

## A review on the theories of bilingual development\*

### Uma revisão acerca das teorias de desenvolvimento bilíngue

Rubia Wildner CARDOZO

**Abstract:** *This paper aims to verify whether a theory which describes and explains in an elegant way the phenomenon of bilingualism exists. In order to do it, we present different definitions of bilingualism and its different types. After presenting these concepts, we show the theories which try to explain how the bilingual brain may represent all languages known by bilinguals. We concluded that the Subsystem Theory Hypothesis better explains how languages are stored in the bilingual brain, because this theory explains some cases that the others do not. This paper demonstrates the evolution of the most important theories involved in bilingualism and can be used as a starting point for a further project.*

**Key-words:** *Bilingualism; unitary system theory; dual system theory; tripartite system theory; subsystem theory hypothesis.*

**Resumo:** *Este trabalho tem por objetivo verificar se existe uma teoria que descreve e explica de forma elegante o fenômeno do bilinguismo. Para isso, nós apresentamos diferentes definições de bilinguismo e seus diferentes tipos. Depois de apresentar esses conceitos, mostramos as teorias que tentam explicar como o cérebro dos bilíngues representa todas as línguas conhecidas por eles. Concluímos que a Hipótese da Teoria dos Subsistemas é a teoria que melhor explica como as línguas são armazenadas no cérebro bilíngue, porque esta teoria explica alguns casos que as outras teorias não explicam. Este trabalho demonstra a evolução das mais importantes teorias envolvidas no bilinguismo e pode ser usado como ponto de partida para um projeto futuro.*

**Palavras-chave:** *Bilinguismo; sistema unitário; sistema duplo; sistema tripartido; hipótese da teoria dos subsistemas.*

## 1 Introduction

Globalization and the constant contact among different peoples and cultures demand that people know more than just one language. Nowadays, being under-graduated is not a guarantee for success and good opportunities anymore.

Knowing another language, especially English, since it is the most prestigious used language, is a prerequisite to many professions. If you do not want to wait for a translation of a certain book which is not written in your mother tongue, for instance, you need to master at least more than one language.

Concerning that, today, it is quite common the interest of various people in becoming bilingual (or multilingual) and more often parents think about stimulating their children to learn other languages. Due to these facts, bilingualism (or multilingualism) has been broadly discussed and it has raised a huge interest in researchers all over the world for quite some time now.

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Many people think that learning a second language is very hard and that children can get confused doing it, because in many cases children start learning a foreign (or additional) language before having their first one totally established. Of course, each person is unique and everyone has their own difficulties, but having in mind that a second language may damage people is to ignore the reality.

What is really true is the fact that each person learns in a quite particular way, and people have different degrees of knowledge in different skills. For example, a person can read a text effortlessly whereas in speaking s/he cannot keep a simple conversation. It may happen in the cases of children of immigrants who move to a different country or community when they are very young and they learn to speak and do not learn to read or write their first language.

Another discussion is related to how the brain stores all languages that people know. There is a curiosity in how the brain deals with two or more languages and how bilingual people choose one or another language in their daily life communication.

In order to discuss these ideas, this paper aims to verify whether a theory which describes and explains in an elegant way the phenomenon of bilingualism exists.

To do so this paper is divided as follows: Chapter one introduces the theme of this paper and presents a general view of it. Chapter two will be about bilingualism itself, it will bring several definitions from different authors about this phenomenon and it will also show the distinct types of bilingualism. Chapter three will present the theories of bilingual development and it will show what each one of them says about the phenomenon in question. Chapter four will focus on the Subsystem Theory Hypothesis, which can be applied to bilingualism. Chapter five will demonstrate what we concluded from this study of bibliographical review.

## **2 Bilingualism**

In this paper we will present some definitions of the phenomenon of bilingualism, starting with the narrowest ideas to the broadest ones. The present paper does not aim to establish just one right definition, but certainly we will adopt one or more concepts as the most appropriate to our purpose.

Before presenting some definitions, we would like to bring an idea from Beadsmore (1986, p. 3), who states that “the term bilingualism does not necessarily restrict itself to situations where only two languages are involved but is often used as a shorthand form to embrace cases of multi- or plurilingualism”, that is, people must apply this terminology in order to mention three or four languages, for example, and not only two. Pavlenko (2005, p. 433) also agrees with this idea, using “the terms *bilingualism* and *multilingualism* interchangeably to refer to the use of two or more languages by individual speakers and groups of speakers”.

Discussing bilingualism itself, Bloomfield (1933) brings a quite narrow idea about it:

In the extreme case of foreign-language learning the speaker becomes so proficient as to be indistinguishable from the native speaker round him. This happens occasionally in adult shifts of language and frequently in the childhood shift [...]. In the cases where this perfect foreign-language learning is not accompanied by loss of the native language, it results in *bilingualism*, native-like control of two languages. (Bloomfield, 1933, p. 55-56)

As we can see, in Bloomfield's definition only those people who have "native-control of two languages" are considered bilinguals, what definitely excludes people whose second language is not well developed yet (the beginners learning<sup>1</sup> an additional language, for example) or in those cases in which people shift the language (immigrant's cases), forgetting their mother tongue in order to adopt their second language.

Shifting the first language and adopting the second one also happen to children of immigrants, when they start attending school. The author mentioned above says that "for them, English has become what we may call their *adult* language" (Bloomfield, 1933, p. 55).

Weinreich (1964, p. 83) claims that there are factors which make a dominant language for bilinguals, such as "the usefulness of a language, its role in social advance, and its literacy-cultural values". Furthermore, he says that "the environment may make certain types of speech situation more prevalent than the others" (Weinreich, 1964, p. 83). For that reason in many cases immigrants adopt the new language and forget their mother tongue. Their mother tongue becomes somehow useless, because they move on to another country in which this language is not spoken and they have to communicate in this new language, which is spoken by everyone.

