When transfer fails:

Positional bias and weight-sensitivity in English stress

Guilherme D. Garcia

Ball State University

guilhermegarcia.github.io

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Indiana University, Bloomington

Intro

1. 40% of world's languages WEIGHT-SENSITIVE (Ryan *to appear*)

   Heavier syllables are more likely to attract stress

   Pattern $\mathcal{P}$ (stress) is affected by factor $\mathcal{A}$ (weight)

2. General assumption in SLA: **L1 transfer** (White 1989)

☞ *Helpful if L1 and L2 weight-sensitive*

Intro

Today: what if more than one factor seem to affect $\mathcal{P}$

- **Weight** and **position** in English stress
- Two typologically distinct L1s: **Portuguese** & **Mandarin**

Stress in English

Factor $\mathcal{A}$: Weight

- English stress is partially determined by weight

☞ **Regular stress in non-verbs**

Heavy penultimate syllable → penultimate (PU) stress

Light penultimate syllable → antepenultimate (APU) stress

agénda vs. *Cánada*
arizóna vs. *América*

- Different patterns for verbs and **non-verbs** (Hayes 1982)

Stress in English

Factor $\mathcal{A}$: Weight

- % of words with APU stress in the CMU Dictionary (cmudict)

Weight profile	PoS	%	Example
HLL	Adj	69.54	*ábsolute*
HLL	N	74.17	*ábstinence*
L**H**L	Adj	0	–
L**H**L	N	2.49	*gálaxy*
LLL	Adj	68.65	*géneral*
LLL	N	75.05	*précedence*

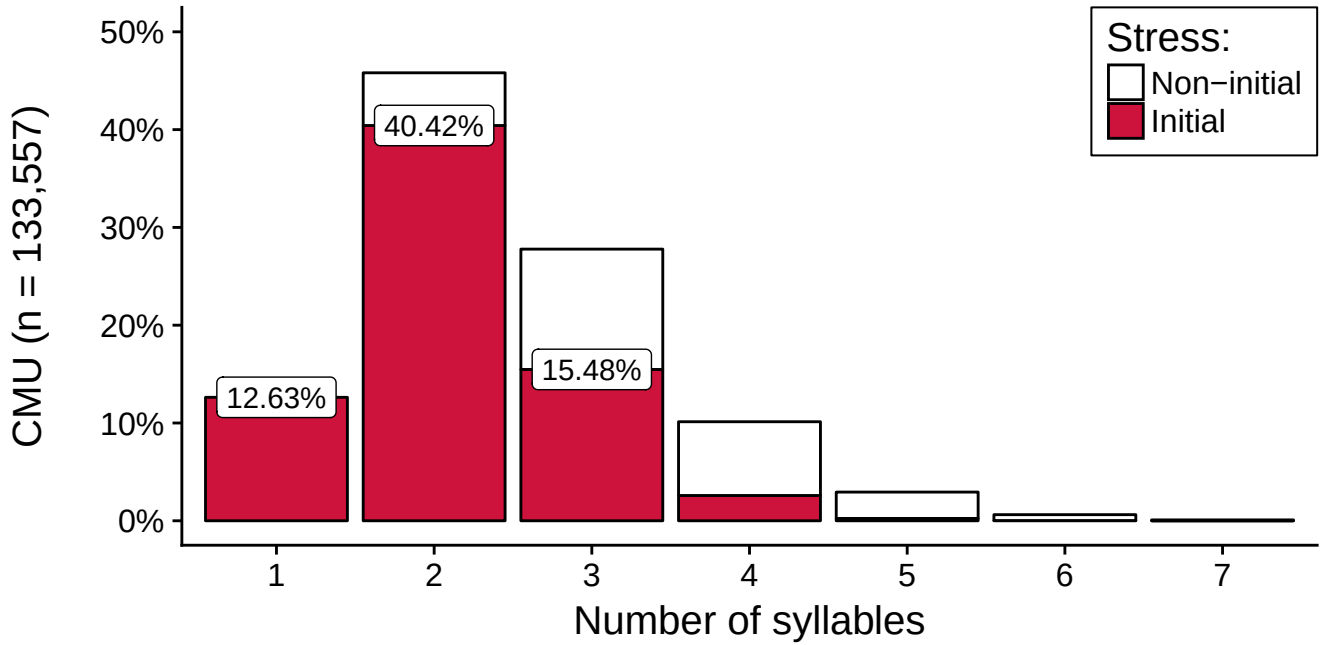
- Sample of 4,573 words (H = heavy; L = light)

Stress in English

Factor $\mathcal{B}$: Position

1. Most non-verbs $\rightarrow$ PU or APU stress
2. Most common words in English are **short** ($\leq$ 4 syllables)

☞ Disyllables and trisyllables will often have **initial stress**



Stress in English

Factor $\mathcal{B}$: Position

Bias towards initial stress in English is well-known: (Cutler 2012)

50% polysyllabic words have initial stress (Cutler and Carter 1987)

