

The bilingual's language modes¹

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Bilinguals who have reflected on their bilingualism will often report that they change their way of speaking when they are with monolinguals and when they are with bilinguals. Whereas they avoid using their other language with the former, they may call on it for a word or a sentence with the latter or even change over to it completely. In addition, bilinguals will also report that, as listeners, they are sometimes taken by surprise when they are spoken to in a language that they did not expect. Although these reports are quite anecdotal, they do point to an important phenomenon, language mode, which researchers have been alluding to over the years. For example, Weinreich (1966) writes that when speaking to a monolingual, the bilingual is subject to interlocutory constraint which requires that he or she limit interferences (Weinreich uses this as a cover term for any element of the other language) but when speaking to another bilingual, there is hardly any limit to interferences; forms can be transferred freely from one language to the other and often used in an unadapted way. A few years later, Hasselmo (1970) refers to three sets of "norms" or "modes of speaking" among Swedish-English bilinguals in the United States: English only for contact with English monolinguals, American Swedish with some bilinguals (the main language used is Swedish), and Swedish American with other bilinguals (here the main language is English). In the latter two cases, code-switching can take place in the other language. The author also notes that there exists two extremes in the behavior of certain bilinguals, one extreme involves minimal and the other maximal code-switching. A couple of years later, Clyne (1972) talks of three communication possibilities in bilingual discourse: in the first, both codes are used by both speakers; in the second, each one uses a different code but the two understand both codes; and, in the third, only one of the two speakers uses and understands both codes whereas the other speaker is monolingual in one of the codes. Finally, Baetens Beardsmore (1982) echoes these views when he writes that bilinguals in communication with other bilinguals may feel free to use both of their language repertoires. However, the same bilingual speakers in conversation with monoglots may not feel the same liberty and may well attempt to maximize alignment on monoglot norms by consciously reducing any formal "interference" features to a minimum.

What is clear from all of this is that, at any given point in time and based on numerous psychosocial and linguistic factors, the bilingual has to decide, usually quite unconsciously, which language to use and how much of the other language is needed - from not at all to a lot. If the other language is not needed, then it will not be called upon or, in neural modeling terms, activated. If on the other hand it is needed, then it will be activated but its activation level will be lower than that of the main language chosen. The state of activation of the bilingual's languages and language processing mechanisms, at a given point in time, has been called the language mode. Over the years, and in a number of publications, I have developed this concept. Already in Grosjean (1982; chapter 6), the bilingual's language behavior was presented in two different contexts: when the bilingual is speaking to a monolingual and when he or she is speaking to a bilingual. The notion of a situational continuum ranging from a monolingual to a bilingual speech mode was presented in Grosjean (1985). In the monolingual speech mode, the bilingual deactivates one language (but never totally) and in the bilingual mode, the bilingual speaker chooses a base language, activates the other language and calls on it from time to time in the form of code-switches and borrowings. The notion of intermediate modes and of dynamic interferences was presented in Grosjean (1989); the

latter were defined as those deviations from the language being spoken due to the involuntary influence of the other deactivated language. The expression "language mode" replaced "speech mode" in Grosjean (1994) so as to be able to encompass spoken language, written language as well as sign language, and the current two-dimensional representation of the base language and the language mode was introduced in Grosjean (1997a) as was the notion that language mode corresponds to various levels of activation of the two languages. Finally, in Grosjean (1998a) perception was taken into account, and the many problems that arise from not controlling the language mode sufficiently in bilingualism research were discussed.

Researchers in bilingualism will need to take into account language mode for a number of reasons: it has received relatively little attention in bilingualism research; it gives a truer reflection of how bilinguals process their two languages, separately or together; it helps us understand data obtained from various bilingual populations; it can partly account for problematic or ambiguous findings relating to such topics as language representation and processing, interference, code-switching, language mixing in bilingual children, bilingual aphasics, etc.; and, finally, it is invariably present in bilingualism research as an independent, control or confounding variable and hence needs to be heeded at all times.

In this chapter, language mode will be described, the factors that influence it will be spelled out, and the impact it has on language behavior will be examined. Next, existing evidence for the bilingual's language modes in language production, language perception, language acquisition and language pathology will be described. Language mode as a confounding variable will then be evoked and suggestions for controlling it will be proposed. Finally, future research topics related to language mode such as assessment, processing mechanisms, highly language dominant bilinguals and modeling will be considered.

1. Language mode

Description. Language mode is the state of activation of the bilingual's languages and language processing mechanisms at a given point in time. Given that activation is a continuous variable ranging from no activation to total activation and that two languages are concerned², language mode is best visualized in a two dimensional representation such as that in Figure 1. The bilingual's languages (A and B) are depicted on the vertical axis by a square located in the top and bottom parts of the figure, their level of activation is represented by the degree of darkness of the square (black for a highly active language and white for a deactivated language) and the ensuing language mode is depicted by the position of the two squares (linked by a discontinuous line) on the horizontal axis which ranges from a monolingual mode to a bilingual mode. Three hypothetical positions are presented in the

² At this stage, only the regular use of two languages in relatively stable bilinguals will be considered. People who use three or more languages in their everyday life will be evoked in the last section.

figure, numbered 1 to 3. In all positions it is language A that is the most active (it is the base language, i.e. the main language being produced or perceived at a particular point in time) and it is language B that is activated to

(Please contact the author to receive copies of the figures.)

Figure 1. Visual representation of the language mode continuum. The bilingual's positions on the continuum are represented by the discontinuous vertical lines and the level of language activation by the degree of darkness of the squares (black is active and white is inactive). This figure first appeared in Grosjean (1998). *Studying bilinguals: Methodological and conceptual issues. Bilingualism: Language and Cognition* 1(2):131-149. It is reprinted with the permission of Cambridge University Press.

lesser degrees. In position 1, language B is only very slightly active, and hence the bilingual is said to be at, or close to, a monolingual language mode. In position 2, language B is a bit more active and the bilingual is said to be in an intermediate mode. And in position 3, language B is highly active (but not as active as the base language) and the bilingual is said to be in a bilingual language mode. Note that in all three positions, the base language (language A) is fully active as it is the language that governs language processing. Examples taken from production and perception will illustrate these three positions on the continuum. As concerns production, bilingual speakers will usually be in a monolingual mode when they are interacting with monolinguals (speakers of language A in Figure 1) with whom they simply cannot use their other language (language B). When they are in this kind of situation, they deactivate their other language (most often unconsciously) so that it is not produced and does not lead to miscommunication. Speakers will be in an intermediate position (such as position 2) when, for example, the interlocutor knows the other language but either is not very proficient in it or does not like to mix languages. In this case, the speaker's other language (language B in the figure) will only be partly activated. And speakers will be in bilingual mode (position 3) when they are interacting with other bilinguals who share their two languages and with whom they feel comfortable mixing languages. In this case, both languages are active but one language (language B in the figure) is slightly less active than the other language (language A) as it is not currently the main language of processing. The same applies to bilingual listeners. In position 1, for example, a bilingual may be listening to a monolingual who is using language A and who simply does not know language B. In position 2, the same person may be listening to another bilingual who very rarely code-switches and borrows from the other language, and in position 3, the listener may be listening to mixed language being produced by his or her bilingual interlocutor³.

