THE BILINGUAL BRAIN AND THE SECOND LANGUAGE LEARNING

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ABSTRACT

The Bilingualism function in humans' communication involves the brain work to produce languages. Bilingual people have their abilities to communicate into more than one language. There are two types of bilingualism, diglossia and code-mixing. Most of us consider bilingualism as something good, an advantage. For one thing, knowledge of another language enables people to communicate with members of other cultures in their own language. Forbidding the public use of a language and forbidding the formal teaching of a language is what governments can do in order to weaken the coherence of a cultural group so as to force integration. There are essentially two conditions according to which a person may become bilingual. Firstly, the two languages can be acquired sequentially. Secondly, the two languages can be acquired simultaneously. Points at stake related to language acquisition and learning, to mention some, are: where language is located in the brain and how it is encoded and decoded. Such demanding problems are among the interests of Neurolinguistics. Studies involving sophisticated brain imaging technologies called functional magnetic resonance imaging, fMRI, have revealed some intriguing patterns in the way brains process first and second languages. Studies and researches had better turn to neurological areas if they are ever to understand the nature of language acquisition and language processing. It is acknowledged that such issues can be useful not only to physicians and psychologists, but also to teachers in general.

Keywords*: Bilingualism, Brain, Neurolinguistics.*

INTRODUCTION

The cognitive study of bilingualism has recently become a major focus of interdisciplinary research an interdisciplinary research program that bridges linguistic theory, psycholinguistics, and experimental neuroscience. Two factors are driving this development, one scientific and one technological. The first is the discovery that the fundamental differences between first language acquisition and subsequent language acquisition may reside in processing abilities rather than in grammatical (morphosyntactic, lexical) knowledge *per se*. The second is the increasing availability of neuroimaging and neurophysiological techniques for the investigation of the normal brain, which make possible unprecedented insight into language processing. For educators there also has been a longstanding interest in research on language and the brain. By understanding how the brain learns

naturally, language teachers may be better able to enhance their effectiveness in the classroom.

It has long been known that different regions of the brain have specialized functions. For example, the frontal lobes are involved in abstract reasoning and planning, while the posterior lobes are involved in vision. Until recently, it was believed that these specialized regions developed from a genetic blueprint that determined the structure and function of specific areas of the brain. That is, particular areas of the brain were designed for processing certain kinds of information from birth.

The findings may have implications for language educators: for one thing, that teaching and teachers can make a difference in brain development, and that they should not give up on older language learners. Rather they should keep up with bilingual researches to take advantage of the greatest possible extent of the available findings for the greatest possible extent of their teaching. This paper is intended to identify:

1. the notion of bilingualism
2. second language learning
3. how bilingual brain works

DISCUSSION

There are some aspects that are related each other on language learning and bilingualism. Those are the notion of bilingualism, second language learning, the structure of general brain and its function, and the work of bilingual brain.

1. The Notion of Bilingualism

Varieties of Bilingualism

To begin with, it would be useful to consider just what the term 'bilingual' and 'multilingual' are. Bilingual is a person who knows and uses two languages. In everyday use the word bilingual usually means a person who speaks, reads, or understands two languages equally well (a balanced bilingual), but a bilingual person usually has a better knowledge of one language than of the other. For example, he/she may be able to read and write in only one language, use each language in different types of situation (e.g. one language at home and the other at work), and use each language for different communicative purposes (e.g. one language for talking about school life and the other for talking about personal feelings). Meanwhile, multilingual is a person who knows and uses three or more languages. Usually, a multilingual does not know all the languages equally well. For example, he/she may speak and understand one language best, be able to write in only one, use each language in different types of situation or domains (e.g. one language at home, one at work, and one for shopping), and use each language for different communicative purposes (e.g. one language for talking about science, one for religious purposes, and one for talking about personal feelings).

