Computing segmental and suprasegmental information in lexical decision

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24th mfm
Today

**Lexical decision & stress**

Speakers take longer to recognize words if stress coincides with the segmental point of recognition.

- **Hypothesis:** when crucial segmental and suprasegmental information need to be processed at (nearly) at the same time, reaction time slows down
Introduction
   Role of stress?
   Portuguese stress

Methods
   Lexical decision task
   Stimuli
   Speakers
   Hypothesis

Results & Discussion
   Data
   Analysis
   Conclusion
Known segmental effects on lexical access


- **Word frequency**
  More frequent words → faster RTs

- **Neighbourhood density**
  Words with sparse phonological neighbourhoods → faster RTs
  (cf. Vitevitch and Rodríguez 2005 for Spanish)

- **Phonotactics**
  More frequent patterns → faster RTs

- **Stress...?**
  Word-initial stress → faster RTs
  (Vitevitch et al. 1997)
Stress & lexical access

Word-initial stress in En → faster RTs (Vitevitch et al. 1997)

- Confound: positional bias in English (Cutler and Carter 1987)

∴ The relationship between stress per se and RT is unclear

Today

Lexical decision task in Portuguese

Unlike English, no bias towards word-initial stress
Portuguese stress
General patterns

In Pt, a heavy (H) σ has a coda or a diphthong:

- **Final** stress if H]_PWd. Else, **penult** stress  (a)
- **Antepenult** stress considered ‘irregular/idiosyncratic’  (b)

**Bias:** penult stress *(default)*

(a) *caracól* (‘snail’), *caválo* (‘horse’)
(b) *patético* (‘pathetic’), *fantástico* (‘fantastic’)

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Suprasegmental information and lexical decision  6 of 19
Auditory lexical decision task
Methods: stimuli

Trisyllabic words ($n = 360$)
Different syllable shapes and segmental qualities
Real ($n = 180$) and nonce words pseudorandomly presented

- Real word $\rightarrow$ **Final onset** $\rightarrow$ Nonce word

∴ **Point of recognition (PoR):** onset of final syllable

E.g. *moletom* (‘sweater’) $\rightarrow$ *molerom*

- Stimuli: article + noun
Auditory lexical decision task

Methods: stimuli

- Recorded by a phonetically trained Portuguese speaker (f)
- No phonetic manipulation
- Response button only available after each stimulus

Stimuli preceded by question:

‘Is this a real word in Portuguese?’
Auditory lexical decision task
Methods: participants & variables

Participants \( (n = 51) \): native Portuguese speakers
Cut-off point: 80% accuracy \( (n = 37) \)

- Variables examined:
  - Stress
  - Bigram probability, neighbourhood density, frequency
- RTs scaled and centred by speaker (z-score)
1 **Hypothesis:** when crucial segmental and suprasegmental information need to be processed at (nearly) at the same time, reaction time slows down

2 Are phonetic cues to stress available early on?
Neighbourhood density
More neighbours = faster RTs

Unlike English (Sommers 1996)
But consistent with Spanish (Vitevitch and Rodríguez 2005)
Stress

Earlier stress = faster RTs

- Real words = faster RTs, consistent with previous studies
Overview
Multilevel linear regression estimates (fixed effects)

U slower than PU
APU faster than PU
Stress

Bayesian estimation (Kruschke 2013)

\[ \text{APU}_{\mu_1} \text{ vs. PU}_{\mu_2} \]

\[ \text{PU}_{\mu_1} \text{ vs. U}_{\mu_2} \]
Phonetic cues

1. **Hypothesis:** when crucial segmental and suprasegmental information need to be processed at (nearly) at the same time, reaction time slows down

2. Are phonetic cues to stress available early on?
   - Given the relative nature of stress:
     
     *How early can speakers perceive APU stress?*
Phonetic cues

Duration

Main phonetic correlate in Pt is duration: (Major 1985)

- Overall, stressed syllables are considerably longer
Phonetic cues

Intensity

Besides, note amplitude in APU $\sigma$s:

$\therefore$ APU stress is phonetically cued **early**
Results are consistent with the hypothesis:
U stress ‘coincides’ with PoR → slower RT
Stimuli contain sufficiently robust phonetic cues to stress
Stress plays a clear role in lexical access in these data
Distance matters: segment vs. syllable?
Next steps

- Prediction: whenever stress is aligned with PoR → slower RTs

Thus, if PoR is varied within each stress pattern:

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Thank you!

Slides on guilhermegarcia.github.io