

Intelligibility and Comprehensibility in Real Time: The Neuro- and Psycholinguistics of the L2 Parser

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The Intelligibility Metric: Word Level

- Intelligibility (Levis, 2005; Munro & Derwing, 1995) Is oft defined functionally as successful identification (by the listener) of the intended word spoken by a NNS.
- I argue it should also be viewed as a measure of psycholinguistic parsing, and neurolinguistic activation.

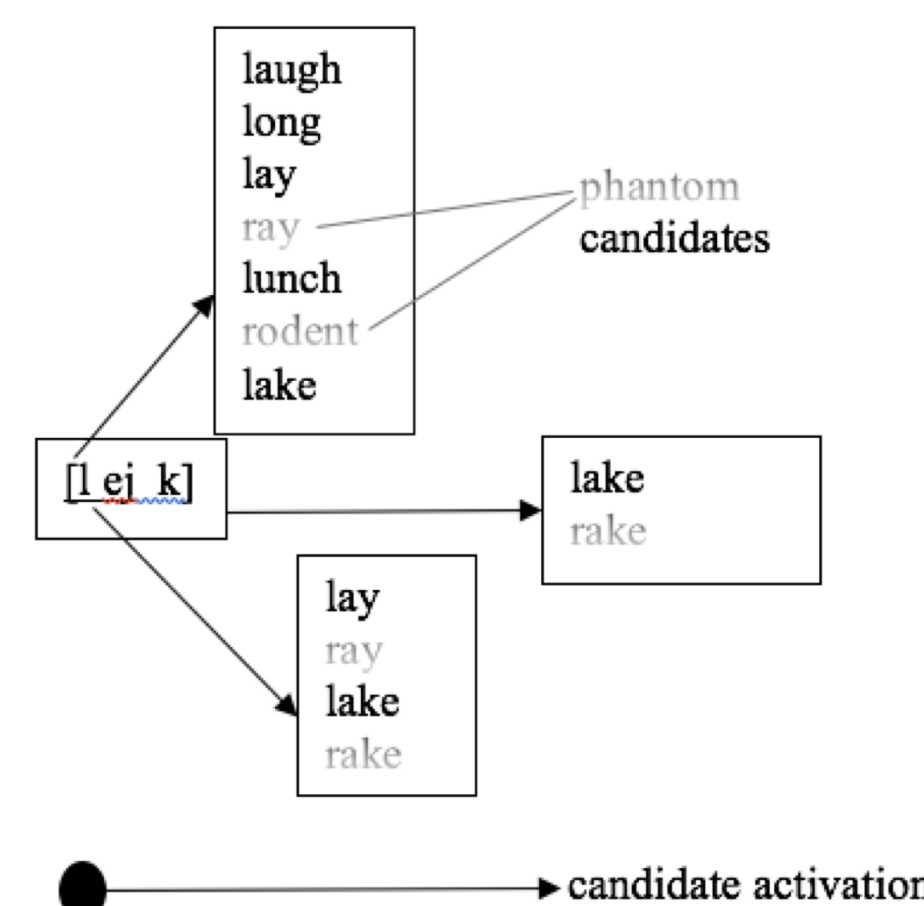
What Makes a Word Intelligible?

- 1.matching acoustic input to abstract units (phonemes; feet)
- 2.activating words consistent with those phonological categories

Spoken Word Recognition

Cohorts and Phantom Competitors

(Marslen-Wilson, 1985; Broersma & Cutler, 2007)



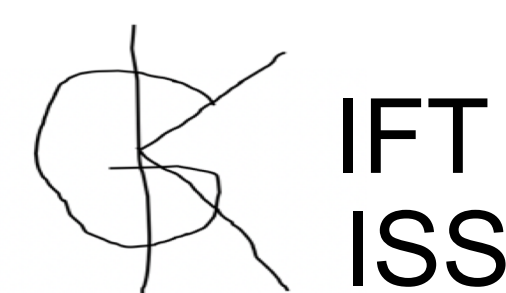
Bottom-up/Top-Down

- ambiguous \$ (part [s])/part [f] is heard as /f/ in 'gift' but /s/ in 'kiss'



