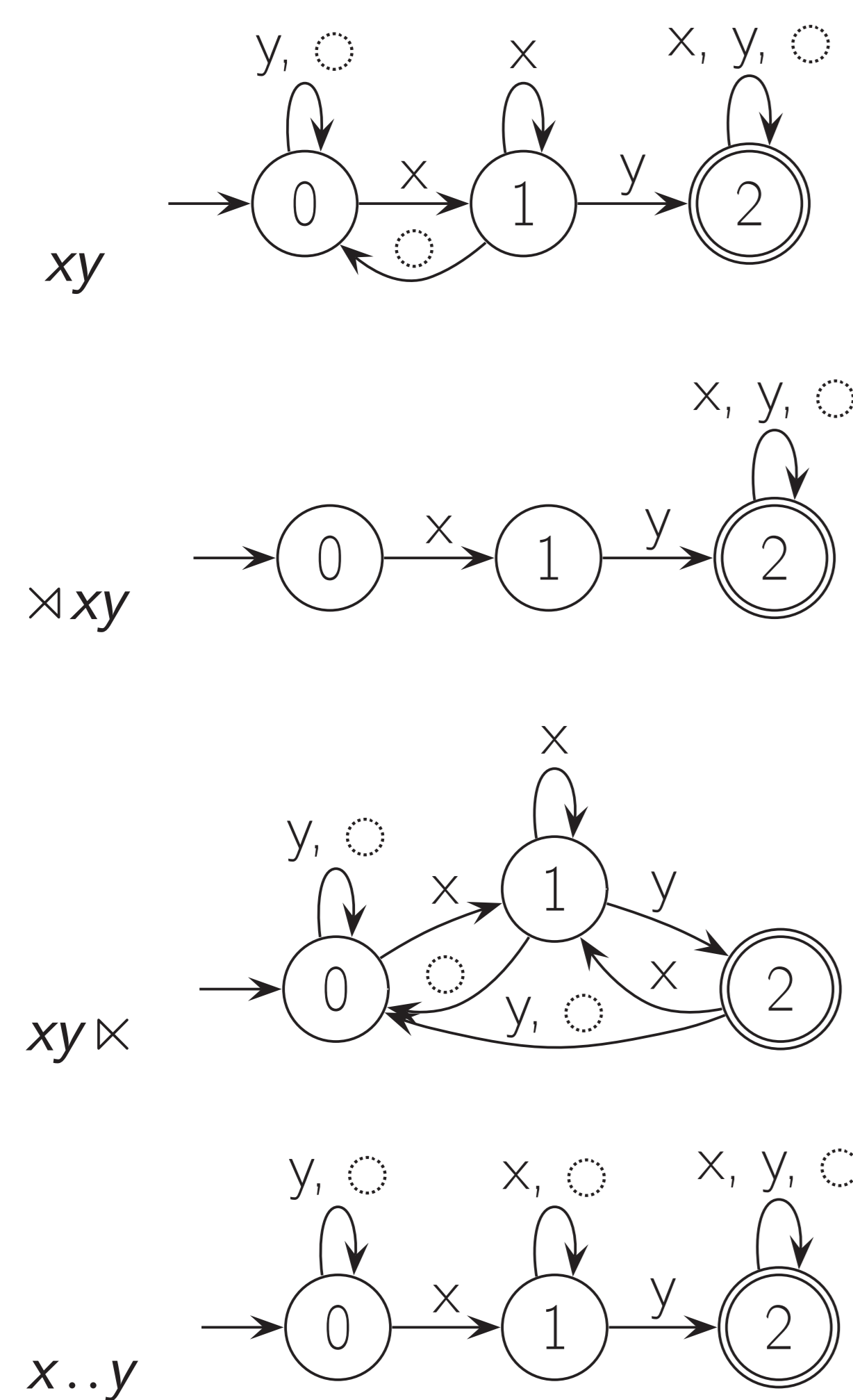


# A logical and computational methodology for exploring systems of phonotactic constraints

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## Logic and automata



Any of these can be treated as pieces  $p_i$ , where the Piecewise-Local factor  $p_1..p_2.. \dots ..p_n$  is realized by concatenation:  $p_1 \bullet p_2 \bullet \dots \bullet p_n$ .