Actually, most of people would think of bilingual as a person, who is able to speak and understand two languages, such as English-Indonesian, France-English, etc. There are common cases that there is a person who can read the second language fluently, but he/she cannot speak it. Then, there is also person who can speak a second language but he/she cannot write it exactly. Based on that phenomenon, we can conclude that language is very complex and it consists of modalities such as, sound (speech), sight (writing), and visual motion (signs). Because language in all its complexity can be acquired through variety of modalities, an adequate concept of a bilingual should allow for any of these realizations. Thus, a person can be said a bilingual if he/she knows:

1) Two languages in the same modality, for example, two speech-based languages such as spoken French and spoken English, or two sign-based languages such as American Sign Language and Japanese Sign Language.
2) Two languages based on different modalities, for example, spoken German and American Sign Language, or spoken French and written Sanskrit.

There are two different types of terminologies, those are bilingualism and multilingualism. Not all researchers, however, have used this terminology to reflect this distinction, though all do make the distinction:

1) Individual multilingualism is the psychological state of an individual who has access to more than one linguistic code as a means of social communication
2) Societal multilingualism includes that of individual bilingualism, but refers equally 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 bilingual.

When people hear the term 'bilingual' many imagine an individual who speaks two languages perfectly. For them someone who is *truly bilingual* is two native speakers in one. They imagine that such a person can speak, understand, read, and write in two languages at the highest levels. For others, the term *bilingual* means something quite different. When newly arrived immigrant children entering U.S. schools, for example, are described as 'bilingual children', the term is often used as a euphemism for *poor* and *uneducated*. In this case, newly arrived immigrant children do not yet function in two languages. They are monolingual speakers of their first language and not bilingual at all. The term *bilingual* here is used to convey a very different set of meanings from what linguists intend.

Some researchers have favored a narrow definition of bilingualism and argued that only those individuals who are very close to two monolinguals in one should be considered bilingual. More recently, however, researchers who study bilingual and multilingual communities around the world have argued for a broad definition that views bilingualism as a common human condition that makes it possible for an individual to function, at some level, in more than one language. The key to this very broad and inclusive definition of bilingualism is 'more than one'.

From this perspective, a bilingual individual is not necessarily an 'ambilingual' (an individual with *native competency* in two languages), but rather a bilingual of a specific type who, along with other bilinguals of many different types, can be classified along a continuum. Some bilinguals possess very high levels of proficiency in both languages in the written and the oral modes. Proficiency in the second language may be evaluated with respect to a variety of variables, including knowledge of syntax, vocabulary, and pronounciation (signing or writing for non-speech). Others display varying proficiencies in speaking or comprehension skills, depending on the immediate area of experience in which they are called upon to use their two languages. According to this perspective, one admits into the company of bilinguals individuals who can, to whatever degree, comprehend or produce written or spoken utterances in more than one language. Thus, persons able to read in a second language (e.g. French) but unable to function in the spoken language are considered to be bilinguals of a certain type and placed at one end of the

continuum. Such persons are said to have receptive competence in a second language, making them *more bilingual* than monolinguals who have neither receptive nor productive abilities in a language other than their first. The judgment here is comparative: total monolingualism versus a minor degree of ability to comprehend a second language.

The Concept of Bilingualism

Bilingualism is a phenomenon that affects people throughout the world. Bilingualism is the proficiency or ability to speak two languages (Jay, 2003:471). People use bilingualism in a particular situation in society such as in education, job, mass media, etc. People who speak bilingualism mean that they get second language learning. Native bilingualism occurs when children acquire two languages simultaneously either in their family or their neighborhood. It is natural for them to speak two or more languages in different situation. For example, children who immigrate from other country use one language in their family that is different with language they use in school. This different path can be called foreign-language learning or second language acquisition (SLA).

A person who is popularly believed to be someone who can function to with equal skill in two or more language is called a bilingual person (Spolsky, 1976:164). The reason of the statement is from the fact that a bilingual society is one in which two or more languages are used with regularity and effect. The fact that a person can use two languages does not mean that he can use them equally well or that he uses them equally often.

