



Original Articles

When having two names facilitates lexical selection: Similar results in the picture-word task from translation distractors in bilinguals and synonym distractors in monolinguals[☆]

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ABSTRACT

We report five experiments using the picture-word task to examine lexical selection by comparing the effects of translation distractors in bilinguals and synonym distractors in monolinguals. Three groups of bilinguals named objects in their L1 or L2, and English monolinguals named objects using common names (e.g., *DOG* = “dog”) or, in a novel manipulation, using synonymous alternative names (e.g., *DOG* = “hound”, *GLASSES* = “spectacles”). All studies produced strikingly similar results. When bilinguals named in L1, there was a small facilitation effect from translation distractors, but larger facilitation when they named in L2. When monolinguals produced common names, there was no reliable effect from synonym distractors, but facilitation when they produced alternative names. (There were also strong identity facilitation effects in all naming conditions.) We discuss the relevance of these results for the debate concerning the role of competition in lexical selection and propose that for speech production there are direct facilitatory connections between the lexical representations of translations in bilinguals (and between synonyms in monolinguals). The effects of synonyms in monolinguals appear to “simulate” the effects found for translations in bilinguals, which suggest that there are commonalities in monolingual and bilingual lexical selection.

1. Introduction

A central component of speech production is the process of lexicalization, which refers to the cognitive operations whereby a semantic representation (e.g., <small mammal>, <pet>, <barks>, etc.) activates a word to be spoken (e.g., Caramazza, 1997; Levelt, Roelofs, & Meyer, 1999; Roelofs, 1992). It is generally accepted that the conceptual and semantic representations aroused by a communicative intent, or by a stimulus object to name, will activate a number of related words (e.g., ‘dog’, ‘hound’, ‘terrier’, ‘fox’, ‘cat’, etc.), if to varying degrees. Levelt et al. (1991) refer to the set of activated words as the “semantic cohort”. A major issue for theories of lexicalization is how people select a word from this cohort of activated candidates to produce in speech, and a continuing debate concerns the role of competition in the process of lexical selection (see Spalek, Damian, & Bölte, 2013).

Finkbeiner, Gollan, and Caramazza (2006) stated that “the closer two lexical representations are in meaning the more difficult it will be to select the correct one” (p. 153), and called this the “hard problem” of

lexical selection. This “hard problem” pertains to both within-language synonyms (e.g., couch–sofa, error–mistake) and bilingual translations. Finkbeiner et al. argued that, in bilingual speakers, “the hard problem is extensive because virtually every concept is associated with synonymous lexical nodes” (p. 153). Bilingual (and multilingual) speakers will always have two (or more) words to name the same object and, more generally, to express the same concept in speech. Their “hard problem” has indeed been hard to solve theoretically, although bilinguals generally appear not to find it too hard in practice. Our research aims to compare bilingual and monolingual lexical selection in the picture-word interference task by examining the effects of translation distractors in bilinguals and synonym distractors in monolinguals.

How are bilinguals able to “choose” the language of a word to produce? A number of logically possible solutions to the bilingual “hard problem” have been proposed. First, the message-level conceptual representation may be so effectively specifying that lexical representations in the non-target language would not be activated; this is the essence of La Heij’s (2005) “complex access, easy selection” approach to

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bilingual word production. Second, lexical representations in the non-target language may be activated but effectively ignored by the selection mechanism; this is the basis of the language-specific selection model championed by Costa, Miozzo, and Caramazza (1999) and Roelofs, Piai, and Garrido Rodriguez (2011). Third, the activation levels of lexical representations in the target language may be increased, as suggested by de Bot's (2004) "multilingual processing model". Fourth, lexical representations in the non-target language may be actively inhibited as part of the selection mechanism (Green, 1986, 1998). (Some accounts of monolingual lexical selection also propose the active inhibition of non-selected competitor words; Wheeldon & Monsell, 1994.) Finally, lexical representations in both languages may be activated, and speakers simply select the most activated word irrespective of its language (Finkbeiner et al., 2006).

All these possible solutions will need to be supplemented by an extra-lexical executive system to permit various aspects of language control. Such a control system is necessary to enable bilinguals to speak consistently in an intended language, to prevent the production of words in the non-intended language, and to allow flexibility in language choice (e.g., when translating words). The control system might operate at an input level, at an output level, or a combination of the two. At an input level, it could increment the activation of words in the intended or task-required language. At an output level, it could permit the production of words only in the intended language, perhaps as part of a more general "verbal self-monitoring" system of the kind proposed to repair slips and to prevent the production of nonwords (Dhooge & Hartsuiker, 2012; Hartsuiker & Kolk, 2001).

