Using the Tolerance Principle as a diagnostic of phonological rules Betsy Sneller ~ University of Pennsylvania ~ @betsysneller

The Problem: Phonological relationships that fall in between *phoneme* and *allophone*, using classic but ill-defined diagnostics of *predictability* and *contrastiveness*.

Examples:



/ay/-raising, Philadelphia (Fruehwald, 2013)

- Trisyllabic Shortening $obscene \sim obscenity$ serene ~ serenity obese ~ obesity
- Philadelphia /æ/ split analyzed as both: phonemic (Ferguson, 1972; Labov 1989; Dinkin 2013) allophonic (Kiparsky, 1995; Labov et al. 2016; Sneller 2018)

 $a \rightarrow ah / [+ant] \wedge (+nasal \vee -voice+fricative)] \sigma$ Ltense {mad, bad, glad, planet*} Llax {ran, swam, can, am, carafe, math, gaffe, ...}

Previous Solutions:

- Intermediate categories (quasi-phoneme, hemiphone, deep allophone, fuzzy contrast) (see Hall, 2013)
- Lexical phonology (Kiparsky, 1995)
- Gradient phonology (Hall, 2008)

Proposal: There are no intermediate categories. Phonological processes can tolerate a limited number of lexical exceptions

Tolerance Principle (Yang, 2016) is one way to define an upper limit to the exceptions a productive rule can tolerate:

Example: If a child knew 10 verbs: {*walk, smile, play, laugh, jump, cry,* run, sing, swim, throw}, the regular past tense -ed morphology would still be productive, because $4 \leq 10/\ln(10)$, or $4 \leq 4.3$.

Implications and Predictions

Phonological Change: Individual differences in phonologization when e is close to the threshold

Nasal /æ/ split, Philadelphia (Sneller, 2018)

 $e \leq N/\ln(N)$

e = exceptions, N = number of words to which the process could apply

Application: Find total N and e using CHILDES (MacWhinney, 2000)

• /ay/ raising: $3 \le 763.8 = 6733/\ln(6733)$ • Nasal $/æ/: 1 \le 194.7 = 1412/\ln(1412)$ • Trisyllabic Shortening: $9 \le 13.1 = 52/\ln(52)$ • Philadelphia /æ/ split: $39 \le 194.7 = 1412/\ln(1412)$

Lexical exceptions participate in variation alongside the regular process (Sneller, 2018)

References: Dinkin, A. (2013). What's really happening to short-a before L in Philadelphia? American Speech 88(1), 7-31. * Fruehwald, J. (2013). Phonological involvement in phonetic change. Philadelphia, PA: University of Pennsylvania Doctoral dissertation. * Hall, K. C. (2009). A probabilistic model of phonological relationships from contrast to allophony. Columbus, OH: The Ohio State University Doctoral dissertation. * Hall, K.C. (2013). A typology of intermediate phonological relationships. The Linguistic Review 30(2), 215-275. * Kiparsky, P. (1995). The phonological basis of sound change. In J. Goldsmith (Ed.), Handbook of Phonological Theory. Blackwell. * Labov, W. (1989). The exact description of a speech community. In R. Fasold & D. Schiffrin (Eds.), Language Change and Variation (pp. 1–57). John Benjamins.* Labov, W., Fisher, S., Gylfadottir, D., Henderson, A., & Sneller, B. (2016). Competing systems in Philadelphia phonology. Language Variation and Change, 28(3), 273–305. * Sneller, B. (2018). Allophonic systems as a variable within individual speakers. In J. Havenhill & D. Lightfoot (Eds.), Variable properties in language: their nature and acquisition. Georgetown University Press.

Phonological Variation: