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## **Bilingualism and Its Importance in Human Life**

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**Abstract**--This article contains bilingualism and its importance in human life, as well as the benefits of bilingualism for children, skills, and recommendations for identifying their ability to be bilingual or to develop their language skills. Thus, children have the ability to accept external stimuli, creating them to form their thoughts in order to recognize similar sounds which together form words and phrases that allow them to easily express thoughts and feelings over the years.

**Keywords**--bilingualism, express thoughts, language ability, language skills, second language.

### **Introduction**

Language is a human-specific mechanism. Language ability has allowed us to transmit knowledge and develop as a species. According to Chomsky, one of the most famous linguists today, who created a theory of language that demonstrated a revolution in this field of education, said that man has an innate ability to master a language. Thus, children have the ability to accept external stimuli, creating them to form their own thoughts in order to recognize similar sounds which together form words and phrases that allow them to easily express thoughts and feelings over the years.

Some children, on the other hand, develop bilingualism from an early age. Bilingualism - perfect knowledge of 2 languages or a particular literary language and its dialect. It occurs for social demand or for some reason. Its natural formation is also due to the fact that two or more peoples live in the same state. The bilingual human brain has several significant advantages. Some can even be seen: the gray matter has a higher density. In addition, the use of a second language increases the activation of certain parts of the brain. We can call this brainwashing.

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Historical and cultural factors have contributed the most to the emergence of bilingualism. More specifically, factors related to the opening and establishment of new borders between countries, for example:

- Territorial expansion of certain nations and cultures. It was so in Latin that its proliferation dramatically increased the number of bilingual speakers of this millennial language.
- Political association by consensus in order to facilitate lingua franca communication. For example, English has risen to the level of academic excellence.
- The post-colonial situation also contributed to the colonizers forcing their language on the conquered villages, which should not have mastered their mother tongue.
- Immigration. People who have moved to another country must learn the language of their place of residence.
- Cosmopolitanism has led to an increase in bilingual intermediaries or traders.

Today, the cognitive advantages of bilingualism seem very clear. But at the time, it surprised experts. Until the 1960s, bilingualism was considered a barrier to child development because it used up the energy needed to constantly switch between languages. This view was based primarily on erroneous scientific work. Recent research has shown that multilingualism can lead to the development of decision-making skills, the ability to switch between tasks, and the ability to concentrate.

Today, about 5,000 languages are used in nearly 200 sovereign states (or 25 languages for each state), so citizens of many countries around the world require open (not many) languages, in fact, David Crystal (1997) estimates that two-thirds of children in the world grow up in a bilingual environment. Statistics obtained by Crystal show that approximately 570 million English-speaking people, more than 41% or 235 million are bilingual in English and other languages. Most people are convinced that bilingualism/multilingualism - which, of course, is often used in many cultures - dominates the world today and is increasingly the future”.

Many representatives of Uzbek classical literature (Middle Ages) were fluent in both Uzbek and Persian. For example, AlisherNavoi was fluent in his native language, Turkish, as well as Persian. He collected his works in this language and composed a devan (“DevaniFoniy”). This divan was highly praised by Persian language poets, especially Jami.

Bilingual writers still meet. In particular, the famous Kyrgyz writer ChingizAitmatov is fluent in Kyrgyz and Russian. In general, bilingualism as a social phenomenon is an important factor in the enrichment and development of languages, the growth of the universal cultural level. Any interaction of languages requires bilingual people. In the Republic of Uzbekistan, the Russian language is widely studied and has its own place and place in the life of the country. Since the majority of the country's population speaks Uzbek and Russian, they can be called bilingualists. Along with Russian, other foreign languages are also taught.

