On the facilitatory effects of cognate words in bilingual speech production

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Abstract

There is a growing body of evidence showing that a word’s cognate status is an important dimension affecting the naming performance of bilingual speakers. In a recent article, Kohnert (2004) extended this observation to the naming performance of an aphasic bilingual (DJ). DJ named pictures with cognate names more accurately than pictures with non-cognate names. Furthermore, having named the pictures in Spanish helped the subsequent retrieval (with a delay of one week between the two tests) of the same pictures’ names in English, but only for pictures with cognate names. That is, there was a language transfer but only for those translation words that were phonologically similar. In this article we first evaluate the conclusions drawn from these results by Kohnert, and second we discuss the theoretical implications of the facilitatory effects of cognate words for models of speech production in bilingual speakers.

Keywords: Bilingualism; Cognates; Speech production; Aphasia

1. Introduction

Bilingual speakers are usually able to produce words in the language they intend while preventing massive interference and lexical intrusions from their other language. To understand how this is achieved, we need to advance in our comprehension of how words in the bilinguals’ two languages are represented in the mind of the speaker and how they are accessed. Most researchers agree on two basic assumptions of the functional architecture of the bilingual lexico-conceptual system: (a) the existence of a common conceptual/semantic store for the two languages, (b) the existence of some sort of segregation between the lexical representations of the two languages (e.g., Kroll & Stewart, 1994). In this context, two different views have been advanced to explain how bilingual speakers access the correct lexical node in the intended language. The first view assumes that lexical access in the target language is achieved by creating an imbalance in the activation levels of the two lexicons (De Bot, 1992; Green, 1986, 1998; Hermans, Bongaerts, de Bot, & Schreuder, 1998; La Heij, in press; Poulisse & Bongaerts, 1994). In some models this imbalance is implemented by assuming that there is inhibition of the non-response language. For example, in the “Activation-...
Threshold-Hypothesis” proposed by Paradis (2004), the activation of one language entails the automatic inhibition of the non-response language (by raising the activation thresholds of the lexical representations), therefore preventing cross-language interference. The second view assumes that selection of the target word in the intended language is achieved by means of a lexical selection mechanism sensitive only to the activation of the lexical items of the intended language (Costa, in press; Costa, Miozzo, & Caramazza, 1999; Costa & Caramazza, 1999; Costa & Santesteban, 2004a, 2004b; Roelofs, 1998). These two views are not necessarily incompatible. In fact, if one assumes that inhibition is very powerful and subsequently lowers the activation of the non-response language to a great extent (or raises the activation threshold of that language in Paradis’ terminology), then both views predict the absence of lexical interference across languages (see Costa & Caramazza, 1999; for a discussion of this issue).2

Perhaps the most relevant property of translation words affecting the performance of bilingual speakers is their phonological similarity (e.g., their cognate status). Cognates are those translation pairs that are phonologically similar (e.g., “lampara” and “lamp” in the case of Spanish and English) while non-cognates are phonologically dissimilar (e.g., “mesa” and “table,” in Spanish and English, respectively). Several studies have shown that the cognate status of translations has a positive effect not only on the speed with which words are produced (e.g., Costa, Caramazza, & Sebastian-Galles, 2000; Kroll, Dijkstra, Janssen, & Schriefers, 2000), but also on how resistant they are to momentary malfunctioning of the lexical retrieval mechanism (e.g., Gollan & Acenas, 2004).

The positive effects of cognate status have also been observed in the context of bilingual aphasia. For example, Roberts and Deslauriers (1999) found that aphasic speakers name pictures with cognate names more accurately than pictures with non-cognate names. The study presented by Kohnert (2004) replicated the cognate advantage and extended this finding in the following way: naming pictures in one of the patient’s languages (e.g., Spanish) had a subsequent positive effect on the picture naming performance of the same items in his other language, if and only if, the pictures’ names were cognates. That is, having named the picture of a “lamp” in Spanish (lampara) supported (one week later) the retrieval of the English name (lamp); having named the picture of a “table” in Spanish (mesa) did not, however, help the retrieval of its English name (table).