Feed-Forward/Feed-Back

- even though we can't re-hear the input, we process in parallel before decision

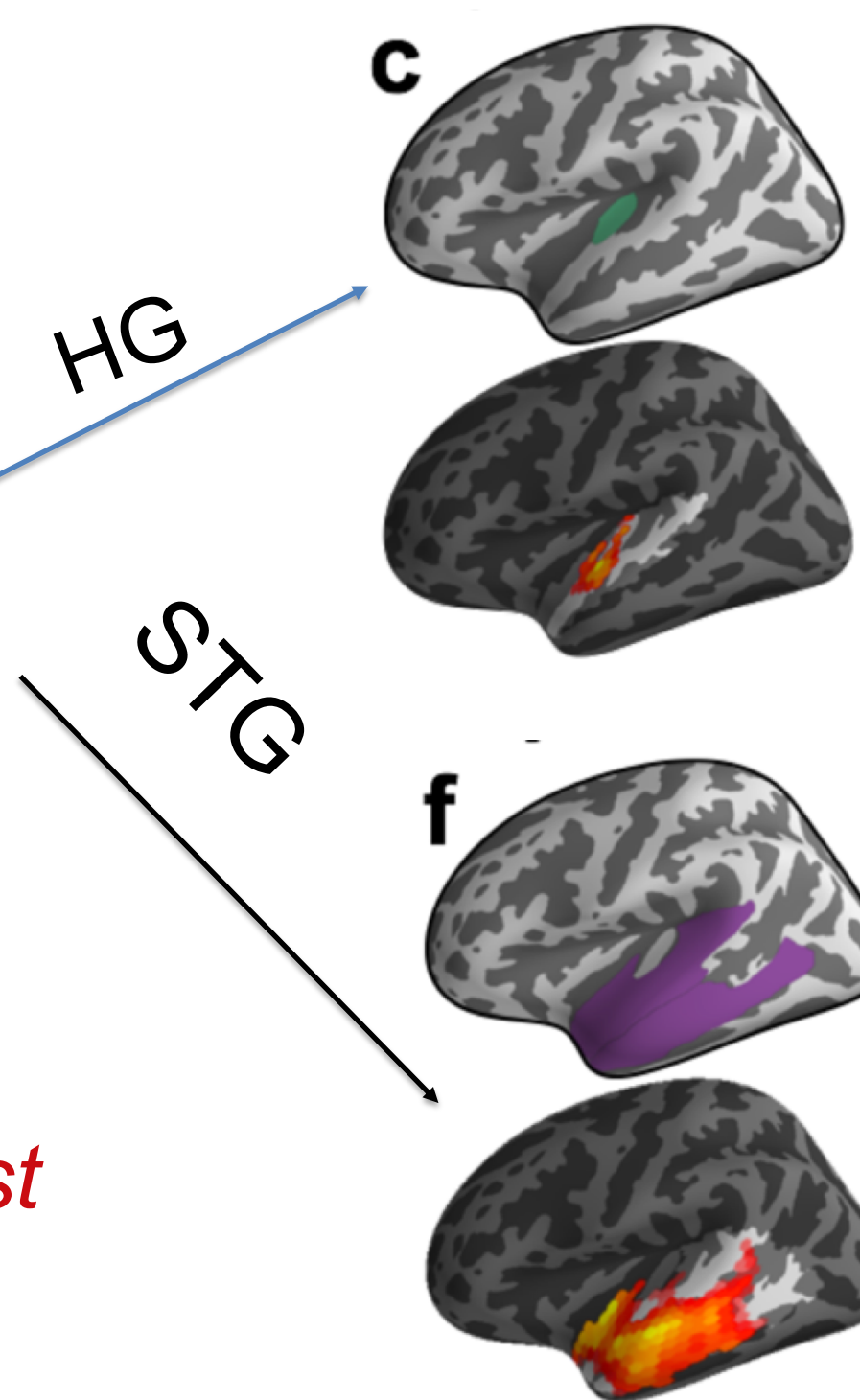


Phoneme Uncertainty (Gwilliams, 2018)