Mackey (1962, p. 22) considers bilingualism "as the alternate use of two or more languages by the same individual". Weinreich (1964, p. 1) has a definition similar to Mackey's, when he says that bilingualism is "the practice of alternately using two languages".

Grosjean (1992, p. 51) calls bilingualism "the regular use of two (or more) languages, and bilinguals are those people who need and use two (or more) languages in their everyday lives".

Hakuta (1992) calls bilinguals people who control two or more languages.

Wei (2000, p. 6) says that "the word 'bilingual' primarily describes someone with the possession of two languages". This author calls the attention to the fact that people present varying degrees of proficiency, and this has to be taken into consideration. He also elucidates something that many people believe in: he claims that not only people who live in multilingual countries can be bilingual or multilingual.

On the other hand, as pointed out by Harding and Riley (2003), in nations where two or more languages have full official recognition (for example, Canada, Belgium and Finland) it

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<sup>1</sup> In this paper we are not going to differentiate the terms "learn" and "acquire" because it is not our purpose. For further information this topic, see KRASHEN, S. The input hypothesis and its rivals. In: ELLIS, Nick C. (Ed.). *Implicit and explicit learning of languages*. San Diego: Academic, 1994.

does not mean that all inhabitants are bilinguals. In Canada, for instance, where English and French are the official languages (in this country there are other languages that are not official but are spoken by individuals, such as Spanish, German, Italian, Hindi, Arab, Chinese, Russian and Hebrew<sup>2</sup>), according to 2006 Census<sup>3</sup>, almost 78% of Canadians are monolinguals (57% of Canadians speak only English and approximately 21% speak only French), and approximately 3% of Canadians are officially bilinguals, that is, people who speak the official languages, English and French. This demonstrates that most Canadian people are monolingual even though Canada is officially a bilingual country. There are, also in this country, people who speak neither English nor French (20% of Canadians); these people speak just the non-official languages (those mentioned above).

Hamers and Blanc (2005, p. 6) claim that “bilingualism refers to the state of a linguistic community in which two languages are in contact with the result that two codes can be used in the same interaction and that a number of individuals are bilinguals”.

Butler and Hakuta (2006) define

bilinguals as individuals or groups of people who obtain communicative skills, with various degrees of proficiency, in oral and/or written forms, in order to interact with speakers of one or more languages in a given society. Accordingly, bilingualism can be defined as psychological and social states of individuals or groups of people that result from interactions via language in which two or more linguistic codes (including dialects) are used for communication. (Butler; Hakuta, 2006, p. 115)

According to Fromkin, Rodman and Hyams (2007, p. 342), “bilingual language acquisition refers to the (more or less) simultaneous acquisition of two languages beginning in infancy (or before the age of three years)”. If a person learns another language after acquiring the first, for them it refers to second language acquisition, and not to bilingualism.

Steiner and Hayes (2009, p. 3) use the definition of bilingualism as “the ability to speak, read, write, *or even understand* more than one language” (italic in the original). We see that they have a very broad concept of this term. By their definition many people would be considered bilingual, even if they do not have all skills and their subdivisions well developed.

As some of these authors mentioned above have already shown and as we see now, the phenomenon of bilingualism does not have a unique definition. Many people have defined it and many people certainly will still try to do it.

We may observe that the authors bring divergent concepts about the same term (bilingualism). Some of them (Mackey, 1962; Weinreich, 1964, Wei, 2000) have a broader

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<sup>2</sup> Office of the Commissioner of Official Languages. A look at bilingualism. Available at: <[http://www.ocolclo.gc.ca/html/statsbil\\_e.php](http://www.ocolclo.gc.ca/html/statsbil_e.php)>. Accessed on: June 14<sup>th</sup>, 2011.

<sup>3</sup> Statistics Canada. Available at: <<http://www12.statcan.ca/census-recensement/2006/dp-pd/hlt/97-555/T401-eng.cfm?Lang=E&T=401&GH=4&SC=1&S=99&O=A>>. Accessed on: June 14<sup>th</sup>, 2011. The results that are shown are from 2006 Census because 2011 Census has been developed and its results are not available yet.

concept of bilingualism; on the other hand, others have a narrower idea of it (Bloomfield, 1933). In this paper we identify with Mackey's (1962), Weinreich's (1964) and Wei's (2000) ideas about the term (since they would consider more people as bilinguals) and we will consider their definitions as the most appropriate to our purpose.

Now that we have already seen several definitions of bilingualism, we are going to present in the next section its different types.

## **2.1 Types of Bilingualism**

As we saw in the previous section, the authors mentioned before have different ideas about bilingualism. Some of them, as Mackey (1962) and Steiner and Hayes (2009), have a broader definition and therefore much more people would be considered bilingual. Taking it into account, however, would it be possible to consider that everybody is equally bilingual?

To answer this question, several authors, such as Hornby (1977), Romaine (1995), Paradis (1997), Harding and Riley (2003) and Edwards (2006), state that bilingualism is a matter of degree. For instance, Hornby (1977, p. 3) states that "bilingualism is not an all-or-none property, but it is an individual characteristic".

Romaine (1995, p. 13) claims that "in principle, there is no necessary connection between ability in one level and another. For example, a bilingual might have a good pronunciation, but weak grammatical knowledge in one of the languages or vice versa".

Paradis (1997, p. 348) also agrees with the idea of degrees of bilingualism, saying that bilinguals "do not form a homogeneous group. They differ from each other in degree of proficiency, manner of acquisition, degree of affective involvement, context of use, and structural distance between the two languages". In another article (1998, p. 38), he states that "no speaker has complete knowledge of two languages", what reinforces the concept of degrees of bilingualism.

Harding and Riley (2003), with the same idea, say that "bilingualism is not a black-and-white, all-or-nothing phenomenon; it is a more-or-less one".

Edwards (2006) draws the attention to the fact that there are four basic language skills (listening, speaking, reading and writing) and we have to take into consideration also their subdivisions (accent in speaking, for instance) to determine bilingual proficiency.

