

Noisy HG Models of Eastern Andalusian Harmony
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Hayes (2017) investigates various implementations of Noisy Harmonic Grammar (NHG) and suggests that actual data bearing on these differences may be hard to find. Eastern Andalusian (EA) harmony (Lloret & Jiménez 2009) presents an interesting case in this regard because the range of possible outputs is circumscribed by categorical imperatives, and therefore small changes in how variation is produced can have significant consequences. A word-final lax vowel causes [ATR] harmony in the stressed syllable. Any intervening vowels optionally harmonize, too (*cómetelos* [kómetelɔ] ~ [kómɛtelɔ] ‘eat them (for you)!’), though if one does, they all do: *[kómetelɔ]. Pretonic vowels also optionally harmonize (*monederos* [moneðéɾɔ] ~ [mɔneðéɾɔ] ‘purses’); again, they do so as a group: *[mɔneðéɾɔ]. Post-tonic harmony is required for pretonic harmony: in *recógelos* ‘pick them,’ the pretonic vowel harmonizes only when the post-tonic vowel also harmonizes: [rekóhɛlɔ], [rekóhɛlɔ], [rekóhɛlɔ], *[rekóhɛlɔ]. Finally, high vowels become lax word-finally but do not undergo harmony: *crisis* [kɾísɪ] ‘crisis.’ This paper explores possible models of this variation centered on Hayes’s varieties of NHG.

Harmony is driven by Positional Licensing (PL) constraints (Lloret & Jiménez 2009) requiring [–ATR] to appear in the stressed syllable (and also post-tonic vowels if discontinuous harmony domains are prohibited) or in all syllables (thus reaching pretonic vowels). Here I consider two versions of PL: negative PL (N-PL), which penalizes unlicensed [–ATR], and Kaplan’s (2018) positive PL (P-PL), which rewards licensed [–ATR].

Monte Carlo simulations following Hayes (2017) were run using 7 different implementations of NHG with N-PL and P-PL, yielding 14 total simulations. The stage at which noise was applied varied: (i) the constraint level: noise is added to a constraint’s weight so that the “new” weight is constant across the evaluation; (ii) the cell level: the noise that is added in two cells of a tableau may differ, even for the same constraint; (iii) the candidate level: noise is added to candidates’ harmony scores. Within (i) and (ii), further nuances were considered: noise is added to weights (a) before or (b) after multiplication of penalties by weights, and (c) like (b), but no noise is added if the constraint assigns no penalty. Four forms that exemplify the range of EA’s harmony were included: *cómetelos*, *monederos*, *recógelos*, and *crisis*.

Of the 14 simulations, only NHG variety (ia)—Hayes’s “classic NHG,” with noise applied to weights at the outset of the evaluation—with P-PL regularly produced attested forms more frequently than unattested ones; see Figure 1 (capitalization = [–ATR]). In fact, unattested forms are almost never generated. The other simulations consistently overgenerate, with at least some unattested form appearing at least as often as some attested form; see Figure 2, e.g., which shows NHG variety (iib) under N-PL.

This study, then, supports classic NHG and P-PL. Under N-PL—unlike P-PL—some attested forms are harmonically bounded. While some versions of NHG can produce harmonically bounded forms, for EA, NHG cannot generate licit harmonically bounded forms without also generating illicit ones. The more successful approach is to instead let constraints make the necessary distinction. This has implications for other kinds of variation. Classic NHG cannot produce local optionality, but other versions of NHG can (Hayes 2017). This means that if we adopt classic NHG, we must seek some other way of producing local optionality besides perturbations in constraint weights.

• Hayes, B. 2017. Varieties of Noisy HG. In K Jesney, C O’Hara, C Smith, & R Walker (eds.), *Proceedings of AMP 2016*, Washington, DC: Linguistic Society of America. • Kaplan, A. 2018. Positional Licensing, Asymmetric Trade-Offs, and Gradient Constraints in Harmonic Grammar. *Phonology* 35:247–286. • Lloret, MR & Jiménez, J. 2009. Un Análisis Óptimo de la Armonía Vocálica del Andaluz. *Verba* 36:293–325.

