Predicting stress in English verbs – analogy, morphology, and the level of abstraction of phonological patterns

Aaron Seiler and Sabine Arndt-Lappe

Trier University (Germany)

Set within the generative tradition, most current work assumes that stress position in English is largely determined by morphological complexity and syllable weight (cf. Alber 2020 [1] for a summary for Germanic). Furthermore, syntactic category is relevant, with verbs displaying a greater tendency towards final stress than nouns (Liberman & Prince 1977 [9]). Still, stress in English verbs has largely remained a puzzle. Why, e.g., is stress penultimate in *pólish*, but final in *commít*, despite their final syllables having the same structure? Recent empirical work has also highlighted the importance even of opaque morphological constituents as well as of word length (esp. Dabouis & Fournier 2023 [4]). For example, stress on opaque prefixes seems strongly dispreferred in disyllables, but is regularly tolerated in trisyllables ending in *-ate* (e.g. *dismíss* vs. *désignate*). It is presently unclear how this complex nexus of facts can be accommodated in a coherent theory of the phonology-morphology interface. One question is whether effects of 'morphology' are purely based on recurrence of form or on a mapping of meaning and form. The other question is about the nature of relevant phonological representations: if recurrence plays a role, what is the evidence for more abstract representations, e.g. in terms of syllable weight? We address these questions from the perspective of an analogy-based view of linguistic generalisation (e.g. Bybee 2010 [3]), which assumes that language users assign stress based on the patterns of similar verbs in their Mental Lexicons.

Employing a computational analogical model ('AML', Skousen et al. 2013 [11]), **Study 1** tests if stress in existing English verbs can be predicted on the basis of recurrence, without explicit information about morphological status or weight. The dataset comprises all verbs from Daniel Jones' Pronouncing Dictionary (Jones 2006 [8], N=3033, > 1 syllable). Verbs were transcribed phonetically (right-aligned by syllabic structure). Accuracy ranges between 78% and 95% on unseen data for antepenult, penult, and final stress. In the model, hubs among influential gangs of analogues can be identified, whose shared features reflect bound morphological units, both transparent and opaque. **Study 2** zooms in on trisyllabic verbs, testing analogy (recurrent form), morphological status of initial syllables, and weight in a production (reading) study with pseudo-words (50 native speakers of British English, N=1,081 observations) and a simulation with AML. Trisyllables are well suited for testing analogical against structural factors because among existing verbs, trisyllables differ considerably from disyllables in several aspects relevant to the study. So far, there has been no investigation of stress in trisyllabic (pseudo-)verbs, with pertinent studies largely focussing on disyllables (e.g., Guion et al. 2003 [6]) or long nouns (e.g., Moore-Cantwell 2020 [10]). Test words were embedded in carrier sentences which controlled for syntactic category and meaning. The design manipulated the morphological status of the initial syllable (productive prefixes, unproductive prefixes, non-prefixes) and the weight of all three syllables, operationalised as a binary distinction between open and closed syllables (Hayes 1982 [7]). To test analogy, we had AML predict stress in the pseudo-words based on the dictionary data used in Study 1. Lexical support measures were then used as a predictors alongside weight and prefixation in a mixed-effects logistic regression model. Results show that all three variables are significant predictors of main stress in the experimental data (cf. Fig. 1). Lexical support is strongly correlated with actual productions, even if AML underpredicts participants' overall preference for antepenult stress. This is unexpected given the formal literature, but in line with patterns found among trisyllabic verbs in the lexicon (Dabouis & Fournier 2023 [4]). Productive prefixes work against, and heavy final syllables work in favour of antepenult stress (as in Domahs et al. 2014 [5]). In sum, Study 1 and Study 2 show that stress in English verbs is predictable from recurrent segmental patterns. Study 2 also provides evidence for the relevance of more abstract categories (weight, word length, morphology). We argue that both types of effect are in line with an analogy-based view of stress assignment.
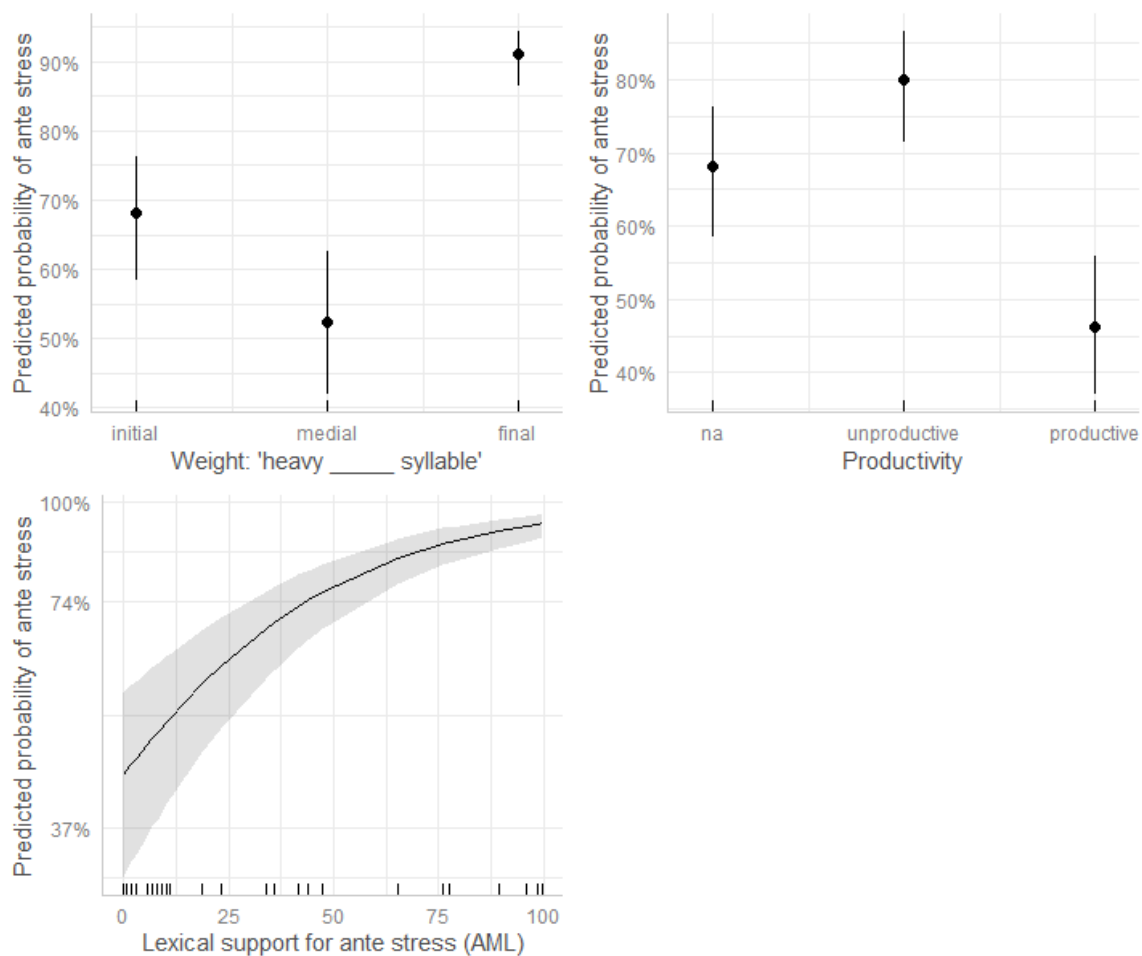
Figure 1. Partial effects plot for a mixed effects logistic regression model (implemented in the lme4 package for R, Bates et al. 2015 [2]), predicting the probability of antepenult stress on the basis of lexical support as computed by AML (LEXICAL SUPPORT FOR ANTE STRESS, lower panel), SYLLABLE WEIGHT (upper panel on the left) and PRODUCTIVITY of the prefix (upper panel on the right, with "na" being a placeholder for "non-prefixed" here). PARTICIPANT is included as a random factor.