Given the robust effects of cognates in several naming contexts, the question becomes one of discovering their origin and implications for the functional architecture of the bilingual (and perhaps the monolingual) speech production system. And in this respect, there is not much agreement among researchers. In the following we discuss: (a) the reliability of the cognate effects observed by Kohnert (2004), (b) the possible origins of such effects, and (c) the implications of cognate effects for models of both speech production and bilingualism.

## 2. Language-treatment and language-transfer effects

Kohnert’s study explored several issues related to treatment and rehabilitation in aphasia. Among these issues we focus on: (a) whether a language treatment involving a specific set of words may produce positive effects in the subsequent naming performance with non-treated words, (b) whether treatment in one of the languages of the bilingual patient generalizes to the other language, and (c) to what extent such generalization depends on the cognate status of the tested words.

To explore these issues, Kohnert assessed the naming performance of a Spanish–English bilingual aphasic (DJ). DJ was asked to name a set of 20 pictures (10 with cognate and 10 with non-cognate names) in Spanish and in English. In the first session (SP pre-treatment session) the patient named the pictures only in Spanish. After this session, DJ underwent several language tasks in Spanish (what Kohnert refers to as Language Treatment—two treatment sessions of 1 h each). Importantly, the language treatment did not include the 20 test items. After the Spanish treatment, DJ was asked to name the same 20 test pictures in Spanish again (SP post-treatment session). DJ showed a better performance in the SP post-treatment session than in the SP pre-treatment session, both for pictures with cognate names (from 40 to 80%) and for pictures with non-cognate names (from 20 to 70%). After one week, the English session started, and DJ was again asked to go through the same program but now in English. Interestingly, the naming performance in the English pre-treatment session was much better for cognates (70%) than for non-cognates (10%). Performance reached again higher levels after the English treatment for both sets of words (90 and 70%, respectively).

From these results, Kohnert concluded that: (a) language treatment had a positive effect in both languages, and generalised to novel stimuli not used in the treatment, and (b) picture naming in one of the patient’s two languages facilitated picture naming in the other (language-transfer) but only for those words that are phonologically similar across languages (i.e., cognates). She further discussed the implications of such an observation for the design of language rehabilitation therapies in the context of aphasic bilingual speakers.

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2 However, postulating that there is inhibition of the lexical representations of the non-response language has implications for whether or not the activation of these representations percolates to subsequent levels of processing.
The first conclusion reached by Kohnert, namely that the difference in performance between pre- and post-treatment sessions is due to the effects of the language-treatment is not warranted by the experimental results. This is because the study lacks a proper control condition. In order to attribute the better performance in the post-treatment sessions as compared to the pre-treatment sessions, one needs to show that under the same conditions, the difference between the sessions disappears if language treatment is removed. Otherwise, the improvement in the post-treatment condition may just be revealing a repetition effect (or even a spontaneous recovery effect). That is, we do not know whether the benefit comes from the language-treatment or from having named the pictures before. Along the same lines, it is possible that the benefit comes not from the treatment with new items, but instead by the fact that the experimenter told DJ the names of the pictures he was unable to name during the pre-treatment session. If that were the case, it would put on hold the claim that the treatment of unrelated items helped the patient’s performance in the test items. At any rate, even if Kohnert were to be right in concluding that the increase in performance were due to the beneficial effects of the language treatment, it is unclear how the effects came about. That is, how does a treatment with one set of items generalize to a different set?