Most people consider bilingualism as something beneficial. By using more than one language, it eases people to communicate with other members of other cultures in their knowledge. Mackey (in Spolsky, 1976:166) believes that "bilingualism is the property of the individual." In addition, Bloomfield (ibid) defines bilingualism as "the alternate use of two or more languages by the same individual." Thus, in turn, provides a means for furthering cooperation and understanding among nations and people. Knowing another language is also important within countries where there is more than one prevalent or official language, as in Switzerland, which has four official languages: German, French, Italia, and Romansh. Moreover, Education in Indonesia recently uses English as an immersion programs in classroom. Thus, students are claimed to learn English as a second language besides their first language. How important learning two or more languages so that bilingualism can be called vehicular bilingualism, where one language is used for limited or personal uses, and then comprehensive or cultural bilingualism, where the language is used as means of entry in the full culture (ibid, 167).

Types of Bilingualism

The distinction can be considered toward bilingualism, namely diglossia and typology of code mixing.

Diglossia

A distinction is made between individual and societal bilingualism. One kind of societal bilingualism is called *diglossia*. The term is used to refer to society where two distinct varieties of language each have a distinct set of functions.

According to Holmes (1992:32), diglossia has three crucial features or criteria:

1. Two distinct varieties of the same language are used in the community, with one regarded as high (or H) variety and the other a low (or L) variety.
2. Each variety is used for quite distinct functions; H and L complement each other.
3. No one uses the H variety in everyday conversation.

From those criteria, it can be concluded that diglossia happens based on a particular purposes in a particular situation. Diglossia is characteristic of speech community rather than individual. While society or community is diglossic, individual is bilingual. In other words, the term diglossia describes societal or institutionalized bilingualism, where two varieties are required to cover all the community's domains.

The H variety in diglossia usually has the prestige variety than the L variety. The language choice in the H variety depends on factors of the context such as the particular topic or function of the interaction.

Code-Mixing

A human being must have linguistic capacity in using their languages in interacting each other. Therefore, s/he becomes a bilingual speaker to combine elements from two languages when processing mixed sentences. The term of code-mixing refers to all cases where lexical items and grammatical features from two languages appear in one sentence (Musyken, 2000:1). The term of code-switching is also commonly used to switch one language to another language.

People sometimes switch code within a domain or social situation. When there is some obvious change in the situation, such as the arrival of a new person, it is easy to explain the switch. So a code-switch may be related to a particular participant or addressee. The cases that make person switch one language to another language are both the switch reflects a change in the social situation and takes positive account of the presence of a new participant (Holmes, 1992:41).

Bilingualism Beneficial or Detrimental

The beneficial effect using bilingualism is it eases people to communicate with other members of cross-cultures. Knowing other languages is also important within countries where there is more than one prevalent or official language, such as in Switzerland, which has four official languages: German, used as an instrument of national policy. Forbidding the public use of a language, such as in newspapers, books, or newscasts, and forbidding the formal teaching of a language is what governments can be done in order to weaken the coherence of a cultural group so as to force integration.

At a personal level, the pleasure and cultural benefits of bilingualism, too, are obvious. Firstly, it must be said that the arguments offered against bilingualism are restricted to young children learning a second language. Allowing teenagers and adults to learn a second language is considered safe. Secondly, it must be said that the criticism that has been leveled against early bilingualism is primarily of another era.

2. Second Language Learning

Ways of Becoming Bilinguals

There are essentially two conditions according to which a person may become bilingual:

1) The two languages can be acquired *sequentially*, such as the second language would be learned later at school. Sequential learning can occur with both children and adults; the second language can be learned during lower-level schooling, e.g. elementary school, or it can be learned after the person has become an adult, e.g. at university or in another country. Sequential bilinguals are those who acquired the second language after the first language was acquired.

