Asymmetrical Generalisation of Harmony Triggers

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In vowel harmony systems, certain classes of segments may be preferred as triggers — Kaun (1995) notes that rounding harmony is preferentially triggered by non-high segments. In Yakut, for example, both high and non-high vowels can spread rounding to high targets, but only non-high vowels can spread to non-high targets. Both language-internally (as in Yakut) and across languages, there is an implicational relationship between high and non-high triggers in rounding harmony: **high-vowel triggers imply non-high triggers, but not vice versa**. Kaun (1995) and others argue that this is phonetically grounded — non-high vowels manifest F_2 contrasts less prominently (Linker, 1982; Terbeek, 1977) and therefore benefit more from the boost in perceptual salience that harmony may provide.

Wilson (2006) proposes that phonetic grounding makes its way into the grammar via biases in learning — while both substantively grounded and arbitrary processes are learnable, the learner assigns a higher prior probability to the former. Moreton and Pater (2012a,b), in their review of artificial grammar learning experiments, find robust evidence for inductive biases based on structural complexity, but mixed and inconclusive evidence where substantive bias is concerned. Following in that line of inquiry, the present study investigates the possibility of substantive inductive bias favouring non-high triggers in rounding harmony. **Hypothesis:** If the implicational relationship described above is encoded as a substantive bias, naïve learners exposed to a harmony pattern triggered by *high* vowels should tend to form *broad generalisations* (including all vowels), while those exposed to *non-high* triggers should show a greater tendency to form *restricted generalisations* (limited to exposed triggers).

Methods: 67 native speakers of British English were trained on a novel suffix alternation involving stem-controlled back/rounding harmony; 33 subjects were trained with stems containing only mid vowels (*mid group*) while 34 were trained on stems containing only high vowels (*high group*). Training included both passive listening and testing with feedback (yes/no well-formedness judgements). In the final test phase (with no feedback) subjects were asked to judge *old* forms (specific items seen in training), *new* forms (new items of the same type seen in training) and *novel* forms (items of a new type — high-vowel stems for the mid group, and mid-vowel stems for the high group). 18 mid-group and 22 high-group subjects did not perform better than chance on old items and were excluded.

Results: Overall, mid learners showed higher performance than high learners ($p < 0.01$). As predicted, there was an interaction between group and item type — high learners showed no difference between new and novel items ($p > 0.05$), while mid learners showed greater generalisation to new items than novel items ($p < 0.001$). **Figure 1** (left) shows that this effect interacted with subjects' overall performance — proficient learners showed a *greater* asymmetry than less proficient learners ($p < 0.001$). Figure 1 (right) shows that non-learners, analysed separately, showed no asymmetry ($p > 0.05$). **Figure 2** shows that the asymmetry is also somewhat modulated by response time — while the interaction did not reach significance ($p > 0.05$), late responses show a greater asymmetry than early responses.

Discussion: The divergent generalisation behaviour of mid-vowel-trained and high-vowel-trained subjects seems to provide some support for a substantive bias. The interaction between this effect and subjects' overall performance suggests, contra van de Vijver and Baer-Henney (2014), that this distinction can emerge late in learning, and that substantive biases may perhaps be involved in *explicit* (rather than implicit; see e.g. Moreton and Pertsova 2015) concept learning.

References

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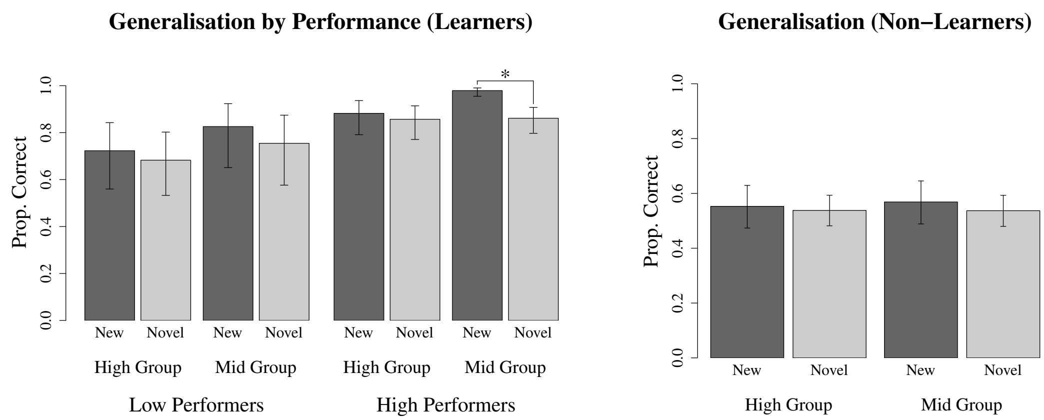

Figure 1: Generalisation by performance, for learners (left) and non-learners (right). 'Correct' responses were consistent with vowel harmony. Error bars are 95% CIs.

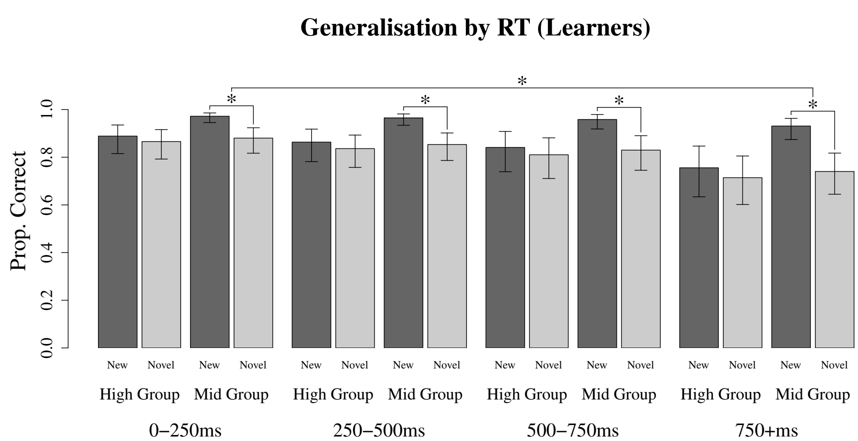

Figure 2: Asymmetrical generalisation as a function of response time.