## Methods

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The origins of various myths about bilingualism go back to research conducted in the United States and Great Britain during the First and Second World Wars. The study involved children from war-torn countries - refugees, orphans, and, in some cases, children in concentration camps, whose quality was very low. Their schooling had been interrupted for several years. Some of them (mentally, physically) may have been traumatized, and at that age, they were involved in research and experiments to measure verbal skills. It is not surprising that these children showed very low results in these experiments. It was not until the 1960s, when scientists at McGill University in Montreal, Elizabeth Peel and Wallace Lambert, published the results of a very important study of their own, that attitudes toward the subject began to change. They found that bilingual children not only did not lag in mental (cognitive) comprehension or mental retardation but in fact this trait was mentally superior and beneficial. Many families choose to teach their children to speak two languages for cultural reasons, whether for educational purposes or to enrich their life experience (Siegal et al., 2009; Vega-Mendoza et al., 2015). Even if you have two languages under the bracelet, you can still have great skills in general, a study shows that this is of great benefit, especially for babies’ brains. Previous research has confirmed that cognitive ability has the benefit of being bilingual, especially as problem-solving. Knowledge of both languages has economic, social and communicative benefits. Short quotations (less than 40 words). The American Speech-Language Learners Association outlines several important advantages of being bilingual:

- Ability to quickly learn new words;
- Teach them how to form words with their sounds as they learn to read;
- Improving the ability to learn new information;
- Category grouping;
- Problem-solving;
- Improving listening skills;
- Sincerity and interdependence to people who speak the same language.

Today, about 12 percent of children over the age of 5 are bilingual, but experts estimate that the number of bilingual individuals will continue to grow. Thus, parents may consider teaching a baby a second language too early, as studies have shown that learning a second language at an early age is much easier. It is

easier for a child to learn two languages at the same time than for an adult to try to learn a second language later in life (Putrayasa, 2021; Schweizer et al., 2012).

While many parents and professionals know the benefits of learning two languages for their children (or more) teaching children to learn two languages can be a little tricky. Babies growing up in bilingual families by parents or caregivers are second and easier to learn. However, children who do not have the preferences of a bilingual parent or caregiver may still benefit from learning two languages (Latupeirissa, 2019; Pulatova & Mamajonova, 2020).

To try to determine how much a child is affected by the second language they need to learn the language, experts in Madrid conducted a study to study ways to teach English to children aged 7 months to 33.5 months in Spain. Specialists trained children in four children's education centers in Madrid, where hourly group English language sessions are held by tutors who teach English in the primary four languages. The session lasted a total of 18 weeks. The study found that, in addition to other methods of teaching English, children in children's group sessions also understood new words and English more than their peers, even 18 weeks after reading. This early exposure in an environment that was the basis for play with the reader helped to increase the brain's ability to retain the logical language.

One study found that how babies feel when they hear words is related to their language until the first 12 months. Babies are born with the ability to hear sounds from any language of babies, but as they approach their first birthday, they become the center of attention, so they only begin to "hear" sounds in their main language. The key to learning a second language in your child's infancy is that the networks and pathways of their brains are not yet fully formed, so their brains can set up a "network" for both languages that are babies at the same time. The adult brain can not. So, especially before the first birthday, it is important to react as quickly as possible to both languages that your child wants to learn. If you delay this deadline, don't worry (Costa et al., 2008; Hernandez et al., 2005). Children who are exposed to two languages before the age of 5 also benefit greatly in brain development.

According to researchers, a baby learns to be bilingual with the quantity and quality of the second language he or she speaks around. Unlike a video or streaming service that teaches a second language, babies learn the best in personalized settings (Bialystok et al., 2012; Bialystok et al., 2012). Research has shown that infants learn the language for 9 months, and especially in play-based language sessions, as well as in a natural environment at home.

Another previous study showed that 12 sessions over 5 weeks - only 6 hours of foreign language exposure - required infants to move on to identifying brain development pathways for learning a second language. (Yes, babies' brains are amazing.) There is a basic connection between social environment and language, so children love to learn in a social or play environment.

## Results and Discussions

In this study, teachers also used infant-focused speech, as parents and caregivers naturally use it when speaking to infants with simple grammar, loud, and long writing sounds. This natural way of talking to babies helps their brains learn the language better. If possible, it's best to put the baby into two languages as soon as possible, as babies' brains begin to focus on one type of language as they age. However, children's brains can still learn and retain language better by the age of five. All children benefit from brain development if they are exposed to two languages, so don't be afraid to encourage your child to learn a second language, regardless of age. Babies learn well through play, and a group session or tutoring session with a real person is the most effective way to teach your child to learn a second language without you knowing the second language (Bialystok & Barac, 2012; Bialystok et al., 2007).