2) The two languages can be acquired *simultaneously*, such as where the young child is exposed to two different languages in the home at the same time. Simultaneous learning, by its very nature, is thus for children only. Simultaneous bilinguals are those who acquired two languages simultaneously as a first language.

The Sequential Learning of Two Languages

The sequential kind of bilingual situation can occur for a child when the child learns a second language at school. Sequential acquisition of the second language may take place at a variety of ages and under a variety of situations. It is quite interesting that the fairly typical case where parents speak one language and the community at large speaks another. The parents could be immigrants or simply people who have moved from one part of a country to another part, such as from Indonesia-speaking in Indonesian to England-speaking in English. The parents speak one language at home, which is different from the one their children are exposed to outside the home, on the streets or at school. For instance, the parents speak in Indonesian at home and the community will speak in English. Thus, from that situation the children has learned two languages, Indonesian and English, sequentially; with the second language being introduced after a great deal of the first language had been learned. Although the child begins learning English, Indonesian continues to be learned from her parents at home. From this point on, the learning of the two languages will be occurring simultaneously. What is sequential is the different starting time, with a four-gap before the introduction of the second language.

In sequential bilingualism young children pass through four common stages (Tabors & Snow, 1994):

1) Children attempt to use the language learned at home with other children in the wider community where a different language is used. They will be silent if others do not understand what they are talking about (language used in their home).
2) They abandon their home language in favor of communication through gesture. Children at this point are beginning to comprehend some of the second language.
3) The children begin to use the second language in ways similar to children learning at first language. They produce abbreviated utterances without function words as in the telegraphic speech of first-language learners.
4) Finally, they begin to produce grammatical utterances in appropriate situations.

In either type of bilingualism, simultaneous or sequential, native speaker levels are rarely attained for both languages. One language is usually dominant, although different languages may be dominant in different modalities. The dominant language may also change over time. The home language may start out as the dominant language, but the second language may achieve dominance as it is used for wider communication. It is this dominant language that typically becomes more developed.

There is often the case that young children can learn an entire language in a year or less. Theoretically, it must be the case that *the learning of a second language is facilitated by the prior learning of the first language*. As the child gets older, however, the time needed for second-language acquisition grows longer. This change with

age would conform to the hypotheses regarding the effects of psychological and social variables on language learning.

The Simultaneous Learning

There are two basic situations in which a child may learn two (or more) languages at the same time:

1) Each person speaks one language only to the child: One Person-One Language (1P-1L), for example, the mother speaks only one language to the child, Indonesian, while the father speaks another, English. Each person uses one language exclusively.
2) Each person speaks the same two languages to the child: One Person-Two Languages (1P-2L), for example, the mother and father use both Indonesian and English to the child. The two languages are mixed by each parent. Thus, each person uses two languages.

There is also a case when a child is in trilingual situation. In his home, there are three people who speak different languages to him, for example, his mother speaks in Indonesian, his father speaks in English, and his grandmother speaks in Japanese. Those languages were maintained by the child to adulthood even though the family lived in an English-speaking community.

It seems that children are so flexible that they can become fluent in both languages by the age of 3 or 4 years, regardless of the language situation (1P-1L or 1P-2L). There is the case that the child in the 1P-1L situation will learn the two languages faster than the child in the 1P-2Lsituation and attain a higher level of proficiency. This would be due to consistency. In the 1P-1L situation, the child on hearing speech would not have to puzzle over which of the two sets of language knowledge is being referred to. The child would know that mother will speak one kind of language while father will speak in another. The grammars which are derived from these speech data can be maintained separately right from the start.

We tend to think that the difference in speed of learning between the 1P-1L and 1P-2L situations would be significant. It seems that *the more different the languages*, the greater the contrast, and therefore *the easier the sorting task* for the 1P-2L child. And it may be that 1P-2L children produce more mixed language sentences, where vocabulary and syntax of the different languages are used in the same sentence, for example, 'Open the *pintu*' (where *pintu* is a door in Indonesian). Overall, it would seem that the 1P-1L situation is better since learning may be faster and less mixing might occur.

