

Well-formed tone mappings with local, inviolable surface constraints

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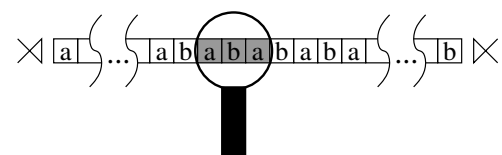


Overview

- How are tonal melodies associated to the timing tier?
- Previous answers:
 - Left-to-right and right-to-left association conventions (Leben 1973, Goldsmith 1976, inter alia)
 - Optimal satisfaction of universal, violable constraints whose prioritization is language-specific (Zoll 2003)
- Our answer: language-specific, inviolable, and **local** well-formedness constraints specifying illicit substructures

Computational Locality

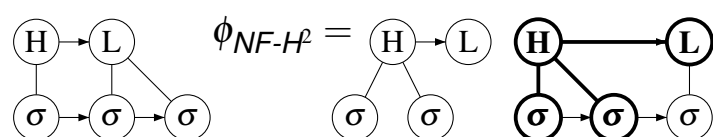
- 'Local': well-formedness of a structure determined solely on its **local substructures**



- Local substructures are **connected** and **bounded in size**
- Locality in strings: **substrings** are substructures (Rogers and Pullum, 2011; Rogers et al., 2013)
- Well-formed strings described by **inviolable** constraints forbidding substrings

Autosegmental Graphs

- Autosegmental representations are **graphs** (Goldsmith 1976, Coleman and Local 1991)

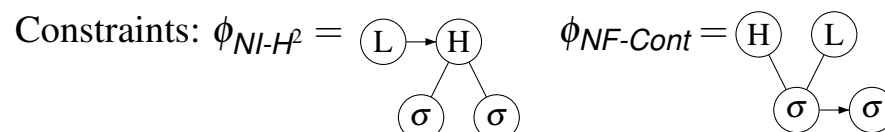
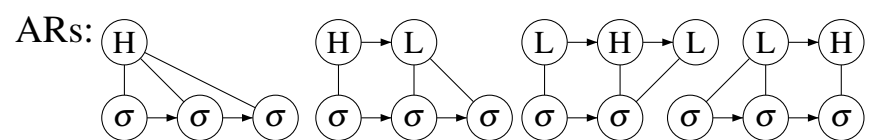


- Forbidden substructures are forbidden **subgraphs**
- Assumptions: full specification, NCC & OCP
- ARs with these properties can be generated through concatenation (Jardine and Heinz, 2015)

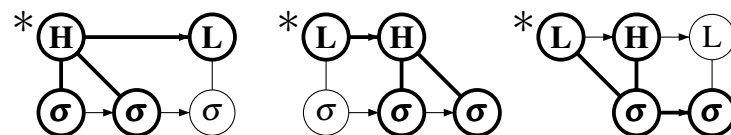
Case studies

Kukuya word tone (Zoll 2003)

a. kâ 'to pick' H-L b. sámà 'conversation' HL c. káràgà 'entangled' HLL
 d. sǎ 'knot' L-H e. kàrà 'paralytic' LH f. m^wàrègí 'brother' LLH
 g. bá 'palms' H h. bágá 'show knives' HH i. bálágá 'fence' HHH
 j. bvĩ falls' L-H-L k. pǎlĩ 'goes out' LH-L l. kàlógí 'turns' LHL



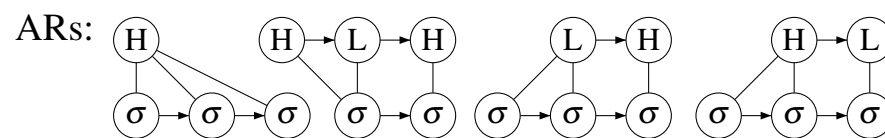
Analysis: $\neg\phi_{NF-Cont} \wedge \neg\phi_{NF-H^2} \wedge \neg\phi_{NI-H^2}$



Mende (Leben 1973): $\neg\phi_{NF-Cont} \wedge \neg\phi_{NF-H^2} \wedge \neg\phi_{NF-L^2}$

Hausa tone-integrating suffixes (Newman 1986, 2000):

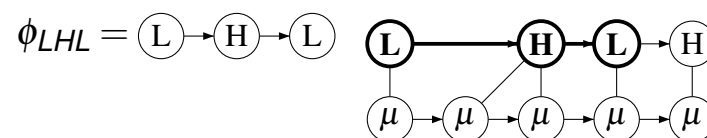
$\neg\phi_{NI-Cont} \wedge \neg\phi_{NI-H^2} \wedge \neg\phi_{NI-L^2}$



Wan Japanese α (Kubozono 2011; Breteler, 2013):

a. ká-ngà 'child' LH b. mǐdù-ngá 'water' HLH
 c. tátámì-ngá 'tatami mat' HHLH d. mǐdúkúmì-ngá 'glutinous rice' HHHLH

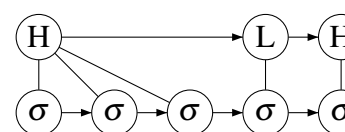
Constraint:



Analysis: $\neg\phi_{NF-H^2} \wedge \neg\phi_{NF-L^2} \wedge \neg\phi_{NI-L^2} \wedge \neg\phi_{Cont} \wedge \neg\phi_{FL}$

N. Karanga 'edge-in' assoc. (Hewitt and Prince, 1989)

(Partial) Analysis: $\neg\phi_{NI-H^2} \wedge \neg\phi_{H^2}$



Discussion

- Language-specific variation in AR well-formedness describable with **forbidden subgraph constraints**
- Previous accounts miss the generalization that association is driven by constraints which are **fundamentally local**

Future work

- Work on learning forbidden substructures in strings (Heinz 2010, Chandlee and Heinz, to appear; Jardine and Heinz, accepted) shows clear path for learning forbidden subgraphs (Jardine and Heinz, LSA 2016)
- How to analyze distinct, grammatically conditioned association paradigms within the same language (Hyman and Ngunga, 1994)?
- Exceptional/rare patterns (e.g. Dwyer 1978's discussion of Mende) can be explained through weighted logics (Droste and Gustin, 2005)

Acknowledgements & Select References

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