For our purposes here, Kohnert’s second observation is more interesting: language-transfer is only present for pictures with cognate names. Kohnert claims that the naming performance in the English pre-treatment session is better for cognates than for non-cognates due to the “spill-over effects” of having named the same pictures previously in Spanish. While Kohnert’s conclusion may be correct, once again the lack of a control condition leaves several other explanations open. For all we know, DJ’s performance in English would have been the same without the previous naming sessions in Spanish. That is, we do not know whether DJ’s performance in English reveals an advantage of cognates vs. non-cognates per se, or the actual language transfer from Spanish to English. Indeed, the fact that DJ already showed a difference between cognates and non-cognates in the pre-treatment session in Spanish (40 vs. 20%), suggests that there were some pictures whose names were probably more accessible to the patient than others. Thus, Kohnert’s interpretation of these results is compromised by the lack of a control condition in which the naming performance is evaluated in English without previous sessions in Spanish.

Given these considerations, caution should be exercised when drawing strong conclusions from Kohnert’s results, that is when concluding the existence of a causal relationship between: (a) the language treatment and the differences in performance levels between pre-training and post-training, and (b) the differential performance with cognates and non-cognates in English and the assumed influence of Spanish naming into English naming. To be fair, Kohnert (2004) was aware of the exploratory nature of the study and she recognized that “future research using true single case design with multiple pre- and post-treatment baselines is needed” (p. 301).

At any rate, and given that the cognate advantage has been observed in several other studies both for normal (Costa et al., 2000; Gollan & Acenas, 2004) and aphasic speakers (Roberts & Deslauriers, 1999) we will assume that the cognate effects observed by Kohnert do actually reveal the influence of this variable in the naming performance of bilingual speakers. The question then becomes one of assessing which functional architecture we must postulate to account for these observations.

3. How does language transfer for cognates occur?

Kohnert’s discussion of the results was focused primarily on their implications for language rehabilitation in bilingual aphasia. Given the increasing number of bilingual speakers, the issue of the extent to which treatment in one language may help rehabilitation of the other language (and the relevant variables for that to occur) is very important. For this reason, we need to advance in our understanding of how the effects observed in this study came about, and its implications for the functional architecture of bilinguals. Once we have such knowledge we can better capture how the treatment actually helps rehabilitation, and this knowledge will eventually help us to design more precise therapies. In this respect, Kohnert’s discussion of the results is modest: “These results provide preliminary evidence that cross-linguistic lexical-semantic links can be exploited in treatment” (p. 300) and “that is, the two languages are functionally and neurologically interconnected in complex and meaningful ways” (p. 301). The question that needs to be answered then is: In “which” ways are the two languages interconnected so that cognate effects emerge? In other words, which is the functional architecture that one needs to put forward to account for: (a) the cognate advantage in picture naming, and (b) the differential sensitivity of cognate and non-cognates to language transfer. In the following, we consider different types of representation candidates for hosting a difference between cognate and non-cognate words: semantic, lexical, and sublexical.

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3. The fact that the difference in the pre-treatment sessions between cognates and non-cognates was smaller for Spanish than for English is irrelevant for the issue at hand. This is because we do not have prior reasons to believe that the differential accessibility of the two sets of pictures should be the same across languages (especially when a very reduced number of items is used).
4. Conceptual-semantic origin of the cognate effect