$<$ 10% polysyllables with weak initial syllable

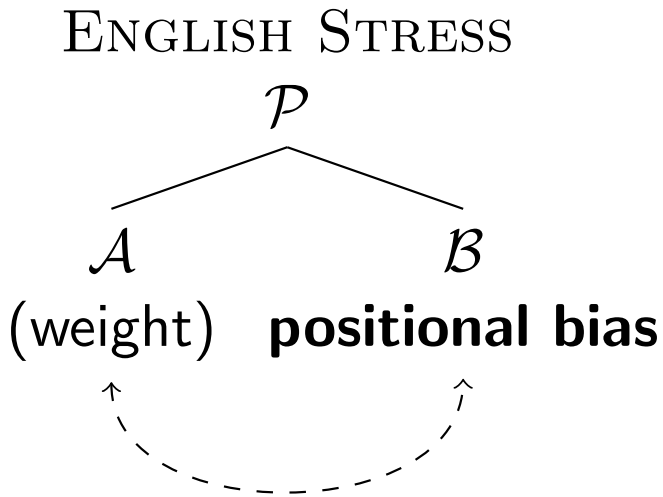
☞ Stress as cue to word boundary in English

Naturally useful to learners

Weight vs. position

- **Two** possible predictors of stress location:

  Weight and position highly correlated in common words



☞ **Could position conceal weight-sensitivity?**

Stress in Mandarin

- Stress & weight are disputed in the language:

a. No stress (Hyman 1977)

b. Weight-**in**sensitive (Feng 1995)

c. Weight-sensitive* (Duanmu 1990; Qu 2013)

* Like English, correlation between duration and weight

* Unlike English, weight not sensitive to syllable shape

Stress in Mandarin

(Qu, 2013)

- Qu (2013, p. 71): four-way weight distinction
- ☞ Based on durational differences across tones

Tone		**Weight**	**Pitch**
$\mathbf{T_{1/2/3/4}}$ in isolation		Super-heavy	
$\mathbf{T_1}$: *mā*	'mother'		High level
$\mathbf{T_2}$: *má*	'helm'	Heavy	High rising
$\mathbf{T_4}$: *mà*	'scold'		High falling
$\mathbf{T_3}$: *mǎ*	'horse'	Light	Low falling
$\mathbf{T_0}$: *ma*	'question marker'	Weightless	Low level

Stress in Portuguese

- Like English, Portuguese stress partially determined by weight:
  anzól, *cacáu* vs. *ánta*, *gáto* 'hook', 'cocoa', 'tapir', 'cat'
- Different patterns for verbs and **non-verbs** (Wetzels 2007)
- Unlike English, Portuguese stress typically not initial
  (Most words → 3–4 syllables; penultimate stress)

Stress in Portuguese

☞ **Stress in non-verbs:**

Heavy final syllable ⇝ final stress — *anzól, cacáu*

Light final syllable ⇝ penultimate stress — *ánta, gáto*

Light final and penultimate syllable ⇝ antepenultimate stress

patético, ótimo — 'pathetic', 'great'

Interim summary

In English, Mandarin, and Portuguese:

- ▶ stress more likely on longer/heavier syllables
- ☞ L2ers could transfer this correlation (weight-sensitivity)

But position can be a good predictor of stress location too

- ☞ **Could position conceal weight-sensitivity?**

Interim summary

Collinearity between two variables

1. Syllable weight
2. Initial stress

- **Take 3-syllable words**

  Light penult → initial stress

  Heavy penult → non-initial stress

- If position is a more **salient** predictor...

  ... it could conceal weight effects in the L2

☞ How salient is salient enough?

  - E.g., Tolerance Principle (Yang 2016)

Methods

Experiment

- Forced-choice task using Praat (Boersma and Weenink 2019)

  3-syl nonce words (English) auditorily presented (N = 180)

