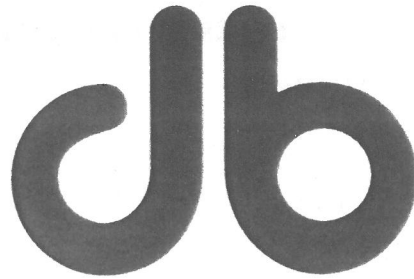


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About phonological, grammatical, and semantic accents in bilinguals' language use and their cause

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The linguistic expressions of the majority of bilinguals exhibit deviations from the corresponding expressions of monolinguals in phonology, grammar, and semantics, and in both languages. In addition, bilinguals may process spoken and written language differently from monolinguals. Two possible causes of such "accents" in bilinguals' language use are considered: the first, that becoming bilingual results in memory representations for specific linguistic units qualitatively different from the corresponding representations in monolinguals, and the second, parallel activation of linguistic elements in the two language subsystems of bilinguals when they use language. I exemplify the occurrence of phonological, syntactic, and semantic accents in bilinguals' language use and explain them in terms of both qualitatively different memory representations and parallel activation.

Keywords: memory representation, monolinguals vs. bilinguals, parallel activation

1. Introduction

Countless studies indicate that the linguistic expressions of the majority of bilinguals, even of those who are fluent in both languages, differ from the corresponding expressions in monolingual speakers. This statement not only applies to a bilingual's second language (L2) but also to the language acquired first (L1), the native language (see, e.g. Cook 2003), and to both early and late bilinguals. Differences between the linguistic expressions of monolinguals and bilinguals have been observed for all sub-domains of the language system: phonology, morphology, syntax, lexicon, conceptual representation, and pragmatics (Pavlenko 2000). In earlier publications (De Groot 2011: 361–371; De Groot 2013) I called all these deviations from monolinguals' language use *accents*, thus extending the meaning of

the word *accent* from its conventional use referring to phonology to other linguistic domains such as grammar and semantics. For instance, a Dutch-English bilingual pronouncing *than* or *flash* the same way as *then* or *flesh*, respectively, would exhibit a phonological accent; an English-French bilingual calling a particular object a *bouteille* (*bottle*) in French whereas a native French speaker would call it a *flacon* would show a semantic accent; a Chinese-English bilingual asking her Dutch guest who just landed at Beijing airport *How is your flight* exhibits a grammatical accent.

The meaning of *accent* can be extended further by not only using it for differences between monolinguals and bilinguals in language production but also for comprehension differences between them. So if a French-English bilingual encounters the word *costume* in an English text and assigns it the meaning of a 'man's suit' instead of the intended meaning of a 'theatre costume', this would qualify as a semantic accent in comprehension (the example is based on Granger 1993). If this same bilingual would parse the sentence fragment *The neighbor of the hairdresser who adores Venice* as if the neighbor was the person enraptured by Venice while the speaker intended to communicate the hairdresser was thus afflicted, he would exhibit a grammatical accent (and an ensuing semantic accent).

The reason for using the word *accent* in this broad sense is the working hypothesis that all of these differences in language use between monolinguals and bilinguals share the same two sources. One source suggested in the literature is that becoming bilingual (either by growing up with two languages or by L2 learning later in life) results in memory representations for specific linguistic units that differ qualitatively from the corresponding representations in monolingual memory. For instance, during L2 learning the memory representation of a specific L1 speech sound may "assimilate" a similar (but not identical) sound in L2 and develop into a representation that constitutes a compromise between the two language-specific sounds (e.g. Flege 1987). The consequence of such a learning process would be accented speech in both L1 and L2. To provide one more example: during L2 learning the learner may map the L2 member of a pair of word translations onto the conceptual representation of the L1 word in the pair even though the two terms of the translation pair are not completely meaning equivalent. The consequence of this mapping process would be accented L2 word use.

A second possible source of accents in bilinguals' language use is parallel activation of linguistic elements in their two language subsystems, even in circumstances where they clearly intend to use one language exclusively and the communicative setting is a unilingual one. The co-activated elements of the other language (the "non-target language") compete with the targeted elements of the language selected for use (the "target language") during comprehension and production. Such parallel activation has been demonstrated in many studies, showing quantitative behavioral differences between bilinguals and monolinguals

(especially differences in response times). The main hypothesis to explore here is that parallel activation in the two language subsystems of bilinguals may also lead to *qualitatively* different language use in bilinguals as compared with monolinguals (that is, to accents), even if the underlying memory representations do not differ from the corresponding memory representations in monolinguals and, thus, *in terms of the underlying linguistic database*, bilinguals would be two monolinguals in one person (cf. Grosjean 1989). So, for instance, even if a particular French-English bilingual has (ultimately) come to store French /t/ and English /t/ in two perfectly native-like language-specific phonetic categories in memory, he may pronounce /t/ differently from monolingual speakers of French and English as a consequence of the parallel activation of both /t/ representations.

The plausibility of this second account of bilinguals' accented language use depends on the generality of the phenomenon of parallel activation in their two language subsystems. To show that the phenomenon is indeed a common one, in Section 2 I review a large number of studies on bilingual word recognition (Section 2.1) and word production (Section 2.2), all of them pointing at parallel activation in both sub-lexicons. In Section 3 I discuss a number of studies that together illustrate the occurrence of phonological, syntactic, and semantic accents in bilinguals' language use, respectively. Where the original authors explain the observed accent in terms of language-independent memory representations shared between the two languages, I attempt to explain it in terms of a parallel activation of two language-specific representations.

2. Parallel activation in bilingual memory

A first indication that bilingual language use involves parallel activation in both language subsystems is succinctly illustrated in Figure 1, based on Mägiste (1979). In this study German and Swedish monolinguals, German-Swedish bilinguals, and trilinguals who, in addition to German and Swedish, mastered a third language (which differed between them) performed a set of simple language production and comprehension tasks in both German and Swedish. The bilingual and trilingual participants were native speakers of German who attended a German-Swedish bilingual high school in Sweden and used German and Swedish daily (the trilinguals also used their third language daily). The monolinguals were matched with the multilingual participants on age, sex, and socioeconomic status. Figure 1 shows the results on three tasks for the participants who had lived in Sweden for minimally 5 years. The tasks involved reading words, naming two-digit numbers, and naming pictures of common objects. The data shown are mean response times per item (in seconds) on each of these tasks in both languages.

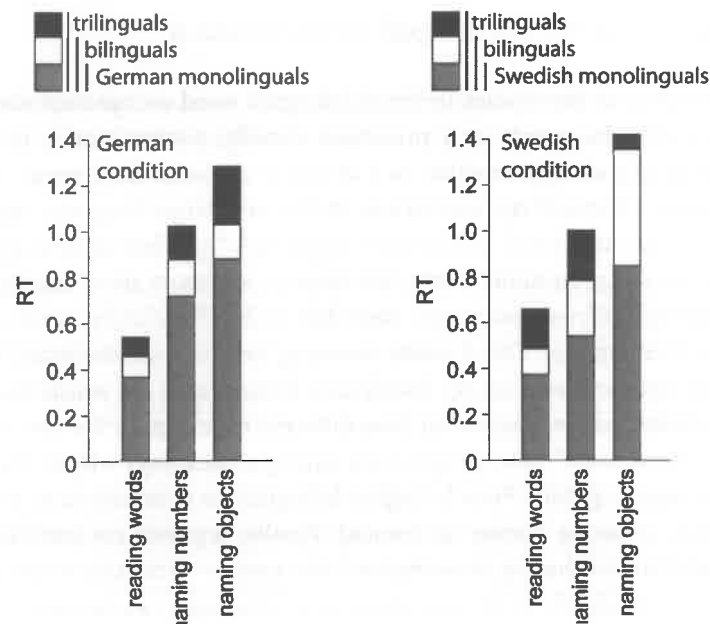


Figure 1. Mean response times on three tasks performed in German and Swedish by monolinguals, bilinguals, and trilinguals. From De Groot (2011), adapted from Mägiste (1979)

In all cases the monolinguals were faster than the bilinguals, who in turn were faster than the trilinguals. These results strongly suggest that elements belonging to the non-target language's memory subsystem are co-activated with elements from the target language's subsystem and that these co-activated elements compete with the targeted element during response generation, thus increasing response time. During number naming and object naming the nuisance competitor is likely to be the memory representation of the number's or object's name in the other language(s), whereas in word reading visually similar words in the other language may temporarily hold up responding (to be detailed below). The fact that the response pattern is the same for both non-native Swedish and native German suggests that also a native language is not immune to interference from the other language.