There have been some proposals arguing that cognate translations may have a larger conceptual overlap than non-cognates (Van Hell & De Groot, 1998), which accounts for their differential sensitivity in, for example, cross-language priming and word association experiments (De Groot & Nas, 1991; Van Hell & De Groot, 1998). In this framework, an advantage of cognates over non-cognates in naming latencies could be accounted for by assuming that the retrieval of those conceptual representations that are shared across languages is faster than the retrieval of those that are not shared. Also, one could explain language-transfer for cognates by assuming that accessing a semantic representation that has been recently accessed (e.g., cognates) is easier than accessing a non-pre-activated representation (e.g., non-cognates). However, this explanation does not seem to adequately characterize the performance of patient DJ. This is because DJ does not seem to have problems in accessing the meanings of intended pictures (or at least nothing is mentioned about this). Thus, for all we know, his problems may be more related to a subsequent process of word retrieval than to damage to the semantic system. Further evidence from tip of the tongue studies (TOT) suggests that characterization of the word’s cognate status in terms of semantic overlap cannot account for all the differences between cognates and non-cognates (Gollan & Acenas, 2004). In this study, cognate words elicited fewer TOT states than non-cognates. Importantly, when a speaker falls in a TOT state she has no problems in accessing the semantic representation of the intended word. Thus, the origin of the cognate effect in TOTs cannot be accounted for by assuming an easier retrieval of semantic representations for cognates in comparison to non-cognates. Finally, it is unclear why one would like to have a phonological property of translations to determine their semantic similarity. In other words, the dimension that distinguishes cognates from non-cognates is formal in nature and therefore should, in principle, be orthogonal to the semantic dimension. Thus, the claim that the semantic representations of “cat” and “gato” [cat in Spanish] are more similar than those of “dog” and “perro” [dog in Spanish] does not seem to be easily justifiable. To illustrate this point, consider the case of semantically related words that may or may not be morphologically related. If we were to assume that phonological similarity determines, to some extent, the degree of semantic overlap between different representations, then we are committed to claim that the pair “broom” and “sweeping” holds a semantic relationship of a different strength than the pair “iron” and “ironing.” Even more striking is the following situation, in which two semantically related word-pairs may be phonologically related in one language of a bilingual (caja–cajon [box and drawer in Spanish]), but not in the other (box–drawer). Should we then postulate that a Spanish–English bilingual has a closer semantic representation for one pair than for the other?

5. Lexical-morphological origin of the cognate effect

The second type of representation candidate to host a difference between cognate and non-cognate words is the lexical (morphological) representation. There has been at least one proposal of this sort put forward by Kirsner, Lalor, and Hird (1993) in which cognate translations are thought to share, to some extent, their morphological representations. Although Kirsner et al’s proposal is more focused on how word perception is achieved by bilingual speakers we may entertain how such proposal could account for the cognate effects in speech production. If cognates were to share the morphological representation, then one would expect that re-use of the same representation when speaking in English and when doing so in Spanish would lead to a benefit, and hence to the observed language transfer. While a functional architecture of this sort would capture the cognate effects reported by Kohnert and others, it would pose some problems for explaining the processes involved in bilingual lexical access. The main problem with such an approach refers to how the same morpheme leads to two different phonological realizations. In speech production models, morphemes (or lexemes) are connected to their phonological content. Once selection of the target stem is achieved, the appropriated morphological transformations are executed and the phonology linked to the target word is retrieved. In this scenario, the question that needs to be addressed is how a shared stem across languages can lead to different phonological realizations. That is, if we assume that two words from different languages share their stem (nas/nariz [nose in Catalan and Spanish respectively]), it is unclear how the correct final pronunciation in the intended language is retrieved. Kirsner et al. (1993) were aware of this problem and postulated the existence of some “more or less regular rules for transforming forms between languages.” In their view, the shared stem would be retrieved and application of some language-specific rule(s) would result in retrieval of the phonological content for the target word in the intended language. In this framework, cognates seem to be treated as a particular case of morphologically related words.

