Word frequency and the elusiveness of the L2-L1 (masked) translation priming effect

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Research into the lexical processing of non-cognates by unbalanced bilinguals under masked priming conditions shows an asymmetry in lexical decision tasks (LDT) (e.g., Wen & Van Heuven, 2016). Responses to L2 targets preceded by L1 translation equivalent primes are faster than when the L1 primes are unrelated. In the opposite direction (i.e. L2 primes – L1 targets), the effects are minimal or, at least, significantly smaller.

The Bilingual Interactive Activation + (BIA+) model (Dijkstra & Van Heuven, 2002) claims slower L2-word processing prevents them from activating their L1 counterparts under masked priming conditions. Factors like word frequency or L2 proficiency can, according to the BIA+ model, speed processing up. The Sense Model (SM, Finkbeiner et al., 2004) claims that a representational asymmetry in the L1/L2 senses (word meanings) causes the priming asymmetry. For a target to be primed, all its senses must be activated. The many meanings attributable to the same apparent morphophonological form, context depending, of an L1 prime (e.g. 'head' can mean many things) are claimed to activate the few meanings known of an L2 target, but not the other way around (i.e. the few meanings known of an L2 translation equivalent prime can only activate a small proportion of the many meanings known of its L1 counterpart, eliciting null or very small L2-L1 priming effects). The Revised Hierarchical Model (RHM), which claims that L2 proficiency should be a key factor to explain the above, is also considered in this study (Kroll and Stewart, 2010).

To investigate these theoretical accounts, we tested 29 adult L1 Spanish-L2 English learners living in an L2-dominant environment (for 3 years on average) in a masked translation priming LDT. The presentation procedure consisted of a 500 ms mask, followed by a 60 ms prime, immediately followed by the target (Figure 1; see Table 1 for stimuli examples). The participants' L2 proficiency (upper intermediate to upper advanced); word frequency (low to moderate); age of L2 acquisition; language dominance; and time living in an L2-dominant environment were treated as continuous variables in linear mixed effects models (Baayen, 2008).

The results showed a priming asymmetry (Figure 2) (38 ms vs 17 ms, $p<.05$). Responses to L2 targets preceded by their L1 translation equivalents were 38 ms (significantly) faster than when an unrelated L1 prime preceded the targets. In the L2-L1 direction, the 17 ms priming effect was not significant, but, crucially, word frequency modulated the effect (i.e. only the most frequent L2 primes elicited priming effects) (Figure 3). Contrary to what was expected, against the RHM's main prediction, L2 proficiency did not modulate the priming effects (and neither did age of L2 acquisition, language dominance, or the time living in an L2-dominant environment). These results challenge the SM, since the model, in its original instantiation, is not able to account for the observed role of word frequency (nor for an attenuation of the asymmetry if more frequent L2 primes are used). These findings can be accommodated by the BIA+ since more frequent L2 words would be processed faster, allowing them to activate the L1 targets under masked priming conditions. In summary, the data overall support the BIA+ approach.

Figure 1. Example of the presentation procedure.

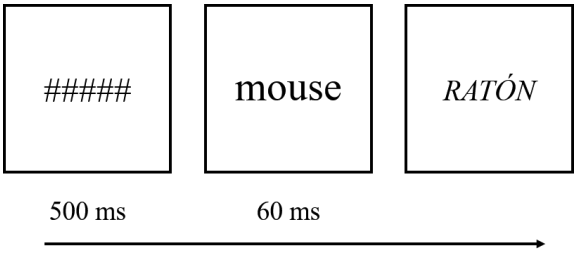


Table 1. Sample stimuli used in in the L1-L2 translation direction.

L1 – L2			
Translation prime	**Control prime**	**Word target**	**Nonword target**
bosque 'forest'	*himno* 'hymn'	FOREST	SMOUNT

Figure 2. Mean RTs for related and control primes in both translation directions.

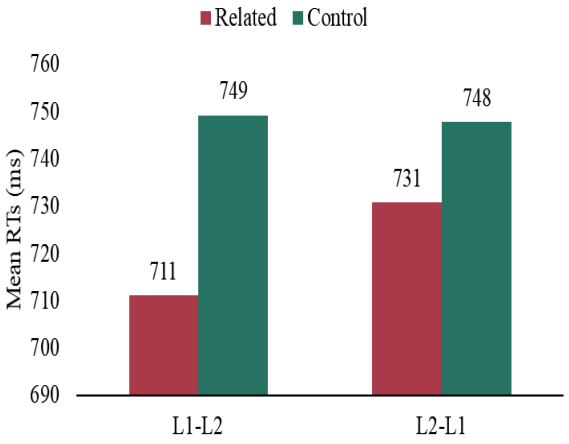
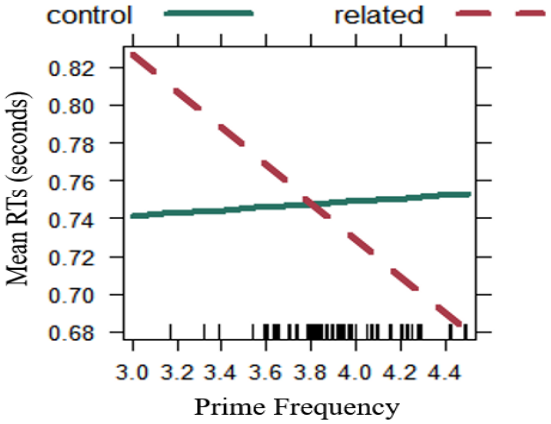


Figure 3. Prime Type by Prime Frequency interaction in L2-L1 direction.



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