Introduction. Several theories of lexical access point to a dual-route for perception of complex words (cf. Taft (1994), Schreuder & Baayen (1995)). In these systems, individual words are both morphologically decomposed and continuously parsed. This allows for compositional access to novel word forms, such as ‘rehumanize’, while allowing direct access to bound stems, for which compositional parsing is insufficient to construct meaning. What has not been well addressed is the relationship between these two routes and allomorphy, particularly as caused by phonetic and phonological alternations. The current study explores the relationship between phonologically-mandated assimilations and online parsing, using behavioral and electrophysiological measures of lexical access.

Methods. In a series of behavioral (N=45) and ERP (N=30) lexical decision experiments, subjects were asked to identify mispronounced words containing either ‘in-’ or ‘un-’ prefixes. These prefixes naturally exhibit divergent alternations: in casual speech, ‘un-’ optionally surfaces as ‘um-’ before labial stems (e.g., umproblematic) whereas assimilation of ‘in-’ is obligatory regardless of speech style (e.g., improper). Mispronunciations therefore fell into one of three nonword categories:

1. UMP (e.g., umprepared), a frequently encountered but optional coarticulatory assimilation

2. UMT (e.g., umtidy), an unfamiliar and unlicensed assimilation

3. INP (e.g., inprecise) / IMT (e.g., imtolerant), an unfamiliar and unlicensed assimilation, paired with a prefix that otherwise participates in obligatory phonological alternations

Results. Using a linear mixed-effects model, significant differences were found between stimulus categories. In particular, UMT nonwords had faster response times and were more likely to be reported as nonwords than either UMP or INP/IMT forms (see Figure 1). Electrophysiological responses also differed across stimulus categories. Here, cluster mass permutation tests were used to compare responses to mispronounced words and correctly pronounced words in each category. The mispronounced UMT words were found to elicit a left anterior negativity (LAN; previously shown to index morphosyntactic violations (Coulson et al., 1998)) in the 250–750msec time window relative to properly pronounced words. No distinction in ERP response is observed for UMP or INP/IMT forms in this window (see Figure 2).

Discussion. Taken together, the UMT nonwords are seen to be more frequently treated as nonwords than UMP or INT/IMP forms, despite the latter containing equivalent phonotactic violations. However, neither decompositional parsing nor continuous parsing can account for the pattern of behavioral and ERP data presented here. Rather, the results are consistent with a dual-route
model in which successful parsing of INT/IMP forms and UMP forms proceeds through separate mechanisms.

In the case of UMP, it is noted that these items are frequently assimilated in everyday speech. Thus, whole-word access forms of these items may already exist, allowing for a continuous parse of these items. This notion is supported by the treatment of UMT forms, which have not been previously encountered, and are rejected as real words. Crucially, the distinction between these two stimulus categories also makes clear that the surface ‘um-’ sequence does not result in access to the ‘un-’ prefix itself; if this were the case, decompositional parsing would be possible, and equivalent responses would be expected for UMP and UMT items.

The utility of a decompositional route is in the parsing of INP/IMT forms. Like UMT items, these forms have not been previously encountered and thus a whole-word continuous parse should not be possible. However, INP/IMT forms are largely treated as real words. Successful parsing here can instead be achieved compositionally, with the parser accessing semantic meaning through each prefix allomorph

(‘in-’/’im-’) separate from the stem to which it is attached. This idea is further supported by the fact that although the INP/IMT forms contain phonotactic violations in their full forms, they are nevertheless accepted as real words.

Conclusion. The distinction between variation which is phonologically mandated, compared to that which arises from phonetic coarticulatory processes, is reflected in the ease with which mispronounced forms are parsed. In this case, prefixes which exhibit phonological variation appear to result in stored forms of each allomorph, facilitating successful decompositional parsing. Prefixes which show only coarticulatory assimilations do not appear to result in stored allomorphs of these forms, thus decompositional parsing fails and successful lexical access occurs only through continuous parsing of previously encountered forms. This line of research extends previous work in dual-route processing to include morphophonological alternations, underscoring the idea that the phonological character of the alternations themselves play an important role in morphological parsing.

References.