The relationship between mother and child is the best prototype of communicative exchange. Over the course of a few months, the mother interprets the signals (crying, screaming, laughing) that the baby sends, which becomes words. Gradually, the mother begins to turn into some kind of mirror for the adult baby. When the mother makes a sound, the child reproduces it. When he gestures, the child tries to imitate him. Thus, the ludic exchange begins to develop, which helps the baby to understand and expand his knowledge of the world gradually and incomprehensibly (Bak et al., 2014; Bhatia & Ritchie, 2014). Therefore, the interrelationship between mother and baby determines the appearance of this language and the level of its child. The types of communicative interactions produced between the two change and develop as the child grows.

There are two main aspects in the development of bilingualism in children: their environment and their stage of maturity. Accordingly, there are two types of bilingual language:

- **At the same time:** The child learns two linguistic systems at the same time. Typically, this happens when parents speak two languages every day;
- **Next:** The child has only one language in childhood. Once they master it, they learn a second language. For example, English lessons at school.

It is very difficult to achieve proper bilingualism. There is a language that is always evolving and more important than any other. The more similar a mother tongue and a foreign language are, the easier and faster the learning process will be. Studies have been performed in 6-month-old infants using filtration methods to prove the early maturity of bilingualism (De Groot & Kroll, 2014; Sorace, 2011). This does not mean that they can distinguish the phonetic details of a language. However, they know how to separate prosodic information (intonation, rhythm). This turns 6-month-old babies into potential polyglots. Keep in mind that this ability decreases with age because it is not considered a skill necessary for survival. According to Mariscal, some social, cognitive, and linguistic factors need to be given for a bilingual child to be positive:

- Achieve a high and sufficient level of knowledge in two languages;

- Good development of the first language in school and learning the second language system;
- High expectations and positive attitudes from the child's relatives and teachers regarding their integral development;
- Good social reputation in both languages.

Cognitive benefits of bilingualism: Numerous studies have shown that the prefrontal and dorsolateral cortices of bilingual children have improved executive functions. This allows them to perform identified tasks quickly and efficiently where they need these high skills. In addition, they tend to better isolate environmental stimuli, making it easier for them to ignore classroom noise. This makes it easier for them to focus on what they are learning. They also have a b that allows them to “soften the effects of age,” delaying their intellectual deterioration (Kroll et al., 2015; Altarriba & Heredia, 2018). As you can see, the benefits of speaking multiple languages are not limited to linguistics. Effective development in an intercultural and multilingual environment is the result of knowing how to take advantage of the adaptive opportunities that nature offers us. From the point of view of language psychology, bilingualism is a very positive thing. However, people didn't always think like that. Until the 60 s, people thought it would hinder the intellectual development of children. They had to translate what they heard and read into both languages at the same time, and it was believed to be a waste of time and effort.

Bilingualism has been proven to benefit rather than endanger our learning process. The benefits of bilingualism are clear not only in children but also in adults. Learning a new language slows down cognitive deficits. Elvira Lopez, communications director at Colegio Brains, clarified the most common doubts parents have about bilingual education for children and its benefits. In this regard, parents who are able to provide their children with a bilingual environment will help them in the future to develop easily in multiple languages and learn new languages in a short period of time (Kroll et al., 2015; Oksaar, 2019). Some benefits of bilingualism:

- Opportunity to talk and communicate with more people around the world. Those who can speak more than one language do not experience a language barrier when they visit some countries in the world that speak another language. In an instant, if you learn and learn Spanish, it will help you to communicate without any problems when you travel to some continents of the world.
- Those who have the opportunity or ability to express themselves in languages other than their own can learn the culture of other people in the world. Language is part of the culture. Your language will portray your culture more remotely. Some people's critical thinking skills improve as they learn to see the world through a different cultural lens. Therefore, when you visit other cultures and interact with more people, you can become a tourist. Travel more like a local, at home. It shows the power of language.
- Keeps the brain's functioning process in one mold. The more you engage the brain, the more efficiently it works. The interesting advantage of learning another language is that it keeps your brain very sharp, creating new

insights and good ways. This allows language learners in most cases to quickly switch between two tasks or cognitive functions. Studies also show that speaking two languages reduces the chances of developing dementia. Learning languages also improves your memory and slows down age-related forgetfulness!