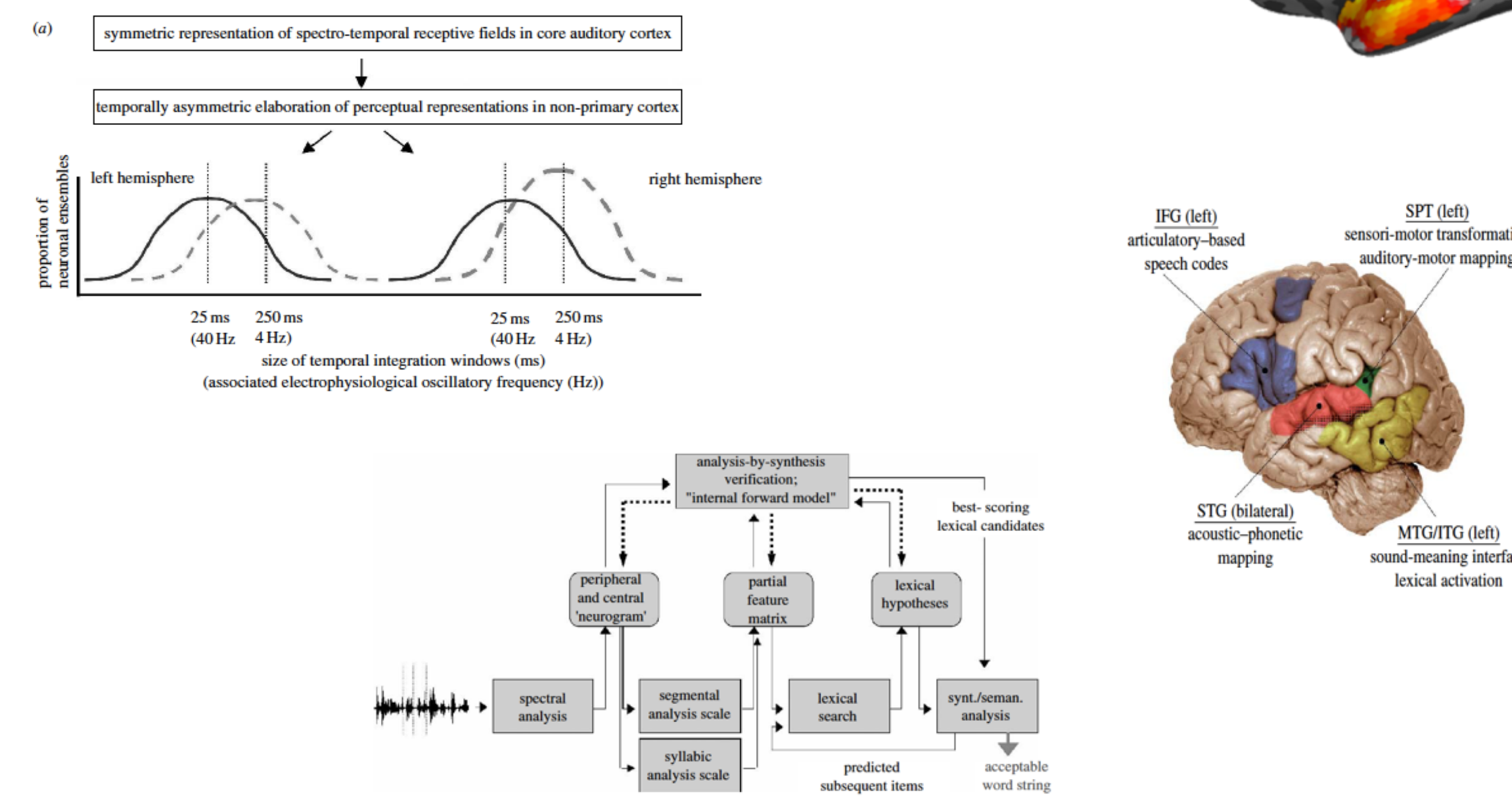
- at word beginning, uncertainty AND lexical frequency weight candidates
- later in word, activation is weighted by frequency alone
- implications for L2 speech

