L2 Prosodic Focus: Processing, Transfer, and Grammatical Architecture

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1. Background

Second Language (L2) Processing

- Is L2 processing *qualitatively* different from L1 processing? (e.g. Clahsen & Felser 2006)
  - L2 learners have been claimed to rely on impoverished grammatical representations
- *Theoretical proposal* in L2: the "Interface Hypothesis"
  - Phenomena at the interface of two domains (e.g., *pragmatics and core grammar*) pose recalcitrant problems to L2 learners (Sorace 2011)
  - Predicts that L2 learners should have problems with English focus prominence

Focus Prominence

ENGLISH: Focus is marked *in-situ* using acoustic prominence; focus can be anticipatory

(1a) A: *Who swam?* B: *[THE DUCKS]$_F$ swam.*

(1b) *John didn't [FAIL]$_F$ the exam*…(can imply he bombed it)

SPANISH: Focus tends to be marked with both acoustic prominence and syntactic movement; focus usually not anticipatory

(2a) A: *¿Quién nadó?* B: *Nadaron [los patos]$_F$.*

(2b) *#Juan no [PASÓ]$_F$ el examen*… (implicature not available)

Contrastive focus may operate differently from *wh*-focus, using prosody without syntactic movement (Zubizarreta 1998, Face 2002, Domínguez 2013)

2. Participants

- 19 Latin American Spanish L2 learners of English and 17 native English speakers

Table 1: L2 Learners' Language Background Information

Mean age (SD)	29.79 (8.53)
Mean age of onset of English learning (SD)	12.10 (4.83)
Mean age of arrival in the US (SD)	25.05 (8.68)
Mean English proficiency (SD)	22.32 (4.03) *30-question cloze test*

3. English Production Experiment

- Participant gave instructions to experimenter based on visual display
- Focus expected on contrastive **head noun** or contrastive **number**

Table 2: Conditions for Production Experiment

Contrast	Instruction: *"Move… to …"*
Head Noun	*…**pumpkin** number two… **rocket** number two*
Number	*…pumpkin number **two**… pumpkin number **three***
Both (control)	*…**pumpkin** number **two**… **rocket** number **three***

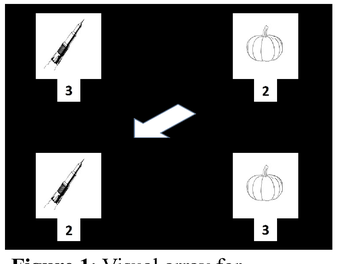
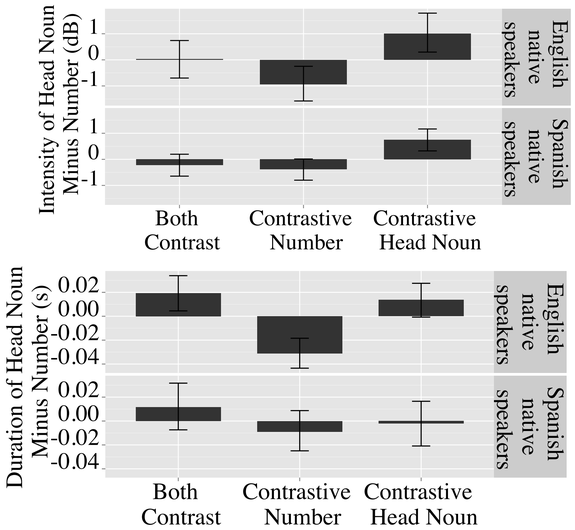


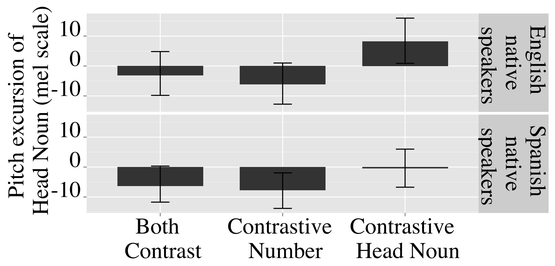
Figure 1: Visual array for production experiment

Note on results: No effect of anticipatory focus



- *Intensity:* Greater *relative intensity* when **Head Noun** contrastive
- *Duration:* Lower *relative duration* in **Number** condition

Figure 2: Normalized relative acoustic measurements in the three conditions



- *Pitch:* Greater *pitch excursion* on **Head Noun** when contrastive

Figure 3: Normalized pitch excursion (max. pitch minus min. pitch within word)

- No statistically significant difference between groups
- No effect of proficiency (subset analysis)

4. English Visual-World Eye Tracking

- Participants instructed to move a center image to one image surrounding (by clicking the outer image)