- Increases leadership skills in the workplace. Today, large corporations and international organizations like to hire workers who speak or communicate with them in languages other than English. This is one of the advantages of bilingualism. According to MIT economist Albert Saiz, those who can speak more than two or three languages in the workplace have the added advantage of knowing Spanish, which pays a whopping \$ 51,000 in your bank account for the rest of your life. At one point, only 20% of Americans speak Spanish, which is becoming the language of demand for Americans in the job market, employers are looking for a very impressive resume, and being bilingual or multilingual is a powerful and perfect way to learn, stand out from your CV and excel among others in a strong competitive job market, so if you want to be bilingual in Spanish or other languages to enhance your skills and opportunities in the job market or a language for cultural experience or exposition, you can strive to fulfill the courageous task of striving for fluency there is a lot of knowledge.
- Ability to make wise decisions or think well. Speaking another language helps you make more wise decisions as an individual. People with multiple languages have the ability to pay more attention to information than their feelings or beliefs. Learning another language sometimes helps to think correctly.
- Speaking another language allows you to face life in a whole new way. By learning multiple languages, you will understand life better. Speaking other languages allows you to communicate with different people and understand the nuances of other cultures around you. This can lead to additional opportunities to make friends and make a good impact on different hobbies and different lifestyles.
- Knowing two or more languages may be an advantage if you want to work in a job such as being a Peace Corps or international service officer in a foreign mission. Knowing a second language can open up new career opportunities. Bilingualism can increase your competitiveness in the job market.
- Speaking two languages can slow down the effects of aging in people. There are vital benefits of being bilingual. For example, cognitive flexibility [is the ability to adapt to an unfamiliar or unexpected situation]. As we grow throughout our lives, those who are prone to decline and have the advantage of speaking a second language can easily block this decline or at least delay it significantly.
- Another major advantage is related to the concept of performance function in the broadest sense. It includes the ability to control, direct, and one's attention, as well as one's ability to plan. It also helps you avoid unnecessary information and focus on important information. Because a bilingual person has mastered these languages and these languages are automatically activated unconsciously, he is constantly monitoring the confusion, such as not having to say a word in one language in another language and in the wrong place and time. The parts of the brain that respond to such control also work when distractions occur during a task.

This task may not be related to language at all; it could be trying to listen to something in a noisy environment or doing a virtual task. Advanced bilingual automation (muscle memory) can also be used for a variety of tasks.

We see those bilingual children, though not always, have advantages. Also, in the case of minors, such as those in their 20s, it is becoming increasingly difficult to see and identify such advantages. There is a rationale for this in terms of brain growth. During childhood, the human brain continues to develop, but as it reaches the early stages of puberty, the human brain reaches a peak of development, and bilingualism does not give the human being much additional advantage.

For a long time, the idea was that the only way to learn a language well was to learn it at a young age. That is, it is believed that a person will not be able to master the language fluently after reaching adulthood. In this case, a person's speech and pronunciation are always influenced by the dialect of his language. Today, we know that this idea is not true, because as we grow older, more and more people are learning foreign languages and mastering them very well. This has prompted researchers to re-examine what are the factors that differentiate learning a foreign language in childhood (Wei, 2020; Antoniou, 2019). The information that an adult who works in two jobs and attends a language course at 7:00 pm will receive will be different from the information that the child will receive from his or her mother, grandmother, father, and other primary caregivers. Ultimately, the difference between language learners in childhood and adulthood is probably due to a combination of two factors, such as adaptability and context. Of course, there are also differences in each person and circumstances. When the same conditions are created for different people, some will prosper and others will suffer.