  Response + certainty level (1–6) + reaction time

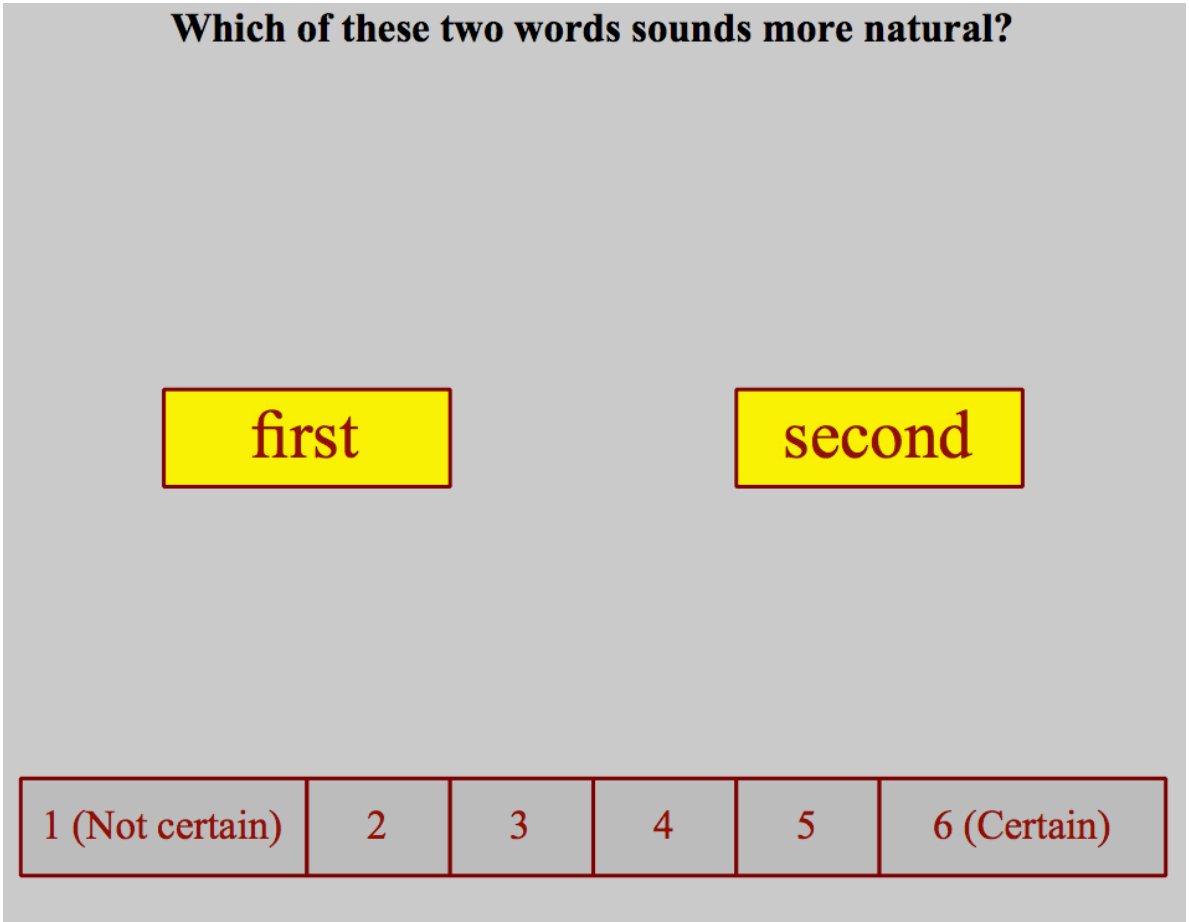
LLL	HLL	LHL
[prɪ.tɑ.rək]	[nɑr.pɛ.lət]	[dɑ.sɛŋ.kəl]
[lɑ.prɛ.sən]	[prɑŋ.kɛ.mət]	[pɛ.trɑŋ.kəp]
[sɑ.pɪ.nər]	[krɪm.pɛ.dən]	[tɪ.prɛs.dəl]

- Participants: En (n = 13), Ma (n = 24), Pt (n = 25)

  Upper-intermediate to advanced adult L2ers

Methods

Experiment



Statistical analysis

- Bayesian logistic regressions (multilevel)

  $\texttt{APU} \sim \texttt{weight} + (1 + \texttt{weight} \mid \texttt{subj}) + (1 \mid \texttt{item})$

  $\texttt{weight} = \{\underline{\texttt{LLL}}, \texttt{HLL}, \texttt{LHL}\}$

Three models:

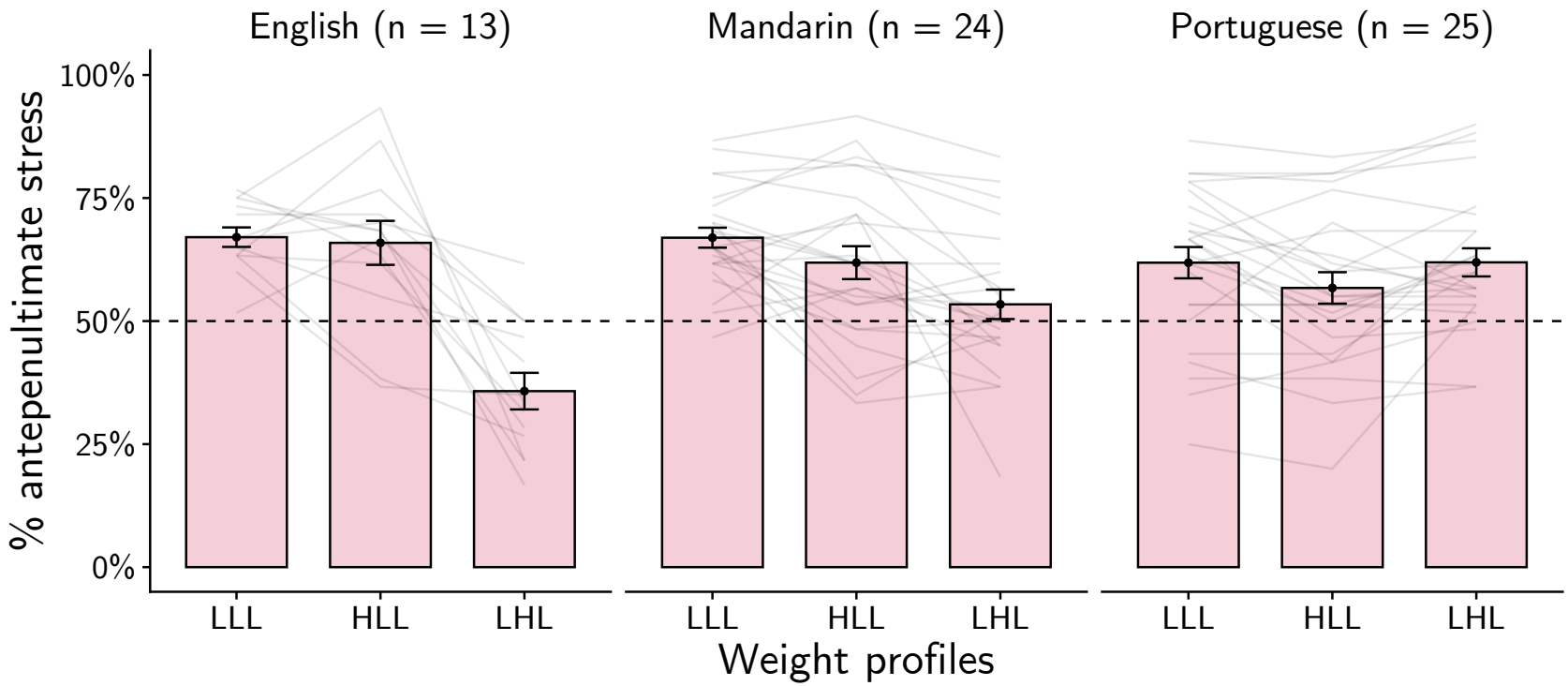
a.	Naïve	No *a priori* assumption
b.	Weight	Weight assumed to be transferred
c.	Position	Position assumed to drive responses

