We test the assumption that verbal working memory and speech production are closely related by testing whether overlap in different phonological features (manner, associated particularly with acoustic similarity according to the *acoustic feature hierarchy*, Fant, 1973, vs. place, associated particularly with articulatory similarity according to *articulatory phonology*, Browman & Goldstein, 1986) affects error patterns in a short-term memory task depending on whether the output requires articulation (in oral serial recall) or whether it does not (in written serial recall) and by comparing these findings to a speech error task in which feature overlap is manipulated in the same way.

In short-term serial recall, participants were presented with lists of five CV-syllables in which the vowel was always /a/ and in which the consonants either shared the manner and voicing features (/p/, /t/, /k/), shared the place and voicing features (/d/, /l/, /z/) or did not systematically overlap (/f/, /n/, /g/; sampling with replacement). In a series of four experiments, list presentation either provided acoustic sensory input or not (auditory presentation vs. visual presentation) and list recall either required articulatory output or not (oral recall vs. written recall). Syllables with onset consonants that are acoustically similar (sharing the MANNER feature, e.g. pa-ta) were more frequently confused than syllables with dissimilar consonants, with both auditory and visual input and written and oral output. Articulatorily similar items (with consonants sharing the PLACE feature, e.g. da-za) led to more errors than dissimilar items only with oral recall, that is, only when the task involved overt articulation. In all conditions, MANNER overlap caused more errors than PLACE overlap. Figure 1 displays mean error rates for visual presentation and oral recall (for a more detailed description of the results see Schweppe, Grice, & Rummer, 2011).

![Figure 1: Percentage of order errors for visually presented lists as a function of onset similarity and recall modality.](image)

The speech error task required paced reading aloud of tongue twisters (each consisting of four syllables with incompatible onset and rhyme patterns, e.g. pam-tos-tam-pos). Analogously to the short-term memory task, the onsets shared the PLACE feature (and the voicing feature), shared the MANNER feature (and the voicing feature), or did not overlap systematically. The error pattern resembled that of oral serial recall. There was a main effect of onset similarity ($F(2,96) = 6.86; \ p = .002$): Both types of feature overlap increased the
number of errors as compared to phonologically different onsets, but MANNER overlap had a stronger effect than PLACE overlap (see Figure 2).

Figure 2: Percentage of contextual onset substitutions as a function of onset similarity.

The influence of phonological feature overlap on speech errors as a function of whether articulatory movements are required or not is recently under discussion, with opposing views and data on whether phonological features are specified in – and thus influence – inner speech (e.g., Corley, Brocklehurst, & Moat, 2011; Oppenheim & Dell, 2008). However, neither of these studies took into account on what kind of feature overlap phonological similarity was based. Our data suggest that the involvement of phonological features in inner speech might depend on the type of feature that is shared.

In sum, both oral serial recall errors and induced speech errors were most frequent when the onset consonants shared the MANNER feature and were again more frequent when the PLACE feature was shared as compared to onsets without systematic overlap. In addition, both were influenced by internal features (acoustic similarity affects serial recall and paced reading in the absence of acoustic input) as well as by motor codes (articulatory similarity affects only those tasks that require overt articulation). This further supports theories that conceive of verbal working memory as being parasitic on language processes instead of constituting a separate cognitive system (e.g., Acheson & MacDonald, 2009; Jones, Macken, & Nicholls, 2004).

References: