



The Impact of Second-Language Acquisition on Cognitive Development

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Abstract. Second language acquisition of children at an early age has become almost prevailing. Parents and educators have long been concerned about the effects of early second language acquisition on young children's cognitive development. Some studies found that the cognitive development of children who learned a second language early could be affected, for example, memory, creativity, social and communication skills, academic skills, and cognitive flexibility. Because of the natural process of the brain's development stages, children have been better equipped to respond to new information, such as learning a second language, because their brains had more plastic than those of adults. This paper summarized the impacts on cognitive development and many theories of cognition, which demonstrated that learning a second language in childhood was an important experience that had the power to affect the cognitive development of kids. The paper contributed to our understanding of second language acquisition and cognitive development of young children, which helped parents and educators consider approaches to teaching the second language that was beneficial to children's cognitive process and future study.

Keywords: second language acquisition · early age · cognitive development

1 Introduction

Globalization has sped up the associations of social relationships that connect far-flung places. Language has become crucial to globalization because it facilitated interactions between people and places and was also influenced by external factors [1, 11]. Many parents hoped their children had a good preparation for future study and more choices of a future career, they thought that their kids learning a second language in childhood was a good choice.

When learning a second language young, there were many impacts on the cognitive development of a kid. It was an essential form of brain training for switching between two languages. Mentally regulating two provides - a higher level of metalinguistic awareness was achieved through brain cognitive training. According to the process of cognition, many children have taken advantage of the chance to acquire or even became fluent in a second language at a young age for the inherent advantage [2].

Therefore, this study reviewed the impacts of second language acquisition on cognitive development, including memory, creativity, social and communication skills, academic skills and cognitive flexibility, and the related theories of cognitive development.

2 Impacts on Cognitive Development

2.1 Memory

Several studies proved that multilingual kids had better memory, planning, and doing two or more things at once abilities. The brain was trained to focus on important information and ignored irrelevant information when learning multiple languages as a child. This ability enhanced focus, memory, planning, and the capacity to do two or more things at once. Research indicated that bilingual people could produce exciting new things [3].

The three interconnected psychological structures of sensory memory, working memory, and permanent memory were the foundation of the information processing model of cognitive psychology, which held that memory was at the center of the information processing system. Memory encoding, storage, and retrieval all needed the acquisition of external information.

Furthermore, in the early stage of second language learning, children were dependent on memorized language for a long time, and it seemed to be more conspicuous than first language acquisition. The kids who learned the second language, in the beginning, had already completed the learning process of the first language and had a stronger desire to communicate with others. Nevertheless, owing to the first language competence of these children being relatively weak, they were not able to use the rules of the second language to express themselves. To avoid making mistakes in conversation, they must use memorized language. In other words, using memorized language to communicate was an important strategy and an inevitable stage for children to learn a second language. One of the greatest advantages of memorized language in use was the need for the computational resource was lesser and the rate of retrieval and extraction was quite fast, which not only can reduce the pressure of synchronous communication on language rule computation, but also can buy more time for language rule computation and ensured a proper speed of synchronous communication, but also helped people pay more attention to communication content to obtain an ideal effect. When learning a second language, children usually relied on memorized language, which was able to boost the development of memory [4].

2.2 Creativity

In terms of some research, the creativity of children who spoke two languages was better than those who spoke one language.

In a controlled study, Landry looked at the creative skills of elementary school students who were taking a foreign language. Many children participated in both programs Landry compared the Foreign Language in the Elementary School (FLES) and ordinary school. He gave examinations to first- and third-graders, monolinguals, and second-language learners to gauge how well the FLES program promoted the development of creative capacity. He didn't include any multilingual home-raised kids in the sample.

Landry said that there were no differences between first graders who participated in the foreign language in the elementary school (FLES) program and those who did not due to the first graders' insufficient exposure to the second language. In third grade by then, however, individuals who were taking a second language class had significantly

improved on all Torrance test scores. When Landry said that learning a second language gave the flexibility that was helpful for both divergent thinking and creativity, he may have taken the concept of cognitive flexibility a step too far [5].

2.3 Social and Communication Skills

Early exposure to a second language fostered versatile thinking and communication abilities, enabling kids to approach problems from various angles. Roberta Michnick Golinkoff, author of the book *How Babies Talk*, said that a child's total verbal development was improved by learning another language [1]. Children who were learning a second language must be exposed to a foreign-language environment and started their second-language acquisition through early dialogue with partners and classmates, which was beneficial for the development of social skills. Children frequently altered their speech to suit the audience. Children gained a greater awareness of social settings and the ability to govern their actions and ideas as their language skills grow. The steady process of language development reflected a child's cognitive abilities. Language served a purpose. Children communicated through language as they worked and played [3].