## Cheremis Meadow

"In words of all sizes, primary stress falls on the final syllable if it is superheavy, else on the right-most non-final heavy syllable, else on the final syllable if it is heavy, else on the final syllable. In words of all sizes, there is no secondary stress." [GHvdH15]

## Categorizing constraints

	Local	PL	Piecewise
Obligatory stress	$\acute{\sigma}$	coSL <sub>1</sub>	coSP <sub>1</sub>
Culminative stress	$\neg\acute{\sigma}.. \acute{\sigma}$	LTT <sub>1,2</sub>	SPL <sub>2,1</sub>
No primary stress precedes superheavy	$\neg\acute{\sigma}..S$	SF	SPL <sub>2,1</sub>
No primary stress precedes a nonfinal heavy	$\neg\acute{\sigma}..H.. \acute{\sigma}$	SF	SPL <sub>3,1</sub>
Light can only have primary stress if final	$\neg\acute{L}\acute{\sigma}$	SL <sub>2</sub>	SPL <sub>2,1</sub>
Primary light cannot occur with heavy	$\neg(\acute{L} \wedge \acute{H})$	LT <sub>1</sub>	SPL <sub>2,1</sub>
Primary light cannot occur with heavy	$\neg(\acute{L} \wedge \acute{S})$	LT <sub>1</sub>	SPL <sub>2,1</sub>
Final plain heavy: unstressed if preceded by heavy	$\neg H.. \acute{H} \times$	LT <sub>2</sub>	SPL <sub>2,2</sub>
Final plain heavy: unstressed if preceded by heavy	$\neg S.. \acute{H} \times$	LT <sub>2</sub>	SPL <sub>2,2</sub>

Adjacency: SF    Precedence: SF    Both: LT<sub>2</sub> + SP<sub>3</sub>    Combined: SPL<sub>3,2</sub> + coSPL<sub>1,1</sub>

