The acquisition of nasal vowels in L2 French as a new phonological category

L2-French learners are known to have problems identifying nasal vowels (e.g., Bustamante et al. 2018), but the sources of these problems remain unclear. Perceiving unfamiliar sounds is especially challenging for L2ers when these sounds are absent or similar to sounds in their L1 (Flege, 1987). In our study, we examine how L1-German L2-learners of French process French nasal vowels (/ɛ̃, ɔ̃, ɑ̃/), using offline and online measures. French has three nasal vowels (/ɛ̃, ɔ̃, ɑ̃/); German has the corresponding oral vowels but lacks vocalic nasals, and nasality is also found amongst the consonants. Under the assumption of Redeployment, L1 learners should be able to "reassemble" features of their L1 in their L2. Thus, L1 German learners should be able to combine the features that distinguish the oral vowels /ɛ, ɔ, ɑ/ in their native language with the nasal features that characterize the consonants /n, m/ (Redeployment; e.g., Archibald, 2005). However, it could still be the case that their novel L2 categories do not perfectly align with those in the L2.

To gain a better understanding, we combined a nasal identification task with eye-tracking. Participants were asked to listen to and identify nasal vowels, using three orthographical labels (IN, AN, ON for /ɔ̃, ɛ̃, ɑ̃/, respectively). There were 144 stimuli with 24 non and 24 real-word triplets (e.g., *ment, main, mon*). To examine processing patterns, participants' eye-fixations of the orthographic labels were recorded. Our goal is to collect data from 30 L2ers and 30 L1ers; preliminary results are based on 9 advanced German learners of French (mean age = 23,5) and 17 native French (mean age = 22,3) controls.

The L1 controls identified all nasal vowels more than 98% correctly. In contrast, the L2 learners showed reduced accuracy ranging from 63% to 89% (see Figure 1), with higher accuracy for /ɔ̃/ than for /ɑ̃/ ($\beta = -1.95$, SE = 0.28, $t = -6.86$, $p < .001$) and /ɛ̃/ ($\beta = -0.98$, SE = 0.29, $t = -3.04$, $p < .001$). Analysis of incorrect responses indicates that L2 learners have particular difficulties distinguishing /ɑ̃/ from both /ɛ̃/ and /ɔ̃/. Eye-tracking data support these findings and reveal longer fixation on AN for L2ers in comparison to L1ers ($\beta=4.13$, SE=1.48 $t=2.81$, $p<0.01$), including when /ɑ̃/ is not the target nasal (/ɔ̃/: $\beta =4.12$, SE = 1.91, $t= 2.18$, $p < 0.0396$; /ɛ̃/: $\beta = 6.16$ SE =1.64, $t = 3.76$ $p < 0.001$; see Figure 2). This suggests increased competition for /ɑ̃/ relative to other incorrect category, potentially reflecting a less distinct category of /ɑ̃/ in L2 learners. Our data are generally in line with the revised Speech Learning Model (rSLM) (Flege & Bohn 2021) and the idea of Redeployment, suggesting that new sound categories can be formed. However, even in advanced learners, they still differ to some extent from target language categories. We discuss the role of acoustic cues, grapheme-phoneme mapping and the interpretation within the rSLM.

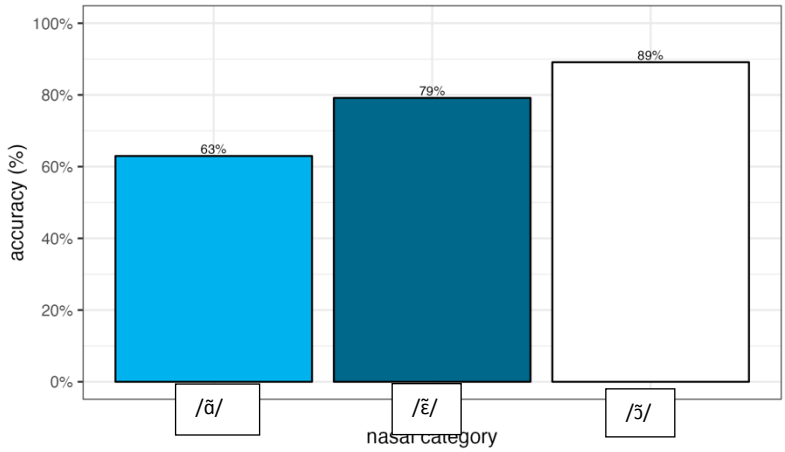

Figure 1: Correct identification of the different nasal vowel for L2s

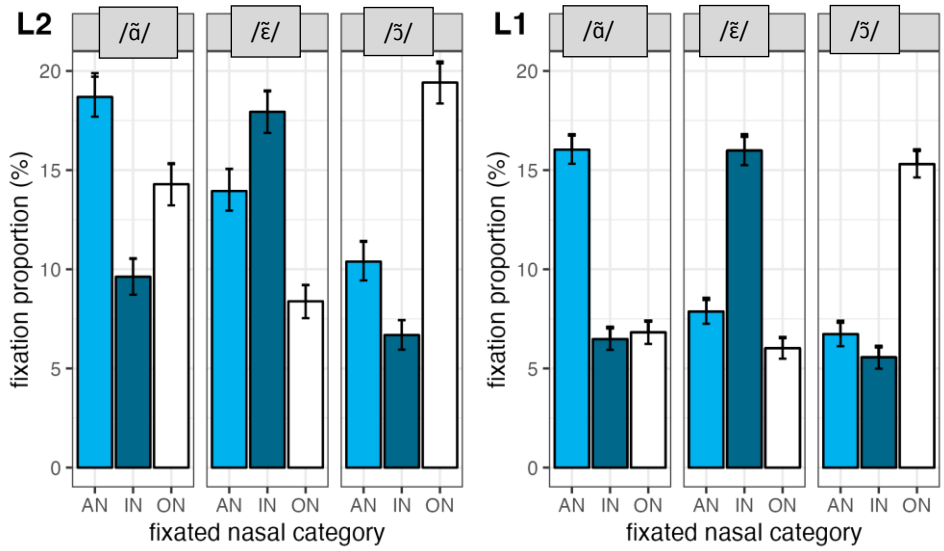

Figure 2: Fixation proportion of different labels (AN, IN, ON) for the different nasal vowels (/ɔ̃, ɛ̃, ɑ̃/) in L2 and L1 speakers

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