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COMMENTARY

Phonology-based bilingual activation among different-script bilinguals?

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Multilink developed by Dijkstra et al. (2018) is a computational model of monolingual and bilingual lexical access in comprehension and production. The non-selective activation of a bilingual's two languages is handled in the model by assuming that bilinguals have an integrated lexicon and that orthographic overlap between the input and the lexical representation drives lexical activation. Hence, an orthographic unit such as the letter *T* may activate words from multiple languages that contain the letter, resulting in simultaneous activation of multiple languages. This basic mechanism for explaining non-selective activation is similar between Multilink and its predecessors BIA and BIA+.

While such a model can explain non-selectivity among bilinguals whose two languages share the same script, it is not clear how to apply this same mechanism to bilinguals whose two languages do not share the same script such as Chinese–English bilinguals. In the latter case, the bottom-up activation from the orthographic input would be clearly language-specific.

Does this mean that bilingual activation is fundamentally different between same-script and different-script bilinguals? Specifically, is language activation among different-script bilinguals more selective than same-script bilinguals?

One way to explore this issue is to consider the possibility of phonology-based coactivation of different-script languages. An element of this possibility, i.e., a direct link between orthography and phonology, is already incorporated in the model, as shown in Figure 1 in Dijkstra et al. (2018). This link permits the direct and automatic activation of phonology from orthography, which has been well documented, even in the case of a logographic language (e.g., Tan & Perfetti, 1999). A revision of the model is necessary, though, that moves away from language-specific phonological representations as envisioned in the current model (in which a phonological representation is linked to one language only).

There are good reasons for postulating a partially integrated (rather than a language-dependent) system of phonological representations, particularly among unbalanced bilinguals. Even though languages often differ in the inventory of the phonetic categories they employ, there is also a great deal of overlap in the sound segments utilized across languages, admittedly with subtle differences in acoustic detail (e.g., Chung, Kong, Edwards, Weismer, Fourakis & Hwang, 2012). In the presence of such similar L1 segments, it is often difficult for L2 learners, particularly adult L2 learners, to develop L2-specific phonetic categories. Instead, these L2 segments are often treated as their closest L1 counterparts in both perception and production, a phenomenon often referred to as perceptual assimilation and well recognized in speech perception and development models (e.g., Best & Tyler, 2007; Flege, 2003). Furthermore, L2 segments may also interact with their L1 counterparts, which leads to the development of composite categories that take on acoustic features of both L1 and L2 categories (Flege, 1999; Baker, Trofimovich, Flege, Mack & Halter, 2008). These are phonetic categories shared by two languages. Under both circumstances, a bilingual's two languages may share at least a subset of their phonological representations.

Additionally, even when new and L2-specific categories are created that are similar to L1 counterparts, the activation of a phonetic category in one language may lead to the activation of words in another language that contain a similar segment. For example, a chain activation may occur from the letter *p* to the English phonetic category /p/ to the Chinese words that contain a similar voiceless bilabial stop. As Dijkstra and Van Heuven suggested, "a slight mismatch is not sufficient to exclude word candidates from another language" (2002, p. 194).

If the above analysis is correct, a bilingual's two languages may be activated simultaneously in a monolingual context due to phonological overlap even when the two languages share minimal orthographic overlap. Such phonology-based coactivation occurs wherever there is phonological overlap, thus going beyond cognates and cross-language homophones.

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There is evidence for phonology-based bilingual activation in a monolingual task among different script bilinguals. The Russian–English bilinguals in Spivey and Marian (1999) fixated on pictures whose English names (task-irrelevant language) overlapped with the Russian names (input language) more than control pictures, the Japanese–English bilinguals in Hoshino and Kroll (2008) named pictures faster when the picture names were cognates between Japanese and English, and, in a monolingual English phoneme monitoring task, Korean–English bilinguals took longer to reject a picture whose Korean name contained the target phoneme than control pictures (Moon & Jiang, 2012). A limitation of such evidence lies in the fact that it was obtained with auditory or picture input. The orthography-to-phonology activation was not involved and assessed.