Children learning two first languages simultaneously follow the same route as other children learning their first language. Bilinguals move through the same stages of one-word utterances, two- and three-word utterances, then increasing complexity with morpheme acquisition and complex sentences. In the two- and three-word stages some mixing might occur between the two languages, especially for 1P-2L learners, for example, the child in 1P-2L situation was somehow mixing the vocabulary and syntax of the two languages to form one language system. This is called 'code switching'. It seems that simultaneous bilingual children tend not to do this as much.

As with first-language learning, when the child often incorrectly extends the meaning of a word to include too many objects, the bilingual child may also overgeneralize in one or both of the languages. Or the child may have yet to learn the word in one language and as a result uses the word of the other language. Thus, sometimes the mixing of words from two different languages may not be the result of

the child having difficulty in distinguishing between the two languages, but it can be the result of the child using every linguistic tool at his or her command in order to

 communicate.

3. Transfer Effects of L1 to the Learning of L2

L1 and L2 Relations Affect Learnability

What one's first language is will affect one's learning of the second language. Not every second language will be learned at the same rate. The nature of the similarity relationship between the first and second languages will determine the rate of learning. For example, after having learned the Indonesian as the first language, learning English would not be as difficult as learning Japanese. There are differences between Indonesian and English syntax but these differences are small if compared with the differences between the syntax of Indonesian and Japanese. Because Indonesian and English are almost similar, so it could be learned faster. The higher the similarity, the faster the learning.

Thus, we may conclude that the greater the similarity between two languages in terms of their syntax, vocabulary, and sound system, the more rapid the rate of acquisition in the two languages. If we had to scale the importance of these variables, we would give syntax and then vocabulary the greater weight. Good pronunciation cannot compensate for poor syntax or vocabulary. So, good syntax with good vocabulary is a winning combination for second language success.

Facilitation Occurs even among Very Different Languages

It is clear that the knowledge one has one's first language may help the learning of second language even when two languages are very different. The knowledge that words and sentences represents objects, ideas, situations, events, for example, are something that the first language learner brings to the second languages situation and does not have to struggle to relearn.

The realization of such facts can enable us to explain the rapid learning of second languages, even when the languages are quite different. The reason that adults are not able to make rapid gain as children is in our view, due to the rich natural situation for the child and its excellent memory as opposed to relatively impoverished natural situation for adults along with their reduced memory ability.

L2 and L3 Intrusions when Learning another Language

There is a moment when one acquires more than two languages, let's say that he or she acquires three languages. Suppose than his first language is English, and he learned French at school. Afterward, he decided to learn Japanese. In this case, the French interference with Japanese continued intermittently for almost a year but then disappeared completely as his Japanese improved. After several years, when he speaks French, he surprise his newly learned Japanese unexpectedly came to mind. Most of the interference occurred in his mind and generally he was able to control himself from uttering it out loud.

When one wants to produce something in a new language, a more established second (or third) language may be accessed. Somehow the neural pathways have not been so firmly connected that they are able to automatically access a particular desired non-native language.

4. Strategies

Strategies for Second-Language Production

"Communication" strategies are used for the purpose of keeping the conversation going. These strategies may have an effect on learning for the more the learner speaks the greater linguistic input the learner will receive. It includes overgeneralization, in which a rule of the second language is applied in inappropriate contexts like the definite article being used with 'dinner' in the previous example. Communication strategies may also involve using words and phrases from the first language when they are unknown in the second language or what we called 'code switching'. It is also used in education.