There are, in the literature, several types of bilingualism such as the distinctions between receptive or passive ("a person who understands the language – either spoken or written – but cannot produce it themselves") and productive or active ("those who can do both") and primary and secondary ("a dual competence acquired naturally, through contextual demands, and one where systematic and formal instruction has occurred", respectively) (Edwards, 2006, p. 10-11).

However, in this paper, we will consider just three types of bilingualism (based on what is more common in the literature): according to age, according to competence and according to the context of acquisition<sup>4</sup>, which will be discussed in the following subsections.

### 2.1.1 According to age

According to age, a bilingual person can be considered early or late.

Kornakov (1997) establishes definitions to early and late bilinguals:

On the one hand, the terms “*early*” and “*late*” bilingualism are sometimes used to refer to *natural* or *primary* bilingualism and to the *artificial*, secondary kind, when someone has *learnt* a second language (in contrast to someone who has *acquired* it under natural conditions). But on the other hand, the original dichotomy of “*early*” and “*late*” bilingualism should be seen only as a reflection of the age of the bilingual, i.e., whether the individual becomes bilingual during his or her childhood or as an adult. Late bilingualism may be the result either of L2 acquisition in a natural environment, or the result of second language learning, as with the person who has studied the L2 for years, using graded language-teaching materials, attending courses, etc. (Kornakov, 1997)

Fabbro (2001) establishes that people who learned a second language before the age of six are early bilinguals and who learned a second language after the age of twelve are late bilinguals.

There are many advantages in learning a second language early. According to King and Mackey (2007), young children do not face the same kind of emotional pressures like adults to speak a foreign language, and children are also not worried about sounding silly. This factor hinders the adults’ performance, what makes them not to feel comfortable speaking a second language and be always preoccupied with making mistakes.

Of course, we are not saying that acquiring a second language in very early ages is the only way to learn. King and Mackey (2007) say that it is never too late or too early to learn another language. It is important to acquire another one, no matter how old the person is.

Grosjean (1982) claims that children can become bilingual in any age. Harding and Riley (2003) also agree with this statement.

De Houwer (1996) considers the period of one month to differentiate Bilingual First Language Acquisition (BFLA), which refers to the acquisition of two or more languages from birth or at most a month after birth, and Bilingual Second Language Acquisition (BSLA), which refers to those cases of bilingual acquisition that are not cases of BFLA.

As we have seen, there are advantages and disadvantages in both forms of acquiring a second language. As Edwards (2006, p. 12) himself claims, “if one could combine the maturity

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<sup>4</sup> Most books which we consulted have considered these types of bilingualism, for that reason we will present them in this paper.

and articulated necessity of the older with the impressionability, imitativeness, spontaneity and unselfconsciousness of the younger, we would surely have a recipe for rapid and proficient bilingual acquisition”.

### **2.1.2 According to competence**

As we saw above, bilingualism is a matter of degree, and people cannot be considered equally bilinguals because they have different levels of proficiency in all skills and their subdivisions.

Grosjean (1982) brings the idea of degrees, when he says:

Contrary to general belief, bilinguals are rarely equally fluent in their languages; some speak one language better than another, others use one of their languages in specific situations, and others still can only read or write one of the languages they speak. And yet, what characterizes all of them is that they interact with the world around them in two or more languages. (Grosjean, 1982, p. vii)

Costa (2005, p. 308) also claims that “individuals acquiring a second language (L2) usually report being better able to understand than speak their L2”. With a similar idea, Steiner (2009, p. 3) says that “most bilinguals are more comfortable using one language than the other”. These statements clearly show us that people are not equally bilingual in all skills.

As many authors did, we will consider two types of bilingualism according to competence: balanced or unbalanced.

Beardsmore (1986, p. 9) establishes that equilingualism, also called balanced bilingualism, occurs when a speaker’s mastery of two languages is approximately equivalent and “where this ability may match that of monoglot speakers of the respective languages if looked at in broad terms of reference”.

Baker (1988) claims that:

Balanced bilinguals may be said to have approximately equal skills in both languages. This does not imply that their language skills are at a high level or that they are very able bilingual. Rather, it implies that in terms of the reception and production of oral and literacy language skills, a person has almost equal competence. (Baker, 1988, p. 3)

Baker’s statement elucidates the fact that balanced bilinguals do not have to have their skills at a high level. A person can speak just a little bit of English and understand this same bit that s/he will be considered balanced bilingual. What really matters here is the equality among skills and not the level of proficiency.

Romaine (1995, p. 19) says that “the notion of balanced bilingualism is an ideal one, which is largely an artifact of a theoretical perspective which takes the monolingual as its point reference”.

Rosenberg (1996) states “the term *balanced bilingualism* is used to describe individuals who possess about the same fluency in two languages”.

De Groot and Kroll (1997, p. 1) claim that

the statement that bilingualism, rather than monolingualism, is more the norm is particularly persuasive if one adopts a definition of bilingualism that covers not only balanced bilinguals, of which there may be relatively few, but also unbalanced forms, where one of the languages dominates the other.

Grosjean (1982) states that most of bilingual people use their languages for different purposes and in different situations. He also states that balanced bilinguals, those who are equally fluent in both languages, are probably the exception and not the norm. The environment in which bilingual people are inserted is what demands the levels of development of the four basic skills in each language (speaking, listening, reading and writing). It is quite difficult that an identical level is needed for each skill, hence people differ in this aspect.

### **2.1.3 According to the context of acquisition**

We will consider in this paper two types of bilingualism according to the context of acquisition: simultaneous and successive (also called sequential).

McLaughlin (1978) considers two types of bilingualism according to acquisition: simultaneous and successive. He claims that the child who hears two languages from birth, one from the mother and another from the father, for example, is a bilingual child and this acquisition is simultaneous.