³ As much of the psycholinguistics of bilingualism has concerned language perception (spoken or written) in the laboratory, it is important to stress that depending on the stimuli presented (monolingual or bilingual), the task used, the laboratory setting and the instructions given, a bilingual listener in an experiment can be situated at any point along the language mode continuum but is usually at the bilingual end. We will come back to this in a later section.

Language mode concerns the level of activation of two languages, one of which is the base language, and hence two factors underlie the concept. The first is the base language chosen (language A in the above figure) and the second is the comparative level of activation of the two languages (from very different in the monolingual mode to quite similar in the bilingual mode). As these two factors are usually independent of one another (for possible exceptions, see section 4), there can be a change in one without a change in the other. Thus, the base language can be changed but not the comparative level of activation of the two languages (e.g. a bilingual can change the base language from A to B but remain in a bilingual mode). Similarly, there can be a change in the comparative level of activation of the two languages without a change in base language (e.g. when a bilingual goes from a bilingual to a monolingual mode but stays in the same base language). Since these two factors are always present, it is crucial to state both when reporting the bilingual's language mode. Thus, for example, a French-English bilingual speaking French to a French monolingual is in a "French monolingual mode" (French is the base language and the other language, English, is deactivated as the mode is monolingual). The same bilingual speaking English to an English monolingual is in an "English monolingual mode". If this person meets another French-English bilingual and they choose to speak French together and code-switch into English from time to time, then both are in a "French bilingual mode". Of course, if for some reason the base language were to change (because of a change of topic, for example), then they would be in an "English bilingual mode", etc. Saying that a bilingual is in an English language mode leaves totally open whether the mode is monolingual or bilingual. It should be noted that the expressions, "language set", "language context" and even "language mode" have been used in the literature to refer to the base language the bilingual is using (or listening to) but they do not tell us anything about the comparative level of activation of the bilingual's two languages (for use of such terminology, see for example, Caramazza, Yeni-Komshian, Zurif & Carbone, 1973; Elman, Diehl & Buchwald, 1977; Beauvillain & Grainger, 1987, etc.).

Factors that influence language mode. Any number of factors can help position a bilingual speaker or listener at a particular point on the language mode continuum, that is, set the activation level of the bilingual's languages and language processing mechanisms. Among these we find the participant(s), that is the person(s) being spoken or listened to (this includes such factors as language proficiency, language mixing habits and attitudes, usual mode of interaction, kinship relation, socioeconomic status, etc.), the situation (physical location, presence of monolinguals, degree of formality and of intimacy), the form and content of the message being uttered or listened to (language used, topic, type of vocabulary needed, amount of mixed language), the function of the language act (to communicate information, to request something, to create a social distance between the speakers, to exclude someone, to take part in an experiment, etc.) and specific research factors (the aims of the study taking place [are they known or not?], the type and organization of the stimuli, the task used, etc.). Thus, a monolingual mode will arise when the interlocutor or the situation is monolingual and/or other factors require that only one language be spoken to the exclusion of the other. This is the case, for example, when a bilingual adult or child is speaking with, or listening to, a monolingual family member or friend, or when a bilingual aphasic is speaking to a monolingual examiner, etc. Of course, no physical interactant need be present for a bilingual to be in a monolingual mode. If a

bilingual is reading a book written in a particular language, watching a TV program in just one language or, more experimentally, taking part in a study in which only one language is used and where there is absolutely no indication that the other language is needed (but see below for the very real difficulty of creating this situation), then the bilingual is probably in a monolingual mode. The same factors apply for any other position on the continuum. Thus, if two bilinguals who share the same languages and who feel comfortable mixing languages, are interacting with one another, there is a fair chance that they will be in a bilingual mode. This will be reinforced if, for example, the topic being dealt with is one that cannot be covered without having recourse to the other language in the form of code-switches and borrowings. A bilingual mode will also arise when a bilingual child is interacting with a bilingual parent (or adult), when a bilingual is simply listening to a conversation which contains elements of the other language or, more experimentally, when the study concerns bilingualism, the stimuli come from both languages and the task asked of the participants requires processing in the two languages. As for intermediate positions on the continuum, they will be reached by different combinations of the above factors. If the bilingual's interlocutor is not very proficient in the other language (but still knows it a bit), if he or she does not like to mix languages, if the topic has to be covered in the base language but the other language is needed from time to time (e.g. in the case of a bilingual child speaking one language to a bilingual researcher about a topic usually talked about in the other language), if the situation is more formal, if only a few stimuli in an experiment are similar in the two languages (e.g. cross-language homographs, cognates), etc., then we can expect an intermediate language mode. Movement along the continuum, which can happen at any given point in time depending on the factors mentioned above, is usually an unconscious behavior that takes place smoothly and effortlessly. It is probably akin to changing speech style or register based on the context and the interlocutor.