Lexical selection has often been studied using the picture-word interference task, in which participants are required to name a pictured object and to ignore a printed word superimposed upon it. Many studies have reported that naming times are slowed by distractor words from the same semantic category as the target (e.g., DOG + cat is slower than DOG + hat)¹ and this interference effect has been interpreted as reflecting a process of competition between the activated lexical representations of related words (e.g., Roelofs, 1997; Schriefers, Meyer, & Levelt, 1990; Starreveld & La Heij, 1996). However, studies have found facilitation from some semantically related words, such as the names of (unseen) parts of target objects (e.g., BRAIN + neurons; Costa, Alario, & Caramazza, 2005), different-category associates (e.g., NEEDLE + haystack; Sailor, Brooks, Bruening, Seiger-Gardner, & Guterman, 2009), and thematically related words (e.g., LION + Africa; de Zubicaray, Hansen, & McMahon, 2013). Mahon, Costa, Peterson, Vargas, and Caramazza (2007) found that related verbs (e.g., BED + sleep) produced facilitation and not interference, and they questioned the orthodox notion that lexical selection necessarily involves competition. They proposed the *response exclusion hypothesis* as a non-competitive account of performance in the picture-word task, and interpreted semantic interference effects in terms of a post-lexical process that excludes distractor words (see later). Our studies will be directly relevant to attempts to adjudicate between these theoretical alternatives concerning the role of competition in both monolingual and bilingual lexical selection.

Another result that is reliably observed in the picture-word task is the identity facilitation effect; naming times are faster when the distractor is the same name as the target object (e.g., DOG + dog is faster than DOG + key). In their seminal investigation of bilingual lexical selection, Costa et al. (1999) used a cross-language version of this identity effect to contrast two theoretical views. The *language-nonspecific* account proposes that lexical representations in both languages are considered by the selection mechanism (e.g., Poulisse & Bongaerts, 1994).

¹ We use the notational conventions of expressing target object names in upper case, underlining printed distractor words (e.g., DOG + hound), using 'single quotes' for lexical representations (e.g., 'dog', 'perro'), and using "double quotes" for spoken responses (e.g., "dog").

In contrast, the *language-specific* account proposes that only the representations in the target language are considered as candidates by the selection mechanism. The experimental adjudication between these accounts centres on the effect of distractors that are translation-equivalents, such as GOS + perro (Catalan and Spanish, respectively, for 'dog'). If lexical selection were to be language-nonspecific, then translations, as particularly strong competitors, should interfere with naming. In stark contrast to this expectation, Costa et al. found that Catalan-Spanish bilinguals showed a facilitation effect from translation distractors, which supports language-specific selection. (Costa et al. referred to this as the "cross-language identity effect", but we shall call it the translation facilitation effect, as it is produced by a distractor word that is the translation of a target object name.) Although a simple view of the language-specific selection account might expect that translations should have no effect on lexical selection (as they are words in the not-to-be-produced language), Costa et al. interpreted the translation facilitation effect they found in terms of semantic priming from the translation distractor word to the target object that occurs prior to lexical selection.

Translation facilitation has been found by a number of studies (Costa, Colomé, Gómez, & Sebastián-Gallés, 2003; Roelofs, Piai, Garrido Rodriguez, & Chwilla, 2016; Roelofs et al., 2011), but it appears to be larger when bilinguals name in L2 than in L1, although this has not been compared directly as most studies have examined naming in one language only. For instance, Costa et al. (1999) tested naming only in L1 and found translation effects of between 10 and 31 ms over their various experiments, whereas Hermans (2004) and Roelofs et al. (2011), who tested naming only in L2 by Dutch-English bilinguals, found effects of 80–110 ms and 95 ms respectively. Costa and Caramazza (1999) found that translation facilitation was larger when English-Spanish bilinguals named in L2 than when Spanish-English bilinguals named in L1 (56 vs. 27 ms), although this between-group contrast was not analysed. It is therefore important to establish the reliability of any possible language asymmetry in the magnitude of the translation facilitation effect, and so our first experiments examined bilinguals' naming in both their L1 and L2 using within-participants designs. We tested three groups of bilinguals who differ in their relative proficiency of L2 compared to L1 to examine the generality of translation facilitation effects. The second motivation for our experiments with bilinguals was to provide a solid empirical base against which we can compare the results of similarly designed experiments with monolingual speakers when the distractor words are synonyms of the target name (e.g., GLASSES + spectacles). This allows the investigation of possible parallels in the processing of translation-equivalents in bilinguals and close synonyms in monolinguals, as Finkbeiner et al.'s "hard problem" of lexical selection applies to both.

1.1. Effects of translation distractors in bilinguals

We report three experiments, each with a similar design. In separate blocks of trials, participants named objects in their L1 and their L2. Within each block, there were four distractor words for each object: the object's name in L1; an unrelated control word in L1; the object's name in L2; and an unrelated control word in L2 (e.g., for the picture DOG, the words were perro, hombro, dog, and lid). (Each stimulus object appeared four times in each language block, and so appeared eight times in the whole experiment.) For each naming language, we will compare the effects of distractors that are identical to the target name (e.g., PERRO + perro and DOG + dog) and those that were translations of the target name (e.g., PERRO + dog and DOG + perro), both assessed against unrelated control words. We expect that identical distractor words will produce a large congruency facilitation effect when naming in L1 and in L2. The theoretically important question is whether the effect from translation distractors will be larger when naming in L2 than in L1. Therefore, the effects from identical words and from translations will be analysed separately.

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