

# How bilingualism can effect cognitive functions



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The aim of this essay is to introduce some issues about bilingualism. We will try to examine some areas of bilingualism, concerning cognitive aspects.

People use the term “bilingualism” in different ways. For some, it means an equal ability to communicate in two languages. For others, it simply means the ability to communicate in two languages, but with greater skills in one language. In fact, it is more common for bilingual people, even those who have been bilingual since birth, to be somewhat “dominant” in one language. The following three types of bilingualism are usually used by researchers to describe bilingual children. Simultaneous bilingualism refers to someone who is learning two languages as “first languages”. A person who is a simultaneous bilingual goes from speaking no languages at all directly to speaking two languages. Infants who are exposed to two languages from birth will become simultaneous bilinguals. Receptive bilingualism refers to someone who is able to understand two languages but expresses oneself in only one. Children who had high exposure to a second language throughout their lives, but have had little opportunity to use the language would fall in this category. For example, many children in Chinese or Mexican immigrant households hear English on TV or in stores but use their home language (Chinese or Spanish) in everyday communication. When they enter preschool or kindergarten, these children are likely to make rapid progress in English because their receptive language skills in English have been developed. Sequential bilingualism refers to someone who is learning one language after already having established a first language. This is the case for all those who become bilingual as adults, as well as for many who became bilingual earlier in their life. A

various cluster of research evidence has demonstrated that there is a strong influence between bilingualism and cognitive impairments associated with attention, problem solving, memory and emotions. Finally we will describe the relationship between bilingualism and psychopathology.

The enormous majority of investigational work in language development, mostly in the area of early lexical acquisition, has focused on monolingual infants. Yet, due to immigration, official language policies, cultural preferences and norms, many infants are brought up in a bilingual environment. The immediate contact with two languages, each with dissimilar sound lists and lexicons leads to a very diverse set of achievement challenges for bilingual infants. The mission of learning two languages from nativity is probably not effortless. Bilingual infants must achieve double language learning in an environment that is not at all times obviously prearranged with respect to language exposure. Many infants hear their two languages from a large amount of sources such as parents, other family members, close friends and surrounding community. Even though they may not have methodical language separation, bilingual infants obtain words in both of their languages from the start of lexical attainment. When measured up to monolinguals, they pass language highlights at parallel ages and have alike-sized vocabularies, when taking words from both languages into account. (Fennell, 2007)

In 1962, for the first time in the bilingualism literature, Peal and Lambert presented empirical data screening a positive influence of bilingualism on children's cognitive

ability. Researchers found that bilingual children showed advanced performance in contrast to monolinguals, on measures of verbal intelligence as well as on non-verbal tasks “ involving concept formation and symbolic flexibility”. Replying to a long belief of negative declarations about childhood bilingualism, the researchers credited the positive results to the fact that their bilingual sample consisted only by “ balanced” bilinguals, that is, children who had alike and age-appropriate abilities in their two languages. Researchers hard work in the past 20 years have long-established Peal and Lambert’s pioneer findings concerning the cognitive advantages of balanced bilinguals. When compared to monolinguals, balanced-bilingual children show crystal-clear advantages on measures of symbolic development, metalinguistic awareness, concept formation, divergent-thinking skills and field independence. Bilingualism promotes a certain degree of “ cognitive flexibility” that accounts for bilingual’s enhanced performance on a wide range of verbal and spatial tasks. The fact that balanced-bilingual children do better than their monolingual peers on several cognitive measures does not tell us the whole story about the effect of bilingualism or second language acquisition on children’s cognitive development. (Diaz, 1985)

Attention is a cognitive process during which the brain selectively concentrates on a particular environmental stimulus while inhibiting the processing of another misleading or unimportant one. Attention is a key component of executive functioning

and is believed to represent thought coherence. Evidence from studies in bilingual children points to a positive effect of bilingualism on the inhibitory control

mechanisms that mediate the process of attention. Bilingual children have been found to exhibit advanced and more rapid inhibitory control skills compared to monolingual children (Bialystok, 1999; Carlson 2008). For example, young bilingual speakers have been found to perform better on tasks involving symbol reorganization, spatial problems and understanding object consistency as well as on nonlinguistic tests of geometric design. Their superior performance could be the result of the cognitive effects of bilingualism during development, on structures of the pre frontal cortex which have been implicated in several executive functions of the brain such as attention. Researchers have developed the “ cross language interactivity” theory which could explain the positive effects of bilingualism on cognitive function. This theory suggests that the cognitive process of learning to speak and distinguish different languages induces the speaker to adopt executive strategies which accelerate cognitive development and cause mental flexibility across all domains of thought. Therefore, bilingual children who have learned to distinguish between the common representational areas of their mutually active languages have developed a more advanced mechanism of the processes of inhibitory control and of selective attention. (Carlson, 2008)

