The role of individual- and stimulus-level factors on translation priming effects

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Studies in bilingual lexical processing employing masked translation priming with lexical decision tasks (LDT) report a priming asymmetry (larger translation priming effects in the L1 prime-L2 target direction as compared to the opposite direction). This potentially reflects a difference in the L1 and L2 primes' ability to influence the processing of their translation targets, whereby L1 primes activate their related targets more effectively than the L2 primes.

The Revised Hierarchical Model (RHM; Kroll and Stewart, 2010), explains the asymmetry by differential access to semantic information for L1 and L2 words. Comparatively weaker lexical/conceptual links for L2 words hinder their direct access to shared conceptual nodes (at least at low proficiency). Therefore, in masked translation priming studies, non-cognate L2 primes are unable to stimulate the shared semantic nodes and, in turn, to activate their L1 translation equivalents. Enhanced L2-L1 priming effects are predicted with increased L2 development (e.g., higher L2 proficiency, more exposure to the L2, etc.). Under the Multilink model's (Dijkstra et al., 2019) tenets, the asymmetry is caused by the comparatively lower *subjective* word frequencies (i.e., how often a word is encountered/used by each individual) of L2 primes, which result in slower processing of these words, preventing them to potentially spread bottom-up activation to the conceptual level under masked priming conditions. Certain individual- and stimulus-level factors (e.g., L2 proficiency, L2 exposure/use, or word frequency) might accurately serve as proxies for subjective word frequency, therefore modulating L2-L1 priming effects. Crucially, a potential effect of word frequency would allow disentangling the predictions of the two models, since only Multilink would be able to explain this outcome.

To examine these accounts, we tested 60 late sequential L1 Spanish-L2 English bilinguals living in an L2-dominant environment in a masked translation priming LDT. A 500 ms mask was followed by a 60 ms prime, immediately followed by the target (Figure 1; see Figure 2 for stimuli examples). Two individual-level factors, the participants' L2 proficiency (i.e., upper intermediate to upper advanced) and amount of L2 exposure/use (the participants used the L1 more than the L2), and a stimulus-level predictor (word frequency) were examined and treated as continuous variables in linear mixed effects models (Baayen, 2008). This approach attempted to weigh the role that these factors have in shaping cross-language masked priming, both individually and in interaction with each other, thus addressing the dearth of data from studies on the priming asymmetry where these factors are treated continuously and in combination with word frequency.

Our results replicate the priming asymmetry (L1-L2: 39* ms; L2-L1: 38 ms) in general terms, but provide a fairly more nuanced picture. Response times in the critical condition were significantly faster than those in the baseline condition in both translation directions, suggesting that the related primes were able to be processed efficiently and activate their targets. Crucially, the L2-L1 priming effects were modulated by a significant effect of the amount of L2 exposure/use (i.e., participants with increased active exposure and use of the L2 showed larger priming effects). Unexpectedly (and against the RHM's main prediction), L2 proficiency did not modulate the priming effects in any direction. (Target) frequency, the only stimulus-level factor under study, was only significant in the interaction with Target Language, Prime Type and Proficiency: the less proficient bilinguals responded more slowly to low-frequency L2 English words in the related condition (i.e., when preceded by their Spanish translations).

These results provide support for both the RHM and Multilink, and support a deterministic role of subjective word frequency in bilingual lexical processing. In light of the present data, conflicting results found in previous studies with regard to the role of the different factors potentially shaping the priming asymmetry might reflect how accurately the predictors under examination proxied subjective frequency. In that sense, the present results point towards active language exposure/use as a more efficient approximation to individual encounters with each word and highlight the importance of studying the role of subjective word frequency (and its individual- and stimulus-level proxies) on bilingual lexical processing.

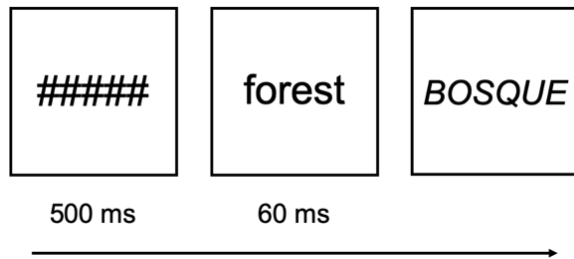**Figure 1. Presentation procedure Figure (related) condition in the L2-L1 task.**

| ##### | forest | *BOSQUE* |
| 500 ms | 60 ms | |

Table 1. Sample stimuli used in the L1-L2 direction.

L1 – L2			
Translation prime	Control prime	Word target	Nonword target
bosque 'forest'	*lápiz* 'pencil'	FOREST	SMOUNT

References

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