Countless more recent studies have similarly shown that in many situations bilinguals cannot "switch off" (deactivate) the non-selected language, in other words, that language processing in bilinguals is "language-nonselective" (as the phenomenon of parallel activation in both languages is often called). Many of these studies examined lexical processing, that is, word recognition and word production. The next subsections present evidence of language-nonselective lexical processing as obtained in these studies.

2.1 Parallel activation in bilingual word recognition

In the majority of the studies in which bilingual word recognition was investigated, the stimulus words were presented visually, predominantly in isolation but increasingly often embedded in a sentence or discourse context. To detect co-activation of lexical representations in the non-target language, quite a few of these studies have used “interlexical neighbors”, “interlexical homographs”, or cognates as critical stimulus words. Interlexical neighbors are words that belong to a bilingual’s different languages, resemble each other closely in form, and do not share meaning (e.g., Dutch *mand*, meaning ‘basket’, is an interlexical neighbor of English *sand* and vice versa). Interlexical homographs are words that exist in both of a bilingual’s languages but have different meanings in the two languages, just like “intralexical” homographs have multiple meanings within one and the same language (e.g., for a French-English bilingual the word *coin* is an interlexical homograph, meaning ‘corner’ in French). Finally, cognates are translation pairs that, in addition to sharing meaning (as is the essence of translation pairs), share their form, completely or in part, between a bilingual’s two languages (e.g. the French-English translation pairs *table-table* and *poire-pear*).

The use of interlexical neighbors in bilingual studies is based on the fact that upon the visual presentation of a word to a monolingual language user, not only this word’s representation becomes activated in lexical memory but also those of the presented word’s “neighbors”: words that closely resemble the presented word in (visual) form (e.g. Andrews 1989; Grainger 1990). Due to the interactive nature of the word-recognition process (see, e.g. McClelland and Rumelhart 1981), all activated representations mutually influence each other’s level of activation. The moment the activation in one of them reaches a critical level of activation (the “threshold”), the presented word is recognized (as the word stored in the representation that has reached its threshold level of activation). In bilingual research the question is posed whether or not co-activation of form-similar words in the mental lexicon is restricted to the language in use: If, for instance, Dutch *mand* is visually presented to a Dutch-English bilingual, does it, in addition to activating the targeted memory representation of *mand*, only activate the representations of visually similar Dutch words like *zand*, *mond*, *pand*, and *mank*, or does it also activate those of similarly spelled English words, like *sand*, *mane*, and *mend*? If so, it would come as no surprise if interlexical homographs and cognates would also turn out to activate their representation in both sub-lexicons of a bilingual. After all, just like interlexical neighbors, interlexical homographs and cognates share a form resemblance between the two languages.

The data of quite a few studies suggest that a visually presented word indeed activates lexical representations in both sub-lexicons, in other words, that

bilingual visual word recognition is language-nonspecific. Figure 2 summarizes the results of the first study that provided evidence of co-activation of interlexical neighbors in bilingual lexical memory (Grainger and Dijkstra 1992). The French-English bilingual participants in this study were presented with English words and English-like pseudowords (like *plunc* or *flamp*) and were asked to decide for each stimulus whether or not it was an English word (a task called “lexical decision”). The word stimuli differed with respect to the relative number of neighbors in English, the target language, and in French, the non-target language: “Patriot” words had more neighbors in English than in French; “Neutral” words had (about) equally many neighbors in English and French; “Traitor” words had more neighbors in French than in English. Patriots, neutral words, and traitors were matched with one another on other variables known to influence recognition time (such as word length and frequency of use) so that any difference in recognition time between them that might occur was likely due to the neighborhood manipulation. As shown, the relative numbers of French and English neighbors clearly influenced response time, neighbors in non-target French delaying responding. This finding implies that the English stimulus words activated lexical representations of both English and French words (see for additional evidence, e.g. Bijeljac-Babic, Biarreau, and Grainger 1997; Dijkstra, Hilberink-Schulpen, and Van Heuven 2010; Van Heuven, Dijkstra, and Grainger 1998).

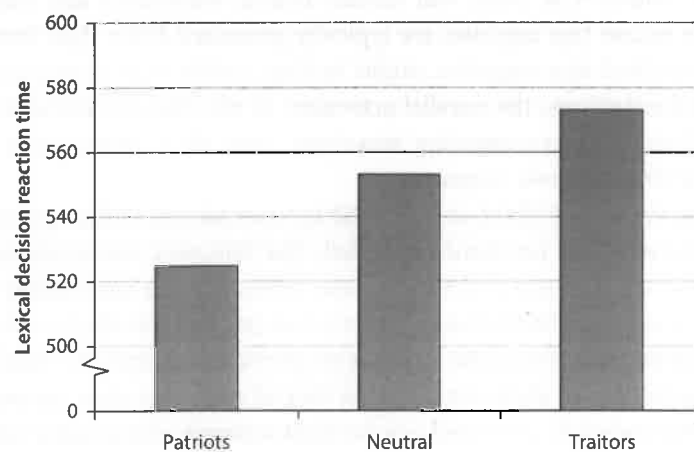


Figure 2. Mean response times on a lexical-decision task performed on English words by French-English bilinguals. From De Groot (2011), adapted from Grainger and Dijkstra (1992)

The results obtained for interlexical neighbors and their interpretation in terms of a bilingual mental lexicon in which elements in both sub-lexicons respond to a word input imply that the presentation of an interlexical homograph or a cognate to a bilingual should also activate representations in both sub-lexicons. Indeed, the outcome of many studies support this prediction, for instance by showing slower responses in “language-specific” lexical decision for interlexical homographs than for control words that only exist in one of the participant’s two languages (e.g. De Groot, Delmaar, and Lupker 2000; Dijkstra, Van Jaarsveld, and Ten Brinke 1998; in language-specific lexical decision a ‘yes’ response must be given if the presented word is a word in the pre-specified language but not if it is a word in the bilingual’s other language). This finding again suggests competition during the recognition process, in this specific case from the presented homograph’s representation in the non-target language subsystem.

Cognate effects have also often been observed, cognates generally being processed *faster* than non-cognate control stimuli. This effect has been observed both when the cognate and non-cognate stimuli were presented in isolation or following an isolated prime word (e.g. Sánchez-Casas, Davis, and García-Albea 1992) as when they appeared in a sentence context (e.g. Duyck, Van Assche, Drieghe, and Hartsuiker 2007; Titone, Libben, Mercier, Whitford, and Pivneva 2011; Van Hell and De Groot 2008), and even (but not always) when stronger L1 was the target language (Titone et al. 2011; Van Assche, Duyck, Hartsuiker, and Diependaele 2009). The reason that cognates are typically processed *faster* than their control stimuli, matched non-cognates, might be that, unlike with interlexical homographs and neighbors, the parallel activation in the two sub-lexicons does not cause a clash between competing meanings. After all, cognates share meaning between a bilingual’s two languages.

So far, the nature of the co-activated representations in the non-target language subsystem has not been explicated. The Bilingual Interactive Activation model (BIA; e.g. Dijkstra and Van Heuven 1998), that has successfully modeled both interlexical-neighborhood and interlexical-homograph effects, only contains representations of orthographic units (letter parts, letters, and the visual forms of whole words), not of phonological units (nor of units that store meaning). This suggests that a visually presented word at least activates orthographic units in the non-target language’s sub-lexicon and that these compete with the target during word recognition. Other studies (Brysbaert, Van Dyck, and Van de Poel 1999; Jared and Kroll 2001; Van Leerdam, Bosman, and De Groot 2009) have shown that activated orthographic representations in both language subsystems automatically transmit activation to the corresponding phonological representations (e.g. phonemes and the sounds of complete words) and that these phonological

representations also take part in the competition. Interestingly, parallel activation of phonological representations in both language subsystems upon the visual presentation of a word is not constrained to same-alphabet bilingualism (which held for all studies discussed so far) but has also been observed for bilinguals who master two languages that employ different scripts (Gollan, Forster, and Frost 1997; Thierry and Wu 2004; Tzelgov, Henik, Sneg, and Baruch 1996).

In yet other studies it was shown that the recognition of *spoken* words by bilinguals is also language-nonselective, at least when the bilingual's weaker language is the target language. The majority of these studies have used the "visual-world paradigm", as illustrated in Figure 3.