References

[1] Alber, B. (2020). Word Stress in Germanic. In Michael T. Putnam & B. Richard Page (eds.), *The Cambridge Handbook of Germanic Linguistics*, 73–96. Cambridge: CUP.

[2] Bates, D., M. Mächler, B. Bolker & S. Walker (2015). Fitting Linear Mixed-Effects Models Using lme4. *Journal of Statistical Software*, 67(1).

[3] Bybee, J. (2010). *Language, Usage and Cognition*. Cambridge: Cambridge University Press.

[4] Dabouis, Q. & J.-M. Fournier (2023). The stress pattern of English verbs. In N. Ballier, J.-M. Fournier, A. Przewozny & E. Yamada (Eds.), *English Word Stress. Theories, Data and Variation*, 154–191. Edinburgh: Edinburgh University Press.

[5] Domahs, U., Plag, I. & R. Carroll (2014). Word stress assignment in German, English and Dutch: Quantity-sensitivity and extrametricality revisited. *J Comp German Linguistics*, 17, 59–96.

[6] Guion, S. G., Clark, J. J., Harada, T., & Wayland, R. P. (2003). Factors affecting stress placement for English nonwords include syllabic structure, lexical class, and stress patterns of phonologically similar words. *Language and Speech*, 46(4), 403-426.

[7] Hayes, B. (1982). Extrametricality and English stress. *Linguistic Inquiry*, 13(2), 227–276.

[8] Jones, D. (2006). *Cambridge English Pronouncing Dictionary*. Cambridge: CUP.

[9] Liberman, M. Y. & A. Prince (1977). On stress and linguistic rhythm. *Linguistic Inquiry*, 8, 249–336.

[10] Moore-Cantwell, C. (2020). Weight and final vowels in the English stress system. *Phonology*, 37(4), 657-695.

[11] Skousen, R., T. Stanford & N. Glenn (2013). *Algorithm: AM*. <https://github.com/garfieldnate/Algorithm-AM>