Impact on language behavior. The impact a particular language mode has on language behavior is quite varied. Among these we find the amount of use of the other (guest) language during language production and language perception, the amount and type of mixed language used, the ease of processing of the two languages and the frequency of base language change. In the monolingual mode, the language not being processed is deactivated (some researchers such as Green (1986, 1998) would even say that it is inhibited). This in turn prevents changing base language as well as producing mixed speech, i.e. code-switches and borrowings or, at least, reducing them drastically. However, dynamic interferences may still take place, that is speaker-specific deviations from the language being spoken due to the influence of the other deactivated language. (Note that interferences can also occur in the bilingual mode but they are more difficult to separate from other forms of language mixing such as code-switches and borrowings). As for the impact on listening in the monolingual mode, the bilingual will not make much use of the deactivated language (if any) and this may speed up the processing of the base language (but this still has to be proved experimentally)⁴. As concerns the bilingual mode, both languages will be active but one language (language B in Figure 1) will be slightly less active than the other language (language A) as it is not

⁴ To my knowledge, no experiment aimed at this question has given all the necessary guarantees that the participants were in a truly monolingual mode.

currently the main language of communication. In production, bilinguals usually first adopt a base language through the process of language choice (language A in our case) and, when needed, they can bring in the other language, often referred to as the guest language, in the form of code-switches and borrowings. A code-switch is a complete shift to the other language for a word, a phrase or a sentence whereas a borrowing is a morpheme, word or short expression taken from the less activated language and adapted morphosyntactically (and sometimes phonologically) to the base language. Borrowings can involve both the form and the content of a word (these are called nonce borrowings) or simply the content (called loan shifts). It should be noted that given the high level of activation of both languages in the bilingual mode, not only can code-switches and borrowings be produced but the base language can also be changed frequently, that is the slightly less activated language becomes the base language and vice versa. A change of topic, of situation, of interlocutors, etc. may lead to a change in base language. In our example, language B would then become the most active language (it would be represented by a black square) and language A would be slightly less active (the black square would contain white diagonal lines). When this happens repeatedly within the same interaction, it gives the impression that the two languages are equally active but there is evidence in the sociolinguistic and psycholinguistic literature that, at any one point in time, one language is always more active than the other and that it is this language that governs language processing. As concerns perception, both languages will be processed in the bilingual language mode but the base language will usually play a greater role (see Grosjean, 1997a, for a review of work on mixed language processing). Finally, the impact of an intermediate mode will be somewhere in between: more code-switching and borrowing than in the monolingual mode, some flagged switches, fewer dynamic interferences, some involvement of the other language during perception, etc.

Additional points. Several additional points need to be made concerning language mode. First, it should be noted that bilinguals differ among themselves as to the extent they travel along the language mode continuum; some rarely find themselves at the bilingual end (for example, bilinguals who rarely code-switch, sometimes on principle, or who do not hear mixed language very much) whereas others rarely leave this end (for example, bilinguals who live in communities where mixed language is the norm). Second, movement along the continuum can occur at any time as soon as the factors underlying mode change, be it during a verbal exchange between bilinguals or, in a more controlled situation, during an experiment. In addition, the movement usually takes place unconsciously and can be quite extensive. Thus, for example, if a bilingual starts off speaking to a "monolingual" and then realizes, as the conversation continues, that he/she is bilingual, there will invariably be a shift towards the bilingual end of the continuum with such consequences as change of base language, code-switching, etc. During perception, if bilingual listeners who start off in a monolingual mode determine (consciously or not) as they go along, that what they are listening to can contain elements from the other language, they will put themselves in a bilingual mode (at least partly), that is, activate both their languages (with the base language being more strongly activated). This is also true of readers, whether they are reading a continuous text or looking at individual lexical items interspersed with items from the other language. Simply knowing that there is a possibility that elements from the other language will be presented (in an experiment, for example) will probably move the bilingual away from the monolingual

endpoint of the continuum. Just one guest word in a stream of base language words may well increase this displacement. Third, the minimum and maximum possible levels of activation of the other language (language B) are still not totally clear and remain an empirical issue. Currently, and as can be seen at the two extremes of the continuum in Figure 1, it is proposed that the other language is probably never totally deactivated at the monolingual end and that it very rarely reaches the same level of activation as the base language at the bilingual end (except, of course, when there is a change of base language). As concerns the lack of total deactivation, there is considerable evidence in the literature that bilinguals make dynamic interferences (ephemeral deviations due to the influence of the other deactivated language) even in the most monolingual of situations. This can only happen if the other language is active to some extent at least. As for the unequal activation of the two languages in the bilingual language mode, linguists working on code-switching and borrowing have often reported that the base language usually governs the language production process (it is the "host" or "matrix" language) and hence it is used much more than the other. Of course, one can think of exceptions where the two languages could share the same level of complete activation. This may be the case, for example, in an experiment where the participants are told, or find out, that the stimuli presented belong to either of the two languages. More interestingly, simultaneous interpreters need both languages to the same extent: input is in one language and output in the other (this special case will be evoked later in this paper). Finally, the case of non accommodation in language choice should be mentioned, that is, when bilingual A speaks language X and bilingual B speaks language Y. Here both languages may be activated to the same level, unless one chooses to talk in terms of input and output processing systems being activated to different extents. These exceptions aside, the base language is normally more active than the other language.

2. Evidence for language mode

Even though the concept of language mode has been alluded to by several researchers over the years, it has not been the object of systematic study until quite recently. However, if one combines earlier research in which language mode is varied in an indirect, non explicit way with more recent research that manipulates it explicitly, one can find strong evidence for the phenomenon. In what follows, research that pertains to language production, language perception, language acquisition and language pathology will be surveyed.

Language production. In one of her first publications, Poplack (1981) reports on a 35-year-old member of El Barrio (a Puerto Rican neighborhood in New York) who was tape-recorded in four different sessions where the base language was English: "Formal" in which she responded orally to a questionnaire given to her by a bilingual member of her community; "Informal" in which she had a conversation concerning topics of interest to her with the same person; "Vernacular" where she was recorded while doing errands and chatting with passersby in her neighborhood, and finally, "Informal (non group)" where she conversed with an English-Spanish bilingual who was not a member of her community. Although language mode was not manipulated directly, the informant was

probably at the bilingual end of the language mode continuum in the "Informal" and "Vernacular" sessions (she was with members of her community with whom she code-switched frequently) whereas she was in an intermediate mode in the other two sessions. In the "Formal" session she probably felt that the formality of responding to a questionnaire was not conducive to code-switching, and in the "Informal (non group)" session, she felt she did not know the other interviewer well enough to code-switch as much with her as with an in-group member. In both these cases, therefore, she probably deactivated her Spanish to some extent and was in an intermediate mode. The code-switching patterns reported by the author confirm the impact of language mode on language production: there were about four times more code-switches per minute in the "Informal" and "Vernacular" sessions than in the "Formal" and "Informal (non group)" sessions.