To define successive acquisition, he argues that “a different situation occurs when one language is established first and a second is learnt subsequently. Here the first language-second language distinction is valid, and learning can be said to be *successive*” (McLaughlin, 1978, p. 10). He also points out that it has to be decided when the language is established. Then he sets “the cutoff point at three years” (McLaughlin, 1978, p. 10). To conclude this idea, he continues his explanation: “The child who is introduced to a second language before three years of age is said to be *simultaneously* acquiring two languages. The child who is introduced to a second language after three is said to be successively acquiring two languages” (McLaughlin, 1978, p. 10).

Grosjean (1982) uses McLaughlin’s (1978) criterion to differentiate simultaneous and successive bilinguals (the age of three years old).

Rosenberg (1996) states that simultaneous bilingualism tends to be affected by four key factors:

- The parents' ability in one or more languages. Some parents speak only one language, the language of the home, and are unable to speak the language of the school and possibly of the community.
- The parents' actual use of language with the child. The parents may have language ability in two or more languages but have made a decision about which language they speak with the child.
- The language or languages other family members speak with the child, such as the language spoken between siblings or between children and grandparents.
- The last factor is the language the child uses in the community. (Rosenberg, 1996)

She has a definition of successive bilingualism similar to the one mentioned above (McLaughlin's definition, 1978), claiming that "this happens when a child has one established language before learning a second language, whether in preschool or later (the age of three usually separates simultaneous and sequential language learning)".

Kornakov (1997) defines these two types of bilingualism claiming that

the first, simultaneous, describes exposure to more than one variety from the onset of speech or, at least, from a very young age (some commentators have suggested age three or four as a rather arbitrary cut-off) as opposed to the second, successive, – at a later age. Age margins are unclear in both cases because of the continuous process of cerebral formation which cannot be established once and for all for all children. (Kornakov, 1997)

Weitzman [n.d.] says that "simultaneous acquisition occurs when a child is raised bilingually from birth, or when the second language is introduced during the earliest stages of emerging language" and "sequential acquisition occurs when a second language is introduced after the first language is well-established".

Hoff (2005) also defines simultaneous and successive bilinguals. She argues that those children who hear two languages from birth and acquire them are so called simultaneous bilinguals. On the other hand, those who hear only one language from birth and later are exposed to another one are called sequential (or successive) bilinguals.

Hamers and Blanc (2005, p. 28-29) make a distinction between childhood bilinguality, adolescent bilinguality and adult bilinguality<sup>5</sup>. These authors still distinguish childhood bilinguality into two subdivisions: simultaneous early or infant bilinguality ("when the child develops two mother tongues from the onset of language") and consecutive childhood bilinguality ("when the child acquires a second language early in childhood but after the basic linguistic acquisition of his mother tongue has been achieved").

According to Edwards (2006),

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<sup>5</sup> We are not going to discuss these terms in this paper.

second language acquisition has been dichotomized as simultaneous or successive. The first describes exposure to more than one variety from the onset of speech or, at least, from a very young age [...] while the second refers to the addition, at a later age, of a new variety to an existing maternal one. (Edwards, 2006, p. 11-12)

For Meisel (2006), simultaneous bilingual is the person who acquires two or more languages from birth; therefore he argues that this kind of acquisition should be qualified as first language development in each one of the languages acquired. On the other hand, successive bilingual is the person who acquires a second language between the ages of five and ten.

Neubauer (2006) states that:

Successive bilingualism, also known as consecutive bilingualism, includes anyone that started to acquire a second language after knowing another language already. Usually adults count to the group of successive bilinguals when they learned a second language later on in life, for example, at school or through spending some time abroad. In contrast to successive bilinguals, simultaneous bilinguals have a different linguistic background. Simultaneous bilinguals include people that learn two languages from the beginning. To the group of simultaneous people belong all those who grew up with two mother tongues. Usually, this means children who grow up acquiring two languages prior to the age of three. (Neubauer, 2006, p. 10)

Steiner and Hayes (2009, p. 40) say that a child can become bilingual in two ways: when s/he is exposed simultaneously to two languages during her/his first three years it is called simultaneous bilingualism. When s/he learns one of the two languages first, and later, learns the other, this is called sequential bilingualism.

Even though most of the authors presented before have a very similar classification, in this topic there is disagreement among them. For instance, on the one hand, McLaughlin (1978) differentiates simultaneous and successive bilinguals setting the cutoff point at three years. On the other hand, De Houwer (1995) considers the period of one month to set this differentiation.

As we have seen throughout this section, the types of bilingualism are very close and sometimes indicate the same thing. As Hoff (2005, p. 339) herself states, “early bilingualism, bilingual first language acquisition, and simultaneous bilingualism are all terms used to refer to the situation in which a child is exposed to, and thus acquires, two languages from the very beginning of language development”.

To close this section, we would like to make clear that there are many reasons for a person to become bilingual, such as wishing a better job, travelling and/or communicating. As it is pointed out by Grosjean (1982):

[...] bilingualism in childhood usually occurs because of the need to communicate with those who play an important role in the child’s life – parents, siblings, other family members, peers, and teachers. As long these factors are important to the child, he or she

will remain bilingual; when they lose their importance or are removed altogether, the child will just as naturally revert to monolingualism. (Grosjean, 1982, p. 179)

Furthermore, Grosjean (1982) continues saying that the type of acquisition, if simultaneously or successively, is not related to the degree of bilingualism. There are psychological factors, such as the language used by the family or in the school, that will determine what extent, and for how long a child will be bilingual. The age of acquisition does not play an important role in this case.

Further, he explains why a bilingual child shows dominance in one of the two languages that s/he knows, establishing two reasons for it: the first, certain linguistic constructs are more difficult to internalize and produce in one of the languages learned by the child. The second, one of the two languages may be more needed by the child and s/he may be exposed to it more frequently.

Now that we have already presented some definitions of bilingualism and its main types, the next chapter is going to be about the main theories that try to explain how languages are represented in the bilingual brain.