MEG Studies (Gwilliams, 2017)

- phonological ambiguity: 50ms
- lexical commitment: 300-450ms
- parallel computation balances trade-off between speed and accuracy



Poeppel & Idsardi: Hypthesize & Test



The Parser

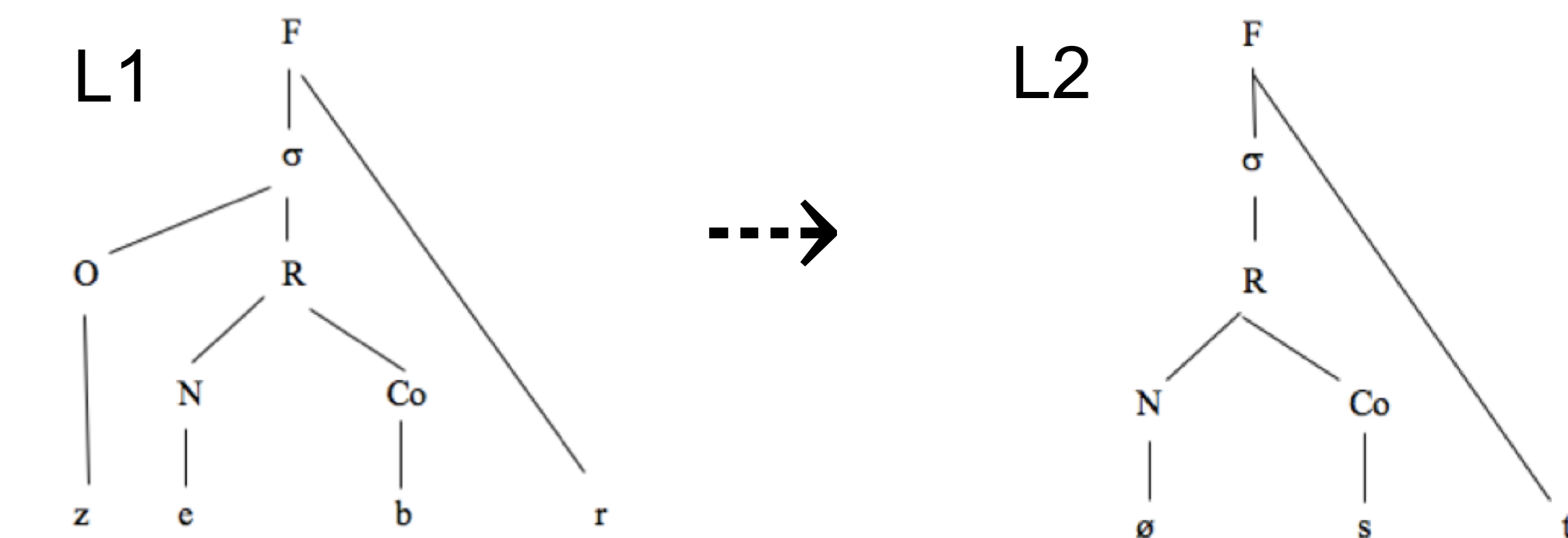
- The parser's job is to assign hierarchical structure to the speech stream (Archibald, 2004).
- the parser operates L → R

Persian/Saudi Illusory Vowels

- Unlike Japanese & BP subjects, Persian (and Saudi) subjects accurately perceive English sC sequences as being [s]- initial, not vowel-initial.

L1	sC Onsets?	Branching Onsets?	Appendices	% Errors
Japanese	No	No	No	72
Brazilian Portuguese	No	Yes	No	50
Persian	No	No	Yes	16