Previous research has shown that the human brain begins to decline at about the age of 25 in terms of work memory, efficiency, processing speed, and similar abilities. And for some as a baby gets older, he or she will outgrow this. As the debate progresses, bilingualism will stop this decline and slow it down. Examples and evidence from older people are the strongest arguments in favor of bilingualism (second only to children). Psycholinguists are currently researching to determine whether learning a foreign language by teaching people a foreign language to people 65 and older can help the brain function healthier even at such a late stage of human life (Hoffmann, 2014; García & Wei, 2014). They are studying whether they can help people in their old age by learning the language. At the same time, the question of whether this situation will benefit the person in terms of the “use it, otherwise you will lose” approach is also being studied. Preliminary data indicate positive results. Learning a language later in life is likely to have a positive effect on cognitive achievement.

The Royal Spanish Academy defines the concept of bilingualism as “the usual use of two languages in one region or one person”. This concept gives relatively abstract results and does not help parents distinguish bilingual education from non-bilingual education. It is the ability to use in any situation without any intervention and with full authority. This degree represents Perfect Bilingualism.

This is very clear until they are seven years old, at which point the speed at which they learn begins to decline. The fact that children are exposed to multiple languages from birth makes them more comfortable learning new languages in the future (Norkuzieva, 2021; Rafiyev, 2020). Through this process of voice recognition, babies retain more recognizable sounds under the influence of a bilingual environment. Thus, as they grow older, they learn both languages more easily because they have registered phonemes, which they will have to pronounce when they want to convey a message in one language or another.

## Conclusion

In conclusion, learning and using a language is a complex process - it is one of the most complex activities that a human being can do, and it involves many levels. You have to work with sounds, syllables, words, grammar, sentences, syntax. Not much is being done; in fact, it's all a processing task for a vast brain network. These parts of the brain are suitable to replace the aging parts of the brain that are showing signs of disease or suffering from neurological pathology. As a result, we argue that learning a second language may be the optimal activity for healthy aging.

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## References

- Altarriba, J., & Heredia, R. R. (Eds.). (2018). *An introduction to bilingualism: Principles and processes*. Routledge.
- Antoniou, M. (2019). The advantages of bilingualism debate. *Annual Review of Linguistics*, 5, 395-415. <https://doi.org/10.1146/annurev-linguistics-011718-011820>
- Bak, T. H., Nissan, J. J., Allerhand, M. M., & Deary, I. J. (2014). Does bilingualism influence cognitive aging?. *Annals of neurology*, 75(6), 959-963. <https://doi.org/10.1002/ana.24158>
- Bhatia, T. K., & Ritchie, W. C. (Eds.). (2014). *The handbook of bilingualism and multilingualism*. John Wiley & Sons.
- Bialystok, E., & Barac, R. (2012). Emerging bilingualism: Dissociating advantages for metalinguistic awareness and executive control. *Cognition*, 122(1), 67-73. <https://doi.org/10.1016/j.cognition.2011.08.003>
- Bialystok, E., Craik, F. I., & Freedman, M. (2007). Bilingualism as a protection against the onset of symptoms of dementia. *Neuropsychologia*, 45(2), 459-464. <https://doi.org/10.1016/j.neuropsychologia.2006.10.009>
- Bialystok, E., Craik, F. I., & Luk, G. (2012). Bilingualism: consequences for mind and brain. *Trends in cognitive sciences*, 16(4), 240-250.
- Bialystok, E., Craik, F. I., & Luk, G. (2012). Bilingualism: consequences for mind and brain. *Trends in cognitive sciences*, 16(4), 240-250. <https://doi.org/10.1016/j.tics.2012.03.001>

