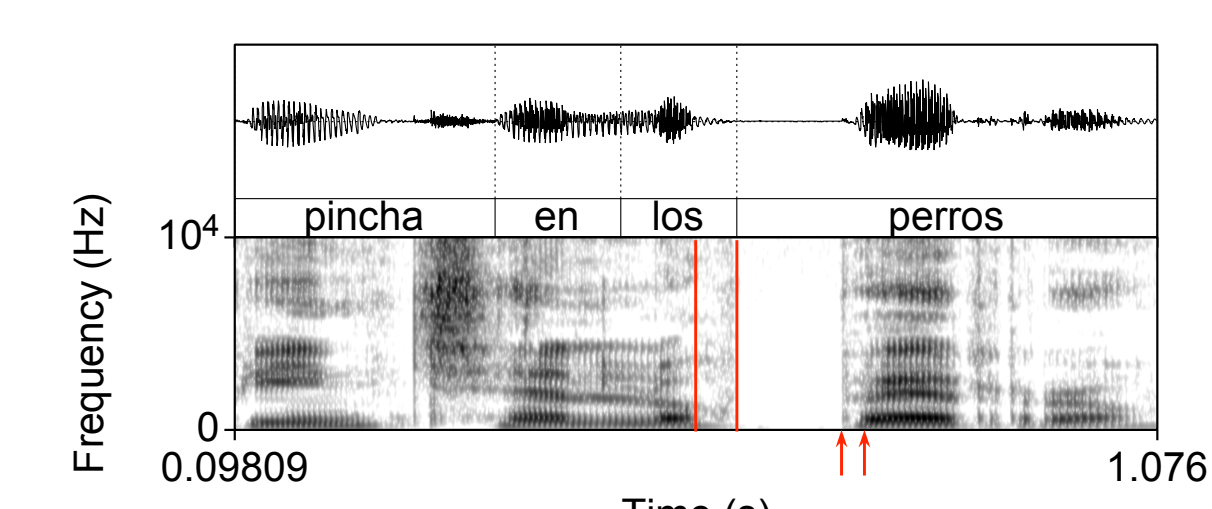
### Conditions

2 groups heard either:

- fully produced /s/ (n = 21)



- naturally reduced /s/ (n = 21)



### Auditory Stimuli

Recorded by a native speaker of EAS, who was instructed to "speak normally" (reduced) or "produce /s/" (full).