☞ **Once we observe the data, which model has the best fit?**

Results

Response patterns

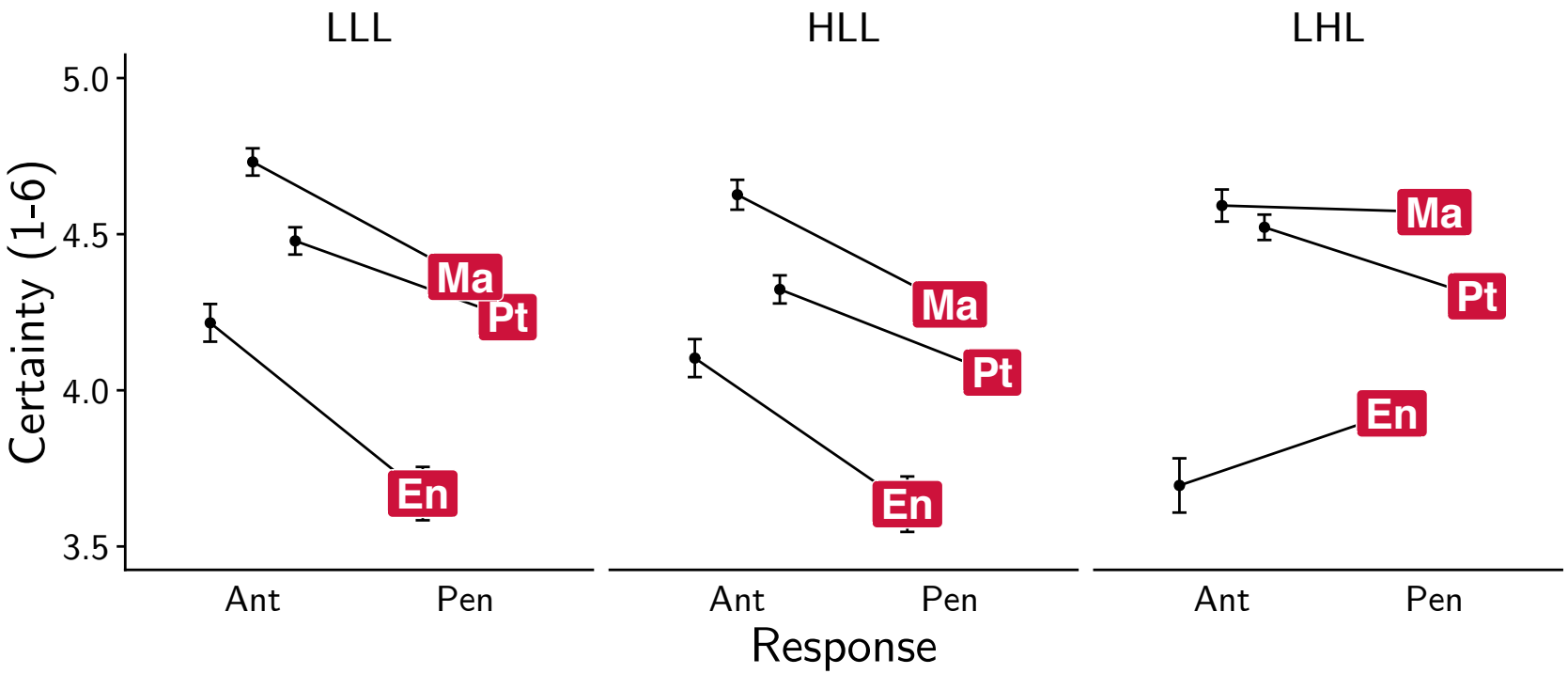
- Only controls favor APU stress $< 50\%$ in LHL words
- ☞ L2ers: APU stress $> 50\%$ **regardless of weight profile**
  - What we would predict if **position > weight**