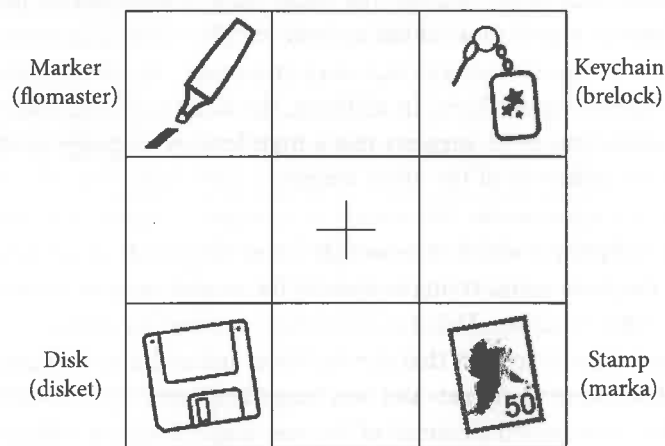


Figure 3. Example display presented to Russian-English bilinguals in an eye-movement tracking task. The participants carry out aural instructions like 'Put the marker below the cross'. From De Groot (2011), adapted from Spivey and Marian (1999)

A visual display (a real one or one on a computer screen) is shown to the participants, the display containing a number of (pictures of) objects and a cross-sign. For instance, on one specific trial in a condition with L2 English as the target language, Spivey and Marian (1999) presented their Russian-English participants with a display containing a marker, a keychain, a disk, and a stamp. Meanwhile the participants were orally instructed to 'put the marker below the cross', and eye movements were recorded to see where the participants looked at while carrying out this instruction. The critical manipulation here was that the L1 Russian name of one of the non-target objects in the display resembled the target object's name in L2 (a stamp, is called *marka* in Russian, resembling *marker*, the target's name). In the analogous condition with L1 Russian as target language the participants heard 'poloji marku nije krestika' (*put the stamp below the cross*). It turned out that

the participants looked more often to both the target object and the non-target object with a similar name in the other language than to the remaining two non-target objects, which did not share a name resemblance with the target. In some of these studies (Marian and Spivey 2003a; Spivey and Marian 1999) this effect occurred both when (stronger) L1 was the target language and when (weaker) L2 was the target language, whereas in other studies (Blumenfeld and Marian 2007; Marian and Spivey 2003b; Weber and Cutler 2004) it only showed up when the task was carried out in L2. Whether the effect occurred in both L1 and L2 or only in L2 appeared to depend on the language mode the participants were in (see, e.g. Grosjean 1998), a bilingual mode (Marian and Spivey 2003a) or a monolingual mode (Marian and Spivey 2003b). The occurrence of these effects indicates that the initial part of a spoken word can activate the phonological representations of all words in a bilingual's memory that share this onset, also those in the contextually inappropriate sub-lexicon. In addition, the occasional null-effect when the task was carried out in L1 suggests that a high level of language proficiency can annihilate the influence of the other language, especially when the participants are in a monolingual mode. The results of a couple of studies that employed the "gating" paradigm (in which increasingly larger fragments of spoken words are presented, the participants trying to identify the words) support these conclusions (Grosjean 1988; Schulpen, Dijkstra, Schriefers, and Hasper 2003).

To summarize, it appears that during visual and auditory bilingual word recognition elements of the target- and non-target languages are activated in parallel and that the co-activated elements of the non-target language influence the recognition process. Furthermore, relative proficiency in the two languages appears to modulate the influence of the non-target language.

2.2 Parallel activation in bilingual word production

Like the majority of studies on word production in monolinguals, bilingual word-production studies typically use one or other version of the picture-naming task, where on each trial a picture of an object or animal (or of anything else that can be named with a noun) is shown and the participants are instructed to come up with the appropriate name. The underlying idea is that the visual analysis of the picture leads to the activation of the depicted entity's conceptual representation (the representation of its meaning) in memory and that from there on picture naming is identical to word production in normal speech (which also starts off with conceptual activation). In other words, the visual analysis of the picture gets the word production process going by loading the concept to name in the word production system.

Models of word production, monolingual and bilingual, generally assume that a word's conceptual representation consists of a set of conceptual components, each of them representing one meaning aspect of the word. In many of these models (but see Levelt 1989; De Bot and Schreuder 1993) no distinction is made between general conceptual knowledge and lexical semantics so that "conceptual representation", "semantic representation", and "meaning representation" are used interchangeably. The conceptual components are called "semantic nodes" or "conceptual nodes" ("nodes" being a common term for all representation units stored in memory). In addition to a layer of semantic nodes that stores the meanings of words, the word production system consists of a number of other layers of nodes, each of them representing one specific aspect of words, for instance, the phonological forms of complete words or the words' separate phonemes.

Evidence for parallel activation in a bilingual's two sub-lexicons during word production has been assembled by using the simple version of the picture-naming task as described above (and focused on here), as well as by using more complex task versions (e.g. the picture-word interference task; Costa, Colomé, Gómez, and Sebastián-Gallés 2003; Hermans, Bongaerts, De Bot, and Schreuder 1998; see there for details). In most of the studies that exploited the simple version of the task, pictures with cognate and non-cognate names were presented in isolation. In all these studies pictures with cognate names were named faster than those with non-cognate names, both in same-script bilinguals (Christoffels, De Groot, and Kroll 2006; Costa, Caramazza, and Sebastian-Galles 2000) and in different-script bilinguals (Hoshino and Kroll 2007). This cognate-effect is explained in terms of language-nonspecific word production, as illustrated in Figure 4. It shows picture naming in Spanish by Catalan-Spanish bilinguals and the underlying word-production structures for two types of Catalan-Spanish translation pairs, cognates and non-cognates (Costa et al. 2000).

As shown, layers of semantic and sublexical (phonological) nodes (the latter representing phonemes) are assumed to be shared between a bilingual's two languages, and a layer of (phonological) lexical nodes, storing the sounds of complete words, contains language-specific representations. The relatively short naming times for pictures with cognate names is attributed to the language-nonspecific nature of the word production process: Activated semantic nodes transmit their activation to the corresponding lexical nodes in both languages, and the latter both send on activation to the sublexical nodes. This holds for pictures with cognate- and non-cognate names alike, but, due to the fact that the sublexical nodes are shared between the languages, this language-nonspecific activation process affects cognate names and non-cognate names differently: Cognate names receive activation from two sources, namely, from both lexical nodes, whereas (the larger

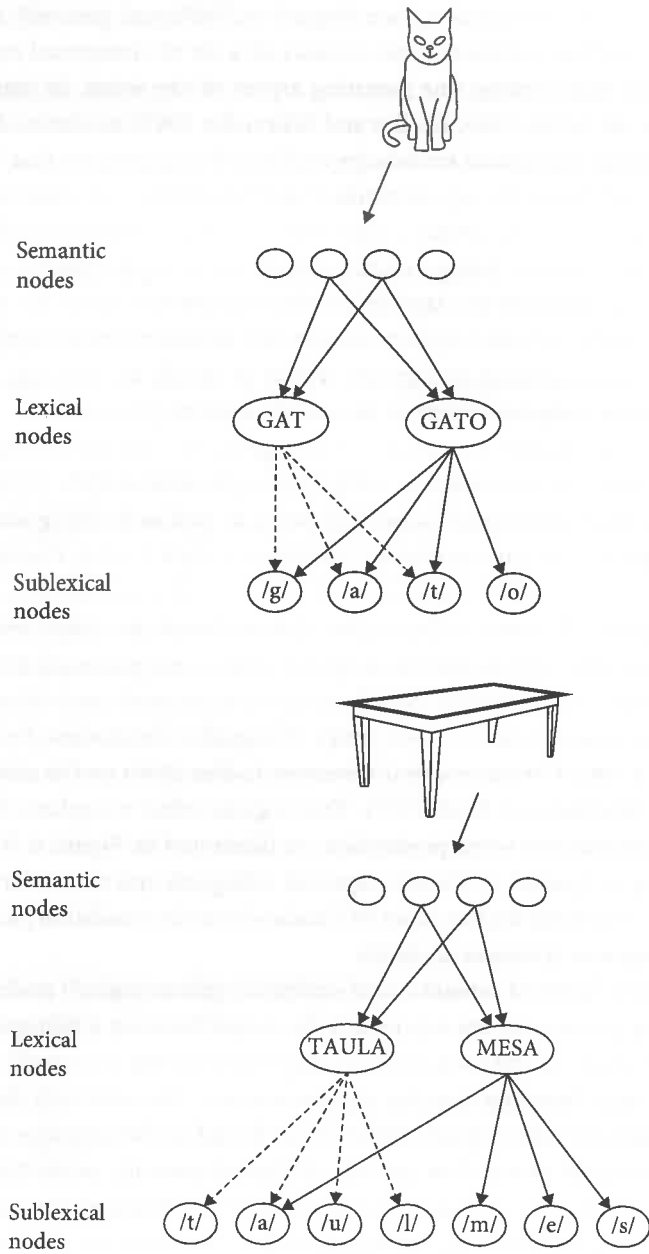


Figure 4. Picture naming in Catalan-Spanish bilinguals. Pictures have a cognate-name (top) or a non-cognate name (bottom). From De Groot (2011), adapted from Costa et al. (2000)

part of) non-cognate names receive activation from just one of them. On the assumption that degree of activation in the relevant sublexical nodes determines naming speed, this difference can explain the cognate effect.