- Costa, A., Hernández, M., & Sebastián-Gallés, N. (2008). Bilingualism aids conflict resolution: Evidence from the ANT task. *Cognition*, 106(1), 59-86. <https://doi.org/10.1016/j.cognition.2006.12.013>
- De Groot, A. M., & Kroll, J. F. (Eds.). (2014). *Tutorials in bilingualism: Psycholinguistic perspectives*. Psychology Press.
- García, O., & Wei, L. (2014). Language, bilingualism and education. In *Translanguaging: Language, bilingualism and education* (pp. 46-62). Palgrave Pivot, London. [https://doi.org/10.1057/9781137385765\\_4](https://doi.org/10.1057/9781137385765_4)
- Hernandez, A., Li, P., & MacWhinney, B. (2005). The emergence of competing modules in bilingualism. *Trends in cognitive sciences*, 9(5), 220-225. <https://doi.org/10.1016/j.tics.2005.03.003>
- Hoffmann, C. (2014). Introduction to bilingualism.
- Kroll, J. F., Dussias, P. E., Bice, K., & Perrotti, L. (2015). Bilingualism, mind, and brain. *Annu. Rev. Linguist.*, 1(1), 377-394. <https://doi.org/10.1146/annurev-linguist-030514-124937>
- Kroll, J. F., Dussias, P. E., Bice, K., & Perrotti, L. (2015). Bilingualism, mind, and brain. *Annu. Rev. Linguist.*, 1(1), 377-394. <https://doi.org/10.1146/annurev-linguist-030514-124937>
- Latupeirissa, D. S. (2019). Naturalness of verbs in Kupang Malay language. *Linguistics and Culture Review*, 3(1), 60-69. <https://doi.org/10.37028/lingcure.v3n1.12>
- Norkuzieva, Z. (2021). CLIL (CONClil (content language and integration learning), the formation of foreign language competence in the field of cognitive bilingual professional communication tent language and integration learning), formation of foreign language competence in the field of cognitive bilingual professional communication *Societyandinnovation*, 2(2/S), 325-332
- Oksaar, E. (2019). Bilingualism in *Current trends in linguistics*, DeGruyter Mouton, 476-511
- Pulatova, G. & Mamajonova, S. (2020, December). Developing children's speech in a foreign language theoretical analysis in *Conferences*.
- Putrayasa, I. B. (2021). Political language variation: stylistic based study. *Linguistics and Culture Review*, 5(1), 1-9. <https://doi.org/10.37028/lingcure.v5n1.45>
- Rafiyev, F. (2020). Psychological basis of foreign language teaching, *Archive of Scientific Publications JSPI*.
- Schweizer, T. A., Ware, J., Fischer, C. E., Craik, F. I., & Bialystok, E. (2012). Bilingualism as a contributor to cognitive reserve: Evidence from brain atrophy in Alzheimer's disease. *cortex*, 48(8), 991-996. <https://doi.org/10.1016/j.cortex.2011.04.009>
- Siegal, M., Iozzi, L., & Surian, L. (2009). Bilingualism and conversational understanding in young children. *Cognition*, 110(1), 115-122. <https://doi.org/10.1016/j.cognition.2008.11.002>
- Sorace, A. (2011). Pinning down the concept of "interface" in bilingualism. *Linguistic approaches to bilingualism*, 1(1), 1-33. <https://doi.org/10.1075/lab.1.1.01sor>
- Vega-Mendoza, M., West, H., Sorace, A., & Bak, T. H. (2015). The impact of late, non-balanced bilingualism on cognitive performance. *Cognition*, 137, 40-46. <https://doi.org/10.1016/j.cognition.2014.12.008>
- Wei, L. (Ed.). (2020). *The bilingualism reader*. Routledge.

- Werker, J. F., & Byers-Heinlein, K. (2008). Bilingualism in infancy: First steps in perception and comprehension. *Trends in cognitive sciences*, 12(4), 144-151. <https://doi.org/10.1016/j.tics.2008.01.008>
- Zied, K. M., Phillippe, A., Karine, P., Valerie, H. T., Ghislaine, A., & Arnaud, R. (2004). Bilingualism and adult differences in inhibitory mechanisms: Evidence from a bilingual Stroop task. *Brain and cognition*, 54(3), 254-256. <https://doi.org/10.1016/j.bandc.2004.02.036>