Results

Certainty

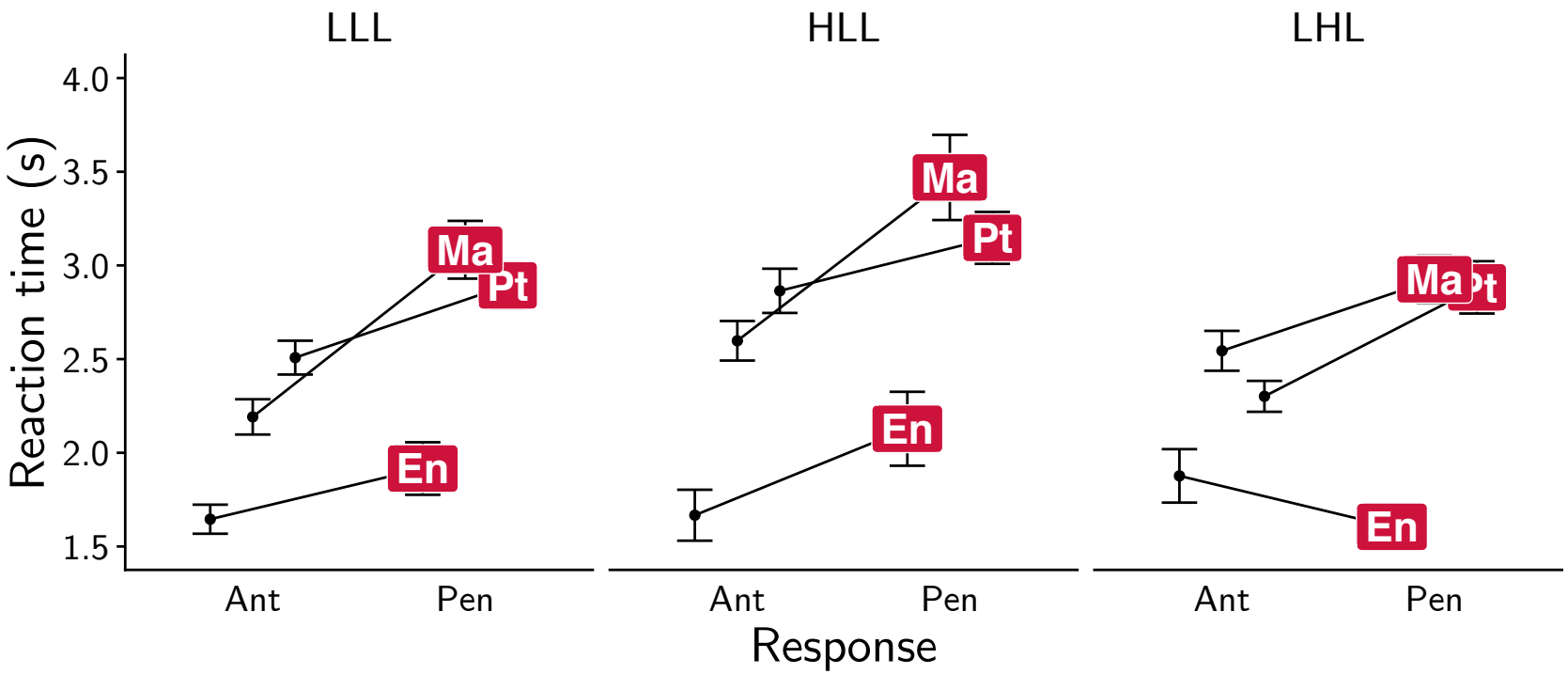
- Controls' certainty aligned with weight-sensitivity
- ☞ L2ers overall more certain about APU stress