The cognate effect in bilingual picture naming is quite robust, occurring both when stronger L1 is the response language and when the pictures have to be named in weaker L2 (although the effect is relatively large in the latter case, Costa et al. 2000; cf. the effect of relative language proficiency as observed in the recognition studies discussed above). The effect has also been obtained when the pictures to name were embedded in a sentence context (Starreveld, De Groot, Rossmark, and Van Hell 2014).

Further evidence that word production in bilinguals is language-nonselective has been obtained in a version of the picture-naming task in which the pictures had to be named covertly instead of overtly. In two of these studies (Colomé 2001; De Groot, Starreveld, and Geambaşu in preparation), together with the picture a phoneme was presented on each trial (more precisely, a letter that represented this phoneme) and the participants had to decide whether this phoneme occurred in the picture's name (in the pre-specified target language). Only pictures with names that were non-cognates in the participants' two languages were used (in a third study pictures with cognate names were added as fillers; Hermans, Ormel, Van Besselaar, and Van Hell 2011). Two groups of trials requiring a 'no'-response were included, one in which the phoneme presented on a trial occurred in neither of the picture's two names (its name in the target language and in the non-target language) and a second in which the phoneme did not occur in the picture's name in the target language but *did* occur in the picture's name in the non-target language. The critical finding was that no-responses in the former condition (the "no-unrelated" condition) were faster than no-responses in the latter condition (the "no-translation" condition). For instance, if a picture of a table (*mesa* in Spanish, *taula* in Catalan) was accompanied by the phoneme /m/, the Catalan-Spanish bilinguals in Colomé's study responded more slowly in a condition with Catalan as the target language than when the picture was accompanied by the phoneme /b/. This finding strongly suggests that the pictures activated their names in both languages. The match between a picture's non-targeted name and the presented phoneme in the no-translation condition subsequently delayed the response because of the initial temptation to respond 'yes', which had to be overcome in order to produce the correct response ('no'). Rodríguez-Fornells et al. (2005) used a slightly modified version of this covert-naming task (the participants now had to decide whether the picture's name started with a consonant or vowel) and obtained converging data.

To summarize, just like bilingual word recognition (Section 2.1), word production in bilinguals involves the parallel activation of representation units in

both language subsystems and the combined data suggest that parallel activation in bilingual memory is a commonplace phenomenon. This conclusion legitimates the hypothesis that parallel activation in both language subsystems in itself is a source of accents in bilinguals' language use. It is to these accents that I now turn.

3. Accents in bilinguals' language use

3.1 Phonological accents

Most bilinguals exhibit a phonological accent when speaking their L2. This statement not only applies to bilinguals with relatively low levels of L2 proficiency, but less obviously, also to those who are highly fluent in L2 and speak it frequently, and to early and late bilinguals alike (though the detection of an L2 accent in highly proficient bilinguals may require subtle measurements in the laboratory). Interestingly, a steadily growing number of studies shows that also bilinguals' L1 exhibits a phonological accent, even in immigrant bilinguals who have not yet resided in their new country for many years and use their L1 more frequently than the L2 so that L1-attrition is not fostered (cf. Weltens, De Bot, and Van Els 1986). Much of the evidence that supports these claims has been assembled by Flege and his colleagues (see Flege 2002, 2007, for reviews).

In one of the relevant studies, Flege, Yeni-Komshian, and Liu (1999) asked native Korean immigrants in the US and a control group of monolingual native English speakers to repeat English sentences (spoken by a native English speaker) and had native English listeners subsequently rate the pronunciation of the repeated sentences on a scale that ranged from "no accent" to "strong accent". The Korean participants (240 in all) were divided in 10 subgroups on the basis of their age of arrival (AoA) in the US (from around 3 years to around 21 years). Importantly, all participants had resided in the US for a substantial number of years (minimally 7). In a parallel study (Yeni-Komshian, Flege, and Liu 2000) the same native Korean participants were tested, but now with Korean sentences (spoken by a native Korean speaker) to be repeated and with native Korean listeners rating the degree of accent of the repeated sentences. A control group of monolingual Korean speakers (tested in Korea) also took part. The 1999 study showed that, compared with the monolingual English controls, all AoA subgroups showed an accent in L2 English. This accent was relatively mild for the Koreans who had immigrated to the US early in life and became gradually stronger the later in life the Koreans had arrived in the US. The 2000 study showed that, compared with the monolingual Korean control participants, all

AoA subgroups showed an accent in L1 Korean, the degree of L1 accent being relatively mild for the Koreans who had immigrated to the US relatively late in life (around age 20) and becoming gradually stronger the earlier the arrival age. These results indicate that even an early onset of L2 acquisition does not guarantee that L2 speech will ultimately be unaccented. These results furthermore suggest that L2 learning impacts on L1 pronunciation, thus pointing at a bidirectional influence of each language on the other.

Flege et al. (1999) and Yeni-Komshian et al. (2000) used a coarse-grained overall measure to determine a speech accent (native listeners' accent ratings of bilingual speakers' pronunciation of complete L1 or L2 sentences) from which it is impossible to tell which phonetic elements exactly are pronounced differently by monolingual and bilingual speakers. In many other studies Flege and his colleagues, and other researchers, have used experimental methods that *do* enable the identification of specific accented phonetic elements. An often-used procedure in these studies is to select a phonetic element that occurs in both of a bilingual's languages but that is realized somewhat differently in the two languages on one or other acoustic dimension. Bilinguals and monolingual controls are asked to pronounce carrier words containing this element and acoustic measurements are then made of the relevant word part to see whether and how its pronunciation differs between monolinguals and bilinguals.

The acoustic dimension that presumably has been exploited most often for this purpose (e.g. Flege 1987; Flege and Eefting 1987; MacLeod and Stoel-Gammon 2005) is the "voice-onset time" (VOT), the time between the release of the air and the moment the vocal cords start to vibrate when the speaker produces a stop consonant. Generally, in "voiced" consonants like /d/ and /b/ the vocal cords start to vibrate earlier than in "voiceless" consonants like /t/ and /p/. However, VOT boundaries that discriminate between voiced and voiceless consonants differ between languages and a phonetic element spoken with one and the same VOT can be perceived as voiceless in one language but as voiced in the other. For instance, adult native speakers of English perceive the boundary between /d/ and /t/ at a VOT of around 43 ms whereas adult native speakers of Spanish perceive it at a VOT of 23 ms (Flege and Eefting 1987). In other words, a prototypical voiceless stop consonant has a shorter VOT in Spanish than in English. The same difference holds for French versus English stop consonants (see e.g. Burns, Yoshida, Hill, and Werker 2007).

Flege (1987) exploited this VOT difference between English and French by comparing the pronunciation of instances of /t/ in English and French monolinguals, late French-English bilinguals, and three groups of late English-French bilinguals that differed between them in L2 French proficiency. The goal was to test his hypothesis that L2 learners merge *similar* L1 and L2 sounds (like English and

French /t/) into a single phonetic representation in memory that (ultimately) represents a compromise between (and thus differs from both) the L1- and L2-specific phonetic representations. (During the first stage of L2 learning extant L1 representations are thought to absorb similar L2 sounds; with increasing L2 learning the representations that thus serve both L1 and L2 gradually settle in between those specific for L1 and L2.) In later publications Flege calls this process of merging “phonetic category assimilation” (e.g. Flege 2002, 2007). A prediction that follows from this assumption is that proficient French-English and English-French bilinguals pronounce /t/ differently, in both languages, from native speakers of French and English, with a VOT value that is somewhere intermediate between the values akin to English and French. In the same study Flege (1987) also tested the participants’ pronunciation of the French vowel /y/ (as in *tu*, French for *you*), that has no close analogue in English. He assumed that for such *new* sounds English learners of French form a separate phonetic representation in memory.

