

L2 learners' processing of allophonic cues in online word recognition

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Native listeners use allophonic cues to “speed up” word recognition. For example, English listeners use allophonic vowel nasality (such that vowels are nasalized preceding nasal consonants, i.e. *man* – [mæ̃n] vs. *mad* – [mæd]) to predictively isolate words with an upcoming nasal consonant (Lahiri & Marslen-Wilson, 1991). There is some evidence that L2 learners likewise exploit allophonic cues during word recognition (Altenberg, 2005; Ito & Strange, 2009). This previous work, though, used offline tasks. Here, we use eye-tracking with a visual world paradigm to examine whether L2 learners' sensitivity to allophony allows them to restrict lexical access online. We focus on English nasal vowel allophony as processed by French learners of English. (In French, vowel nasality is phonemic (*pain* “bread” – [pɛ̃] vs. *paix* “peace” – [pɛ]); hence, in their native language, vowel nasality does not predict a following nasal consonant).

We selected pairs of imageable words that 1/ are phonologically identical until the first syllable coda, 2/ contrast in the nasality of the first vowel (i.e. oral: *cactus* vs. nasal: *camera*), and 3/ are in the same lexical frequency range, calculated from the CELEX database (Baayen et al., 1995). In each trial, both pictures of a pair are shown, and participants hear either the oral or the nasal word embedded in the sentence “Click on the X”. Eye movements are measured throughout. Participants are 24 advanced French learners of English and 24 native English controls. French participants rated themselves on average 7.7/10 on English oral comprehension. Participants were recruited with an announcement in English (that specified the desired advanced level of proficiency), and the experiment session took place in English with the intention of excluding any who had difficulty with comprehension (n=0).

Data collection is near completion, but an analysis of data from 12 advanced learners and 12 English controls, shown in Figure 1, provide tentative evidence that the learners fail to use the allophonic rule to restrict lexical access: a linear mixed-effects model with fixed factors Group and Word type on proportion fixations to target for a 1000 millisecond time window starting 200 milliseconds after word onset reveals no main effects but a trend towards an interaction ($\beta=0.93$, $SE=0.49$, $t=1.88$, $\chi^2=3.54$, $p=.060$). With the full dataset, we will also analyze the proportion fixations to target at the target midpoint – the point at which 50% of all fixations in a trial are to the target word – to determine at which point listeners rule out competitor words (following the procedure in Farris-Trimble & Tessier, 2019).

A control experiment with an offline gating task shows that advanced learners do have knowledge of English nasal allophony. Sixteen different French participants with the same level of English proficiency (self-rated oral comprehension: 7.7/10) performed a forced-choice task on the same item pairs, presented in written form, where increasingly larger “gates” of either the oral or the nasal word were presented in 20 millisecond increments. On average, participants were consistently correct (i.e., they chose the correct word and persisted with that choice for the rest of the gates) upon hearing 80% of the vowel ($SE=0.02$), for both oral and nasal words. Thus, they relied on vowel nasality to restrict lexical access well before the beginning of the crucial consonant.

Overall, our results would suggest that French learners of English can learn L2 allophonic distributions but struggle to implement them into a native-like processing strategy. It is possible that our learners have not had enough daily exposure to English to develop such a strategy: in their study on Japanese learners of English, Ito & Strange (2009) found that even in an offline task, only learners that had lived in an English-speaking environment for 10 years or more used non-native allophonic word boundary cues for the purposes of word segmentation at a similar rate and in the same way as native speakers did. Our 12 learners report having lived on average only 2 months in an English-speaking region, with 8 subjects reporting no experience living in an anglophone environment at all. Future research would thus be useful to determine if advanced French learners can rely on allophonic vowel nasality in online word recognition with more exposure to English.

References

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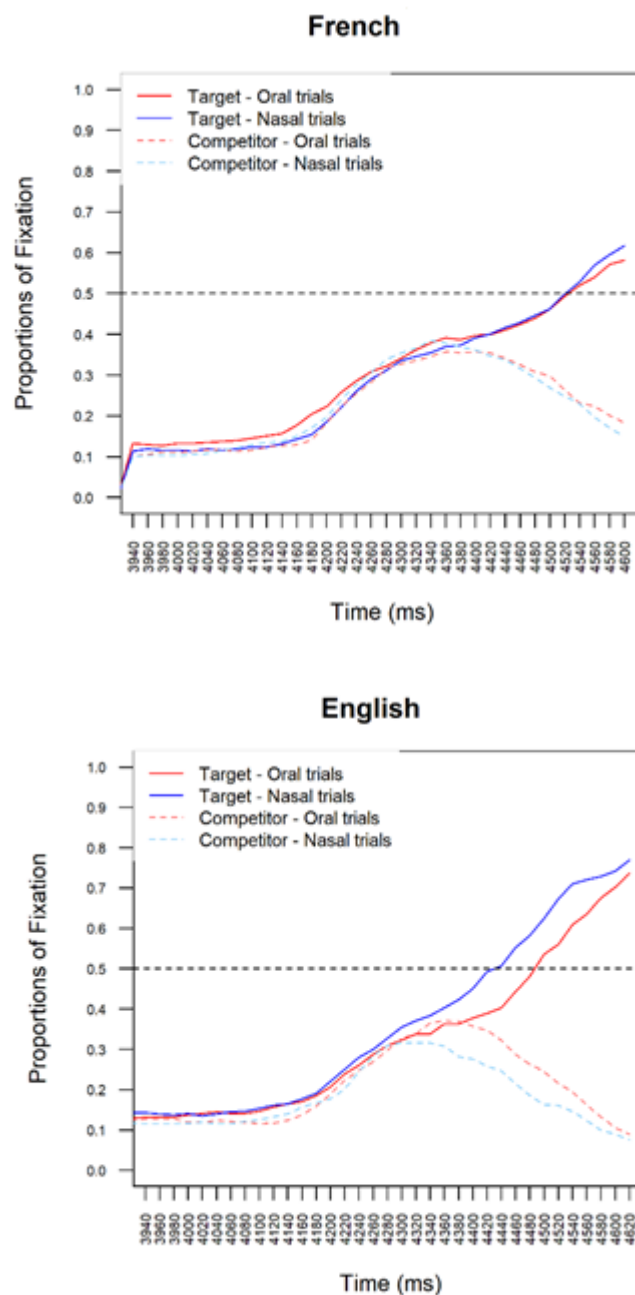


Figure 1. Proportions of fixations to target word from word onset in oral & nasal trials, for French learners (top) and English controls (bottom).