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4 Nevertheless, the semantic hypothesis makes an interesting prediction worth considering here. If we were to find an aphasic bilingual whose naming problems stemmed from selective damage to the semantic system, then we would expect this patient to show a cognate effect. That is, damage to the semantic system may result in a disproportionate impairment for naming pictures with non-cognate names. Future research is needed to test this prediction.
We believe that this approach miss-characterises the relationship between the words of two different languages. While we can find a clear systematicity in the way morphologically related words are created from a shared stem, such systematicity is not that obvious in the case of cognates. Consider the case of plural inflection in English. In a system of morphological decomposition, production of the word “dogs” would entail retrieval of the stem “dog” and the application of the plural morphological rule that would end up attaching the plural morpheme “s” to the stem. Importantly, application of this transformation is (with a few exceptions) very regular. Let’s consider now the case of cognates with the example “nas–nariz” [nose in Catalan and Spanish, respectively], and assume that these two words share a common stem (e.g., presumably “na”). Once this stem is retrieved, it is unclear how realization of the target word is achieved, given that neither “s” for Catalan (nas) nor “riz” for Spanish (nariz) can be derived from a rule-based mechanism. This is because there is no systematic relationship between the two endings. That is, whether or not the word ends with “s” or with “riz” cannot be derived morphologically, but rather is an intrinsic property of the lexical item. Note that this same problem is not only present for the retrieval of segmental information. For example, the stress pattern of the translations “carrer–calle” [street in Catalan and Spanish, respectively] is different (in Catalan the second syllable carries the stress while in Spanish it is placed in the first syllable). Thus, assuming that these words share a common stem it is unclear how they would lead to two different stress patterns. This phenomenon is very pervasive in languages in which the stress distribution is very different. For example, translation words such as saxophone/saxofón; paper/papel, etc. carry the stress in different syllables. However, cognate translations do not always have a change in the stress (e.g., guitar/guitarra carry the stress in the same syllable), and hence whether or not a change should be applied is not completely predictable. In sum, it remains unclear how “regular” rules for transforming forms between languages can be implemented, and hence it is also unclear whether one can postulate a way to recover a word’s language-specific phonological properties when such information is lost at the immediately preceding level of representation.

There is also another problem with this view that reveals once again the fact that cognate status is defined in terms of formal overlap, and not in terms of morphological similarity. Despite the fact that words with high formal overlap across languages sometimes seem to have a common stem, there are many exceptions to the rule. That is, there are many cognate words, for which it is not apparent that we could postulate a common morphological stem (e.g., “carrer–calle” [street in Catalan and Spanish, respectively]; “cullera–cuchara” [spoon in Catalan and Spanish, respectively]).

6. Phonological-sublexical origin of the cognate effect

Finally, the third level of representation at which the cognate/non-cognate dimension might be relevant is the phonological or sublexical level. Before going into the details of this proposal, note that the cognate/non-cognate distinction is usually defined by appealing to form similarities (phonological/orthographic) between word translations. That is, semantic, lexical, and morphological considerations are irrelevant for categorising a given translation pair as cognate or non-cognate. Consider, for example, the Catalan–Spanish translation pair “carrer–calle” [street in Catalan and Spanish, respectively]. These two words have different grammatical properties in the two languages (“carrer” is masculine in Catalan and “calle” is feminine in Spanish) and, as already said, they do not seem to share any clear morpheme, but nevertheless they are considered cognates. Given that the definitory dimension is phonological, it seems appropriate to explore whether the source of the cognate effects can also emerge due to the effects of this overlap.

How can we explain the cognate effect and the cross-language benefit observed by Kohnert (2004) by appealing to phonological similarity? One possibility is to assume that in the course of language production, there is phonological activation not only of the target word in the intended language but also of its translation in the non-response language. That is, when DJ names the picture of, say, “bottle,” the phonological information of both “bottle” and that of its Spanish translation “botella” is activated. In this context, the retrieval of the phonological properties of the target word “bottle” would be easier than that of a non-cognate word “box” (Spanish “caja”). This is because a cognate’s phonological content would be activated from two sources (the target word and its translation). As we show below, the postulation of such a cascade system might account not only for DJ’s performance, but also for other cognate effects observed in picture naming (Costa et al., 2000).

In this framework, explanation of the language transfer for cognates requires further postulating one of the following two mechanisms. First, it is possible that the activation sent by the target’s translation (e.g., “botella” when naming “bottle”) to its phonological segments is sensitive to how recently such a representation (e.g., “botella”) has been produced. That is, the target’s transla-
tion (e.g., botella, when naming “bottle” in English) may send more activation to its phonological segments if it has been recently used (e.g., if the speaker has recently produced such a word in Spanish), than if it has not. Put differently, if the patient is naming the picture of a bottle in English, the amount of activation that the Spanish translation word sends to its phonology would depend, among other things, on how recently the patient named the same picture in Spanish, and hence the language transfer for words that share some phonological information. Note that this benefit will not be present for non-cognate words, since no phonological overlap is present and activation of the translation’s phonology would be therefore irrelevant for retrieval of the target’s phonology.