Children can develop their language skills through play, where new words can be introduced and new applications for them can be found. Additionally, it gave kids the chance to voice their opinions, settle disputes, and convinced their friends to cooperate. The linguistic play focused on the language elements that children would later need to consider when learning about language. A language was a powerful tool for influencing thinking and behavior, whether it be one's own or that of another. Children required several opportunities to interact for their language to develop. Speaking to children helped them learn. For children to develop linguistic skills, they must first feel confident in their social abilities and accepted. Adults socialized with children through language, which also taught them how to control their inner voices. The primary function of language was to facilitate communication with others and with ourselves.

Due to a child's own cognitive and social growth, language structure developed. Although there was a lot of variety among children and the rate at which they picked up a language, the pattern of development between languages was very consistent. We can conclude that no language is more difficult than another by looking at how easily children pick up new languages at the same age. Almost every child learned language and communication skills, and rather than being learned in a simple to complex order, they learned organically and in context.

Children and adults successfully communicated all the time, which was proof that we all adhered to the same set of communication behavior norms (Lindfors, 1991; McLaughlin, 1984). Patton Tabors challenged educators to consider language as a "puzzle," where each piece must fit perfectly for language to function properly. Phonology, vocabulary, grammar, discourse, and pragmatics made up these puzzle parts [6].

2.4 Academic Skills

Early second language acquisition can aid in a child's academic development. Bilingual youngsters understood the wide symbolic representation of print better than monolingual children, according to recent research that assessed [1, 3, 4] four and five-year-old

kids' reading skills. Another Louisiana research from the 1980s found that independent of color, gender, or academic standing, students who received daily foreign language instruction outperformed those who did not on the third, fourth, and fifth-grade language arts portions of Louisiana's Basic Skills examinations.

These findings all pointed to the benefits of learning a second language for improving academic performance and native English proficiency. Numerous researches demonstrated that on standardized college entrance exams, kids who learned foreign languages do statistically better than non-learners. For example, according to the College Entrance Examination Board, on the verbal component of the Scholastic Aptitude Test, students who had studied a foreign language for at least four years performed on average better than those who had studied any other topic for at least four years (SAT) [7].

2.5 Cognitive Flexibility

According to several pieces of research, bilingual children were more "flexible" in their thinking than monolingual children; nevertheless, it had never been possible to define "cognitive flexibility" in depth. It had been exploited or misapplied to try to explain why bilinguals outperform monolinguals on a range of cognitive tasks. Although this ill-defined phrase was now widely used, many students and scholars in the field argued that bilinguals are, in fact, more cognitively flexible than monolinguals [6].

In their studies on bilingualism and cognitive development, Peal and Lambert (1962) used the term "cognitive flexibility" to characterize how bilinguals performed on IQ tests. The idea was used to explain the outcome that bilingual children performed better than those who speak only one language, which confused many scholars. Due to many previous studies on the advantages of bilingualism, for example, the distinction of sound and meaning in the early period can easily interpret why balanced bilinguals perform better in verbal [8].

An investigation carried out by Balkan in Switzerland is one of the most commonly referenced research on the cognitive flexibility of bilinguals. Balkan (1970) used a variety of nonverbal tests to assess a variety of cognitive flexibility traits. As anticipated, the bilingual group outperformed the control monolingual group on two of these measures. One task required the ability to rearrange a perceptual situation. Figures Caches is comparable to the well-known Embedded Figures Test. The second assignment, Histories, required awareness of the various connotations of a word. It's interesting to note that for kids who learned to speak two languages before the age of four, bilingualism had a considerably greater positive impact on these outcomes. Children who learned to speak two languages later than monolinguals did better, though the difference between the two did not achieve statistical significance.

Balkan's research suggested that bilingualism may offer the most cognitive benefits for kids who acquired their two languages simultaneously, which was in line with other linguistic studies' findings [5].

3 Theories

3.1 Naturally Process

The prefrontal cortex's growth was tied to cognitive development, which was essential for learning language and other abilities. According to Piaget's theory of cognitive development, there were four phases of cognitive development: the sensorimotor stage (from birth to age two), the preoperational stage (from age two to seven), the concrete operations stage (from age seven to eleven), and the formal operations stage (11 Years Old and Up).

Children's preoperational development included the shift from sensorimotor to representational intelligence. The child can communicate verbally and visually at this age. An artwork, a written sentence, or a spoken phrase can all serve as representations of true things. In addition to symbolism, there was a vivid sense of the past and future. At various phases of growth, egocentrism, an inner speech, can take many different shapes, but it was always distinguished by a lack of diversity in one's thinking. (Doran & Cowan, 1975). Another element of preoperational children's thinking was their inability to appropriately reason about changes. The child cannot consciously reverse the process of extending during the preoperational period (Brown, 2000).