More recently, Treffers-Daller (1998) has examined explicitly the effect of a speaker's position on the language mode continuum in terms of language choice and code-switching. She placed the same speaker, a Turkish-German bilingual, in three different positions by changing the context and the interlocutors, and she found quite different results. In the first context, which corresponds to a position to the right of the monolingual mode endpoint, the bilingual was speaking to members of a German-speaking family in Turkey who knew some Turkish. As a consequence, about three quarters of the speaker's utterances were in German and not much language mixing occurred (they mainly concerned borrowings). In the second context, which corresponds to an intermediate mode, the same bilingual, in Germany this time, was speaking to a Turkish-German bilingual he did not know very well. The author noted more changes of base language than in the first context and although the amount of mixed utterances was not much greater, these were quite different. They consisted of peripheral switches that filled a pragmatic function and that contained various types of pauses (this behavior has been called flagged switching). As for the third context, which corresponds to the bilingual end of the language mode continuum, the same bilingual interacted with a very close bilingual friend in Turkey. Here most utterances were in Turkish and there was much more language mixing than in the other two contexts. In addition, the code-switches were both intra- and intersentential and they were produced without hesitations or special highlighting (these have been called fluent switches). Based on these results, Treffers-Daller concludes that the language mode continuum concept may offer a new approach to study variable code-switching patterns within and between communities (e.g. Poplack, 1985; Bentahila & Davies, 1991) because it can help predict the frequency and type of switching that takes place.

In a laboratory based study, Grosjean (1997a) manipulated the language mode French-English bilinguals were in when retelling French stories that contained English code-switches. The participants were told they were taking part in a "telephone chain" experiment whose aim was to examine the amount of information that could be conveyed from one person to another. The three French interlocutors they had to retell the stories to were described to the participants before the experiment started by means of short biographical sketches. (They were not actually present in the room during the experiment). The first person (referred to as "French") had just arrived in the United States to do a postdoc. He could read and write English quite well but still had difficulties speaking it. He was still adapting to

life in America and spoke French at home. Faced with this kind of interlocutor, it was hypothesized that the participants would be in a monolingual mode as the interlocutor could not understand English very well. They would only speak French to him and do very little language mixing. Any code-switching that took place would have to be explained. The second person ("Bilingual A") had lived in the States for seven years and worked for a French government agency. He taught French and organized French cultural events. His children went to a bilingual school and he only spoke French at home although he was bilingual in French and English. It was hypothesized here that the participants would be in an intermediate language mode. Although Bilingual A knew English well it was inferred from the description given that he did not code-switch much. Thus, it was expected that the amount of code-switching would be kept down (although there would be more than for the first interlocutor) but what code-switching did take place would not be explained. Finally, the third person ("Bilingual B"), was a more traditional immigrant bilingual who had also been in the States for seven years. He worked for a local electronics firm, had French and American friends and spoke both languages at home. His children went to the local school. It was hypothesized that with this interlocutor, the participants would be in a fully bilingual mode and that they would code-switch as much as necessary with him. The results confirmed the hypotheses. In effect, the three dependent measures obtained (number of guest language syllables, number of base language syllables, and number of hesitations produced) were all affected by the language mode the speakers were in. The number of guest language syllables (code-switches, borrowings) increased significantly as the participants moved from a monolingual to a bilingual mode whereas the number of base language syllables decreased as did the number of hesitations.

Language perception. There has been far less (if any) systematic research on language mode in the domain of perception. Consequently, evidence for its impact in this modality has to come from studies that have manipulated the variable inadvertently. One example comes from two studies in the domain of speech perception. Caramazza et al. (1973) tested English-French bilinguals on VOT continua (ba-pa; da-ta; ga-ka) and obtained identification curves in an English and in a French language set. The language sets were obtained by changing the experimenters (one English speaking, one French speaking), the settings, the language of the instructions and the initial production task. (We should note that manipulations of this type determine what the base language will be, English or French in this case, but do not necessarily deactivate the other language). Although the authors expected the bilinguals to behave like French listeners when in a French language set and like English listeners in an English language set (i.e. show a perceptual boundary shift), they obtained similar functions for the two languages. These were situated in an intermediate position between the functions obtained with monolingual speakers of each language set. The authors concluded that the bilingual participants were responding to the stimuli themselves and were not influenced by language set. A few years later, Elman, Diehl & Buchwald (1977) decided to investigate this question further but this time to make sure that the language set was firmly established. Thus, in addition to using naturally produced stimuli, the test tapes contained an assortment of one or two syllable filler words along with the stimuli. In addition, each item was preceded by a sentence in the appropriate language (in this case, English and Spanish). This time, the authors did find a boundary shift, with ambiguous stimuli perceived significantly more as English, or as

Spanish, depending on the language set the listeners were in. How can these contradictory results be interpreted in terms of language mode? It is proposed that in the first study, the language set manipulation undertaken at the beginning of testing was not sufficient to keep the bilingual listeners at the monolingual endpoint of the continuum. In effect, they were probably in, or they quickly moved to, a bilingual mode when asked to identify the experimental stimuli (especially as the latter were language-neutral synthetic speech). Hence the bilingual participants produced compromise (bilingual) results that were intermediate between those of the two monolingual groups. However, in the second study, there was constant language specific information (through the natural stimuli, the carrier sentence and the filler words) which activated one language much more than the other and hence kept the bilinguals at the monolingual end of the continuum. The stimuli were thus processed more "monolingually" in Spanish or English and this led to a boundary shift.

Language mode was manipulated both by top-down and bottom-up information in the two speech perception studies we have just seen, whereas in a lexical access study conducted some years later by Grainger & Beauvillain (1987), it depended on bottom-up information only. In this study, French-English bilinguals were asked to do a lexical decision task on two types of lists: "pure" lists which contained words from one language only and "mixed" lists which contained words from both languages. The authors found that the participants were some 36 msec faster in the pure list condition than in the other condition. We can interpret this result in the following way. In the pure list condition, the bilinguals were close to the monolingual end of the continuum (they didn't attain it though as they knew the study dealt with bilingualism) and hence their lexical search/look-up task was made easier as one lexicon was much more active than the other. In the mixed condition, however, the bilinguals were at the bilingual end of the continuum. Both lexicons were active as words could come from either and hence lexical decision took more time. It should be noted that in a second experiment, the authors found that the list condition effect was significant only in the absence of language specific orthographic cues. This in no way weakens the explanation just given as language mode is just one of many variables that will account for the time it takes to recognize a word.