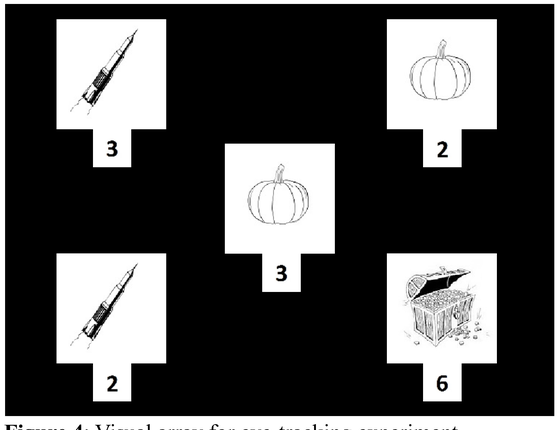
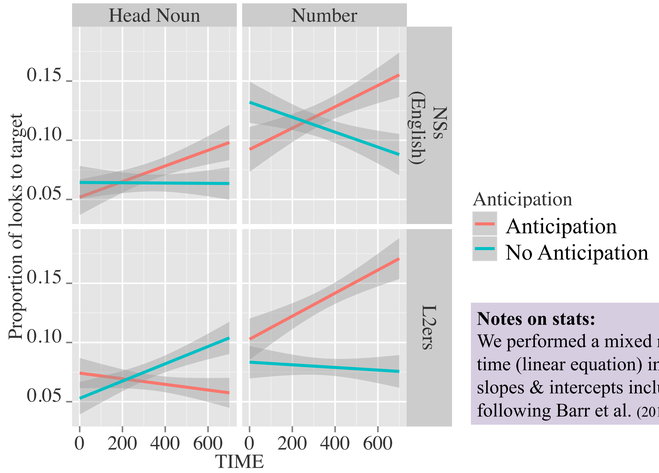


Figure 4: Visual array for eye-tracking experiment

Table 3: Conditions in the Eye-Tracking Experiment

	Anticipation
Head Noun:	*Move PUMPKIN number three* | $_{700ms}$ | *to ROCKET number three.*
Number:	*Move pumpkin number THREE* | $_{700ms}$ | *to pumpkin number TWO.*
	No Anticipation
Head Noun:	*Move pumpkin number three* | $_{700ms}$ | *to ROCKET number three.*
Number:	*Move pumpkin number three* | $_{700ms}$ | *to pumpkin number TWO.*



Notes on stats:
We performed a mixed regression on converted log odds; time (linear equation) included as fixed effect; all random slopes & intercepts included (for participant & item); following Barr et al. (2011, 2012)

Figure 5: Looks to target (linearly fitted, 95% C.I. shaded grey) within 700-ms interest period

- In the **Head Noun** and **Number** conditions, native English speakers benefited from anticipatory prosody (sig. time × anticipation interaction; t = 5.21)
  - **Head Noun** was slower (sig. time × ant. × location interaction; t = 6.13), which could be an issue of semantic priming or "salient natural partitions" (Wagner 2006)
- Only in the **Number** condition did L2 learners make use of anticipatory prosody (sig. time × ant. × location × L1 interaction; t = -2.65)

5. Conclusion

- L2 learners produced contrastive focus prosody in English
- L2 learners used anticipatory prosody to facilitate comprehension
  - Not an across-the-board deficit/impoverished representation
- L2 learners did not use anticipatory prosody in cases where head noun was focused, suggesting a L1 transfer effect

REFERENCES

Barr, D. J., Gann, T. M., and Pierce, R. S. (2011). Anticipatory baseline effects and information integration in visual world studies. *Acta Psychologica*, 137(2):201–207.

Barr, D. J., Levy, R., Scheepers, C., and Tily, H. J. (2012). Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language*, 68(2):255–278.

Clahsen, H. and Felser, C. (2006). Grammatical processing in language learners. *Applied Psycholinguistics*, 27(1):3–42.

Domínguez, L. (2013). *Understanding Interfaces: Second Language Acquisition and Native Language Attrition of Spanish Subject Realization and Word Order Variation*. John Benjamins, Amsterdam, NL.

Face, T. L. (2002). Local intonational marking of Spanish contrastive focus. *Probus*, 14(1):71–92.

Sorace, A. (2011). Pinning down the concept of "interface" in bilingualism. *Linguistic Approaches to Bilingualism*, 1(1):1–33.

Wagner, M. (2005). *Prosody and Recursion*. PhD thesis, Massachusetts Institute of Technology, Cambridge, MA, USA.

Wagner, M. and Klassen, J. (2014). Accessibility is no alternative to alternatives. Language, Cognition and Neuroscience, 30(1-2):212–233.

Zubizarreta, M. L. (1998). *Prosody, Focus and Word Order*. MIT Press, Cambridge, MA, USA.

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