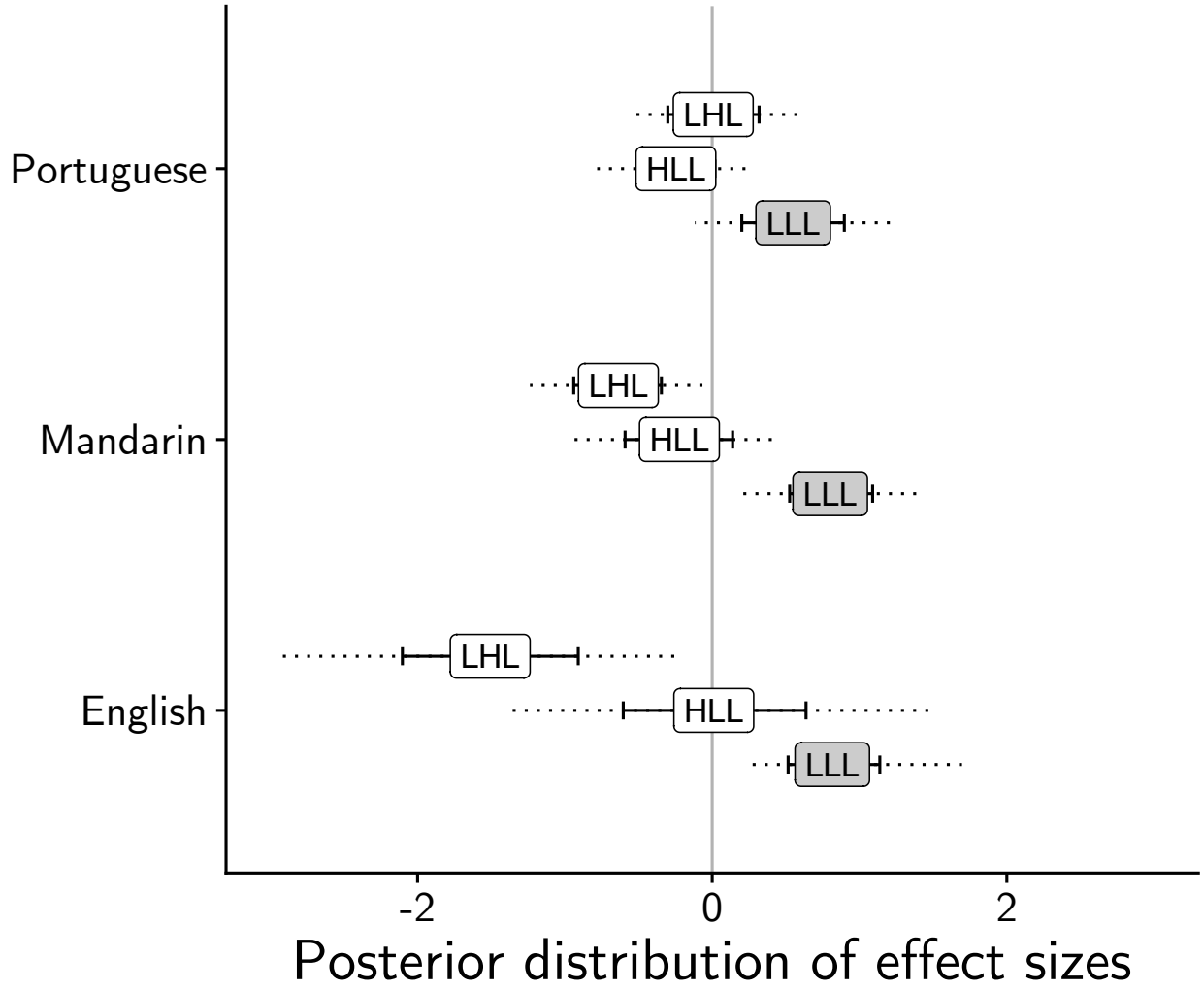
Results

Reaction time

- Controls' RT aligned with weight-sensitivity
- ☞ L2ers overall faster when choosing APU stress



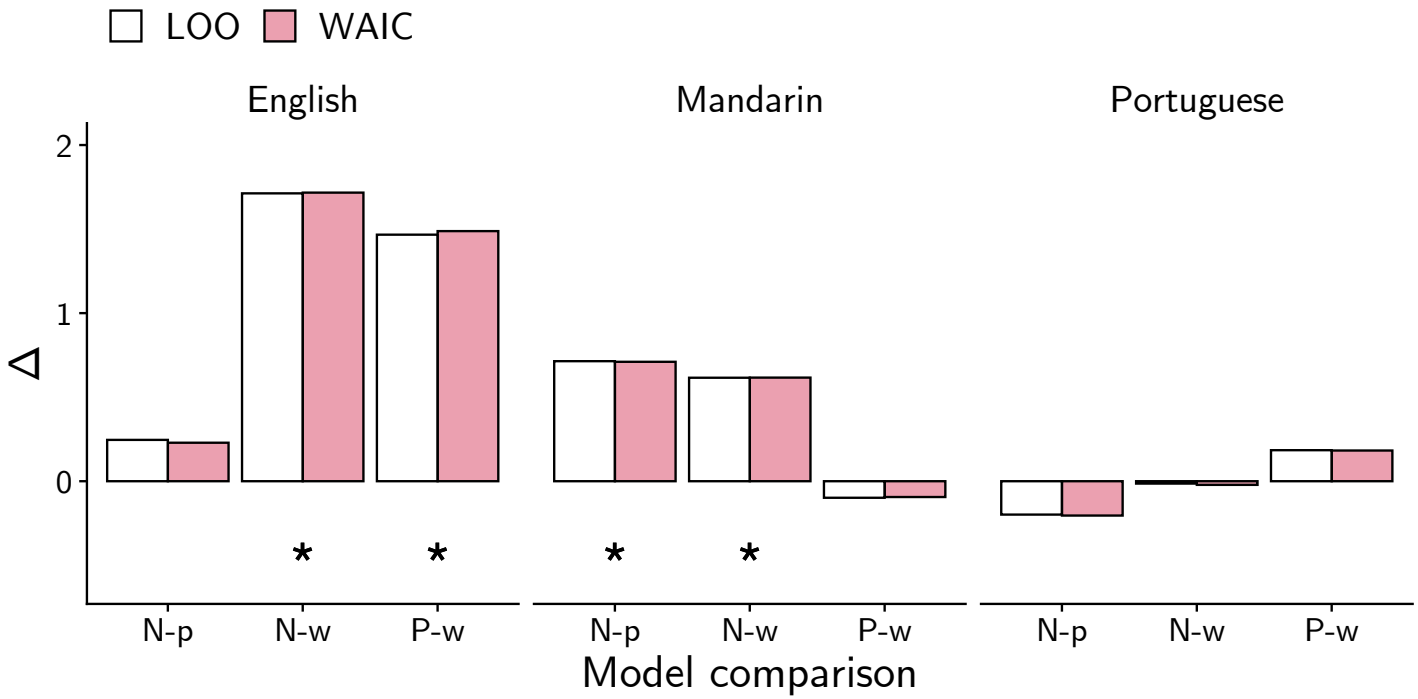
Statistical analysis (naïve models)



