Language and cognition in bilingual production

Language and cognition in bilingual production: the real work still lies ahead

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Goldrick, Putnam and Schwarz (Goldrick, Putnam & Schwartz) argue that code-mixing in bilingual production involves not only combining forms from both languages but also – crucially – integrating grammatical principles with gradient mental representations. They further propose an analysis of a particular case of intrasentential code mixing – doubling constructions – framed within the formalism of Gradient Symbolic Computation. This formalism, in their view, is better suited to accounting for code mixing than other generative language models because it allows the weighting of constraints both in the choice of particular structures within a single language and in blends of structures in code-mixed productions.

My commentary is not concerned with the technical details of the analysis, although I certainly agree that any formal account of either monolingual or bilingual language development and processing that does not incorporate gradience is bound to be inadequate (Sorace, 2006). I will instead focus on PROCESSING and LEARNING as two aspects of Goldrick et al.'s proposal that are left unexplored. Goldrick et al.'s account, in the present version, is a representational theory of dual monolingualism. It assumes the simultaneous presence of two complete grammars in the bilingual's mind and it abstracts away from developmental and real-time processing factors, as Goldrick et al. themselves recognize: "To develop this account it is important that we

gain a more precise understanding of the factors that facilitate and inhibit the activation of representations within each of a bilingual's languages during sentence processing as well as how bilinguals learn the relative weightings of grammatical constraints". Integrating such factors is the real challenge for the model, in at least three ways.

First, bilingual production in most cases requires cognitive control mechanisms that allow channeling the message into one language: this is probably one of the reasons why doubling constructions are relatively infrequent. Research in cognitive psychology has identified two possible mechanisms for language selection: inhibition of the unwanted language, and enhanced activation of the target language (Green, 1998; Costa & Santesteban, 2004). Language proficiency may play a role in the reliance on one mechanism rather than the other: unbalanced bilinguals may rely more on inhibitory control than balanced bilinguals. What would Goldrick et al. predict about the graded weighting and activation of constraints in different types of unbalanced bilinguals, such as child sequential bilinguals or adult second language learners, as opposed to balanced bilinguals? To what extent does the implementation of the grammatical computations involved in blending interact with cognitive control? Would the model predict different types of code mixing at different stages of bilingual development?

Second, the degree of code mixing is influenced by the interaction context, e.g., whether the bilingual is interacting with another bilingual or with a monolingual (Grosjean, 1998). Goldrick et al. acknowledge this but do not explore the implications for their model. It is not clear how an inherently probabilistic formalism like Gradient Symbolic Computation can account for the adaptability of the structural aspects of code mixing to such factors (Green & Abutalebi, 2013). Interaction context is also

important because mechanisms of priming in dialogue (and whether the interlocutor is monolingual or bilingual) may affect the likelihood of particular code mixing constructions; this in turn may depend on the strength of the constraints associated with the mixed structures in the bilingual's mental representations.

Third and most important, Goldrick et al.'s proposal relies on the implicit assumption that code mixing in bilingual production is based on equivalent linguistic knowledge of the sets of constraints characterizing the two languages. Although they allow for the possibility that spreading activation depends on the languages' relative strength, they do not discuss how weakly mastered constraints in an unbalanced bilingual would participate in blended representations. In sequential bilinguals the weighting of constraints may change not only in the L2, as a result of increasing proficiency, but also in the L1 as a result of attrition processes, especially in structures that are sensitive to probabilistic conditions of a non-linguistic nature (Chamorro, Sorace & Sturt , 2015; Sorace, 2011). These changes may affect not just strength of activation but the actual language-specific weighting of particular constraints. Indeed, a current hypothesis is that change in the L1 may contribute to success in L2 learning (Linck, Kroll & Sunderman, 2009), so that successful bilinguals are not monolingual-like in either language. Gradient probabilistic formalisms like the one proposed by Goldrick et al. may have an edge in accounting for the bilingual application of changing grammatical constraints from a purely linguistic point of view, but shed little light on the interplay between linguistic and general cognitive factors in the way bilinguals handle their two languages. The real work of bringing together language and cognition within the formal linguistic framework presented by Goldrick et al. still lies ahead.

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