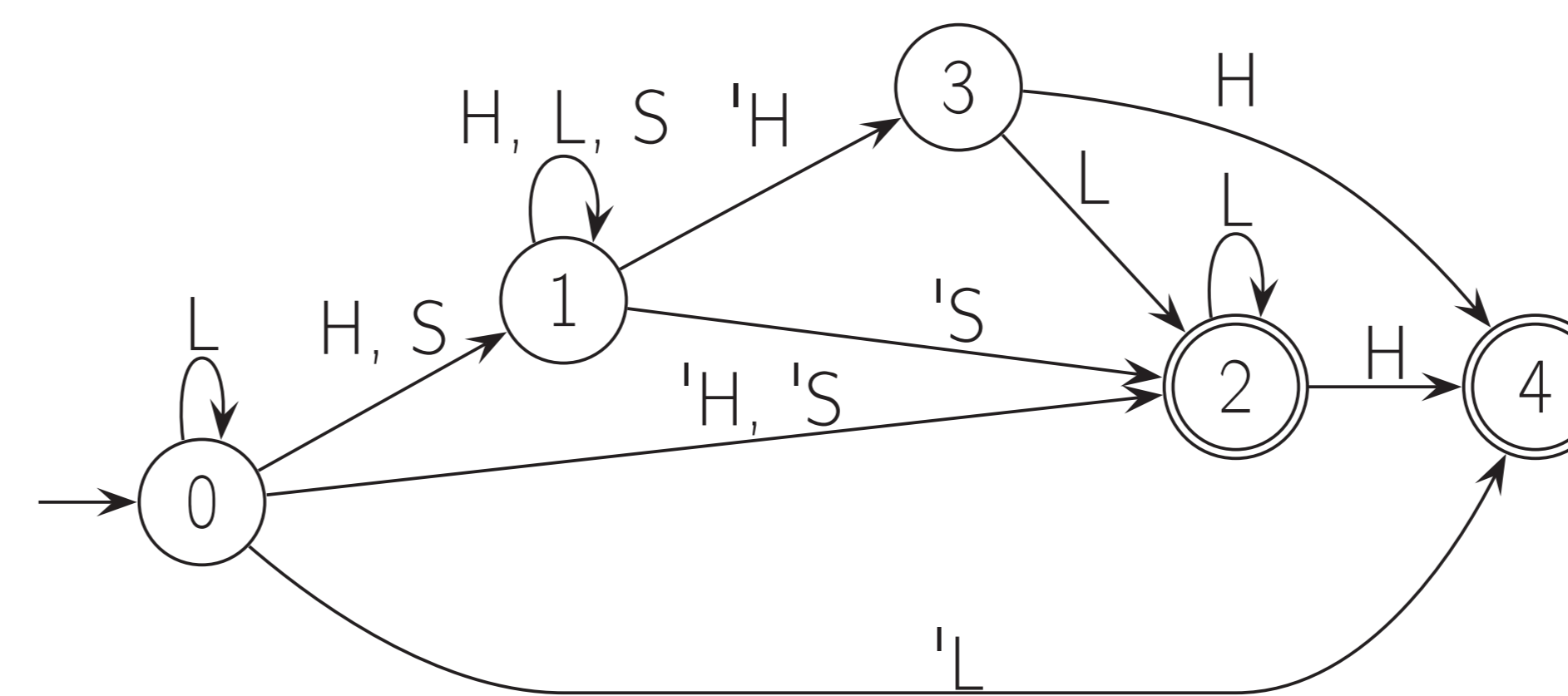
## The Local Language Toolkit

**plebby** Piecewise-Local Expression Builder interpreter

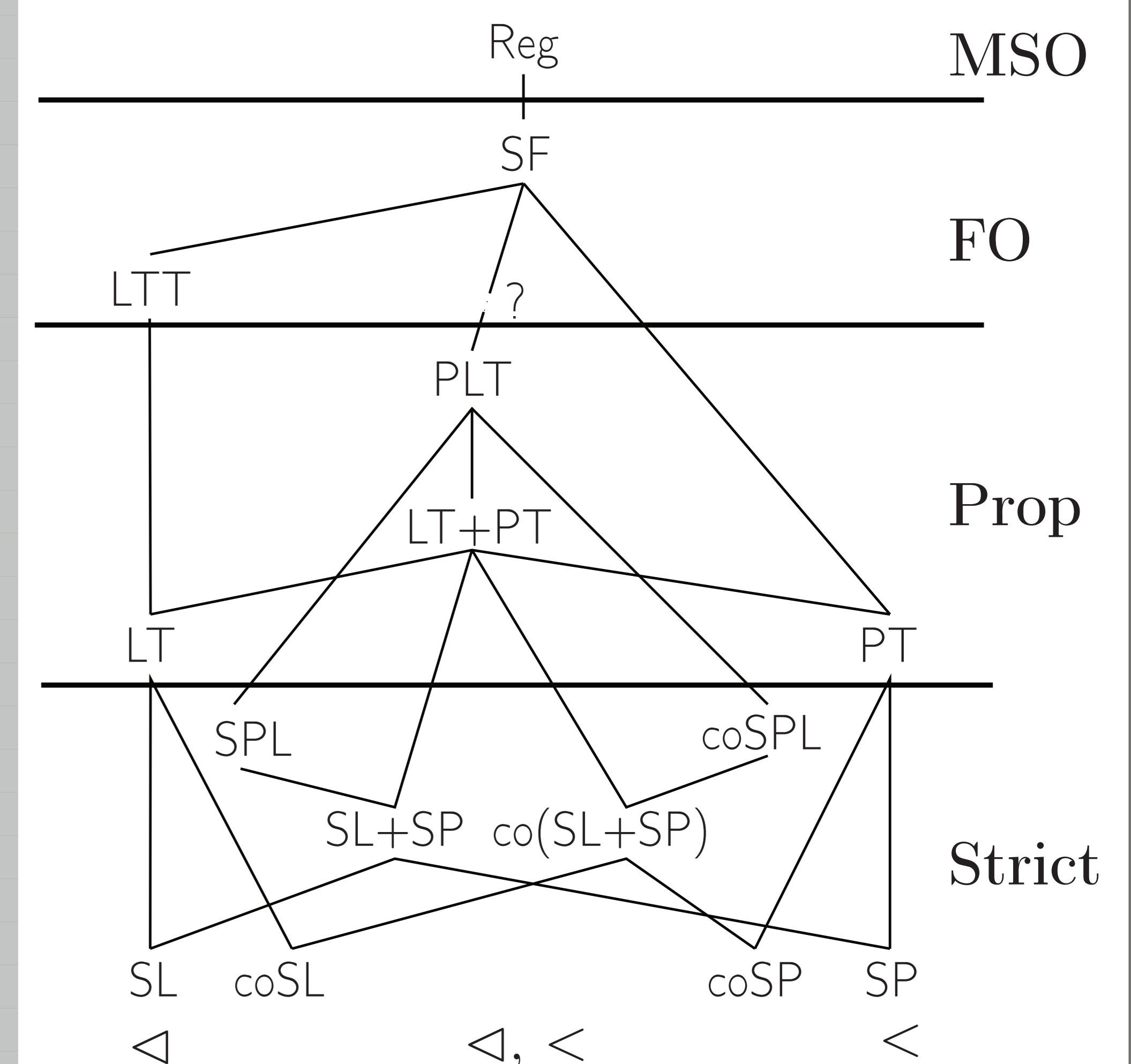
**factorize** Automatically extract certain classes of constraints from automata

## Interacting with plebby

- =  $\sigma \{ /L, /H, /S \}$
  - =  $'\sigma \{ /'L, /'H, /'S \}$
  - =  $\times\sigma \{ \sigma, '\sigma \}$
  - =  $\times\text{heavy} \{ /H, /S, /'H, /'S \}$
  - = obligatoriness  $\langle '\sigma \rangle$
  - = culminativity  $\neg \langle '\sigma, '\sigma \rangle$
  - = d1  $\neg \langle '\sigma, /S \rangle$
  - = d2  $\neg \langle '\sigma, /H, \times\sigma \rangle$
  - = d3  $\neg \langle /'L, \times\sigma \rangle$
  - = d4  $\cap \{ \neg \langle /'L, \times\text{heavy} \rangle, \neg \langle \times\text{heavy}, /'L \rangle \}$
  - = d5  $\neg \times \langle \times\text{heavy}, /'H \rangle$
- $\cap \{ \text{obligatoriness}, \text{culminativity}, d1, d2, d3, d4, d5 \}$   
:display it



## A local hierarchy



## References

- ▶ R. W. Goedemans, Jeffrey Heinz, and Harry van der Hulst, <http://st2.uliet.net/files/files/st2-v1-archive-0415.tar.gz>, April 2015, Retrieved 24 Jun 2015.
- ▶ Jeffrey Heinz, *The inductive learning of phonotactic patterns*, Ph.D. thesis, University of California, Los Angeles, 2007.
- ▶ James Rogers, Jeff Heinz, Margaret Fero, Jeremy Hurst, Dakotah Lambert, and Sean Wibel, *Cognitive and sub-regular complexity*, Formal Grammar 2012 (Glyn Morrill and Mark-Jan Nederhof, eds.), Lecture Notes in Computer Science, vol. 8036, Springer, 2012, pp. 90–108.

See full paper for full list.