Richards states that bilingual education is the use of a second or foreign language in school for the teaching of content subjects. Bilingual education programmes may be of different types and include:

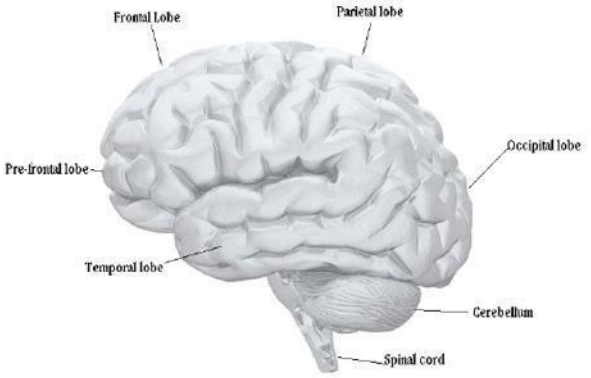
1. The use of a single school language which is not the child's home language. This is sometimes called an immersion programme.
2. The use of the child's home language when the child enters school but later a gradual change to the use of the school language for teaching some subjects and the home language for teaching others. This is sometimes called maintenance bilingual education.
3. The partial or total use of the child's home language when the child enters school, and a later change to the use of the school language only. This is sometimes called transitional bilingual education.

5. Structure of Brain the Function

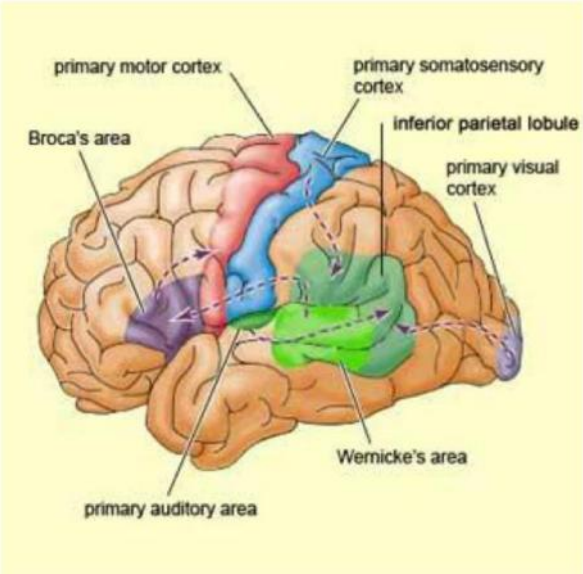
a. General Areas and Their Functioning

Language acquisition and learning's function in brain are dealing with where language is located in the brain and how it is encoded and decoded. Such demanding problems are among the interests of Neurolinguistics. In this domain it has been widely known that brain can be mapped or divided into areas or parts with specialized functions.

Generally speaking, brain is divided into two different parts or cerebral hemispheres i.e. the left and the right which **15 | >>** also termed lateralization (Steinberg, Nagata and Aline, 2001: 318-325).



Those hemispheres are connected by the corpus callosum which permits the two to communicate with each other (Titone and Danesi, 1985: 43-46). It is shown in the above picture that the left concerns to logic, reason, objective, verbal, self-oriented, categorical, detail focused, mimicry and purposefulness, and the right side concerns to intuition, emotion, subjective, visual, group-oriented, relational, whole picture-focused, creativity and playfulness. In addition, Steinberg, Nagata and Aline point out that the left is related to language, logical and analytical operations, and mathematics (2001: 318). The left controls the movements on the right side of the body, and the right does those on the left side (Titone and Danesi, 1985: 43).



A more detailed parts of the hemispheres are illustrated by the figure above. Each hemisphere is divided into four parts or lobes. They are, from front to back, 1) the frontal, 2) temporal, 3) parietal, which is located above the temporal, and 4) occipital (Stenberg, Nagata, and Aline: 2001: 311).

In general, functions such as cognition occur in the frontal lobe, hearing occurs in the temporal lobe, general somaesthetic sensing like feeling in the arms, legs, face, etc. in the parietal lobe, and vision in the occipital lobe. Meanwhile, the copus collasum not only serves to connect the hemispheres but is itself a principal integrator and coordinator of the mental processes carried out in the two hemispheres.