The second possibility is that activation of phonological information affects the process of lexical selection (the connections between lexical items and phonological forms would therefore be assumed to be bi-directional). That is, not only would any activated lexical representation (regardless of the language it belongs to) spreads some activation to its corresponding segments, these segments would also send back some activation to all words with which they are connected. In this interactive model, naming a cognate word in Spanish (“botella”) would automatically lead to activation of its translation in the other language (English), and hence this residual activation might be enough to produce language transfer.

Note that the two mechanisms called into play to explain language-transfer at the phonological level are not mutually exclusive. That is, it is possible that there is both cascade and interactive processing. However, the two principles are not independent, and in fact, the principle of interactivity is only meaningful in the context of cascade processing. Below, we seek convergent evidence for the validity of both principles.

However, before doing so it is important to discuss a possible caveat of our interpretation of the cognate effect in terms of phonological overlap. For this interpretation to work we need to assume that cognate translations have more similar phonological/phonetic representations than non-cognate translations. However, phonemes generally have different instantiations in different languages; that is the Spanish /t/ is different from the English /t/. This raises the question of whether cognate words are at the phonological level as dissimilar as non-cognate words. We think that there are compelling reasons to believe that this is not the case. First, it is unclear whether bilingual speakers do actually have two different phonological repertoires for their two languages (at least for all sounds). For example, for those phonemes that are very similar across languages (/t/ /t/) it is possible that the phoneme in L2 is assimilated to an existing category in L1 (Flege, 1995, 2003; Sebastián-Gallés & Kroll, 2003). The mere fact that most L2 speakers have a foreign accent, and that that accent depends on the phonological properties of L1, suggests that bilinguals do not seem to build two fully specified L2 phonological repertoires. So for all we know, while the /t/ of a native Spanish speaker is different from that of a native English speaker, a bilingual speaker may have only one of those representations. Second, even if bilingual speakers actually had different representations for every single phoneme of each language (that is they have a /t/ for English and a /t/ for Spanish), the cognate effect could still arise at the level at which phonological features are represented. That is, for our explanation to work we only need to assume that the phonemes that conform cognate translations (lampara–lamp) would tend to share more phonological features than those that conform non-cognate translations (mesa–table). We believe that this is a reasonable assumption to hold.

7. Searching for convergent evidence: The cognate and the neighbourhood effects

Given the available experimental evidence from bilingual studies, it is difficult to determine whether cognate effects are due to differences in the way words are represented in the lexicon (e.g., shared morphemes for cognates), or rather are due to a more general property of the speech production system (e.g., cascade/interactivity dynamics). It is important to recall that the above-mentioned explanations of cognate effects are of a different nature. The “semantic” or “lexical” explanations account for the cognate/non-cognate distinction by postulating that cognates are represented “differently” than non-cognates. In contrast, when accounting for the cognate effect in terms of cascade or interactivity principles, the effect arises as a consequence of the dynamics of the language production system, rather than as a consequence of a different representational format. That is, the cognate effect is a by-product of an independent motivated mechanism, and the question then is whether there is independent experimental evidence supporting the existence of such mechanism.

