Language-specific and language-independent feature-based effects on response latencies in reading nonce words aloud

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Mousikou et al. (2015) showed that vocal response latencies in a masked-priming experiment using English nonce words were shorter when the first segments of the prime and target differed in voicing only (/piv/-/bæf/) vs. when they differed in multiple features (/suz/-/bæf/). These results indicate that feature-level representations are activated in reading aloud, though they provide evidence from only one feature in one language. We conducted a series of masked-priming experiments in which we manipulated several features in English and Russian. We hypothesized that the more features shared between prime and target onsets, the greater the probability of feature-level effects. Two segments with different voicing differ on one feature only, whereas segments differing in place differ on multiple features, since major place features include dependent features that are definable only within that place. Exp. 1 sought an all-but-voicing effect in Russian. Exp. 2 sought an all-but-place effect in English by having prime and target onsets differ in place but match in voicing and manner (/duz/-/bæf/). Exp. 3 sought an all-but-place effect in Russian. Exp. 4 included a replication of Exp. 1 (Exp. 4b) and an all-but-constriction-location manipulation (Exp. 4a) in Russian (/suf/-/ʂix/). Our hypothesis—which is language-independent—predicted that all-but-voicing and all-but-constriction-location effects should be found in Russian, and that an all-but-place effect should be small or non-existent in both languages.

Results are shown in Fig. 1. A significant effect of shared Onset was obtained in all experiments. Exps. 1 and 4b show that the all-but-voicing effect was reliable in Russian, per our hypothesis. An all-but-place effect was not found in Exp. 2 for English, but was found in Exp. 3 for Russian, albeit with a smaller effect size than in Exp. 1 (4 ms vs. 6m). No all-but-constriction-location effect was found in Exp. 4a. Statistical models including data from all experiments including Mousikou et al. (2016) showed that there was no reliable difference between the all-but-place conditions in English and Russian, but that there was a significant difference between the all-but-voicing and all-but-constriction-location conditions in Russian.

The Onset and all-but-voicing effects found for Russian demonstrate that the effects that had been found in English are also obtained in a language with a different (alphabetic) orthography, phonological system, and phonetics. The absence of an all-but-place effect in English and the presence of a small all-but-place effect in Russian were consistent with our hypothesis. The absence of an all-but-constriction-location effect in Russian despite a robust all-but-voicing effect was not predicted by our hypothesis. The lack of an all-but-constriction location effect may have been due in part to the relative predictability of voicing vs. constriction location in Russian for a given letter. In addition, dynamical models commonly include both excitatory and inhibitory forces. While it is the case that our all-but-voicing and all-but-constriction-location conditions each involved manipulating one feature, it is an open empirical and theoretical question as to how and whether those features activate and/or inhibit other features and feature values. The dynamical interactions between voicing and other features may not be the same as those between constriction location and other features (see, e.g., Roon and Gafos, 2016, for an example of a

model that incorporates such feature-dependent differences in the dynamics of phonological planning).

These results have implications for psycholinguistic models of reading aloud and of speech production, which assign either no role (Roelofs, 2000; Coltheart et al., 2001; Perry et al., 2010) or a limited role (Dell et al., 1993; Harm and Seidenberg, 1999) to feature-level representations, and thus cannot account for the results presented here. Expansion of these models must take into account the details of language-independent theories of phonological representation. Models of reading aloud must additionally take into consideration how phonological representations interact with orthographic representations in language-dependent ways, given the specifics of the language's phonological inventory and its relationship with orthography.

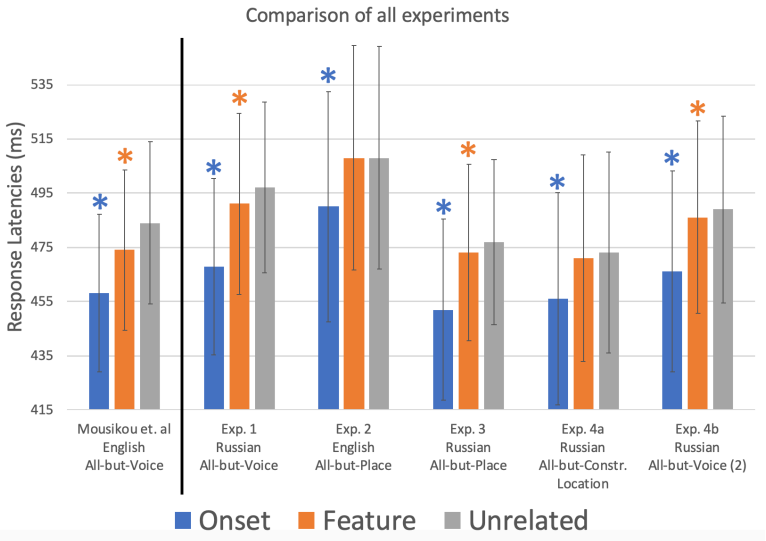

Fig. 1. Effects on response latencies in masked-priming experiments: Mousikou et al. (2015, left of the vertical line) and the present experiments (right of the vertical line). The Onset condition indicated that the prime and target had the same onset. The Feature condition depended on the experiment and is explained below each bar cluster. Error bars represent one standard deviation. Asterisks indicate significant differences from the Unrelated condition.

References

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