Ambiguity of analysis: Inducing indexed constraints for Dutch stress

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Central issue

- More than one way to make the cut between rule and exception in stress systems like Dutch
- Existing Faithfulness-based theories need special factor to allow learning of regular stress
- Alternative: induction of indexed constraints
  - Direct evaluation of rule vs. exception
  - I offer (first) implementation
    - Framework: Expectation Driven Learning (Jarosz submitted)

Ambiguity: Dutch stress

- Dutch: QS with exceptions (van der Hulst 1984)
  - Antepenult if …-Light-Heavy, else penult (Heavy = closed syllable)
  - Quantity-sensitivity confirmed experimentally (Domahs et al. 2014)

(1) a. Antepenult in -LH: vá ni **tas** 'vanitas'
b. Penult stress: ka sí no 'casino'
c. Exceptional antepenult: kí mo no 'kimono'

- Van Oostendorp (2012): Alternative analysis with QI default rule (penult stress)
  - Why are (1a) and (1c) not both exceptions?

(2) *Non-shaded cells: Type freqs of 3 and 4-syllable monomorphemes per syllable weight/stress pattern (Ernestus & Neijt 2008; from CELEX corpus). Shaded cells: frequencies used in simulations.*

Weight pattern	Stress pattern					
	Antepenult		Penult		Final	
XLL	63	6	74	7	24	2
XXLL	18	2	21	2	2	0
XLH	54	5	7	1	34	3
XXLH	1	0	8	1	5	1
XHL	2	0	41	4	6	1
XXHL	0	0	12	1	0	0
XHH	2	0	2	0	2	0
XXHH	0	0	1	0	0	0

Inducing indexed constraints

- If stress exceptions come from Faithfulness:
  - Extra factor needed to learn regular stress
    - Markedness>>Faithfulness bias (Tessier 2006), or
    - Two-stage learning (Jarosz 2006)
- Strength/strictness of factor can influence rule/exception divide
- Alternative: replace stress Faithfulness by indexed Markedness constraints (Pater 2000, 2010)
  - But how to link constraints to individual words?
  - No previous implementation of this process
- Proposal: induce indexed constraint for a word when the word contradicts a pairwise ranking tendency set by previously encountered words (cf. Pater 2010)

Implementation and testing

- Expectation Driven Learning (Jarosz submitted)
  - Grammar: probability distribution over rankings
  - For data point d and constraint pair {A, B}, E(A >> B|d): how often within a sample of rankings from [current grammar given A>>B] is the data point generated in its tableau?
  - $P(A>>B|d) = \frac{E(A>>B|d)}{[E(A>>B|d) + E(B>>A|d)]}$
  - Used to update P(A>>B) in the grammar
- Induce indexed constraint when average over last 25 data points yields P(A >> B|d) > 0.5 and current data point yields P(A >> B|d) < 0.5
- Run on 36 constructed words with frequency of stress/weight as in (2), shaded columns
- Constraint set based on Nouveau (1994), van Oostendorp (1997):
  - Edgemost(L), Edgemost(R), Trochaic, Iambic
  - Non-finality(syll), Non-finality(foot), Ft-Bin, WSP

Results and discussion

(3) *A representative run, 730 iterations, plasticity = 0.1, sample size = 50: tested on novel unindexed items over 20 ranking samples; stress patterns that won most often are shown*

(X)XLL	**jalábada**	jabáda
(X)XLH	kalábadɑn	pábadɑn
(X)XHL	malabánda	labánda
(X)XHH	**xalábɑndɑn**	sabándɑn

- Learner finds QS rule (deviations from gold standard in bold): QI hypothesis rightly rejected
- Not directly derived from parameters in model: avoids challenges of Faithfulness-based model
- Future: more data, more parameter exploration

References

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