The group of English-French participants most proficient in L2 French consisted of native English speakers who were married to native French speakers, had been living in France for over 10 years, and indicated French to be their dominant language. Conversely, the French-English participants were native French speakers who had lived in the US for over 10 years and indicated English to be their principal language. Importantly, the participants in both these groups used both languages regularly and, though dominant in L2, were also fluent in L1. The participants were asked to read aloud instances of French and English /t/ in carrier phrases that started with either *two* in the English condition (e.g. *two little boys*; *two little mice*) or with *tous* in the French condition (e.g. *tous les soldats*; *tous les gendarmes*). The participants also read instances of French carrier phrases to assess their production of French /y/ (e.g. *tu les montres*). The data for the /t/ sounds produced by the above mentioned two bilingual groups and the monolingual control groups are summarized in Figure 5. It shows the mean VOT value for English /t/ and French /t/, collapsed across 70 observations per condition (7 participants, 10 observations per participant).

Inspection of this figure reveals that, as predicted, the VOT of the /t/ sounds pronounced by bilinguals, in both L1 and L2, were in between the long-lag VOT of the English monolinguals and the short-lag VOT of the French monolinguals. In other words, the bilinguals produced accented /t/ sounds in both L1 and L2. In contrast, they pronounced French /y/ the same way as the French monolinguals did (not shown). Flege (e.g. 1987, 2002, 2007) concluded that the data pattern observed for /t/ confirmed his hypothesis that during L2 learning phonetic category assimilation occurs for similar L1/L2 sounds, resulting in one merged phonetic representation in memory for such sounds. In addition, he regarded the non-accented pronunciation of French /y/ as confirmation of his assumption that

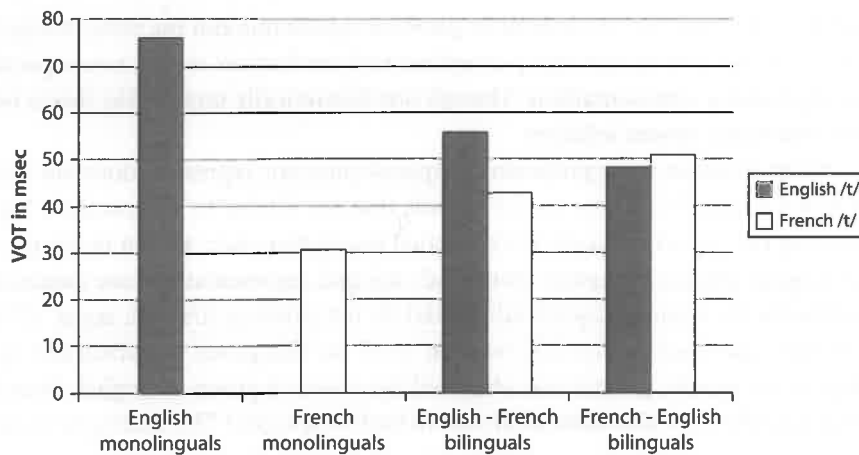


Figure 5. Mean VOT values of the pronunciation of word-initial /t/ in English and French words by English-French and French-English bilinguals and monolingual control groups. From De Groot (2011), adapted from Flege (1987)

for L2 sounds that do not closely resemble any L1 sound a new phonetic representation is formed in memory.

But is an explanation in terms of phonetic category assimilation for similar L1/L2 sounds the only possible explanation for the phonological accents shown in Figure 5 and, if not, is it the most plausible one? Can bilinguals perhaps develop separate representations for L2 speech sounds that have a close analogue in L1 just as they can for L2 speech sounds that are dissimilar from all L1 speech sounds, and if so, could a separate-representation account explain the observed data pattern as well?

One reason to consider the possibility that similar L1/L2 sounds are (ultimately) stored in separate phonetic representations in memory is that late bilinguals with a high level of L2 proficiency can *perceive* the difference between similar sounds in L1 and L2, as acknowledged and demonstrated by Flege himself (e.g. Flege 1987, 2007; and see Burns et al. 2007, and Sundara, Polka, and Molnar 2008, for evidence that children growing up in a bilingual environment can already perceive such differences around 10 to 11 months). With this *discrimination* ability in place, an important prerequisite for developing separate representations for use in *production* is fulfilled. But what is more, this discrimination ability *per se* forces one to conclude that the similar L1/L2 sounds in question have separate phonetic representations in memory, because how could one perceive a difference between two sounds if they share one and the same representation? The only way to reconcile this conclusion with the assumption that

during production the two sounds in question exploit one and the same, merged, representation is to accept that perception and production exploit two separate sets of phonetic representations. Though not theoretically impossible, this is not a parsimonious system solution.

Another reason for hypothesizing separate phonetic representations not only for new L2 sounds but also for L2 sounds that are similar to L1 sounds is suggested by one aspect of Flege's (1987) actual production data, shown in Figure 5: The English-French bilinguals (for which merged representations are assumed, just like for the French-English bilinguals) do not produce /t/s with equal VOTs in French and English (the difference in VOT for this group is statistically significant). (A similar pattern was observed for a second group of English-French bilinguals who were also quite proficient in both languages.) This finding is inconsistent with a merged-representation account because if one and the same representation is used for the production of a particular sound in L1 and a close analogue in L2, the VOT values of the produced sounds should be (about) equal in both languages. Independent evidence that sounds similar in L1 and L2 can get stored in language-specific phonetic representations was obtained in a production study by MacLeod and Stoel-Gammon (2005), who showed that (simultaneous) bilingual participants produced monolingual-like stop consonants in most cases (suggesting that non-accented speech in bilinguals is not totally out of reach; see also Abu-Rabia and Kehat 2004, and Bongaerts 1999, for evidence that non-accented speech is also within reach of late bilinguals).

So is there a way to explain the pattern of phonological accents in the /t/ pronunciations as obtained by Flege (1987) in terms of a separate-representation account of similar L1/L2 sounds? Perhaps there is. Recall that the data shown in Figure 5 are *mean* VOT values for 70 observations (/t/ productions), based on the average VOT value for each participant (10 observations per participant). Assuming two separate language-specific phonetic representations for /t/ in the bilingual participants, the data pattern observed for these participant groups can be explained in terms of parallel activation, in both language conditions, of both /t/ representations that arises upon reading the letter *t* in the carrier words. Section 2.1 discussed studies that provided evidence that visually presented language materials indeed lead to the activation of phonological elements in both of a bilingual's language subsystems (Brysbaert et al. 1999; Jared and Kroll 2001; Van Leerdam et al. 2009; see De Groot 2011: 183–191, for a review). Assuming between-trial fluctuations in the degree of activation of the two /t/ representations (both between and within participants) and furthermore assuming that the representation that is most highly activated determines the response, on one trial English /t/ may be activated most and spoken whereas on a next trial French /t/ may be activated

most and spoken. Averaging over trials will then result in a VOT value somewhere in between the VOT values for English and French monolinguals.

It remains to explain why in one of the bilingual groups the average VOT values do not differ between the two language conditions whereas in the other they do. This finding may relate to the well-known fact that the activation level of bilinguals' two languages at a particular moment in time depends on a number of variables such as the relative amount of time they use each of the two languages, which language they have recently been exposed to most, and which language is currently spoken (e.g. Grosjean 1998; Wu and Thierry 2010). In fact, Flege is fully aware himself that such variables affect the degree of activation of bilinguals' two languages, as shows from other studies (e.g. Flege, Frieda, and Nozawa 1997, a study on the effect of amount of native-language use on L2 pronunciation). Possibly, the two bilingual groups differed from one another in one or more of these respects, with the effect that the relative activation level of the two languages was not comparable for the two groups at the time of testing.