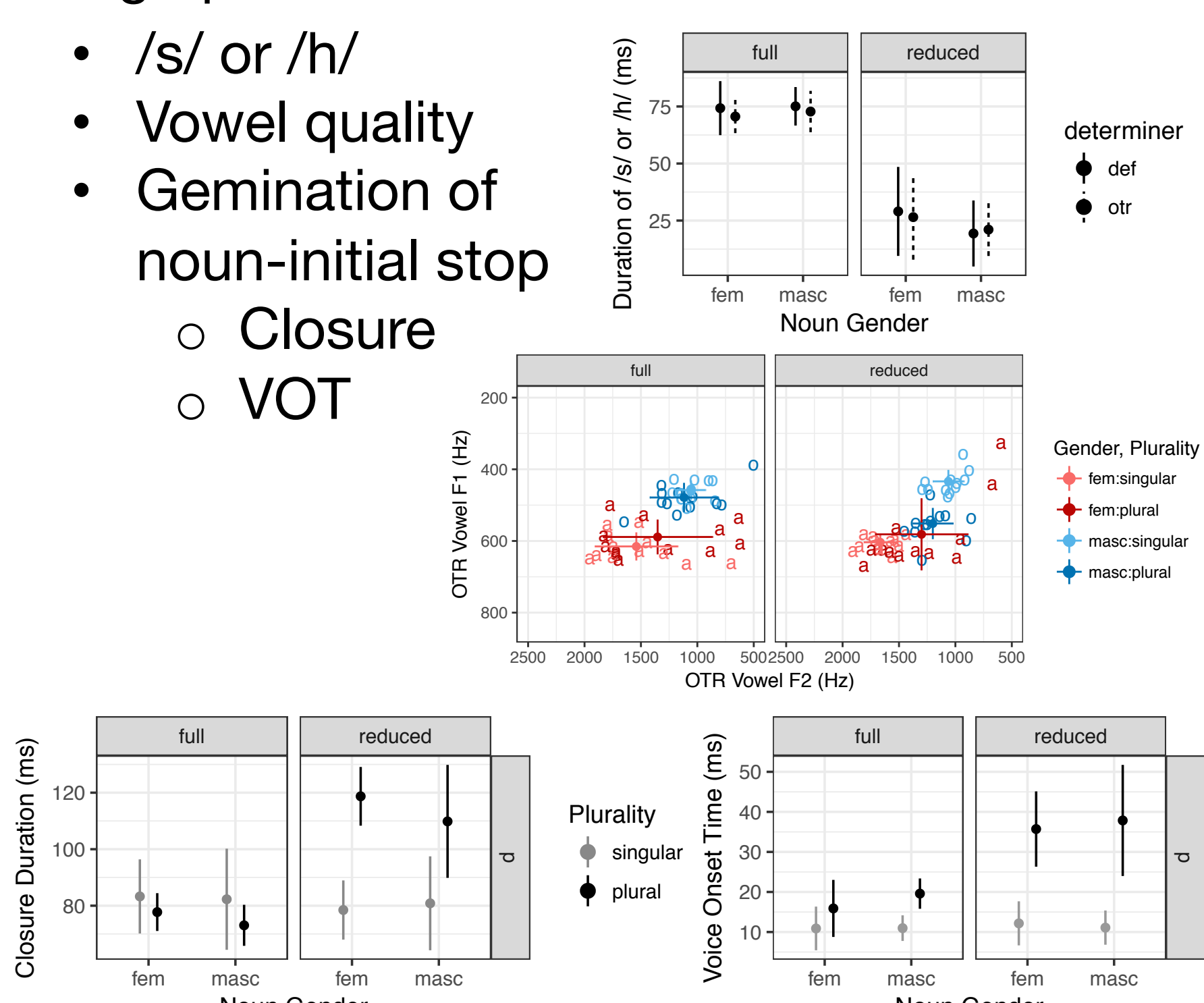
24 target nouns beginning in voiceless stops.

- 12 feminine ending in /a/
- 12 masculine ending in /o/

### Cues to plurality

All graphs show means ± 1 SD.

- /s/ or /h/
- Vowel quality
- Gemination of noun-initial stop
  - Closure
  - VOT



## Results

Accuracy			target	competitor	distractors
			def	singular	98.5%
		plural	97.1%	0.8%	2.1%
otr	singular	88.5%	10.8%	0.7%	
	plural	96.9%	0.9%	2.2%	

Accuracy differed by determiner: eye-movements for *definite* and *otr* trials were therefore analyzed separately.

### Latency of first shift to target plurality (1500 ms from determiner onset)

def: no reliable effects, interactions  
otr: \*plurality, \*condition x plurality

faster in plural than singular otr trials, pattern was stronger in the reduced condition