Thus, the issue at stake here is whether: (a) lexical items that are not uttered but receive activation from the semantic system, nevertheless activate their phonology (e.g., when producing a word in language A, its translation in language B activates its phonology), and (b) phonological segments send back activation to the lexical items with which they are connected (interactivity between lexical and sublexical representations). Several studies that made use of different experimental paradigms have shown that lexical items other than the target one activate their phonological segments in the course of speech production (Jescheniak & Schriefers, 1998; Morsella & Miozzo, 2002; Peterson & Savoy, 1998). More importantly, there is experimental evidence showing that in the course of naming a picture in one language, there is phonological activation of the target’s
translation in the non-response language (Colomé, 2001). What about the notion that the lexical and sublexical levels interact with each other? Here again, there is a large body of experimental results suggesting that phonological segments send activation back to the lexical representations with which they are linked (e.g., Cutting & Ferreira, 1999; Dell, 1986; Ferreira & Griffin, 2003; Harley, 1993). Interestingly, evidence supporting the existence of interactivity comes also from studies in which the naming performance of aphasic individuals has been explored (Dell, Schwartz, Martin, Safran, & Gagnon, 1997; Foygel & Dell, 2000; Goldrick & Rapp, 2002; Rapp & Goldrick, 2000; but see Ruml, Caramazza, Shelton, & Chialant, 2000). Let us discuss one result that is particularly relevant in the present context.

In several recent studies, Vitevitch (2002, 2003) explored the effects of neighbourhood density in picture naming. Words with dense neighbourhoods refer to those that have many phonologically similar words (exchanging a sound of the target word leads to many existing words), while words with sparse neighbourhoods are those that have few phonologically similar words (changing a sound in the target word does not lead to many existing words). For example, the word “cat” has a dense neighbourhood (“hat, rat, bat, fat, mat, cap, sat, pat, cot, etc.”) in comparison to the word “cry” (“fry, try, dry, and pry”).

Unlike in word recognition, neighbourhood density correlates negatively with picture naming latencies. That is, pictures whose names have many neighbours are named faster than pictures whose names have few neighbours. This effect finds a ready explanation in terms of an interactive model of word production, in which words with many neighbours would reach higher levels of activation than words with few neighbours. This is because the phonological segments of the former words would be feeding back much activation to the target lexical node, given that they would be highly activated due to the activation sent by the neighbours. For example, when producing the word CAT, the segmental information corresponding to that word would send activation back to all lexical representations with which it is connected (fat, rat, mat, cap, sat, pat, etc.). These representations, in turn, would send activation forward to their corresponding phonological segments. Thus, the more words sending activation to shared phonemes, the higher the activation of these phonemes and the larger the magnitude of activation that they would send back to the target words. After several iterations, selection of the target representation would be achieved. In this scenario, selection would be easier if activation of the target’s lexical node were high than if it were low.7

Thus, given that words with many neighbours would be more highly activated than words with fewer neighbours, selection should be easier and faster for the former words. Interestingly, this neighbourhood effect has been found to affect not only the speed with which speakers produce words, but also the probability of successful selection during lexical access. For example, words with dense neighbourhoods are less vulnerable to falling in TOT states than words with sparse neighbourhoods (Harley & Brown, 1998; Vitevitch & Sommers, 2003). Neighbourhood density also predicts, to some extent, successful speech production of both normal (Stemberger, 2004; Vitevitch, 1997) and aphasic speakers (Gordon, 2002).

The similarities between the cognate and neighbourhood effects are instructive, as they reveal that when a given word has a phonological overlap, either with many other words of the same language (many neighbours), or with its corresponding translation (cognate translation), its processing is facilitated. Furthermore, the contexts in which these facilitatory effects are observed are also remarkably similar (picture naming latencies, TOT states, and aphasic performance). Thus, one may tentatively hypothesize that both effects have the same origin. If one resorts to the interactive mechanism to explain the neighbourhood effect in monolingual speech production, it seems reasonable to ascribe the cognate effect to the same mechanism. Note, however, that the cognate transfer effect observed by Konhert should stem from a long term priming of the English lexical representations when naming the pictures in Spanish. This priming will be present only for cognates given that its origin is phonological. In normal circumstances (e.g., with unimpaired speakers) such a long-term priming would be very likely minimal. However, in cases of anomia such priming might be enough to produce detectable effects over relatively long periods of time. According to this explanation of the neighborhood effect in terms of interactivity to work, we need to assume that the increase in activation of the target lexical node is larger than the increase in lexical competition produced by the neighbours.