### **3 Theories of Bilingual Development**

As mentioned in Chapter two, due to the fact that many people are interested in becoming bilinguals and more often parents think about stimulating their children to learn other languages, bilingualism has been broadly discussed all over the world. As a result several studies in this area have been carried out.

Then, bilingualism has raised another topic and more studies related to it were needed. Thus many researchers from several countries started to study how the brain deals with two or more languages and how bilingual people choose one language or the other in their daily life communication.

The studies came up with four different theories: the Unitary System, the Dual System, the Tripartite System and the Subsystem Theory Hypothesis.

In this chapter we will present the theories mentioned above, showing the arguments against and in favor of each one of them. After that, we are going to defend one of them, the one which we consider the most appropriate to the purpose of this paper.

#### **3.1 The Unitary System Theory**

The Unitary System is the first theory which tries to explain how the bilingual brain stores all languages known by bilingual people. This theory claims that all languages known by bilinguals are stored in a common location.

The main scholars who defend this theory are Volterra and Taeschner (1978). These authors say that there are three stages in the process of a child becoming bilingual: the first one is the stage in which the child has one lexical system which includes words from both languages. They say that in this stage the language development of bilingual children seems to be like the development of monolingual ones. It is an explanation for the switching of words done by children. At the second stage, the child distinguishes two different lexicons (in this stage the child can be said to possess two lexical systems), but s/he applies the same syntactic rules to both (the child has just one syntactic system). At the third stage, the authors say that the bilingual process of learning is practically complete. In this stage the child has two linguistic codes (two lexical systems and two syntactic systems), but each language is associated with the person using that language. For example, if the mother of a child speaks German and the father speaks English, the child will associate German with her/his mother and English with her/his father.

So, these authors claim that initially the bilingual child's brain stores all linguistic information in the same single place.

What supports this idea is the interference of aspects from one language to another. The authors say that interference happens in the lexical level in the first stage and that there is interference in the syntactic level in the third stage.

Another point that supports this claim is the fact that indeed bilingual people code-switch<sup>6</sup> languages.

Weitzman [n.d.] agrees with Volterra and Taeschner's statement, also defending that there are three phases in the simultaneous acquisition of languages (phase 1: "A child has one, undifferentiated language system. This results in one lexicon containing words from both languages"; phase 2: "A child begins to differentiate lexical systems, but often shows considerable grammatical mixing"; and phase 3: "The two languages are differentiated in vocabulary and syntax. A child may associate the two languages rigidly with people or contexts (depending largely on whether or not parents adopted the popular, 'one person – one language' or 'one location – one language' approach to teaching their child a second language)").

Nevertheless, Lindholm and Padilla (1978) disagree with the statement above when they say that the children are able, from very early age, to differentiate their two linguistic systems. They claim that children do mix, but when they do not know the corresponding word in the other language and it also occurs because one word may be more salient than the other.

Genesee (1989) also does not agree with Volterra and Taeschner's claim and states that:

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<sup>6</sup> In this paper we are not going to differentiate the terms "code-switching" and "language mixing", having in mind that this is not our purpose. To check these terms out, see LANZA, Elizabeth. Can bilingual two-year-olds code-switch? *Journal of Child Language*, v. 19, p. 633-658, 1992.

Evidence of declining rates of overall mixing does not constitute sufficient proof that the child has only one language system. Mixing may decline with development, not because separation of the languages is taking place but rather because the children are acquiring more complete linguistic repertoires and, therefore, do not need to borrow from or overextend between languages. (Genesee, 1989, 166)

According to this author, mixing is not an evidence to support that children have just one language system. For him, there are some cases in which mixing might occur, for example, when children lack an appropriate lexical item in one language but know it in the other. It might also occur when in the moment of usage the language system is not complete and does not include the grammatical device needed to express certain meanings. Children can use whatever grammatical devices they have in their repertoire. Bilingual children may also mix because the input conditions allow it or because of the verbal interaction (in those cases that children receive mixed input by their parents, for instance).

As pointed out by Lanza (1992), mixing cannot be invoked as evidence for the young bilingual child's lack of language differentiation once it happens to bilingual adults. She says that "language mixing per se is not a valid measure for determining a lack of bilingual awareness". Further, she explains that "children do learn to differentiate their languages; however, this differentiation process occurs in language socialization through which they learn to differentiate ways of speaking according to the social demands of the situation".

Also disagreeing with Volterra and Taeschner's point of view, Genesee, Nicoladis and Paradis (1995) say that the children mix languages because of the children's preferences for a language or word. "Another possible explanation", they say, "is related to the children's language dominance, or their relative proficiency in each language". Children tend to mix elements from their dominant language more when using their non-dominant language than when using their dominant language.

Another point that goes against this theory is the cases of aphasia<sup>7</sup> in bilinguals, in which just one of the languages is affected by impairment.

As an example, Aglioti et al. (1996) report that a patient (E.M.) suffered from a mild right sensorimotor hemisyndrome. The consequences were a slowing down of movements and she was no longer able to express herself in her mother tongue – Venetan (Veronese dialect).

