

# Can late bilinguals have the same advantages in cognitive ability as early bilinguals?

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## Instructions

Have you ever lived in a foreign country in your adulthood? Are you struggling to use your second language in its native environment even though you have already acquired some level of proficiency? Do you feel that you are losing confidence because of the difficulties of learning a second language in your adulthood? Hold on, do not lose it yet! You still have the potential to master a second language and benefit from being bilingual. After I came to the University of Minnesota, I have found many bilingual students who seem “smarter” than monolinguals: They can switch between different languages with no difficulty and even have more elaborate minds than monolinguals. So do these signs of intelligence have some relation with bilingualism? Before 2010, most of the research on bilingual effects focused on the effects of early bilingualism compared to monolingual. Evidence from these studies has shown that the advantages of bilingualism are not limited to the linguistic performance; they can also be found in cognitive performance. However, there are more than one type of bilingualism. An early bilingual learns two languages at the same time and becomes proficient in using both of them from birth or in their childhood; while a late bilingual might start learning a second language in his early adulthood. Here, one thing we should note is that bilingualism is not just about learning two different languages but also about the immersion in two different language environments. Given that there is a large population of late bilinguals who do not have opportunities to be immersed in their second language environment since a very young age, it seems more relevant to know whether late bilinguals can gain the same cognitive benefits as early bilinguals. In this paper, I will compare the cognitive abilities between early and late bilinguals to determine if late bilinguals can have the same cognitive benefits as early bilinguals.

## How Does Bilingualism Benefit Human Cognitive System?

Bilingual individuals, either early or late, may have better development in executive functioning than monolinguals. Executive function, also called cognitive control, refers to a cluster of mental processes that help people flexibly adjust thoughts and behaviors across different themes called domains, which allows individuals to adapt to new regulations and inhibit task-irrelevant information in an environment that constantly changes (Miller & Cohen, 2001). To be specific, executive control has many aspects, including attention switching, inhibitory control, selective attention, and task shifting (Bialystok & Craik, 2010). When learning a second language, bilinguals are required to avoid using their native language

production system, thus developing a greater awareness of confining their language production to the relevant linguistic system. The dorsolateral prefrontal cortex (DLPFC), a brain region associated with cognitive skills like attention and inhibition, is stimulated and activated by such brain activities (Hernandez, Martinez, & Kohnert, 2000). As bilinguals are constantly exposed to a different language environment, their DLPFC gets developed and, consequently, their non-verbal skills such as executive control improve. An example of DLPFC function can be seen in a task called Dimensional-Change Card-Sort Task that requires the ability of inhibitory control (Zelazo, Frye, & Rapus, 1996), which was applied to 4- and 5-year-old children in Bialystok and Martin’s research (Bialystok & Martin, 2004). In this task, participants switch from sorting cards by color to sorting them by both color and shape. The result has shown that bilinguals perform better in sorting the cards by two dimensions after the second dimension is introduced to the task. That is to say, bilinguals can better inhibit the irrelevant information than monolinguals. In addition, another illustrative experiment by Bialystok and Martin (Bialystok & Martin, 2004) found that bilinguals are able to respond faster to the target than monolingual with the disturbance of irrelevant information. This effect is known as the Simon effect. Bialystok and Craik (Bialystok & Craik, 2010) added that because the act of switching between two different languages is one of the most common tasks inherent to second language acquisition, this advantage not only develops quite early in the process of second language learning but also benefits bilinguals throughout their lifespan. This implies that bilingualism may protect against degenerative brain disorders such as Alzheimer’s. All of this evidence verifies that changes in the brain region affected by bilingualism improve the cognitive system in bilingual brains.

## The Differences in Cognitive Benefits Between Early and Late Bilingualism

In general, early and late bilinguals both have a more developed cognitive system than monolinguals. However, the cognitive system might be slightly different between these two types of bilingualism considering the differences in the onset age and the methods of second language acquisition between early and late bilinguals.

## The overall degree of cognitive advantages

First of all, what and how many cognitive benefits can be gained by bilinguals depend on when an individual starts learning a second language and how long that individual is exposed to a foreign language environment. Research by (Vega-Mendoza, West, Sorace, & Bak, 2015) applied a task in which