PG-PL: Classic NHG

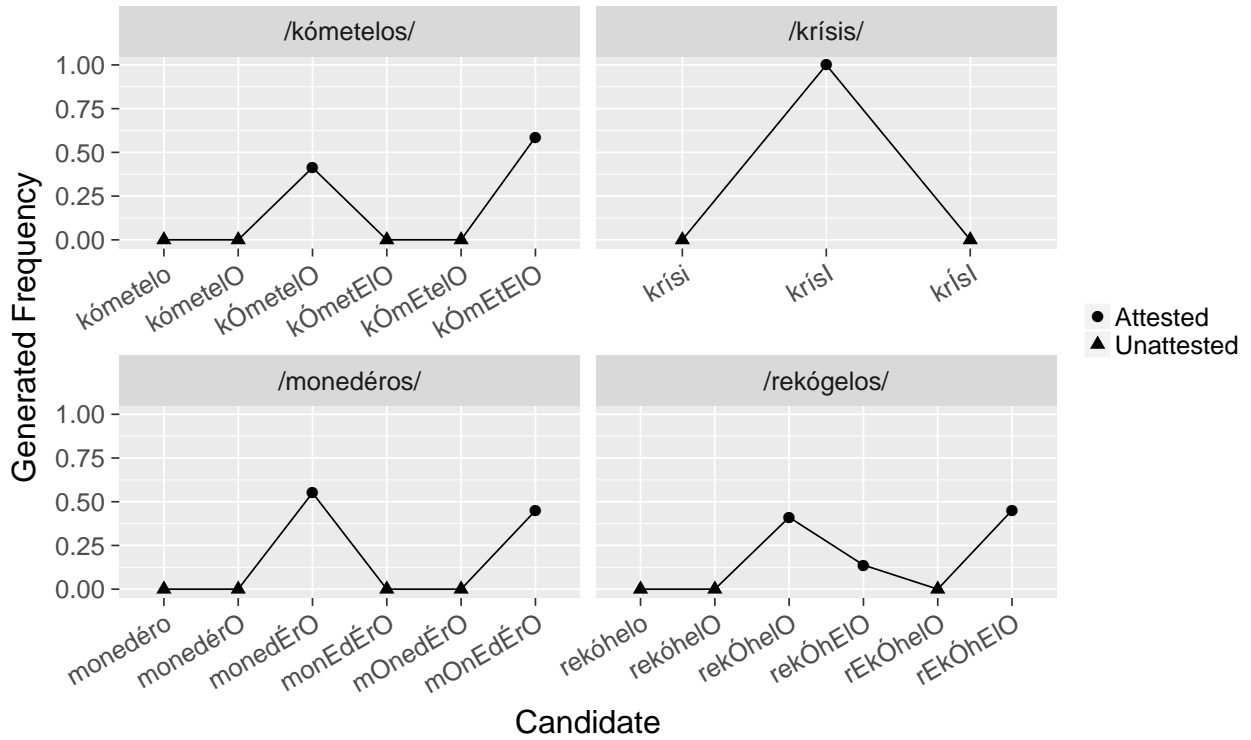


Figure 1: Results of a simulation using classic NHG & P-PL

NG-PL: Cell-Level Post-Multiplicative Noise Noise Allowed with Zero Violations

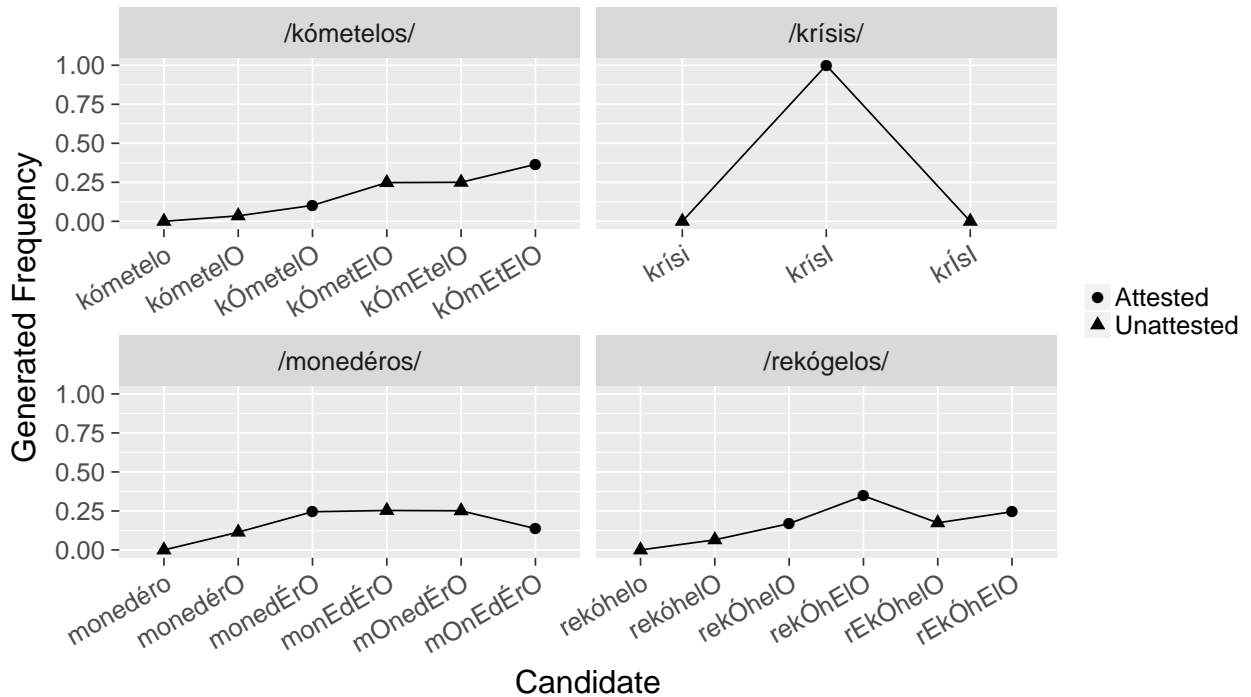


Figure 2: Results of another simulation with worse results