### Proportion looking to plurals, early (500 ms from determiner onset)

def: \*plurality  
otr: \*plurality

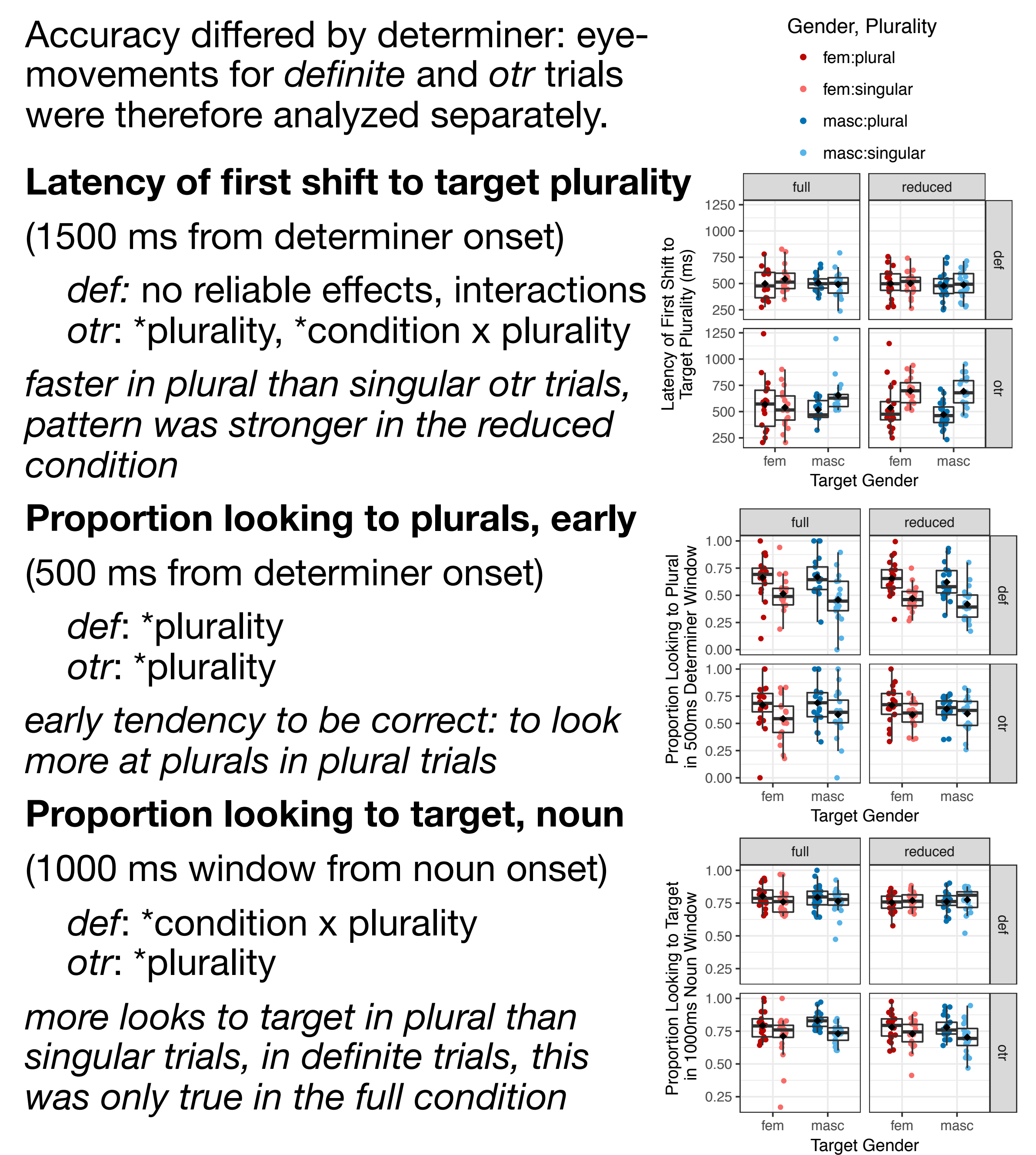
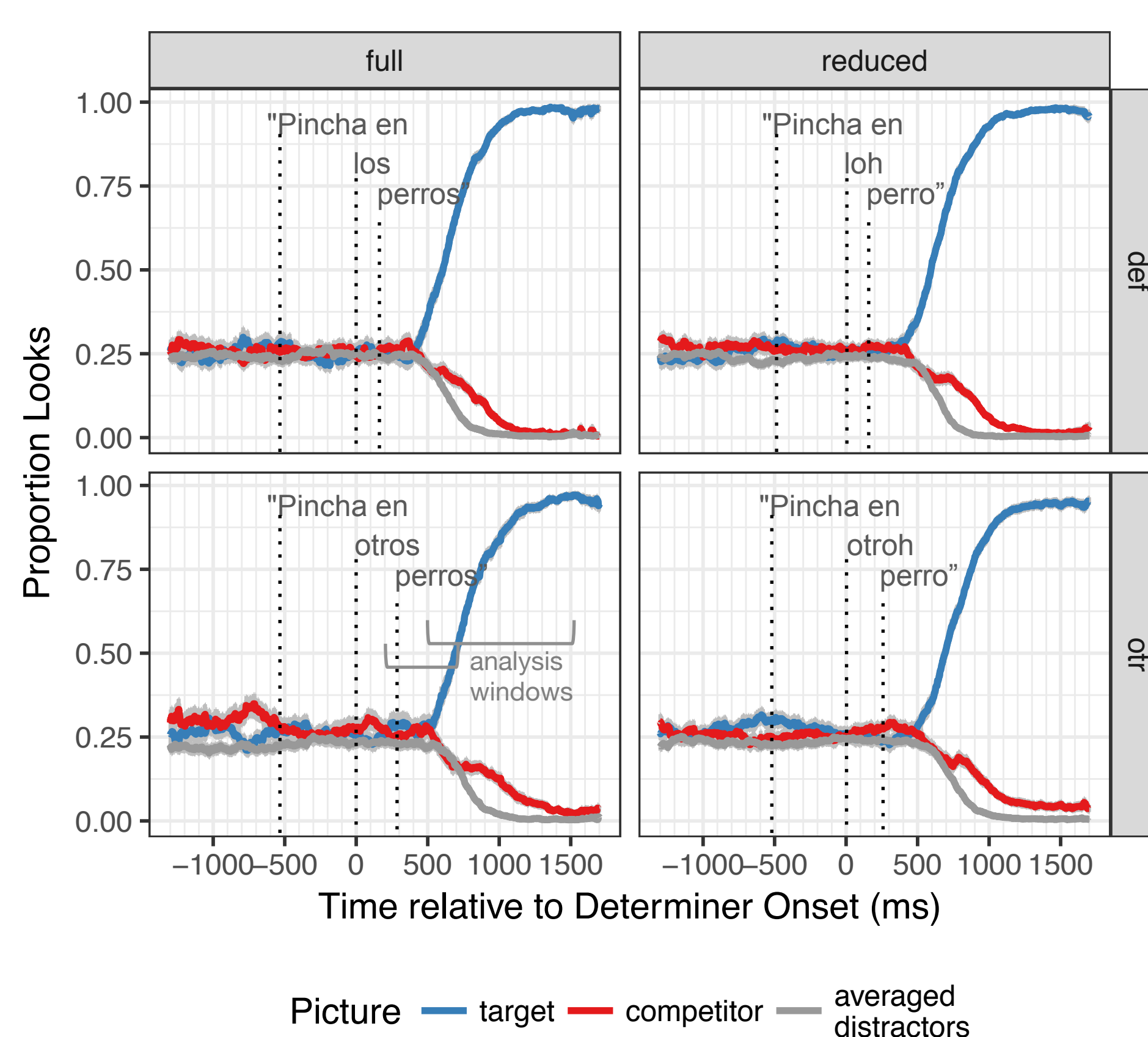
early tendency to be correct: to look more at plurals in plural trials

### Proportion looking to target, noun (1000 ms window from noun onset)

def: \*condition x plurality  
otr: \*plurality

more looks to target in plural than singular trials, in definite trials, this was only true in the full condition

### Eye-movements



## Conclusions

Participants readily and rapidly identified plurality of noun phrases in both full and reduced /s/ conditions.

Cue salience did not have a large effect:

- no advantage for masculine definite trials, in which determiner root (*el/los*) is a cue to plurality.
- interaction of condition and plurality in *def* trials suggests that full form /s/ may be a particularly strong cue, but lack of a similar interaction in *otr* trials casts doubt on this interpretation.

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## Future Directions

Few studies have addressed the online processing of sociolinguistically variable forms. This project thus serves as a foundation for future investigations.

- Are there differences in processing that our study was unable to detect? Allow more time?
- Is there an advantage for processing the local forms if testing in a community (not university) location?
- Does speakers' facility with their native variety stem from long exposure, or would non-leniting speakers quickly adapt to the new set of cues?
- How do learners acquire morphological paradigms affected by sociolinguistic variability? (Miller, 2013; Lukyanenko & Miller, under revision)