Venetan was E.M.'s mother tongue and the language she had been using all her life; nonetheless, she presented with a very strong tendency to use standard Italian even when her relatives and the medical staff addressed her in Venetan. During the first 3 months

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<sup>7</sup> We are not going to present neither the different types of aphasia nor the different types of recovery, since this is not our purpose and this paper would lengthen too much. To check these terms out, see PARADIS, Michel. *A neurolinguistic theory of bilingualism*. Amsterdam: John Benjamins, 2004; PARADIS, Michel. Bilingual and polyglot aphasia. In: BOLLER, François. *Handbook of neuropsychology: language and aphasia*. 2<sup>nd</sup> edition. Amsterdam: Elsevier, v. 3, 2001; and PARADIS, Michel. Bilingualism and aphasia. In: WHITAKER, H.; WHITAKER, H. A. (Eds.). *Studies in neurolinguistics*. New York: Academic Press, v. 3, 1977. p. 65-121.

following the brain insult, the patient's mother tongue was so severely impaired that she could hardly interact linguistically with her family and friends. Eleven months after the stroke the patient spontaneously applied to the speech therapy service at the Ospedale Policlinico in Verona, asking to be re-educated in the comprehension and production of her mother tongue. Both E.M. and her relatives found the nature of the linguistic deficit extremely odd and they had not realized that E.M. had such a high proficiency in speaking standard Italian. (Aglioti et al., 1996, p. 1553)

As we can see, only E.M.'s mother tongue was impaired by the lesion which she suffered; her Italian language remained intact. Cases such as this just reported do not corroborate with the Unitary System because if all languages known by bilingual people are represented in a common location in their brain, how after a lesion does one of these languages remain intact whereas the other is totally impaired? E.M. has lost the capacity to speak her mother tongue, whereas Italian, a language that she was not so familiar with, became her new way of communication. Having in mind that all linguistic information is in the same place, this seems to be quite difficult for a plausible defense of the Unitary System Theory.

Such case rules out the Unitary Theory, because if a person hits her/his head or suffers a lesion in her/his brain and all languages are located in a common place, all languages have to be equally damaged and not just one of them. Therefore it becomes quite difficult to accept the Unitary System Theory.

Having in mind the failure of this theory in trying to explain how the bilingual brain deals with linguistic information, other theories were created to try to do and will be reviewed in the next section.

### **3.2 The Dual System Theory**

As we have demonstrated in the previous subsection, the Unitary System had no success in explaining how the bilingual brain is organized in terms of linguistic information. For that reason another theory was proposed to try to do it. This theory is known as the Dual System Theory.

The Dual System Theory is defended by some authors, among them Genesee (1989), Meisel (1989) and Heredia (1996). This theory states that the bilingual brain has two different systems, one for each language.

Genesee (1989) claims that bilingual children are able to distinguish their language systems from the very beginning and they are able to use them differently in contextually sensitive ways.

Meisel (1989, p. 37), in his turn, says that "bilinguals are capable of differentiating grammatical systems" and "mixing may occur until code-switching is firmly established as a strategy of bilingual pragmatic competence".

Heredia (1996) establishes that the “view of bilingual memory emphasizes differential storage and processing”. Besides, he claims that “bilingual memory is conceived as represented in separate but interconnected lexicons”.

The author mentioned above states that the bilingual’s first (L1) and second (L2) language lexicons are linked to a general concept and to each other. L2 lexicon is strongly linked to the L1 lexicon and L1 is linked to L2 weakly, and these links reflect the manner in which the L2 was learned. “For instance, in learning their second language, L2 learners usually associate the new word to their L1” (Heredia, 1996). He claims that the meaning of the L2 item becomes subordinated to the meaning of the L1 language.

What supports this theory is the fact that the languages known by bilingual people indeed can present grammatical differences, and the hypothesis that there are separate systems to each language in the brain is totally acceptable.

This theory also explains the case mentioned in the subsection 3.1 (Aglioti et al., 1996), in which the patient (E.M.) suffered from a mild right sensorimotor hemisyndrome and then lost the capacity to express herself in her mother tongue – Venetan (Veronese dialect); however, after the lesion she could still speak Italian. Since bilinguals have as many systems in their brain as many languages they know, they can have just one language affected or lost, as it was seen in E.M.’s case.

On the other hand, this theory fails because it does not explain the fact that bilingual people mix languages in the same sentence, and we know that bilinguals really do it. So, if it is claimed by the Dual System Theory that the bilingual brain stores all languages in separate systems, how would bilingual people mix languages? Therefore this theory fails as well, since it does not present any argument to explain this fact.

So in the following subsection we will present another theory that tries to explain bilingualism.

### **3.3 The Tripartite System Theory**

Since the previous two theories have failed in explaining how the bilingual brain deals with languages, a third theory proposed by Ojemann and Whitaker (1978) came out to try to solve this problem.

The Tripartite System Theory claims that in the bilingual brain there are as many systems as many languages bilingual people know. In these separate systems the brain stores all linguistic information that is not common to both languages. What is common to them is stored just once in one common system.

In a study done by Lucas, McKhann and Ojemann (2004), in which they compared electrical stimulation language mapping in 25 bilingual patients and 117 monolingual control

patients, the authors say that they “found distinct language-specific sites as well as shared sites that support both languages”.

Apparently this theory would finally solve the problem. It would explain the loss of just one of the languages known by bilinguals, such as the case reported by Aglioti et al. (1996); it would also explain the mixing done by bilingual people, because there is a link between the systems; and it would accept the specific information that each language presents, since there is a place in which the brain stores specific linguistic information, information that is not common to both languages.

However, the Tripartite System Theory also fails when we hear about studies which present cases of aphasic bilinguals. As pointed out by Tomioka (2002), this theory “cannot explain why an item in a language cannot be accessed while its cognate in another language can be accessed in bilingual aphasia”.

If there is really a common place to common linguistic information, this case could not exist, because people are not able to access this kind of information in both languages. By this theory, this person would have just two alternatives: either s/he accesses both languages or s/he does not access any of them at all.

Paradis (2009) says that if the features both languages have in common are represented just once, this theory would not explain non-parallel recovery patterns<sup>8-9</sup>.

As we saw, again a theory presents failures and it does not explain the question how the bilingual brain organizes all languages.

For that reason, another theory was created, having in mind the failures of the previous ones. This theory, the Subsystem Theory Hypothesis, is going to be presented in the following subsection.

### **3.4 The Subsystem Theory Hypothesis**

As we saw throughout subsection 3.3, the theories mentioned before have failed in trying to explain the bilingual brain organization, and we have presented the arguments which go against them.

The Subsystem Theory Hypothesis states that in the bilingual brain there is a larger system which contains each language in smaller subsystems.

