



Tip-of-the-tongue in a second language: The effects of brief first-language exposure and long-term use



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ABSTRACT

Bilinguals have more tip-of-the-tongue (TOT) incidents than monolinguals. Whereas previous research has focused on differences in the long term language experience between these groups, the present study examined the hypothesis that both long-term and transient context factors modulate TOT rates. Russian–Hebrew bilinguals who acquired Hebrew either early (<5 years) or late (>11 years) were compared to native Hebrew speakers on a picture naming task in Hebrew, before and after viewing a short movie in Russian. Both the short-term context (before–after the movie) and long-term language experience modulated TOT rates: Late bilinguals exhibited significantly higher TOT rates than early bilinguals who did not significantly differ from native Hebrew speakers. Critically, following the Russian movie, bilinguals in both groups differed from the native speakers of the target language. Thus, exposure to the non-target language exerted a global, non-item-specific, cross-language interference effect. The findings highlight the dynamic nature of the bilingual system in which both short and long-term language experience operate to influence bilingual performance.

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1. Introduction

One of the most frustrating difficulties bilinguals experience during production is the tip-of-the-tongue (TOT) state (Brown & McNeill, 1966), which is a temporary difficulty in retrieving words in one of the languages they speak. Interestingly, TOT incidents are not confined to bilinguals, but bilinguals consistently exhibit higher TOT rates than monolinguals (e.g., Gollan & Silverberg, 2001). The research that investigated bilingual TOT has initially focused on general long-term differences in language experience between bilingual and monolingual speakers (e.g., Gollan & Acenas, 2004). However, many bilinguals shift flexibly from one language to another, and such brief

language exposure may additionally affect bilinguals' TOT rates. In the current study, we examine how TOT rates are modulated by both long-term and very recent short-term language exposure. Further, we test to what extent global, non-item-specific effects emerge from such brief language exposure.

Differences in language experience have been shown to affect TOT rates. For example, Gollan and Silverberg (2001) showed increased TOT rates in Hebrew–English bilinguals compared to age matched English monolinguals. Similar effects were shown with Spanish–English and Tagalog–English bilinguals (Gollan & Acenas, 2004), and with American Sign Language (ASL)–English bimodal bilinguals (Pyers, Gollan, & Emmorey, 2009). Notably, bilinguals do not differ from monolinguals in TOT rates for cognates (Gollan & Acenas, 2004) and proper names (Gollan, Bonanni, & Montoya, 2005) suggesting that this group difference is rooted in the linguistic system, and not in

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domain general faculties such as memory or attention (e.g., Bialystok, 2009).

Two general accounts have been proposed to explain such bilingual difficulties in production. The *Frequency-Lag* (or *Weaker-Links*) hypothesis (Gollan & Acenas, 2004; Gollan, Slattery, Goldenberg, Van Assche, Duyck, & Rayner, 2011) postulates that bilinguals divide their time between two languages so their frequency of use in each language is reduced. Consequently the connections in the bilingual lexical system are weaker, which in turn leads to increased difficulty in retrieving words. This account highlights accumulating frequency of use as the underlying factor that explains the bilinguals' higher TOT rates compared to monolinguals. Notably, this account can explain differences between bilinguals and monolinguals that are not due to simultaneous activation of both languages, such as the higher TOT rates of bilinguals for words they know in just one of their languages (Gollan & Acenas, 2004).

By contrast, the *Dual-Language activation* account focuses on processes that take place at the time of production and comprehension. This account emphasizes processes that arise from the co-activation of both of the bilingual's languages while performance in one language is expected (Hermans, Bongaerts, De Bot, & Schreuder, 1998). This account suggests that production in the target language is hindered due to competition from non-target language elements. Moreover, prior exposure to the non-target language reduces target language accessibility either because it increases the activation of non-target language elements making them more effective competitors, or because such prior exposure requires that the target language is inhibited (Green, 1998) and subsequently necessitates recovery from inhibition (for elaborate discussions see Kroll, Bobb, & Wodniecka, 2006; Van Assche, Duyck, & Gollan, 2013). The effects of such dual-language activation were recently demonstrated in a TOT paradigm involving translation priming (Gollan, Ferreira, Cera, & Flett, 2014). Specifically, Spanish–English bilinguals performed a picture naming task in English, after being primed with the Spanish translation of the picture name. Translation primes significantly increased TOT rates, suggesting that even very limited exposure to words in one language can affect production in the other. Moreover, translation-equivalent primes reduced retrieval rates (“GOT” responses) compared with non-related primes, suggesting that the dual-language activation increased TOT rates because co-activation interfered with retrieval rather than facilitated speakers' ability to get out of the pre-TOT failure.

Gollan et al.'s (2014) priming study showed item-based effects in which immediate exposure to particular items in the non-target language affected retrieval of the translations of these items in the target language, in a trial-by-trial design. Similar effects were shown in a picture naming study where exposure to specific items in the non-target language was manipulated in blocks rather than a trial-by-trial design (Misra, Guo, Bobb, & Kroll, 2012). Both reaction times and event-related potentials (ERPs) measures showed dual-language activation effects associated with naming pictures in the other language on a previous block of trials. Whereas the *dual-language*

activation account explains these effects as the result of cross-language interference due to simultaneous activation of the specific items in both languages, the *Frequency-Lag* account may explain this effect in terms of recency of use, where recent use disproportionately changes the strengths of the connections of particular items. Thus, although they offer different explanations, both accounts can explain such short-term item-based effects. The two accounts may not be mutually exclusive but rather it is plausible that both reduced frequency of use and interference due to dual-language activation operate simultaneously to increase TOT rates in bilinguals relative to monolinguals (see also Gollan et al., 2014).

Importantly, short-term effects may not be limited to specific items. Instead, exposure to the non-target language may operate at a more general level, affecting global language activation (see also Guo, Liu, Misra, & Kroll, 2011; Van Assche et al., 2013). For example, Van Assche et al. (2013) asked bilingual speakers to produce words starting with a specific phoneme. Retrieving words that start with specific phonemes in one language reduced fluency of production in the other language, even when production did not involve repeated phonemes. Although it was present only in one group of bilinguals (Chinese–English but not Dutch–English bilinguals), this finding suggests that production in one language can exert global, rather than item-based, cross-language effects on production in the other language. Global effects of brief exposure to the non-target language were also demonstrated in comprehension. Specifically, Elston-Güttler, Gunter, and Kotz (2005) found that target word recognition was influenced by prior comprehension of a movie in the non-target language. However, in a study comparing bilingual and monolingual performance on reading and picture naming tasks, Gollan et al. (2011) observed differences between these language modalities, suggesting that in production lexical access is primarily semantically driven whereas in comprehension it is predominantly frequency-driven. In view of these differences it is not clear whether brief exposure involving only comprehension (as in Elston-Güttler et al., 2005) will generalize to affect subsequent production. In the current study we therefore investigate the influence of comprehension on production and examine whether global cross-language effects can arise from recent brief *comprehension* of the non-target language (i.e., short movie) to influence *production* in the target language in a TOT paradigm.

Global cross-language effects in bilingual *production* require further specification of the dual-language activation account. In particular, item-based effects were interpreted as arising from co-activation and competition between corresponding lexical items in the two languages suggesting that the language of production is selected at the stage of lexical retrieval. In contrast global effects may suggest different loci of language selection. In a review of bilingual production studies, Kroll et al. (2006) suggest that the locus of selection is dynamically determined by factors associated with both long-term language experience and the immediate production context. Hence, they propose a dynamic system of lexical selection where both languages are active and potentially compete with

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