Model comparison

N(aïve), P(osition), W(eight)

Positive bar $\rightarrow$ X-[x] better fit



Conclusion

- L2ers are not using weight consistently

  Instead, they favor initial stress across the board
- L2ers' certainty and reaction time aligned with responses

☞ Consistent with the hypothesis that **position ≻ weight**

Weight-sensitivity doesn't seem to have been acquired

I.e.: Not robust enough to be generalized by L2ers (E.g., Yang 2016)

L2 lexicon size + low frequency of LHL (common) words

☞ **Weight model:** no better fit for L2ers; better for natives

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Thank you!

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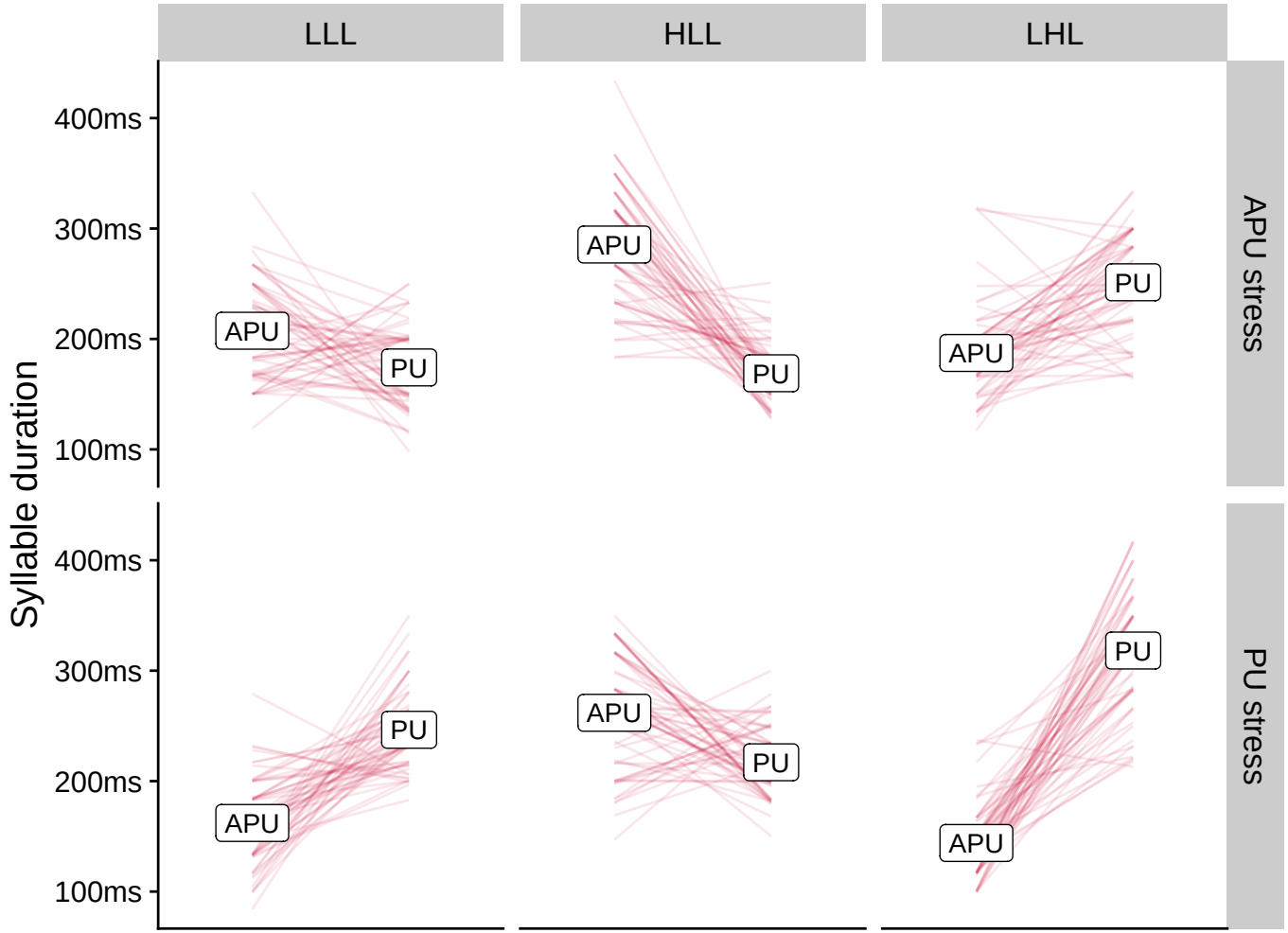
Appendix i

Syllable duration in stimuli



Appendix ii

Statistical models

- Positive → antepenultimate stress is favored (relative to LLL)