Finally, in a very recent study, Dijkstra, Van Jaarsveld & Ten Brinke (1998), bring further, albeit indirect, evidence for the effect of language mode during perception. They tested Dutch-English bilinguals (dominant in Dutch) in three experiments and manipulated word type, language intermixing, and task. In what follows, only the first and third experiments will be examined as they pertain more directly to the language mode issue. In the first, the participants saw English/Dutch homographs and cognates, English control words and English nonwords. They were asked to do an English lexical decision on the items presented, that is indicate whether the items were English words or not, and they were tested in an English language set. Although cognates were responded to significantly faster than control words (570 and 595 msec respectively), no difference was found between homographs and their controls (580 msec in both cases). In the third experiment, participants once again saw homographs (no cognates though) as well as English and Dutch control words and English and Dutch nonwords. On this occasion they were asked to do a general lexical decision, that is indicate whether the items were words in English or in Dutch. This

time, the authors did find a homograph effect in English: participants reacted to homographs faster than to English control words (554 and 592 msec respectively) but not to Dutch words (554 msec). A language mode account of these results is as follows. In Experiment 1, the participants were positioned towards the monolingual end of the continuum without reaching it totally though as they knew they were being tested as bilinguals. They only heard English words and nonwords (although some words were homographs and cognates) and they were asked to decide whether the items were English words or not. Thus although their Dutch was partly active (which would explain the cognate effect) it was not sufficiently active to create a homograph effect. However, in Experiment 3, the participants were definitely at the bilingual end of the continuum. Not only were the words and nonwords both English and Dutch but the participants were asked to do general lexical decision, that is search/look-up both their lexicons to accomplish the task. As both lexicons were active, they probably considered homographs as Dutch words and hence reacted to them as quickly as to regular Dutch words. This would explain the lack of difference between homographs and Dutch control words but the significant difference between homographs and English control words. The latter, it should be recalled, belonged to their weaker language and hence were reacted to more slowly.

Language acquisition. As will be seen later, language mode has rarely been controlled for in bilingual acquisition research. However, more recent studies have started to manipulate this variable and they have produced converging evidence for its importance. In one such study, Lanza (1992) recorded a two-year-old Norwegian-English bilingual child (Siri) interacting either with her American mother or her Norwegian father, both of whom were bilingual. What is interesting is that the mother frequently feigned the role of a monolingual and did not mix languages with Siri. The father, on the other hand, accepted Siri's language mixing and responded to it. Lanza studied the interactions between Siri and her parents in terms of a monolingual - bilingual discourse context continuum on which she placed various parental strategies. For example, "Minimal grasp" and "Expressed guess" are at the monolingual end (they were precisely the strategies used by the mother) and "Move on" and "Code-switching" strategies are at the bilingual end (they were the ones used by Siri's father). These strategies produced very different results: Siri did much more content word mixing with her father (who was open to code-switching) than with her mother (who did not respond to it), and this over the whole period of study (from age 2;0 to 2;7). What this means in terms of language mode is that Siri was herself probably in different modes with her two parents - she leaned towards the monolingual end with her mother (but never reached it as she did switch with her sometimes) and she was at the bilingual end with her father.

Although Nicoladis & Genesee (1998) have not managed to replicate Lanza's finding with English-French bilingual children in Montreal, they do not seem to question the parental discourse strategies proposed by Lanza nor the results she obtained. Instead they offer other reasons for finding different results such as the different sociolinguistic context, the fact that the Montreal children may not have understood the parental strategies, or the difference in language proficiency of the children in the two studies. In fact, Genesee, Boivin & Nicoladis (1996) have published some rather compelling evidence that bilingual children are very sensitive to the language behavior of

the adults they are with. They recorded four English-French bilingual children (average age 2;2) as they spoke to their mother, to their father or to a stranger who only spoke their weaker language. On the level of language choice, they found that each child used more of the mother's language (be it French or English) with the mother than with the father, more of the father's language with the father than with the mother, and that they accommodated to the stranger as best they could by adopting the stranger's language as the base language, at least in part, or by mixing more. As concerns language mode, it would seem that only two of the four children had enough competence in the two languages to benefit fully from movement along the language mode continuum (Jessica and Leila). If for these children one takes the amount of weaker language used by the parent (e.g. the amount of English spoken by a French dominant parent) to which one adds the amount of mixed utterances, and one then correlates this value with the equivalent amount obtained from the child when speaking with that parent, one obtains a very high 0.85 correlation. This indicates that the more a parent switches over to the other language during communication, the more the child does so too. This finding is very similar to Lanza's (1992). In terms of language mode, children are more in a monolingual mode with parents who do not mix language much (all other things being equal) whereas they are more in a bilingual mode with parents who mix languages to a greater extent (or at least accept language mixing).

Language pathology. Studies that have examined bilinguals that suffer from some form of language pathology (aphasia, dementia, etc.) have also rarely manipulated language mode or controlled for it. Thus claims that language mixing is due to the patient's pathology may have to be revised if language mode is a confounding factor (as it often is; see the next section). Just recently, Marty & Grosjean (1998) manipulated language mode in a study that examined spoken language production in eight French-German aphasic bilinguals. The patients were asked to undertake various language tasks: place one of several cards in a specified position on a board, describe a postcard in enough detail so that it can be found among several similar postcards, take part in a topic constrained interaction and, finally, talk freely about any topic which comes to mind. The critical independent variable was the patient's interlocutor. The first was a totally monolingual French speaker who did not know any German whatsoever (unlike in many other studies where the interlocutor knew the other language but pretended not to) and the second was a French-German bilingual. The patients were told about their interlocutors' language background prior to testing and they interacted with them a bit at that time. The results clearly differentiated pathological from non pathological mixing. Five of the eight aphasics did not mix their languages with the monolingual interlocutor (they only used her native language), one did so extremely little (it was probably due to stress or fatigue) whereas two did so quite extensively. It was concluded that of the eight aphasics, six patients could still control their language mode and adapt it to the interlocutor whereas two could no longer do so.

In sum, there is increasing evidence, direct and indirect, that language mode plays an important role in language processing as well as in language acquisition and language pathology.

3. Language mode as a confounding and a control variable

Given that language mode plays an important role in all types of bilingual language behavior, it is important that it be controlled for if it is not the main variable being studied. Unfortunately, this has not been the case in many past studies. The consequence is that the data obtained is both very variable, due to the fact that participants are probably situated at various points along the continuum, and at times ambiguous given the confound between this factor and the variable under study. In this section, issues in bilingualism research that are affected by language mode will be presented and examples of how the variable can influence them inadvertently will be discussed. Ways of controlling language mode will then be proposed⁵.