Language Areas and Their Functioning

Broca's Area, the Motor Area, and Speech Production

Pierre Paul Broca was a French pathologist and Neurosurgeon who made the first great discovery regarding brain and language. He discovered a ceratin area of the cortex that is involved with the production of speech. The part is therefore named after him, Broca's Area. He further noted that the speech area is adjacent to the region of the motor cortex which controls the movement of the muscles of the articulators of speech: the tongue, lips, jaw, soft palate, vocal cord, etc. He also pointed out that speech is formulated in Broca's Area and then articulated via the motor area. The link between Broca's Area and the motor area was later shown to be the nerve fibres of the arcuate fasciculus. The speech production process would begin in Broca's Area, pass on through the arcuate fasciculus to the motor area and from there to the articulators of speech and vocalization.

2) Wernicke's Area, the Auditory Area, and Speech Understanding

Carl Wernicke, a German neurologist, in considering that Broca's speech area was near that part of the brain which involves areas which control the articulators of speech, reasoned that in the same way two other areas of the brain must similarly be involved in the process of speech comprehension. In his research he discovered, near the part of the cortext in the temporal lobe which receives auditory stimuli, an area which was involved in the understanding of speech. Wernicke hypothized that this area, later named after him, must in someway be connected to the auditory area. Later research showed that these areas are indeed connected, by fibres of the arcuate fasciculus.

The model that Wernicke posited over a century ago is still largely the model which most researchers use today in describing how speech get understood. According to him, on hearing a word, the sound of a word goes from the ear to the auditory area and then to Wernicke's area. It is from Broca's Area that the vocalization of speech would then be activated. When a word is read, according to him, the information goes from the eyes to the visual area of the cortex in the occipital lobe, from there to the angular gyrus, then to Wernicke area and then to Broca's Area,

which causes the auditory form of the word to be activated. Wernicke had the mistaken belief that all written words had somehow to be speech activated.

The left side of the brain is responsible for Processes verbal, abstract, analytical information in a linear, sequential manner, looks at differences and contrasts, seeing small signs that represent the whole, and concerns itself with reasoning abilities such as math and language. Meanwhile, the right side of the brain is held responsible for processes of non-verbal, concrete, and spatial information, looks at similarities in patterns, forming a whole picture, and processing parts in relationship to the whole, and concerns itself with artistic abilities such as music and graphics.

The Work of Bilingual Brain

How the Brain Makes Way for a Second Language

Studies involving sophisticated brain imaging technologies called functional magnetic resonance imaging, fMRI, have revealed some intriguing patterns in the way brains process first and second languages.

Joy Hirsch and her colleagues at Cornell University used fMRI to determine how multiple languages are represented in the human brain. They found that native and second languages are spatially separated in Broca's area, which is a region in the frontal lobe of the brain that is responsible for the motor parts of language-movement of the mouth, tongue, and palate. In contrast, the two languages show very little separation in the activation of Wernicke's area, an area of the brain in the posterior part of the temporal lobe, which is responsible for comprehension of language.

The fMRI studies suggest that the difficulty adult learners of a second language may have is not with understanding the words of the second language, but with the motor skills of forming the words with the mouth and tongue. This may explain why learners of a second language can oftentimes comprehend a question asked in the new language, but are not always able to form a quick response.

Thus, for adult English language learners, techniques that emphasize speaking may be more successful than methods that focus more on reading and listening. For example, rather than lecturing to a class about vocabulary and grammar, an instructor perhaps should encourage her adult students to have conversations in English, or to act out short skits incorporating the day's lesson, which would more closely link the students' abilities to understand and speak the new language. Speaking would thus equal understanding.

The Cornell researchers also studied the brains of people who were bilingual from a very early age. Presumably, this group of people is able to speak the two languages as easily as they can comprehend both languages spoken to them. The researchers found that these subjects showed no spatial separation in either Broca's or Wernicke's areas for the two languages, indicating that in terms of brain activation at least, the same regions of the brain controlled their ability to process both languages.