The main scholar who defends this theory is Paradis (1997), who claims that

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<sup>8</sup> “[...] non-parallel recovery is reported among early and late bilinguals, irrespective of structural distance. The second language is reported to be recovered selectively [...], or recovered long before the first [...], or better recovered.” (PARADIS, Michel. *Bilingual and polyglot aphasia*. In: BOLLER, François; GRAFMAN, Jordan. *Handbook of neuropsychology: language and aphasia*. 2<sup>nd</sup> edition. Amsterdam: Elsevier, v. 3, 2001)

<sup>9</sup> Grosjean (1994) mentions non-parallel recovery in his article, saying that it refers to “when the languages are not all recovered together at the same rate”.

[...] the subset hypothesis states that a bilingual's two languages are subserved by two systems of the larger system known as implicit linguistic competence (as distinct from other cognitive systems). As subsystems of language, each (specific) language subsystem has a nature more similar to the other language subsystem(s) than to any other cognitive system but can, nevertheless, be independently activated or inhibited. (Paradis, 1997, p. 341-342)

Paradis (2001) says that “language is an independent neurofunctional system, a neurofunctional module, receiving inputs from the cognitive systems and providing outputs to the articulatory or digitomanual kinetic systems. Each language is a subset of the larger language neurofunctional system”.

As we can see, this theory states that there are, in fact, as many systems for languages as many languages bilingual people know. However, differently from the previous theories mentioned in the subsections above, the Subsystem Theory Hypothesis (as the name suggests) brings the idea that there is a smaller system (also called subsystem or subset) for each language, inserted inside another system: the language system. This larger system has the subsets inside itself, and these subsets are independent from each other, having relation just to the larger system in which they are inserted.

This theory explains what the previous ones (Unitary System, Dual System and Tripartite System) do not: the Subsystem Theory Hypothesis explains the case mentioned by Aglioti et al. (1996). Since this theory defends that to all languages there is a subsystem inside a larger one, it is totally acceptable the fact that this person loses just one of her languages and keeps the other one, because they are stored in different subsets. It also explains the mixing done by bilinguals, because all languages are inside a larger system and more than one subsystem can be activated at the same time.

#### **4 On the Subsystem Theory Hypothesis**

In the previous chapter we have presented the theories which try to explain the bilingual brain organization and how they do it. We have also demonstrated the supporting ideas of each one of them. However, three of the theories (Unitary System, Dual System and Tripartite System) have failed in explaining how the bilingual brain deals with languages and we showed the arguments which go against them.

The last theory presented in the previous chapter (the Subsystem Theory Hypothesis) is the one which has fewer arguments against it. Therefore this theory is nowadays the most accepted theory among authors.

Paradis (1997) claims that the Subsystem Theory Hypothesis (also called Subset Hypothesis) establishes that there is in the bilingual brain a larger system which controls smaller

subsystems, one for each language. For instance, a person who speaks Portuguese and English has two subsystems, one for Portuguese and other for English. These smaller subsystems can be activated or inhibited independently. Paradis (2001) states that “each language system of a bilingual speaker is a complex subsystem comprising several modules” and “each subsystem contains its own phonology, morphosyntax, semantics and lexicon” (Paradis, 2007, p. 4).

The languages known by bilinguals do not form a common system at any level or at any time in development. As an example, Paradis (2007) says that even when a person speaks L2 with a strong foreign accent, “the phonemes of L2 are not the phonemes of L1” (Paradis, 2007, p. 8). This condition would more adequately explain the cases in which a patient loses the capacity to speak one of the languages, but still maintaining the other language completely functional (for instance, the case reported by Aglioti et al. (1996)). The Subsystem Hypothesis provides an explanation that is consistent and strong for it is the system of language that is preserved and not the language itself.

Another example pointed out by Paradis (2007) is about cross-linguistic cognates (at the level of lexicon). These words are represented in each system, and the author presents three reasons for it: the first reason refers to cases of bilingual aphasia patients, for whom a word is available in one language but its cognate is not in the other language (this example was mentioned before by Tomioka, 2002); the second reason is that lexical meaning and pronunciations are hardly ever identical; and the third reason is that lexical items and their cognate translation equivalents have different intralingual connections and often possess different syntactic characteristics. To elicit this idea, Paradis (2007) brings as an example the verb “telephone”. In English, it requires a direct object, whereas in French, an indirect object. Another example mentioned by him is the word “information”, which is a mass noun in English, but a count noun in French.

Differently from the Tripartite System, when it states that all linguistic information that is common to both languages is stored once in a third system, the Subsystem Theory Hypothesis claims that no matter how many features of L1 are found in L2, this information is stored twice, redundantly represented in the L1 and in the L2 subsystems, that is, no subsystem may ever share a single item with another subsystem (Paradis, 2007).

This author (1998) says that

the Subset Hypothesis, according to which each language constitutes a subsystem of the larger cognitive system known as language, in the same way that various registers constitute subsystems of the overall language competence of an individual, or even that phonology and syntax, for example, constitute separated modules within the language system. Each subsystem can be selectively impaired by pathology; however, each subsystem is nevertheless part of the overall language system, as distinguished from other higher cognitive systems. (Paradis, 1998, p. 47)

Paradis (2004) states that language itself is part of a larger system, the verbal communication system, and that this verbal communication system is made up of at least four systems involved (implicit linguistic competence, explicit metalinguistic knowledge, pragmatic abilities and affect/motivation<sup>10</sup>) (Paradis, 2007).

This author sees the languages as a neurofunctional system divided into neurofunctional modules, which respectively subserve phonology, morphosyntax and semantics; “each module is subdivided into as many subsystems as there are languages spoken by the individual” (Paradis, 2004, p. 119). “In bilingual speakers, each such modular language system contains two or more subsystems, one for each language. For example, the morphosyntax module contains as many subsystems as the person speaks languages” (Paradis, 2004, p. 130).