Because they cannot discriminate between themselves and other items as objects, children are egocentric. A child's logical thinking can develop higher degrees of logical thinking and reasoning with diminishing egocentrism in the concrete operational stage and the formal operational stage. Egocentrism was a method of teaching young children how to control their internal concepts through inner or private speech, according to Piaget (as quoted in Doran & Cowan, 1975), and it affected language development in young children. Early language acquisition and the distinction between different stages of cognitive development will likely be greatly influenced by egocentrism. The stage in the theory demonstrated how language learning and other skills advance as cognition developed [9].

Vygotsky saw language as the most important developmental step in a child's cognitive growth because it served as a vital link between the sociocultural world and personal mental functioning. Learning a second language, in his opinion, affected the overall development of a child's personality, therefore it "must be examined in all its width and all its depth." His research of the link and unification of cognitive process, which referred to acceptance, organization, and storage, as well as using the information from the environment to guide conduct and the process of language - those in charge of creating and interacting through perceptual symbol representation in the social interaction, which offered the foundation to the meaning of communicating with the second language related to thinking and language process [3].

Children's ability to learn a second language depended on how aware they were of their thought processes. Vygotsky found that children, to some extent at least, need self-awareness while they learning a second language and writing, which was lacking in the mother language acquisition. He also briefly said that the differences between native language learning and second language learning, and children had already gotten the meaning system of the first language before learning a foreign language. This system was translated into a second language. He accepted the fact that the child who learned

two languages grew up with somewhat separate cognitive and linguistic systems in each language. He quoted research by Ronget that demonstrated that the youngster learned both languages concurrently and almost entirely independently of one another [10].

3.2 Brain's Development

In the book *Inside the Brain* whose author Ronald Kotulak wrote, the basis for thinking, language, visuals, attitudes, capabilities, and other characters were made in this period, especially the first three years of life. It was a kind of a waste if children's talents weren't used well, because second language learning was as easy as first language learning. Growing up in a plural environment, kids can speak 2000 easy words at least by the age of 4. Just by observing infants as they develop their speech, it was clear that they were good learners by nature. Babbling babies used 70 voices that were general to all languages in the first six months. Only can they use the sounds learned from the external environment, especially from their parents and carers. The ability of a baby to communicate in a language they had not yet heard would be rejected by their brain as a result [11, 12].

The brain's developmental stages (Dryden & Vos, 1997) were - the first month - a baby can grow new synapses up to three billion times per second as their senses respond to their environment (Kotulak, 1996). A baby's brain absorbed everything they encountered and stored it in memory cells; in the first six months - all of the sounds used in the world's languages can be heard in babies' babbling. However, a child only picked up sounds and words from their environment when learning to talk. A youngster would lose the ability to communicate in tongues that they had not heard; at eight months—there were over 1,000 trillion connections in a baby's brain. The number of connections started to decrease after that unless the newborn was exposed to stimulation using all of his or her senses.; around age 10—in the average youngster, nearly half of the connections have vanished. Five hundred trillion will last a person their entire life; up to age 12 - a super-sponge has developed inside the brain. During this period, the building blocks for thinking, language, vision, attitudes, aptitudes, and other attributes are established. The windows closed after this developmental stage; the basic structure of the brain was finished. Consequently, during these crucial years, learning a foreign language was simpler [12].

4 Conclusions

In conclusion, the positive impacts of bilingualism on kids' language and cognitive development have been demonstrated by research [13].

Balanced bilingual kids outperformed monolingual kids in tests of memory, creativity, social and communication skills, academic ability, and cognitive flexibility. First, second language acquisition made children have a better memory. When learning a second language at an early age, kids used memorized language to communicate with others, which was an essential stage for children. Secondly, a kid who learned a second language fostered their creative abilities. Thirdly, social and communication skills were also related to second language acquisition. Children must be exposed to an environment

where they should start an early dialogue with partners and classmates with a foreign language, and they learned the language through work and play, which was a practice of social skills. Fourth, many findings showed the benefits of learning a second language for improving academic performance and native English proficiency. Several studies indicated that students who learned foreign languages gain higher scores, which meant they had better academic skills. Fifth, bilingualism offered the most cognitive benefits for kids who acquired their two languages simultaneously, some studies showed that bilingual children owned more cognitive flexibility.

It was a natural process for kids to study a second language, for example, Piaget's theory of cognitive development included a special stage, Egocentrism was likely to play a significant influence in early language acquisition as well as in the development of differentiated cognitive abilities. However, previous studies covered in this paper found cognitive benefits for bilinguals in various but specific skills, which were not considered comprehensively. In the future, researchers could give a greater knowledge of the comprehensive skills involved in the cognitive development of bilingualism. What aspects of cognitive development have been altered by social circumstances, such as prior educational experience and familial history, have been likely to have been some of those factors [14].

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