Studies of semantic and episodic memory in bilingual and monolingual children further support the cross language interactivity hypothesis. Although bilingual advantage in regard to memory has been repeatedly implicated, not much is known about the relation between bilingualism and memory in children. Bilingual children

have been found to perform better in both episodic and semantic memory tasks compared to monolingual children. The beginning of linguistic development early in childhood is closely associated with the children's cognitive capacity and the influence of language specific input. Therefore, the effects at the cognitive level of increased linguistic input and information storage from a very young age could enhance memory capacity. Therefore, bilingualism in early years enhances information processing provided by the two languages allowing the individual to experience, retrieve and store information from different sources and by different cues. Such enriched information processing in its turn increases memory capacity and improves memory performance. (Kormi- Nouri, 2008)

Problem solving is defined as a higher order cognitive process that involves the control and modulation of several fundamental skills. Performance in problem solving tasks in bilinguals has been extensively studied using mathematical problems. Mathematical knowledge and skills can benefit an individual in developing problem solving skills for real life situations. Studies have shown that performance on math problems in bilinguals is influenced by linguistic factors implicating a possible, more generalized effect of bilingualism in the cognitive process of problem solving. Bilinguals have been found to perform better in arithmetic word problems when presented in their native language than in their second language. This indicated that better performance in such tests results from better comprehension of the problem text when presented in the mother language and therefore better comprehension leads to

more effective problem solving ability. Other studies using statistical tasks have revealed that linguistic factors do not influence the computational and abstract thinking aspects of solving word modeled problems.

The results indicate that the problems in the problem-solving performance of bilingual students are not only limited to those related to difficulties in understanding word problems in their less proficient language. The problems also might be associated with learning experiences that give rise to the acquisition of problematic strategies.

The results of the study indicate that the language in which word problems are stated affects how bilingual students apply their knowledge, procedures, and strategies for solving the problem. (Bernardo, 2005)

Emotions can influence cognitive processes and bilingual speakers have been tested for the effects of bilingualism in emotional behaviour via the “emotional Stroop effect” test. In this task participants are presented with words that represent emotions such as fear, anger, happiness and neutral words such as house, car, boat. Participants are asked to name colours of these emotion words and performance on this task assesses selective attention to emotional information. Linguistic factors can influence the expression of an emotion as well as an emotional word represented into a different language can influence the perception of that emotion by the listener. Assessment of

the emotional Stroop effect in bilingual speakers have revealed that the Stroop effect is the same when the two languages were learnt at the same

time early in childhood and the Stroop effect is bigger for the mother language compared to the effect for the

second language which was learnt later in life. This could be due to the fact that emotion words learnt in the mother language have been experienced in a broader and deeper context and therefore have been more deeply coded compared to the same emotion words of the second language, which seem to produce reduced emotional activation. In addition, the language barrier arising from bilingualism could also affect emotional perception and attention. (Sutton, 2007) A bilingual speaker can be differently influenced by an emotion word expressed in two different languages simply because the same word in one language can possibly lack a single word translation in the other language. This can give rise to the language barrier which in turn can form a barrier in the expression of the same emotion in two different languages. Therefore, in a bilingual speaker who learnt the second language later in life and not at the same time with the mother tongue, emotion words seem to be processed differently at the higher levels of language processing such as discourse and represented differentially in bilingual memory. (Eilola, 2007)

The underlying cognitive processes associated with bilingualism and its effects on different cognitive functions are interesting to be studied as it could provide us with important information regarding the psychopathology of several conditions. Language deficits are very common in many children psychiatric syndromes and have been found to predict language disorders such as dyslexia but also depression, anxiety and attention deficit



hyperactivity disorders. In addition language deficits and disorders are very common among psychiatrically ill children. Another interesting observation is that when language deficits go undetected for a long time, which frequently occurs, they are associated with more severe psychopathology and poor school performance. Studying the psychopathology of several disorders in bilingual children would be of vital importance in understanding the relationship between psychiatric and linguistic deficits in general and could provide us with a deeper insight into several of children psychiatric conditions. Studies have shown that associations between low bilingual language ability with several psychopathological manifestations such as social, attentional, thought and externalizing symptoms. So far, not much is known about the role of bilingualism in the psychopathological manifestations of several child disorders mainly due to lack of such research in bilingual child populations. Extending the research on bilingualism to such populations could provide us with important information that would enhance the current diagnostic assessments and therapeutic approaches used for psychiatrically ill bilingual children. (Toppelberg, 2006)

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