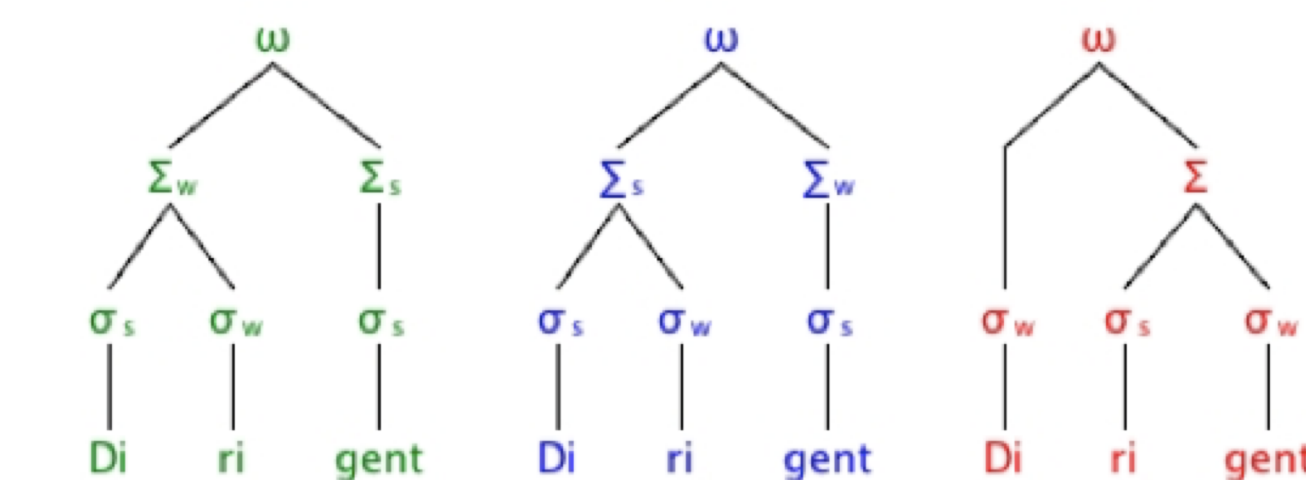
Intelligibility/Parsability: Syllables



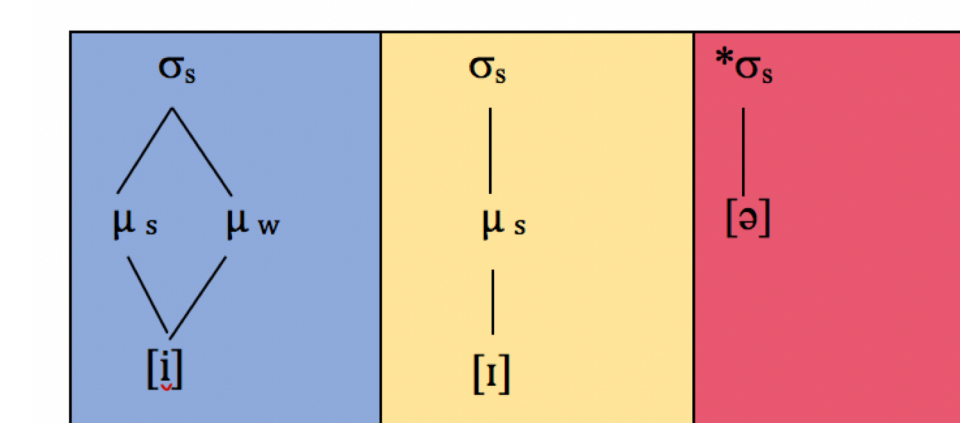
- via redeployment (Archibald, 2006) the English sC onset is *intelligible* to Persian (but not Japanese) ears because the string can be *parsed*. (Archibald & Yousefi, 2018; Almeheid, 2018)

Intelligibility/Parsability: Stress

- Isaacs & Trofimovich (2012) showed stress errors impede *comprehensibility* in English listeners.
- Weber (2013) showed certain stress errors affect intelligibility for German listeners (with both German & English input); wrong foot better than wrong syllable within a foot



- when combined with vowel reduction (Cutler, 2005) *intelligibility* affected in English
- not phantom competitors because few minimal pairs



It's hard because it can't be resolved after 50ms; must be a parsing problem: mapping segment to moras/feet

Pedagogic Implications

Left-edge uncertainty (word & syllable) more costly. Right edge: epenthesis >> deletion

Conclusion

There is no universal intelligibility based on the signal alone; mediated by parsing.