Language mode as a confounding variable. One issue influenced by language mode concerns the type of data obtained in descriptive studies. For example, researchers who have examined bilingual language production have often reported instances of interference. The problem is that it is not always clear what is meant by this term (also called transfer or transference). As indicated earlier, for Weinreich (1966), interferences are instances of deviation from the norms of either language which occur in the speech of bilinguals as a result of their familiarity with more than one language. Haugen (1956) refers to interference as the overlapping of two languages, Mackey (1968) talks of the use of features belonging to one language while speaking or writing another, and for Clyne (1967) transference is the adoption of any elements or features from the other language (he uses the term as a cover term for language contact phenomena). A direct result of this broad view is that the interferences observed in linguistic studies correspond to interferences but also often to borrowings and even code-switches. As stated in Grosjean (1998b), we will never get to the bottom of this terminological problem, and we will never isolate interferences from code-switches and borrowings in bilingual speech, if we do not take into account (and do not control for) the language mode bilinguals and language learners are in when they are being studied (i.e. observed, recorded, tested, etc.). Very often the bilinguals' interlocutors know the language not being spoken (the one causing the interference) and hence bilinguals are in an intermediate mode if not in a bilingual mode when being recorded. When interferences occur in the bilingual mode, which they also do, they are very difficult to separate from other forms of language mixing, especially borrowings. What might appear to be an interference could also be a guest element or structure produced by the speaker who is aware that his or her interlocutor can understand mixed language. (The same point is made by Poplack, 1985).

A similar problem concerns "intentional" and "unintentional" switches in second language production. Poulisse & Bongaerts (1994), for example, define unintentional switches as cases which were not preceded by any signs of hesitation and did not stand out from the rest of the utterance by a marked intonation. The problem is that it is not clear what language mode their second language learners were in when they tested them. If they were not in a

⁵ For a more extensive discussion of these topics, see Grosjean (1998a).

monolingual mode, then their switches may not have been unintentional (at least not all of them). In fact, we are told that these switches contain a large proportion of editing terms which the speakers used to comment on an error made or on an inappropriate word used, and/or to warn the listener that what followed should be interpreted as a repair of what preceded. This would seem to indicate that the interviewees could indeed understand the other language and that the learners were at least partly in a bilingual mode. The same argument can be made about "fluent" and "flagged" switches. Poplack (1985) defines the former as switches with smooth transitions and no hesitations whereas the latter are switches that draw attention to themselves by repetition, hesitation, intonational highlighting and metalinguistic commentary. Poplack compares the fluent switches found in the Puerto Rican community in New York and the flagged switches obtained in Ottawa-Hull and recognizes that the difference in type could be due, in part at least, to the data collection technique used in each case - an informal participant observation technique in New York and a more formal random sampling technique in the Ottawa-Hull region. In terms of language mode, participants were probably in a totally bilingual mode in New York and in an intermediate language mode in Ottawa-Hull.

Another issue that is affected by language mode concerns whether bilinguals have an integrated semantic memory for their two languages (also called a shared or a common store) or whether they have two separate, independent semantic systems. Several studies have addressed this question and some (e.g. Schwanenflugel & Rey, 1986; Fox, 1996, etc.) come to the conclusion that bilinguals have a shared representational system. The problem is that it is difficult to tease apart in their results what is due to the representational issue and what is caused by the language mode variable. The bilingual participants were probably not in a monolingual mode when they took part in the studies. They knew they were being tested as bilinguals and they saw words in the two languages. Because of this, they had probably activated both their languages (consciously or unconsciously) and were thus in a bilingual mode. This would invariably lead to results indicating a shared system. A related issue concerns the presence or absence of language-selective access during visual word perception. Beauvillain & Grainger (1987), for example, found evidence for non-selective access when bilinguals were shown interlexical homographs. The problem though is that the bilingual participants in their experiment needed their two languages to do the task: they had to read a context word in one language and then decide whether the next word, always in the other language, was a word or not in that language. In order to do this, they had to activate both their languages and hence were in a bilingual language mode. (As they were tested as bilinguals, they were probably already in a bilingual mode before the experiment even started). It is no surprise therefore that a result indicating non-selective processing was obtained (the same comment can be made about another well known study which examined the same question, that of Altenberg & Cairns, 1983). In sum, if one is interested in such issues as the independence or the interdependence of the bilingual's language systems, selective versus non-selective processing, one versus two lexicons, etc., one should be careful not to activate the other language with the stimuli or the procedure used. When this occurs, it becomes difficult to disentangle what is due to bilingual representation and processing, and what is due to the bilingual language mode the participants are in. In addition, strict dichotomies such as selective vs. non-selective processing probably have

little psychological reality if one thinks of the bilingual moving along the language mode continuum in his/her everyday life. Processing may be selective (or very close to it) when the bilingual is in a monolingual mode, partly selective when the mode is intermediate and non-selective when the mode is bilingual.

A last issue pertains to the amount of language mixing that is produced by certain types of bilinguals. For example, in the bilingual language development literature, it has been proposed that children who acquire two languages simultaneously go through an early fusion stage in which the languages are in fact one system (one lexicon, one grammar, etc.). They then slowly differentiate their languages, first separating their lexicons and then their grammar. Evidence for this has come from the observation of language mixing in very young bilingual children and from the fact that there is a gradual reduction of mixing as the child grows older. However this position has been criticized by a number of researchers (e.g. Meisel, 1989; Genesee, 1989, among others) and one of the points made each time (in addition to the fact that translation equivalents may not be known in the other language) is that the children were often in a bilingual mode, i.e. the caretakers were usually bilingual themselves and they were probably overheard using both languages, separately or in a mixed form, by the children, if not actually mixing their languages with them (see Goodz, 1989). In addition, the context in which the recordings were made for the studies probably induced language mixing as it was rarely (if ever) monolingual (see, for example, Redlinger & Park (1980) and Vihman (1985)). The children in these studies were thus probably in a bilingual context which induced a bilingual mode and hence language mixing. In another domain, the amount of language mixing produced by bilingual patients suffering from some type of language pathology (e.g. aphasia, dementia) has been used as an indication of their pathology (e.g. Peregman, 1984; Hyltenstam, 1991; Lud rus, 1995). However, as argued in Grosjean (1998a), most of the patients recorded were at least partially in a bilingual mode when being recorded (and sometimes even in a fully bilingual mode). It is no surprise therefore that they switched to the other language if this improved communication between the interviewer and themselves.