MODELS' ASSUMPTIONS AND ASSOCIATED PRIORS

		1. Naïve	2. Weight	3. Position
LLL	*Effect:*	–	Positive	Positive
	Prior:	Flat	$\mathcal{N} \sim (1, 1)$	$\mathcal{N} \sim (1, 1)$
HLL	*Effect:*	–	Neutral	Neutral
	Prior:	Flat	$\mathcal{N} \sim (0, 1)$	$\mathcal{N} \sim (0, 1)$
LHL	*Effect:*	–	**Negative**	**Neutral**
	Prior:	Flat	$\mathcal{N} \sim (-1, 1)$	$\mathcal{N} \sim (0, 1)$
			transfer	*no transfer*

Appendix iii

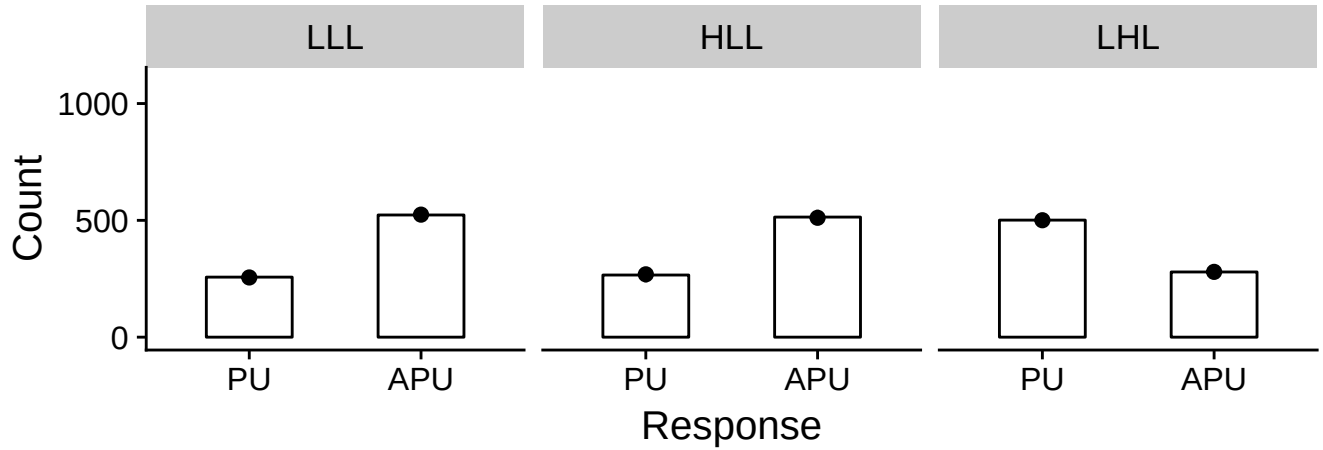
(Naïve) models' results

	GROUPS		
	English	*Mandarin*	*Portuguese*
LLL	0.82	0.80	0.56
95% HDI	[0.53, 1.11]	[0.53, 1.09]	[0.21, 0.91]
HLL	0.02	-0.22	-0.24
95% HDI	[-0.61, 0.68]	[-0.59, 0.15]	[-0.50, 0.02]
LHL	-1.51	-0.64	0.01
95% HDI	[-2.13, -0.93]	[-0.93, -0.35]	[-0.28, 0.31]

Appendix iv

Posterior predictive checks

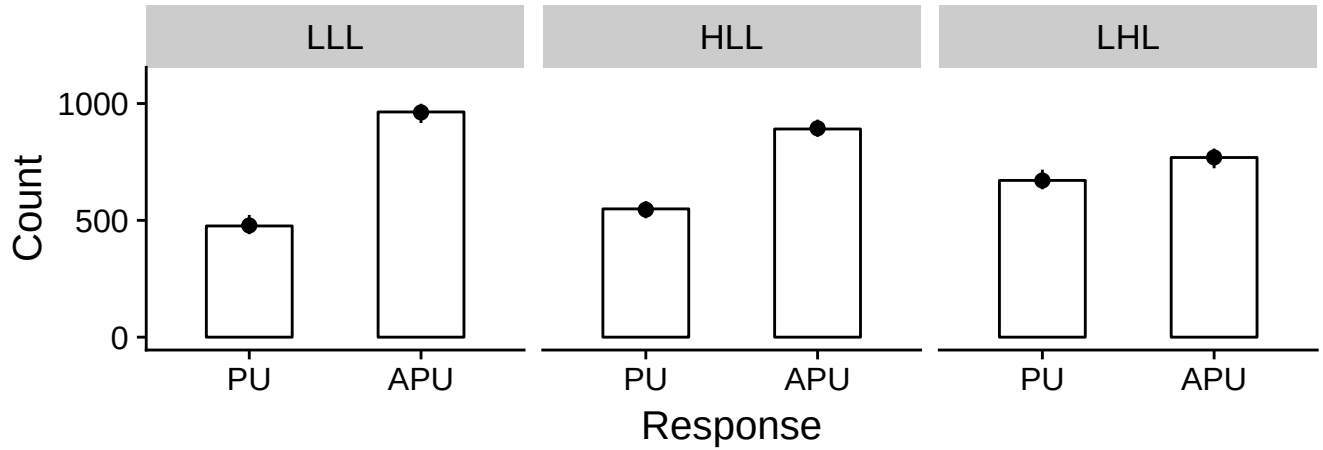
English



Appendix iv

Posterior predictive checks

Mandarin



Appendix iv

Posterior predictive checks

Portuguese