However, preliminary evidence became available recently for phonology-based activation of non-target language even in a visual word recognition task. Kim (2017) tested Korean–English bilinguals in a monolingual English lexical decision task with prime-target pairs such as *hook* and *soil*. There was a high degree of phonological overlap between the English word *hook* and 흙 (pronounced as /huk/), the Korean translation for *soil*. A reliable masked priming effect was found among Korean–English bilinguals, but not among monolingual English controls. The finding suggested that the orthographic input of the English prime activated a Korean word that overlapped with the prime in phonology, which facilitated the processing of the target. Even though the exact nature of this facilitation is debatable (e.g., between the Korean word serving as an intermediate prime to preactivate the target and the Korean word facilitating a post-access verification of the target), it is clear that orthographic input in one language can activate a word in another language on the basis of phonological overlap. Note that this finding is different from those by Thierry and Wu (2007) as the latter offered evidence only for the activation of L1 translations in L2 word recognition.

Whether and to what extent phonological overlap may lead to phonology-based coactivation of multiple languages among different-script bilinguals is ultimately an empirical issue. Many details await to be worked out. For example, it is conceivable that phonological overlap is more difficult to quantify than orthographic overlap. Phonology-driven bilingual activation may lag behind or be weaker than orthography-driven activation due to the involvement of an extra link. This is certainly a topic worth exploring both in relation to this model and to bilingual processing in general.

References

Baker, W., Trofimovich, P., Flege, J. E., Mack, M., & Halter, R. (2008). Child-Adult Differences in Second-Language Phonological Learning: The Role of Cross-Language Similarity. *Language and Speech*, *51*, 317–342.

Best, C.T., & Tyler, M.D. (2007). Nonnative and second language speech perception: Commonalities and complementaries. In O. S. Bohn, & M. J. Munro, (Eds.) *Language experience in second language speech learning* (pp. 13–34). Amsterdam: John Banjamins.

Chung, H., Kong, E. J., Edwards, J., Weismer, G., Fourakis, M., & Hwang, Y. (2012). Cross-linguistic studies of children's and adults' vowel spaces. *The Journal of the Acoustical Society of America*, *131*(*1*), 442–454.

Dijkstra, T., & Van Heuven, W. J. (2002). The architecture of the bilingual word recognition system: From identification to decision. *Bilingualism: Language and cognition*, *5*(*3*), 175–197.

Dijkstra, T., Wahl, A., Buytenhuijs, F., van Halem, N., Al-jibouri, Z., de Korte, M., & Rekké, S. (2019). Multilink: a computational model for bilingual word recognition and word translation. *Bilingualism: Language and Cognition, 22.* doi:10.1017/S1366728918000287

Flege, J. E. (1999). Age of learning and second-language speech, In D. Birdsong (Ed.), *Second Language Acquisition and the Critical Period Hypothesis* (pp. 101–132). Hillsdale, NJ: Lawrence Erlbaum.

Flege, J. E. (2003). Assessing constraints on second-language segmental production and perception. In A. Meyer and N. Schiller (Eds.), *Phonetics and phonology in language comprehension and production, differences and similarities* (pp. 319–355). Berlin: Mouton de Gruyter.

Hoshino, N., & Kroll, J.F. (2008). Cognate effects in picture naming: Does cross-language activation survive a change of script? *Cognition, 106*(*1*), 501–511.

Kim, S. (2017). The cross-language activation of Korean and English in a monolingual setting. Qualifying Paper, The University of Maryland, March 27, 2017.

Moon, J., & Jiang, N. (2012). Non-selective lexical access in different-script bilinguals. *Bilingualism: Language and Cognition, 15*(*1*), 173–180.

Spivey, M. J., & Marian, V. (1999) Cross talk between native and second languages: Partial activation of an irrelevant lexicon. *Psychological Science*, *10*(*3*), 281–284.

Tan, L. H., & Perfetti, C. A. (1999). Phonological activation in visual identification of Chinese two-character words. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *25*(*2*), 382.

Thierry, G., & Wu, Y. J. (2007). Brain potentials reveal unconscious translation during foreign-language comprehension. *Proceedings of the National Academy of Sciences*, *104*(*30*), 12530–12535.

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