The contribution of phonological and lexical knowledge to the encoding of difficult second-language contrasts into lexical representations

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Learning a second language (L2) involves acquiring sounds that are not part of the native phonological inventory. Especially problematic for learners are cases in which two sounds that are contrastive in the L2 are perceptually mapped onto the same native language (L1) category, as in the well-known example of English /ɛ/ and /æ/ for native speakers of German [1]. An essential yet often overlooked step towards learners' full mastery of this type of contrasts is the reliable assignment of the two non-native sounds to the L2 words that contain them. For instance, for /ɛ/-/æ/, this means that /ɛ/ has to be established as part of the lexical representations of *bet* and *lemon*, and /æ/ of *bat* and *dragon* –and not the other way around. This process, known as phonolexical encoding, is thought to be largely dependent on the state of the contrast in the learner's phonological system as well as on lexical knowledge in the L2 [2, 3]. However, the relative contribution of phonological and lexical knowledge to the phonolexical encoding of difficult L2 contrasts is still unclear. Furthermore, as both phonological and lexical knowledge improve with L2 experience, it remains to be seen to what extent their contributions vary as a function of L2 proficiency.

The present study intended to shed light on these issues by testing German learners of English of advanced (n = 30; English Studies MA students and English language instructors) and intermediate proficiency (n = 49; university students not enrolled in an English Studies program) in three tasks: i) an English lexical decision task including words and nonwords with /ɛ/ and /æ/ aimed at assessing their phonolexical encoding of the critical contrast, ii) a 2AFC categorization task on a *bet-bat* continuum gauging into their phonological representation of the L2 sounds, and iii) an English vocabulary test quantifying their L2 lexical knowledge [4]. Individual measures were extracted for the categorization task (i.e., slope of the categorization curve) and vocabulary test (i.e., proportion of correct responses) and used to predict learners' accuracy in rejecting nonwords in which /ɛ/ and /æ/ had been swapped (e.g., *l[æ]mon, *dr[ɛ]gon) in the lexical decision task. Results of generalized linear mixed-effects modelling showed that the effects of both perceptual categorization and vocabulary on lexical decision performance were modulated by proficiency. This was evidenced by the significant interactions between perceptual categorization and proficiency group and vocabulary and proficiency group (both $p < .05$). Analyses following up on these interactions showed that one's ability to phonologically categorize /ɛ/ and /æ/ predicted nonword rejection accuracy only for intermediate learners ($p < .01$), whereas vocabulary predicted accuracy only for the advanced learner group ($p < .01$). Scatterplots of individual values are provided in Figure 1.

Results for the intermediate group therefore suggest that a sufficiently robust phonological distinction between /ɛ/ and /æ/ is an essential prerequisite to reach an accurate encoding of these confusable L2 sounds into lexical representations. This fits well with the findings of previous research on the link between phonological knowledge and phonolexical encoding [5]. However, the outcome for advanced learners crucially indicates that robust phonological knowledge alone does not automatically translate into an accurate representation in the lexicon. For learners who are already past major difficulties with /ɛ/ and /æ/ at the phonological level, the quality of the sounds' encoding into non-native lexical items is still largely constrained by their general lexical knowledge in the L2. I argue that this is because phonolexical encoding improves as learners accumulate evidence of category membership for individual L2 words (e.g., *dragon* has /æ/ and not /ɛ/) and lexical knowledge is tightly linked to the amount of relevant L2 input received [6]. Building on the present data, a tentative model of the development of the phonology-to-lexicon mapping of difficult L2 sounds will be proposed.

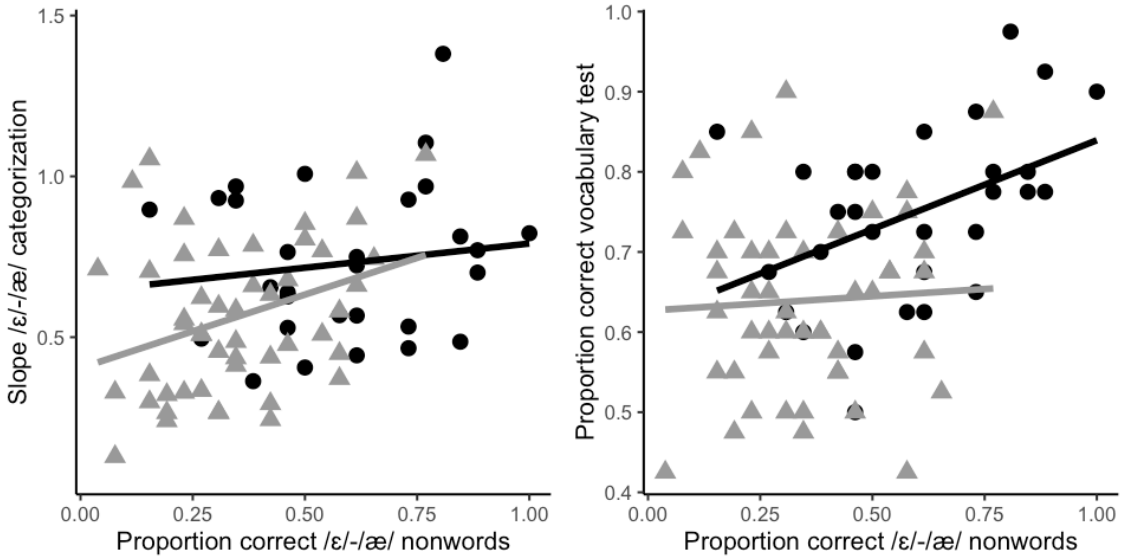

Figure 1. *Scatterplots showcasing individual values for /ɛ/-/æ/ categorization slopes and accuracy in /ɛ/-/æ/ nonword lexical decision (left panel) and accuracy in vocabulary test and accuracy in /ɛ/-/æ/ nonword lexical decision (right panel). The black circles correspond to values for the advanced learner group and the grey triangles to values for the intermediate learner group. Regression lines for each group are also provided for illustration purposes.*

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