As mentioned before, the subsystems can be activated or inhibited independently, and the speaker has no conscious control of it. Paradis (2004) claims that sometimes one subsystem is activated in a context, but “a word from the other subsystem may nevertheless be chosen when it uniquely corresponds to the concept the speaker wishes to verbalize. The fact that the subsystems constitute one language system allows this to happen” (Paradis, 2004, p. 213). In this case, mix occurs due to the fact that just one of the subsystems offers the word which is related to a certain concept, even though this subsystem is not the one which has been selected at the moment of the speech.

Paradis (2009) states that there is indeed a larger system, “the neurofunctional language system”, of which each language is a subsystem. He explains that this larger system is not a third one, but it is made up of as many subsystems as there are languages spoken by the individual. Further, he claims that this larger system is the sum of its subsystems.

We may observe that the Subsystem Theory Hypothesis has an explanation to those cases that are not explained by the three theories presented before, therefore, this theory is nowadays the most accepted among authors.

As we demonstrated in Chapter three, the Unitary System Theory was supported by the fact that one language may interfere into another, since all linguistic information is represented in a common place. However, it does not explain the case reported by Aglioti et al. (1996), in which E.M. has lost her mother tongue and kept speaking the Italian language. Nevertheless, the Subsystem Theory Hypothesis has an explanation to such case. If each language is represented in a different subsystem inside a larger one, the system of language, it is totally acceptable the fact that E.M. loses just one of her languages, because they are stored in different places in the brain. So she may lose Venetan and keep speaking Italian, since they are stored separately.

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<sup>10</sup> We are not going to discuss these topics in this paper. For further information this topic, see PARADIS, M. The neurofunctional components of the bilingual cognitive system. In: KECSKÉS, István; ALBERTAZZI, Liliana (Eds.). *Cognitive aspects of bilingualism*. The Netherlands: Springer, 2007.

The Dual System Theory was also presented, and it has as supporting ideas the fact that languages present grammatical differences, what corroborates with the idea of totally separate systems, one to each language. This theory also explains the case reported by Aglioti et al. (1996), because being languages stored separately, it is acceptable the fact that one of them can be impaired whereas the other remains intact. However, the Dual System fails just because it claims that all languages are stored separately, what blocks mixing, and we know that bilinguals do it. The Subsystem Theory Hypothesis explains it, because all languages, as subsystems, are inside a larger system, which is a sum of them (Paradis, 2009). The subsystems can be activated or inhibited independently; for that reason individuals may mix both languages in the same sentence.

We also presented the Tripartite System as the third theory which tries to explain the bilingual brain organization. Apparently this theory solves the problem, because it explains E.M.'s case reported by Aglioti et al. (1996), since each language is stored separately and just linguistic information which is common to both languages is stored once, in the same place. This theory also has a solution to the mixing done by bilinguals, because there is a link between the two (or more) systems. This theory accepts the grammatical differences between languages, representing specific linguistic information in different places, where there is no link to the other language. Nevertheless, as pointed out by Tomioka (2002) and Paradis (2007), the Tripartite System cannot be accepted by the fact that it does not explain cases of bilingual aphasia, in which a word is available, but its cognate in another language cannot be accessed. The Subsystem Theory Hypothesis explains the fact that a bilingual can lose, after a stroke, linguistic information that is common to both languages just from one of them, since it is stored twice, redundantly represented in the L1 and in the L2 subsystems, and not just once.

As we see now, all these three theories do not have explanation to the cases mentioned before. Concerning that we cannot defend them as the most appropriate theories.

Paradis (2004) himself says that “the Subsystems Hypothesis is a *neurofunctional* proposal, compatible with all the various known recovery patterns of bilingual aphasic patients” (2004, p. 210).

As we can observe, all failures presented by the previous theories are explained by the Subsystem Theory Hypothesis, what makes this theory more reliable and widely accepted by scholars all over the world.

## **5 Conclusion**

As we have shown throughout this paper, bilingualism is a topic which raises much discussion and which is seen differently by different authors.

We have presented many definitions about bilingualism, and we clearly have noted that some of them diverge from one to another; some of them contradict the others and the first definitions are narrower than the last ones.

We have divided this paper into five chapters. Chapter one has dealt with an overview about the paper itself. Chapter two has presented many definitions about bilingualism, and we have seen that there is no agreement in this topic. This chapter was subdivided into three parts, in which we have discussed the three main types of bilingualism: according to age (early or late bilingualism), according to competence (balanced or unbalanced bilingualism), and according to the context of acquisition (simultaneous or successive (also called sequential) bilingualism).

In Chapter three we have brought four theories that try to explain how all languages are stored in the bilingual brain. Then we presented the Unitary System Theory (which supports the idea that all linguistic information is stored in a common place), the Dual System Theory (which, in opposition to the Unitary System, says that there are separate systems, one to each language), the Tripartite System Theory (which claims that different linguistic information is stored in different places, and what is common to both languages is stored once, instead of twice), and the Subsystem Theory Hypothesis (which, having last arguments against it, is the most accepted theory. It states that each language constitutes a subsystem which is part of a larger system called language). Chapter four has focused its attention to presenting the Subsystem Theory Hypothesis and bringing a brief historic of this theory, showing aspects in favor and against it.

Thus, we have come to the conclusion that the Subsystem Theory Hypothesis is the theory which better explains how the bilingual brain stores all languages, because it explains the cases of aphasia in which, for instance, people cannot speak their mother tongue, but can their additional language. Hence this theory can be considered the most plausible among authors.

We would like to make it clear that the purpose of this paper is not to explain bilingualism and the theories of bilingual development, but just to make a bibliographical revision of them and show how different they are. Obviously we have to choose one of them as the most appropriate to our purpose; however, it does not imply that the other definitions are inappropriate. We just had to present the definitions to introduce and to give readers some support to what was going to be presented in the following sections.

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E-mail:

[rubia.cardozo@acad.pucrs.br](mailto:rubia.cardozo@acad.pucrs.br)