Though speculative, this alternative account of Flege's (1987) data in terms of parallel activation of two language-specific /t/ representations is a plausible one in view of the fact that a particular type of accent in another linguistic domain, grammar, can only be explained in terms of a separate-representation account, not in terms of some representational structure that is shared between the two languages. The studies that produced evidence of this grammatical accent tested bilinguals who, in terms of L2 proficiency, were arguably comparable to Flege's participants and clearly demonstrated that the ambient language influences the data pattern to be obtained. These studies are presented next.

3.2 Grammatical accents

Accented grammar in bilinguals has, for instance, been observed in studies that examined how bilinguals parse sentences that contain a syntactic ambiguity for which the preferred solution differs between the bilinguals' two languages. The type of sentence that has presumably been exploited most in these studies (Dussias 2003; Dussias and Sagarra 2007; Frenck-Mestre 2002, 2005) contains a relative clause with an ambiguous subject. Specifically, this subject can refer back to either the first or the second noun of a complex noun phrase in the preceding main clause. An example sentence is *Someone shot the son of the actress who was on the balcony*, in which *who* can refer back to both *son* and *actress*. Obviously, language users must master both parsing procedures because both solutions are valid some of the time, but languages differ between them in how often the one or the other solution is required. For instance, Spanish and French favor N1 (for Noun 1) attachment, which means that the subject of the relative clause most often refers

back to the first noun of the complex noun phrase. In contrast, English favors N2 attachment, which means that the subject of the relative clause most often refers back to the second noun of the complex noun phrase. This fact gives rise to the question of how bilinguals whose two languages favor different attachment strategies resolve these syntactic ambiguities. Do they transfer the parsing pattern preferred in L1 to L2, tune their parsing behavior to the language they are primarily or currently exposed to, or show a parsing pattern that deviates from both the L1- and L2-like patterns?

In a series of studies Dussias and her colleagues (e.g. Dussias 2003; Dussias and Sagarra 2007) have shown that the solution bilinguals preferably apply to this type of sentences varies with the language they are exposed to most at the time of testing, be it L1 or L2. In Dussias (2003), proficient L1/Spanish-L2/English and L1/English-L2/Spanish participants were presented with English and Spanish sentences (in separate sets) and tested (by means of a pencil-and-paper questionnaire and a self-paced reading task) in a predominantly English-speaking environment in the USA. For both the English and the Spanish sentences, both participant groups generally favored N2 attachment over N1 attachment, thus demonstrating a preference for the parsing strategy most common in English (and a grammatical accent while processing Spanish). Because at the time of testing English was the language all participants were exposed to most, these results suggest that the proportion of exposure to each of the two languages (specifically, to each of the two syntactic constructions) is an important determinant of bilinguals' parsing preferences. Phrased differently, the probability with which the use of a particular parsing procedure results in proper comprehension of the message intended by the speaker determines whether or not it is preferably applied.

The results of a later study (Dussias and Sagarra 2007) also suggest that bilinguals' parsing preferences reflect the degree to which they are exposed to each language. In this study the linguistic environment outside the laboratory was varied. The participants were Spanish-English bilinguals living and tested in the US, and Spanish monolinguals and Spanish-English bilinguals living and tested in Spain. The participants in both bilingual groups were highly proficient in L2 English, the degree of English proficiency not differing between the two bilingual groups. The stimulus materials consisted of L1 Spanish sentences exclusively. All experimental sentences contained the present type of syntactic ambiguity (distracter sentences containing other types of ambiguities were also included) and the proper resolution of these sentences required either N1 or N2 attachment. Gender agreement between a modifier in the relative clause on the one hand and one of the two nouns in the complex noun phrase on the other hand signaled which syntactic analysis of a sentence was required.

Consider for instance the following sentence pair (from Dussias and Sagarra 2007):

1. *El policía arrestó a la hermana del criado que estaba enferma desde hacía tiempo* (The police arrested the sister (female) of the (male) servant who had been ill (female) for a while.)
2. *El policía arrestó al hermano de la niñera que estaba enferma desde hacía tiempo* (The police arrested the brother (male) of the (female) babysitter who had been ill (female) for a while.)

In Sentence 1 gender agreement between the first noun of the complex noun phrase and *estaba enferma* in the relative clause forces N1 attachment whereas in Sentence 2 gender agreement between the second noun of the complex noun phrase and *estaba enferma* forces N2 attachment. The sentences were presented visually for reading and the participants' eye movements while reading them were registered. The time the participants' eyes lingered on the critical, disambiguating, sentence region (*estaba enferma*) served as dependent variable. The authors predicted that Spanish monolinguals would spend less time looking at this region in sentences of Type 1 than in sentences of Type 2 because N1 attachment is the preferred Spanish parsing solution. If this prediction would be confirmed, the question of special interest would then be how the bilinguals, of whom the two languages favor different solutions, would parse these sentences. The results are summarized in Figure 6.

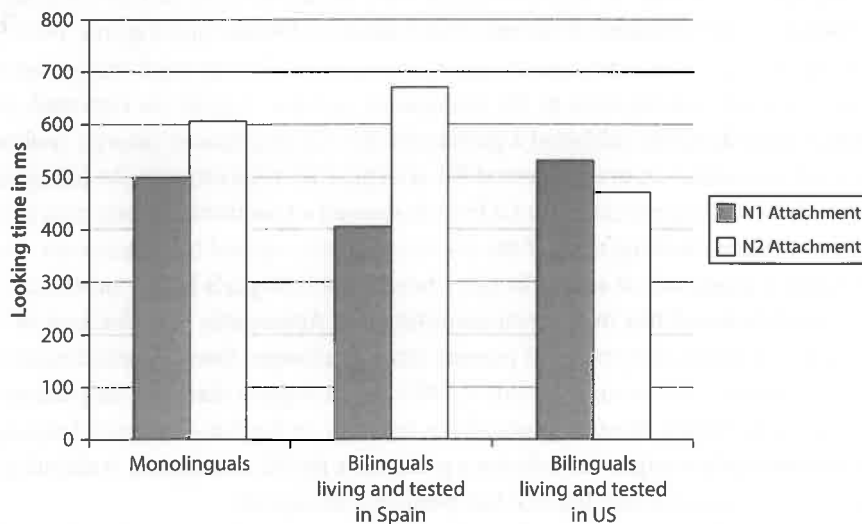


Figure 6. Mean looking times at the disambiguating region for sentences requiring N1-attachment and N2-attachment. Adapted from Dussias and Sagarra (2007)

As predicted, the Spanish monolinguals showed shorter looking times for the Type-1 sentences than for the Type-2 sentences. The bilinguals living and tested in Spain (and, thus, currently predominantly exposed to L1 Spanish) showed this same preference for N1 attachment. In contrast, the bilinguals living and tested in the US (currently predominantly exposed to L2 English) showed the opposite pattern of shorter looking times for Type-2 sentences, that is, for sentences that require the N2-attachment analysis that is preferred in L2 English (these bilinguals thus showed a grammatical accent in L1). Combined with the results of Dussias (2003), these findings show that bilinguals adopt the parsing pattern that fits the language they are exposed to most of the time. In other words, their preferred parsing procedure is the one they must most frequently apply to this type of syntactically ambiguous sentences when they encounter them in the ambient language. In the words of Dussias and Sagarra (2007: 102): “[...] the syntactic parser tunes to variations in the language to which it is exposed and uses this information to resolve syntactic ambiguity”.

In two studies testing English-French bilinguals, Fenck-Mestre (2002, 2005) extended Dussias and Sagarra's (2007) findings by demonstrating that level of L2 proficiency also plays a role in how bilinguals process the present type of syntactically ambiguous sentences. Like Spanish and unlike English, French favors N1 attachment. In the 2002 and 2005 studies combined, French monolinguals and two groups of English-French bilinguals were tested, one group with a relatively low level of L2 French proficiency and a second with a relatively high level of proficiency in L2 French. All participants were presented with exclusively French sentences in experiments administered in France. As Dussias and Sagarra, Fenck-Mestre registered the participants' eye movements while they read the sentences and measured looking time to the ambiguous sentence region. As expected, the French monolinguals exhibited a preference for N1 attachment (shorter looking times if the correct analysis required N1 attachment). Interestingly, the bilinguals with a low level of proficiency in L2 French showed a resolution pattern typical for English (shorter looking times if the correct analysis required N2 attachment, thus showing a grammatical accent in L2) whereas the bilinguals highly proficient in L2 French behaved like the French monolinguals. Apparently, with the level of L2 French increasing, the preferred parsing strategy changes from N2 attachment to L1 attachment. Dussias and Sagarra's (2007) results suggest that, had the proficient bilinguals in Fenck-Mestre's studies been tested in an English-dominant language environment they might have shown a preference for N2 attachment (exhibiting a grammatical accent), just like the less proficient bilinguals.