Language mode as a control variable. Until more is known about language mode (see next section), it is safer to control it by putting bilinguals in a monolingual mode or in a bilingual mode in preference to an intermediate mode (Grosjean, 1998). As concerns the monolingual mode, two inappropriate approaches must be avoided. The first is to simply put the participants in a "language set" (also called erroneously by some a "language mode") by giving them instructions in one language, getting them to do preliminary tasks in that language, occasionally presenting reminders in that language, etc. What this does is to activate a particular base language (the variable depicted on the vertical axis in Figure 1) but it does not guarantee a particular position on the monolingual-bilingual mode continuum. A second inappropriate approach, which has been used a lot with bilingual children, second language learners and aphasic or demented patients, has been to hide the experimenter's or interviewer's bilingualism. This is a very dangerous strategy as subtle cues such as facial expression and body language can give away the interlocutor's comprehension of the other language. In addition, it will not prevent occasional slip-ups such as responding in the "wrong" language or showing in one's response that what has been said in that language has been understood. The

solution to positioning the bilingual at the monolingual endpoint of the continuum is unfortunately not quite as easy as one would like it to be. For interview situations, if the researcher is interested in observing how a bilingual can produce just one language (something a bilingual often has to do), then the interviewer must be completely monolingual in that language (and not feign to be). In addition, the situation must be monolingual and there must not be any other person present who knows the other language. For more experimental situations, the difficulty is how to prevent the bilingual from activating, to some extent at least, the other language. If interest is shown in the participant's bilingualism, if he or she is tested in a laboratory that works on bilingualism, if the experimenter is bilingual, if the participant sees or hears stimuli from both languages, and if the task requires both languages (e.g. the bilingual Stroop test, bilingual word priming, bilingual association production, bilingual category matching, word translation, etc.) then any one of these factors is sufficient to put the participant in a bilingual mode, in part at least, and hence activate the two languages, albeit to differing degrees. One solution that comes to mind is to intermix bilingual participants in with monolingual participants in a monolingual experiment (for example, a study that is part of a course requirement) and once the experiment is done, and after the fact only, so as to avoid the Rosenthal effect, to go back into the list of participants and extract the bilinguals. As concerns the bilingual endpoint of the language mode continuum, care will have to be taken that the participants are totally comfortable producing, or listening to, mixed language. This can be done by having bilingual experimenters or interviewers who belong to the same bilingual community as the participants and, if possible, who know them well. They should interact with the participants in mixed language and the situation should be conducive to mixed language (no monolinguals present, a relaxed non-normative atmosphere, etc.).

4. Further research on language mode

In this last section, several aspects of language mode that need to be investigated further will be mentioned briefly. They concern the assessment of language mode, the bilingual's processing systems, the case of highly language dominant bilinguals, and modeling.

Assessing language mode. As we have seen in this chapter, many different factors influence language mode. They range from factors that concern participants (language proficiency, language mixing habits and attitudes, usual mode of interaction), to situational factors (physical location, presence of monolinguals, formality), to factors that deal with form and content (language used, topic, amount of mixed language) and with the language act (communicate information, create a social distance, etc.), all the way to specific research factors (aims of the study taking place, type and organization of the stimuli, task used, instructions, etc.). Future research will have to isolate these factors, determine their importance, and ascertain how they interact with one another to activate or deactivate the bilingual's languages to varying degrees and hence change the bilingual's position on the language mode continuum. Researchers will also have to examine the maximum movement possible on the continuum for various types of

bilinguals. As we saw above, bilinguals differ among themselves as to the extent they travel along the language mode continuum; some rarely find themselves at the bilingual end (the other language is never very active) whereas others rarely leave this end (the other language is always very active). And within a bilingual, the minimum and maximum possible levels of activation of the other language can also vary. Another issue concerns a hypothetical resting mode for any bilingual individual, that is the language mode the bilingual returns to in between language activities. Does this notion have any reality or is the bilingual constantly traveling along the continuum? Finally, to complicate things further, people who use three or more languages in their everyday lives will need to be accounted for. For example, one can certainly imagine a trilingual in a monolingual, a bilingual or a trilingual mode. Figure 2 depicts each of these three modes. In the top part of the figure, the trilingual is in a monolingual mode; language A is active and the other two languages are only very slightly active. In the middle part of the figure, the trilingual is in a bilingual mode; language A remains the base language, language B is active (but less so than language A) and language C is very slightly active. Finally, in the bottom part of the figure, the same trilingual is in a trilingual mode where language A is the base language and languages B and C are also active. What has just been said about trilinguals is true of quadrilinguals. For example, a quadrilingual can be in a language B monolingual mode where language B is being used (it is the base language) and languages A, C and D are very slightly active. This same person, in another situation, can be in a quadrilingual mode where, for example, language B is the base language and languages A, C and D are also active. If all this is possible, which it probably is, the language mode concept will have to be extended and its various manifestations in these kinds of multilinguals will have to be investigated. This said, it would be a mistake to put the language mode variable aside in bilingualism studies as long as it has not been described fully and a metric has not been developed for it (as a continuous variable

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Figure 2. Visual representation of a trilingual in a monolingual mode (top part), bilingual mode (middle part) and trilingual mode (bottom part). The level of activation of a language is indicated by the degree of darkness of the squares (black is active and white is inactive). Language A is the base language in each case.

affected by a host of factors, one may never be). Language mode is a variable that is constantly present, whatever the bilingual research question being studied, and it therefore needs to be taken into account at all times.

Language mode and the processing mechanisms. So far language mode has been defined as a state of activation of the bilingual's languages and language processing mechanisms at any given point in time. To simplify things, no difference has been made in terms of mode between language knowledge and language processing, and in the latter case, between the input and output mechanisms. However, it could be that one will need to differentiate these three components at some time. For example, as concerns processing, a bilingual can be speaking one language and listening to another (such as when two interlocutors do not accommodate to a common base language). A simple account of this is that the language mode is the same in the input and output systems but that the base language is different. But things become more complex if the interlocutor's input is monolingual in nature (it contains no language mixing) but the speaker's output involves language mixing (or vice-versa). In this case, different language modes will have to be attributed to the input and output systems. The case of simultaneous interpreters is akin to this situation. What language mode are interpreters in when they are doing simultaneous interpretation? A suggestion made in Grosjean (1997b) is that the input and output processing mechanisms of each language are indeed separated here. First, as can be seen in Figure 3, the interpreter is in a bilingual mode and both languages are active. However, one language is not more active than the other as is normally the case in the bilingual mode. Both the source language and the target language are active to the same extent (black squares in the figure) as both are needed, for perception and production respectively. Second, input and output components have been added to each language (circles in the figure) and it is their level of activation that varies. Although the two languages are equally active, the processing mechanisms are not. In this way, the interpreter will be able to input the source language (and to a lesser extent the target language, see below) and to output the target language only. Third, the input component of the source and of the target language are both active. At least three reasons require that the input component of the target language also be active: the interpreter must be able to monitor his/her overt speech (Levelt, 1989), the client's occasional use of the target language must be processed (interpreters report that this indeed takes place), and a fellow interpreter's cues must be heard. Fourth, the target language output mechanism is active whereas the source language output mechanism is not (it may be totally deactivated or, quite exceptionally, inhibited). In sum, the two languages are in a bilingual mode (both are active), the output mechanisms are in a monolingual mode (only one language is normally output) whereas the input mechanisms are in a bilingual mode (input takes place in the source and sometimes in the target language). How inactive the source output mechanism should be is discussed in Grosjean (1997b).