The idea that second languages learned early in childhood are not separately processed in the brain is supported by fMRI studies of brain development in children. Researchers at UCLA report that the language areas of the brain seem to go through the most dynamic period of growth between the ages of 6 and 13. In contrast to the "first three years" idea of child development that has received so much press in the past few years, the UCLA study instead suggests that the elementary and middle school years are the biologically most

advantageous times for acquisition of a second language.

These various neuroscience studies tell us that the brain is a remarkably plastic entity. A combination of listening and vocalization seems to be the most biologically advantageous method of acquiring a second language for both adults and children. Incorporating what we know about the way the brain processes language into the way languages are taught will benefit not only students who want to learn English, but also all those who wish to extend their linguistic range.

(http://www.brainconnection.com/topics /?main=fa/second-language).

Early and Late Bilinguals

In 1997 Dr. Hirsch and her then graduate student, Karl Kim, used fMRI to research as to what portions of the brain were activated by use of a second language. They wanted to know if there was any difference between the brain activity of early bilinguals, those who learned a second language at a very young age, and late bilinguals, who learned a second language as a teen-ager or adult. They discovered that early bilinguals use the same part of the brain's language center, Broca's Region, whether they are using their native or second language. With fMRI imaging the brain region for both languages appears identical. But for late bilinguals, two separate, adjacent, but not overlapping parts of Broca's region are activated, depending on which language is being used. So people who learn a second language as teenages or adults seem to store the ability to speak that language in a different part of the brain than the first language, whereas learning the languages very early in life results in their storage of the ability to speak each language in the same portion of the brain. However, when it comes to processing language, for which another part of the brain is responsible - Wernicke's Area - both early and late bilinguals store the ability to understand and process both languages in the identical part of the brain.

The investigation of bilingual brain works emphasizes the importance of control mechanisms in bilingual processing. What remains to be clarified, however, is where the circuits that are being controlled are. Are the brain circuits that support L1 and L2 anatomically segregated, or are they intermingled in the same cortical regions? Price *et al*. observed that comprehension of words in L1 yielded greater activation of the left temporal lobe, including the temporal pole, than did words in L2. This replicates several earlierstudies which all showed that the `language organ' in the left temporal lobe is more activated when listening to the mother tongue than to any other lesser known language Other studies capitalizing on the higher spatial resolution afforded by functional magnetic resonance imaging have suggested that, even within a single brain region, there may be smaller-scale circuits specialized for L1 or L2 For instance, in bilingual**s** who learned their second language late in life, sentence production tasks in L1 and in L2 have been found to activate two non-overlapping subregions of Broca's area .In that study, only early bilinguals, who received equal practice with their two languages from birth, showed an activation overlap for L1 and L2.

CONCLUSION

There is no doubt that there will be more studies implementing the latest state-of-the-art instruments in a quest for answers on how the bilingual brain handles L1 and L2. Increased understanding of the ways in which multiple languages are represented in

bilingual speakers' brains is undoubtedly advancing several theoretical issues in areas such as language acquisition and performance theory. Almost all of the work in modern linguistics and second language acquisition has been done on overt rather than covert linguistic performance. The linguists organize the overt spoken and written speech behavior into relevant categories, infer significant relationships, explanations, and attempt to discover relevant research variables accounting for variance in performance across different individuals and for the same individual over time. There has been very little work done on first or second language acquisition from the neurolinguistic perspective.

In the light of above, it is arguable for inclusion of the neurofunctional perspective as a comprehensive basis for the discussion of many issues in second language acquisition. Language teachers should not be satisfied with the widespread belief that loss of brain plasticity disables adult learners from ever mastering their L2. Studies and researches had better turn to neurological areas if they are ever to understand the nature of language acquisition and language processing. It is acknowledged that such issues can be useful not only to physicians and psychologists, but also to teachers in general. Teachers, in fact, deal every day with one of the most typical features of the human brain, namely the ability to learn.

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