In view of the present goal to identify the source of accents in bilinguals' language use, the results of the joint set of studies discussed in this section are highly relevant because the grammatical accents they reveal cannot be explained

in terms of some critical representation being shared by L1 and L2 (cf. Flege's account of accented pronunciations of phonetic elements that are similar in L1 and L2). Because each parsing solution is valid some of the time, monolingual speakers of English, Spanish, or French (and many other languages) and bilingual speakers who master two of these languages must all possess two specific grammatical knowledge structures, one that enables them to apply one of the two possible parses, a second that enables them to apply the other. When an instance of the present ambiguous construction is encountered, both of these knowledge structures are plausibly activated in parallel. However, as suggested by the above data, in bilinguals the degree of activation of each of them at any moment in time is influenced by the language they are exposed to most at the time of testing and by L2 proficiency. Specifically, the data indicate that, in proficient bilinguals, the knowledge structure taking care of N1 attachment is more highly activated than the one serving N2 attachment when they are exposed more to sentences forcing N1 attachment than to sentences that force N2 attachment (and vice versa). Furthermore, the data suggest that in less-proficient bilinguals the relative activation level of the two relevant knowledge structures does not yet tune to the ambient language but is governed by L1, the dominant language. The combined data suggest that the frequency of current and previous use of the two parsing procedures determines the activation level of the two knowledge structures that subserve them.

3.3 Semantic accents

Rather inconveniently for the L2 learner, a word and its translation "equivalent" in another language typically do not have exactly the same meaning. This statement generally holds, also if the two words in a translation pair belong to closely related (instead of distant) languages and it holds for both concrete and abstract words (although more strongly for the latter; e.g. Van Hell and De Groot 1998). This fact of cross-language non-equivalence of word meanings has led to the question of whether L2 learners and bilinguals may use words differently from monolingual speakers of the languages involved. Many studies have shown this to be the case (e.g. Ervin 1961; Malt and Sloman 2003; Ameel, Storms, Malt, and Sloman 2005). In other words, L2 learners and bilinguals exhibit a semantic accent. A next question then is what causes their word use to be semantically accented.

It seems that most researchers assume that these accents are due to translation pairs sharing their meaning representations, partly or completely, in the bilingual's mental lexicon. These shared meaning representations (also called "conceptual representations" or "concepts") are thought to result from specific learning

processes. For instance, in foreign-vocabulary learning by means of paired-associate learning (in which an L2 word is simply paired with its closest translation in L1), an L2 word to learn at first simply adopts the meaning representation of the corresponding L1 word. The consequence of such a process of “conceptual transfer” (as Pavlenko 2005, calls it) is accented L2 word use: A particular L2 word will be used where a native user would not use it (comparable to the overextended word use of young children learning their L1) and, conversely, the word might not be used when a native speaker would use it. Through extensive subsequent reading in the L2, or other ways of immersion learning, the L2 meaning can subsequently be refined: L2-specific meaning elements are gradually added onto it, L1-specific elements are deleted from it, and only the meaning elements common to each term in the translation pair remain shared between the two (e.g. Dong, Gui, and MacWhinney 2005; see De Groot 2011: Chapter 3, for details).

A second vocabulary-learning process that is assumed to take place and, if it does, would lead to accented word use in bilinguals is the gradual convergence or merging of the L1 and L2 meanings associated with a translation pair into a single representation (e.g. Pavlenko 2005). Because this representation would contain both L1-specific and L2-specific meaning components, it would lead to accented word use in *both* L1 and L2. It may be recalled that Flege (1987; see Section 3.1) assumed a similar convergence process, for similar sounds in L1 and L2, to explain bilinguals’ phonological accents. It may also be remembered that I suggested an alternative interpretation of those accents, one that assumed separate, language-specific representations for similar L1/L2 sounds that are activated in parallel during bilingual speech. Since, furthermore, a separate-representation account applies to grammatical accents as well (Section 3.2), one starts to wonder whether semantic accents can similarly be explained in terms of parallel activation of language-specific memory structures. This question becomes all the more pressing because two seminal studies on concept representation in bilinguals appear to account for similar results, in the same conceptual domain, in terms of parallel activation and merged representations, respectively.

Ervin (1961) and Caskey-Sirmons and Hickerson (1977) both studied color concepts in bilingual speakers of pairs of languages that differ in the way they lexicalize the color spectrum. Caskey-Sirmons and Hickerson presented L2 English learners with five different Asian languages as L1 (Korean, Japanese, Hindi, Cantonese, and Mandarin) and monolingual speakers of these languages with a set of color names in their L1 and asked them to point out the focal area and range of each name on a chart that showed the whole color spectrum. They found that the bilinguals exhibited more variability in their choice of focal areas and that their choices tended to shift towards those typical for native English speakers. In Ervin’s study Navajo-English bilinguals and monolingual speakers of these two languages

were presented with color patches and asked to name their color. The bilingual participants produced the color names in both Navajo and English, in two separate sessions. The probabilities by which the various color names were given differed between the bilinguals and monolinguals. For instance, when English was the response language, relatively many of the bilinguals would call the color of a particular patch *yellow* whereas the English monolinguals would typically call it *green*.

Although both sets of results clearly point towards the conclusion that the bilinguals' performance was influenced by the colors' names in the non-response language, the respective authors explained their results in crucially different ways. Caskey-Sirmons and Hickerson (1977) attributed their findings to a process during which concepts that are similar (but not the same) in L1 and L2 are merged into one concept that is shared between the languages:

All of these observations are indicative of a tendency of generalization, which appears to be typical of bilingualism and multilingualism, whatever the semantic domain and whatever the languages involved – that is, terminological categories of bilinguals become broader, and the available choices more varied, to the extent that the semantic differences between the languages are merged into a 'combined code'.
(Caskey-Sirmons and Hickerson 1977: 365)

In contrast, Ervin (1961) seems to opt for a parallel-activation account of her data, specifically, one in terms of implicit responses in the non-response language mediating the response. She assumed that, when one and the same external stimulus (A) invites one response (B) on some occasions and another response (C) on other occasions, B and C get connected in memory with the effect that either one of them will later automatically evoke the other. Ervin assumes the underlying linking mechanism to be a general one. According to her, it gives rise to memory connections between synonyms and word associations in monolinguals and – of particular importance here – between translation-pairs in bilinguals. For instance, because a French-English bilingual calls some hair-covering object (A) a *chapeau* (B) some of the time and a *hat* (C) at other times, a memory connection develops between the representations of *chapeau* and *hat*, and the latter two will henceforth automatically evoke one another. The consequence of such an association process is that during color naming, the experimental task used by Ervin, the color-stimulus' name in the non-response language automatically activates its name in the response language. This process, combined with the fact that color-to-name mappings differ between Navajo and English, can have the effect that even a Navajo-English bilingual who is perfectly aware of these between-language differences may name one and the same color differently from monolingual speakers of these languages, thus exhibiting a semantic accent.

For instance, when Navajo is the response language this bilingual may occasionally say *tatLqid* (*green*) to a color patch that most Navajo monolinguals call *litso* (*yellow*) because in English this specific color is typically called *green*, not *yellow*, and he has come to master this specific concept-name association, adding it to the one that holds for Navajo. When presented with this color patch, it activates both its most common Navajo and English names in memory (*litso* and *green*) and immediately afterwards *green* activates Navajo *tatLqid* via the memory connection between them. Inadvertently, *tatLqid* instead of *litso* may then emerge as the overt response. In Ervin's terms, becoming bilingual leads to altered response probabilities in the response language due to failures of a suppression mechanism to suppress implicit responses in the non-response language. She concluded that the differences between the naming patterns of bilinguals and monolinguals "could be predicted on the basis of an assumption of verbal mediation by the response term which is most rapid" (Ervin 1961: 241). In other words, Ervin attributed the semantic accents she observed in bilinguals to increased competition between alternative names for specific concepts in bilinguals, not to different concepts in bilinguals and monolinguals. It appears that Caskey-Sirmons and Hickerson's (1977) results can similarly be explained in terms of parallel activation: When a bilingual is presented with a color name in, say, L1 and asked to point out the focal area and range of that color on a color chart, the color's name in L2 will automatically be activated. In turn, this name will automatically activate the associated concept, leading to markings on the color chart that differ from those provided by monolinguals.