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6 Neighborhood density correlates with the frequency with which a particular segment or sequence of segments occurs in a given position within words or syllables (phonotactic probability). This frequency has been shown to affect the occurrence of some speech errors during speech production (Blumstein, 1973; Dell, Reed, Adams, & Meyer, 2000; Levitt & Healy, 1985; Shattuck-Hufnagel & Klatt, 1979; Trost & Canter, 1974). In addition, Levelt and Wheeldon (1994) found that syllable frequency correlates negatively with picture naming latencies. Thus, in principle one could account for the neighborhood effect in terms of these correlated variables without need of postulating interactivity. However, neighborhood effects are still present when these correlated variables are controlled for, suggesting that it has an effect by itself (Vitevitch, 2002).

7 Note, however, that the selection of the target word may depend not only on the activation of the lexical node, but also on the activation of other lexical nodes that may act as competitors. Thus, it is likely that words with many neighbors also have more competitors at the lexical level than words with few neighbors. That is, while having many neighbors may increase the activation of the target lexical node, it will also have the consequence of activating more lexical competitors. For an explanation of the neighborhood effect in terms of interactivity to work, we need to assume that the increase in activation of the target lexical node is larger than the increase in lexical competition produced by the neighbours.
tion, the cognate effect should be considered as a special case of a neighbourhood effect. Importantly, the neigh-
bourhood effect in the case of cognates would be magni-
fied by the fact that the target’s translation is not only
activated by feedback from the phonological level, but
also from the semantic level (See Fig. 1).

The interpretation of the cognate effect in terms of
interactivity has important implications for the functional
architecture of the bilingual speech production system.
This is because it presupposes that the interactive mecha-
nism is not only functional within a single language, but
also across languages. However, this does not seem to be a
problem. In fact, if the functional architecture of the
monolingual speech production system follows an interac-
tive nature, parsimony dictates that, unless there are good
reasons to discard such an assumption in bilingual con-
texts, it should also be functional across languages.

Note that to embrace the interactivity principle is prob-
lematic for those models of bilingual language production
that assume that lexical selection in the proper language is
achieved by inhibiting the lexical representations of the
non-response language (Green, 1986, 1998). This is
because, if the target’s translation is inhibited, in principle,
it should not be able to affect the retrieval of the target’s
phonological content and hence the cognate effect would
not be present (according to the current explanation).

8. Conclusion

An increasing number of studies are revealing facilita-
tory effects in the processing of cognates vs. non-cognates
in bilingual speech production. Compared to pictures
with non-cognate names, pictures with cognate names:
(a) are produced faster, (b) are more resistant to retrieval
failures both in normal and aphasic speakers, and (c)
show language transfer. Given the pervasive nature of
this effect, the question becomes one of understanding its
implications for the functional architecture of the bilin-
gual speech production system. We have entertained
different interpretations of the effect. These explanations
vary in whether they assume that the cognate effect
reveals a difference in the way cognates are represented
(in comparison to non-cognates), or whether the effect
emerges from certain dynamic properties of the speech
production system that are independently motivated.

We argued that the origin of the cognate effect finds a
ready explanation without the need to postulate different
semantic or lexical representations for cognates and
non-cognates. Instead, such an effect emerges naturally
from the independently motivated mechanism of interac-
tivity between the lexical and sublexical levels of repres-
entation. Importantly, there are independent experi-
mental observations in contexts of monolingual
speech production that lend support to the interactivity
principle. Therefore, we conclude that, at present, the
most parsimonious way to account for the cognate bene-
fits in speech production is by assuming the existence of
interactivity between the lexical and sublexical levels of
representation, both within and across the two lan-
guages of a bilingual speaker. This interactivity may be
one of the ways in which, as Kohnert puts it, “the two
languages are functionally and neurologically intercon-
nected in complex and meaningful ways (p. 301).”

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References