(Please contact the author to receive copies of the figures.)

Figure 3. Visual representation of the interpreter's position on the language mode continuum when doing simultaneous interpreting. Both languages are active (black squares) but they differ as to the level of activation of their input and output mechanisms (represented by circles).

Highly language dominant bilinguals. Language mode will also have to be studied in bilinguals who are highly dominant in one language, such as members of minority groups who rarely use the majority language, bilingual children who are strongly dominant in one language, second language learners (on the condition that they make regular functional use of their second language),⁶ etc. It has been reported repeatedly in the literature that these types of bilinguals do more language mixing when speaking their weaker language than their stronger language. Thus, Genesee, Nicoladis & Paradis (1995) and Nicoladis & Genesee (1998) report that bilingual children code-mix more when talking with the parent who speaks their non-dominant language (irrespective of whether the parent code-mixes in return); Lanza (1992) reports that the Norwegian-English bilingual child she studied (Siri) did more function word mixing with her English speaking mother, indicating thereby the child's dominance in Norwegian; Poulisse & Bongaerts (1994) report that the use of unintentional switches is L2 proficiency related (more proficient learners produce less of them) and, even in perception, Elman, Diehl & Buchwald (1977) report a 0.52 correlation between the degree of bilingualism and the amount of identification shift for the ambiguous VOT stimuli. This would mean that bilinguals who are highly dominant in one language may simply not be able to control language mode in the same way as less dominant or balanced bilinguals. Although they may deactivate their stronger language in a monolingual environment that requires only the weaker language (for example, it is of no use speaking Italian to an English speaker who knows absolutely no Italian), that language will simply not be developed enough or active enough to allow them to stay in a monolingual mode. Future research will have to investigate the underlying mechanisms that make a stronger language "seep through" despite the fact that it has been deactivated. It will also have to isolate which part of behavior is due to competence (i.e. the representation or grammar of the weaker language) and which part is due to performance (i.e. the system's inability to activate or deactivate a language or processing mechanism at any particular point in time). Finally, attention will have to be paid to bilinguals who through some kind of pathology (aphasia, dementia, etc.) lose their ability to move along the language mode continuum. Some can no longer leave the monolingual mode (they cannot mix languages anymore) whereas others are in a constant bilingual mode and hence mix their two languages when it is not appropriate.

Modeling. Models of bilingual competence, bilingual production and perception as well as bilingual language acquisition will have to take into account language mode. For example, De Bot's (1992) global model of bilingual

⁶ It is difficult to know how the language mode concept applies to "traditional" language learners who acquire their second language in a formal school environment. Those who interact in their L2 in a natural environment can be accounted for more easily.

language production has played an important role in bilingualism research in recent years but it does not yet give a clear account of how language choice takes place (i.e. how the base language is chosen), how the language mode is set, and the impact it has on processing. Some models may have a harder time integrating language mode, in particular the bilingual language mode where both languages are active but one slightly less so than the other. For example, Green's (1998) Inhibitory Control (IC) Model supposes that a word from a chosen language is output by suppressing lemmas with the incorrect language tags. This can account for production in the monolingual mode but it is problematic when the mode is bilingual. In this case, it is often the most active word that is output, irrespective of language. Admittedly, Green does agree that code-switching would involve a cooperative rather than a competitive relationship between the word production schemas but this needs to be spelled out. Green (p.c.) proposes that this might take place either by reducing the strength (gain) of the inhibitory relations directly or by inhibiting the inhibition. In the domain of perception, models that contain inter-language inhibition will have a problem accounting for the perception of code-switches and borrowings in the bilingual language mode. Thus, in the Bilingual Interactive Activation (BIA) model (Dijkstra & Van Heuven, 1998), one language is normally deactivated during the word recognition process by means of top-down inhibition from the other language node and lateral interlanguage word level inhibition. This will produce satisfactory results for word recognition in the monolingual mode but it will be less than optimal when mixed language is being perceived. In this latter case, it would be better if both languages were active with one more active than the other (see the base language effect described in Grosjean, 1988, 1997a). BIA has the possibility of presetting a language node from external sources at the beginning of word recognition but invariably, during the actual recognition process, the built-in cross-language inhibitory mechanisms will cause one language to be inhibited unless, of course, these mechanisms are switched off. (It should be noted that Woutersen (1997) proposes a model of the bilingual lexicon that contains language nodes and where the bilingual can be in differing language modes; it is unclear however how the model would be implemented computationally). To our knowledge, the only bilingual word recognition model that currently simulates language mode is the Bilingual Model of Lexical Access, BIMOLA, first proposed by Grosjean (1988). The computational version (Lewy & Grosjean, in preparation) consists of three levels of nodes which use localist representations (features, phonemes, and words), and it is characterized by various excitatory and inhibitory links within and between levels. Among its particularities we find shared phonetic features for the languages (in this case, English and French), language independent, yet parallel, processing at the higher levels (phonemes and words), as well as the absence of cross-language inhibition processes. It does not resort to the concept of a language node as proposed by the BIA model but relies instead on overall language activation as an emergent phenomenon. Both the base language setting (a discrete value) and the language mode setting (a continuous value) can be set prior to simulation.

Conclusion

This chapter has examined the many facets of language mode, a concept that has received relatively little attention in bilingualism research. This is unfortunate as taking language mode into account offers many advantages. It gives a truer reflection of how bilinguals process their two languages separately or together, it helps to understand data obtained from various bilingual populations, it accounts for problematic or ambiguous findings in the literature, and it can serve as a control variable in studies examining other topics. Language mode will invariably be present in bilingual research be it as an independent variable, a control variable, or unfortunately, a confounding variable. Giving it the importance it deserves will facilitate our work as researchers and will further our understanding of the bilingual person.

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