This analysis can also be applied to types of concepts other than the concept of color, e.g. to so-called "object concepts", that is, the concepts associated with common artifacts such as bottles, cups, and keys. Ameel and Malt and their colleagues conducted several studies to find out whether such concepts differ between bilinguals and monolinguals (Ameel et al. 2005, 2009; Malt and Sloman 2003) and concluded this to be the case. In all three studies they asked the participants to name a set of photographed household objects that belonged to either a "bottles set" or a "dishes set". In an earlier monolingual study it was found that native speakers of American English primarily used the words *bottle*, *jar*, or *container* to name the items in the bottles set and *plate*, *bowl*, or *dish* to name those in the dishes set. Following the naming task the participants indicated for each of the depicted objects how typical an instance it was of each subclass. The participants in Malt and Sloman (2003) were three groups of L2 English speakers, the groups differing between them in English proficiency. Their performance was compared to that of the native English speakers in the earlier study by calculating the overlap between the naming responses of the native English speakers on the one hand

and those of each group of L2 English speakers on the other hand. Furthermore, the correlations between the typicality scores of the native English and L2 English speakers were calculated. These analyses showed that the higher the degree of L2 proficiency, the more similar the scores of the native English and L2 English speakers were, but the response pattern for the most proficient L2 English group still differed from the one obtained for the native speakers. In other words, all three groups of L2 speakers exhibited a semantic accent in L2 English.

The participants in Ameel et al. (2005, 2009) were simultaneous Dutch-French bilinguals, having grown up with both languages from birth, and Dutch and French monolingual control groups. The type of stimulus materials presented and the experimental tasks were largely similar to those used in Malt and Sloman (2003), except that the bilinguals now named the stimuli in both languages (in two separate blocks). Whereas the two monolingual groups showed language-specific naming patterns, the French and Dutch naming patterns of the bilinguals converged on a common pattern, thus showing semantic accents in both L1 and L2. The authors concluded, "Through the mutual influence of the two languages, the category boundaries in each language move towards one another and hence diverge from the boundaries used by native speakers of either language" (Ameel et al. 2005: 60).

This quote strongly suggests that Ameel and colleagues hold the view that bilinguals develop merged L1/L2 object concepts through a process of semantic convergence, a view they share with Caskey-Sirmons and Hickerson (1977). We have seen, however, that naming patterns may differ between monolinguals and bilinguals as a result of competition in the memory system due to parallel activation of multiple names (Ervin 1961), even if the underlying memory structures would not differ between monolinguals and bilinguals. Ervin's analysis of color naming by monolinguals and bilinguals can be applied to object concepts as well. Assume, for example, that a particular small-sized bottle-shaped object is habitually called *bottle* by native English speakers but *flacon* by native Dutch speakers and that a particular Dutch-English bilingual is perfectly aware of this subtle difference between Dutch and English (the subtle difference being that most bottles, are called *fles* by Dutch native speakers, but not this specific one). Upon the presentation of (a photograph of) this object to this bilingual with the instruction to name it in Dutch, the memory representations of both these names will become activated (see Section 2.2) and, in turn, each of these will activate their most common names in the other language via extant between-language memory connections. *Bottle* will thus activate *fles* (and perhaps *flacon* activates *flask*) and *fles* instead of *flacon* may subsequently emerge as the overt response (especially because, according to current models of word production, *fles* is also activated top down by the concept, thus becoming a strong competitor for *flacon*).

In conclusion, even if a bilingual possesses two language-specific sets of word-to-meaning mappings, both of them perfectly native-like, his naming *behavior* in each language may be accented.

A similar analysis can be applied to studies that examined how grammatical gender affects object concepts and how this plays out in bilingualism, where only one of a bilingual's languages may exploit grammatical gender (Boroditsky, Schmidt, and Phillips 2003), or where the names for one and the same object may be feminine in one language and masculine in the other (Bassetti 2007). The bilingual participants in Boroditsky et al.'s study were German-English and Spanish-English bilinguals. They were presented with a set of L2 English common nouns, all referring to inanimate objects, and asked to list three adjectives for each of them in English. The critical manipulation was that the German and Spanish translations of the (non-gendered) English nouns had opposite genders (e.g., the German translation of English *bridge* is feminine whereas its Spanish translation is masculine). Interestingly, the English nouns with a feminine translation in the participants' L1 evoked relatively many adjectives with a feminine connotation whereas for those with a masculine translation in L1 relatively many adjectives with a masculine connotation were listed. For example, the stimulus word *bridge* evoked *beautiful*, *elegant*, *fragile*, *pretty*, and *slender* in the participants with L1 German and *big*, *dangerous*, *strong*, *sturdy*, and *towering* in those with L1 Spanish. It is tempting to draw the conclusion that during L2 learning conceptual transfer has occurred from L1, but it appears this result can also be explained in terms of the non-response language mediating the response during task performance: The stimulus word *bridge* automatically activates its L1 translation and, subsequently, the concept associated with this L1 word (which apparently contains feminine-like semantic features in German and masculine-like ones in Spanish, suggesting that during learning an L1 its grammatical gender system influences the content of the emerging concepts). The participants may then "read out" the L1 concept (in addition to reading out the concept associated with English *bridge*) to produce the requested adjectives.

Conceivably, the results of a related study by Bassetti (2007), with German-Italian simultaneous bilingual children and monolingual Italian children as participants, can similarly be explained. She found that these two groups differed from one another in assigning gender to objects whose Italian and German names have opposite grammatical gender and suggested that "[...] when the two languages of a bilingual represent a specific aspect of reality differently, the bilingual may develop different concepts from a monolingual" (Bassetti 2007: 251). This may be so, but it appears that her findings can also be explained in terms of parallel activation of the objects' names in the two languages while each name may map to meaning in a perfectly native-like way.

4. Conclusion

The studies discussed in Section 3 represent only a minor portion of the substantial body of research showing that bilinguals use language qualitatively differently from monolinguals. Nevertheless, I hope to have demonstrated that parallel activation of units in both of a bilingual's language subsystems in itself can be a source of accented language use in bilinguals and, thus, that different language behavior in bilinguals and monolinguals does not necessarily imply that their linguistic knowledge structures differ. To determine the scope of a parallel-activation account of bilinguals' accented language use, the present analysis will have to be applied to other relevant studies, such as those in which sentence parsing in bilinguals was examined by exploiting a paradigm developed by MacWhinney and his colleagues to test their "competition model" of sentence comprehension (e.g. MacWhinney, Bates, and Kliegl 1984). These studies have revealed accented grammatical processing of both L2 sentences (e.g. McDonald and Heilenman 1992) and L1 sentences (Cook, Iarossi, Stellakis, and Tokumaru 2003).

In applying this analysis to further studies (and developing new studies), two possible other sources of accented bilingual language use, ignored so far, may be taken into account as well. The first concerns the role of cognitive control in bilinguals' speech. If during bilingual language use the non-target language is also activated, cognitive control must incessantly be exerted to guarantee that the proper elements are output by the language system (and the implication is that bilinguals are experts in cognitive control; see e.g. Bialystok 2008). In circumstances of excessive mental processing load, cognitive control may fail and accented elements may be produced. It seems that MacLeod and Stoel-Gammon (2005) attributed their finding that simultaneous English-French bilinguals produced one type of voiced stops (but only one) differently from monolingual speakers to the operation of the cognitive-control system: They suggested that bilinguals try to find a balance between maintaining language-specific distinctions and the effort required to do so. In circumstances of excessive mental load, the goal of maintaining language-specific output is mitigated, resulting in accented output. Similarly, Ervin's (1961) repeated mentioning of the requirement to *suppress* implicit responses in the non-response language (see e.g. Green (1998) for a more recent expression of this idea) suggests that she acknowledged a role of the cognitive-control system in bilinguals' accented semantics. The second possible source of accents ignored so far only applies to phonological accents: the fact that each language may require its own unique set of settings of the articulatory organs (see e.g. Gick, Wilson, Koch, and Cook 2004). Learning to pronounce a new language in a native-like way requires the learning of a new set of articulatory settings of the one and only set of speech organs we possess. It takes little imagination to see how this can be a source of

accented speech. Importantly though, both of these possible additional sources of accents are compatible with the view that the underlying memory structures are not shared between a bilingual's two languages.

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