bilingual beginners (students in their first year of learning a second language) and proficient bilinguals (students in their fourth year of learning) need to recognize the direction with the given low and high tones. This task requires them to shift their attention from low tones to high tones, which relates to the attention switching ability. The results has shown that late bilinguals in their fourth year of learning perform better than those who are in their first year of second language exposure, indicating that late bilinguals have a chance to experience cognitive effects similar to those of early bilinguals. That is, no matter when one starts learning a second language, as long as one reaches a certain level of proficiency, one can gain the benefits of that stage. However, another experiment by (Luk, De Sa, & Bialystok, 2011) found that the earlier one learns a second language and becomes an active bilingual, the more cognitive benefits one will gain. This means that late bilinguals experience fewer cognitive benefits than early bilinguals even when they reach the same level of language proficiency. Although it seems that these two studies contradicted each other, they actually do not. The relevant variable in the first study is the length of time one is exposed to different languages. Comparatively, the relevant variable of the second study is the age at which one becomes an active bilingual or uses two languages actively on a daily basis. On balance, perhaps it would be more convincing to combine these two variables together considering that the second study takes the age-related advantage of learning a second language into account. In this case, when a late bilingual moves to another country and starts being an active bilingual, it means he could experience similar cognitive benefits that emerge at certain stages of the language acquisition process. The earlier one becomes an active bilingual, the more benefits one will gain. But this does not mean that late bilinguals will miss some types of cognitive ability development. He could still have all kinds of bilingual cognitive abilities exercised. The difference just exists in the degree to which those abilities are developed.

### **The varying degree of specific cognitive abilities**

Secondly, and more specifically, even if they experience similar cognitive benefits, early and late bilinguals do not perform uniformly on all attentional tests because of the difference in the methods of their second language acquisition (Bak, Vega-Mendoza, & Sorace, 2014). Early and late bilinguals have different advantages over each other, with early bilinguals being better at attention switching and late bilinguals being better at selective attention (Tao, Marzecová, Taft, Asanowicz, & Wodniecka, 2011). The reason for this is that these groups experienced different types of language acquisition and processing. For example, early bilinguals are exposed to a two-language environment from birth, so they need to frequently switch between two languages when talking to their relatives at home and their classmates in school. This situation occurs on almost every early bilingual. As time goes by, they develop a strong ability to switch between two different languages.

In contrast, for late bilinguals, learning a second language occurs after the consolidation of their native languages. At the beginning of the second language acquisition process, they are unbalanced bilinguals who have not reached a proficient level of their second languages, and perhaps most of them struggle to avoid using their native dominant language. Take me, for example. As a late unbalanced bilingual who first came to the U.S., when something unexpected suddenly happens to me, I will blurt out a word or a sentence in Chinese rather than in English, even though I may be talking to an English speaker. This is the kind of task that requires the ability of inhibitory control rather than attentional switching. Late bilinguals need to avoid using their native dominant language in such a second language environment. Thus, this way of language acquisition and production exercises the specific cognitive ability: selective attention. To put it simply, different ways of language acquisition result in different degrees of cognitive effects.

### **An Exception to the Cognitive Advantages of Bilingualism**

Being bilingual is not all positive. In fact, there are also some disadvantages of being bilingual and most of them are in the lexical or vocabulary aspects. For instance, monolinguals are better at recalling words because of the more frequent use of their only language (Vega-Mendoza et al., 2015). But these disadvantages are not related to the cognitive aspect of the bilingualism effects. With regard to the cognitive disadvantages, there has not been much evidence shows the differences in cognitive costs between early and late bilinguals. However, the interesting thing is that some advantages and disadvantages can be converted to each other under certain conditions (Treccani, Argyri, Sorace, & Della Sala, 2009). That is to say, the advantages and disadvantages are relative considering different conditions. For example, the bilingual advantage of inhibiting irrelevant information might turn into a disadvantage in other conditions such as negative priming task. In this task, volunteers were expected to find the target that had been viewed as distractors previously. It has shown that although bilinguals can find the targets faster with the disturbance of distractors than monolinguals in the first ‘finding targets’ task, they fail to perform better in the following ‘finding distractors’ task. This is because the bilingual group paid more attention to the target in the first task and even completely neglected the existence or features of those distractors. In contrast, despite the monolingual group is less attentive than their bilingual counterpart in the first task, they might notice some features of those distractors. As a result, the monolingual group showed a comparative advantage over bilingual group in the following ‘finding distractors’ task. Generally, we tend to attribute the inhibitory control to one of the bilingual cognitive benefits, but it is not always the case. This nuanced finding allows later scientists to evaluate the cognitive effects in a more critical way. Whether the cognitive effects are good or bad depend on what kind of tasks

one are dealing with. Strictly speaking, we cannot attribute those cognitive abilities affected by bilingualism to the bilingual benefits. Rather, we should apply those cognitive abilities to different situations or tasks and evaluate their roles in the specific situation.

## Discussions and Future Research

As we have seen, bilinguals, whether early or late, tend to have more developed cognitive abilities than monolinguals. With regard to the differences in cognitive benefits between early and late bilinguals, they might be found in many different aspects and conditions, even though they can be very nuanced. On the one hand, the length of time and the onset age of being active bilinguals are the main factors that influence how many cognitive advantages one can gain. Even if a late bilingual could experience the same advantages throughout the second language acquisition process as an early bilingual, there exists a difference in the general degree of those advantages. The earlier one becomes an active bilingual, the higher degree of those cognitive benefits he could gain. On the other hand, the nuanced difference can also be found in the degree of some specific cognitive benefits. For example, it appears that selective attention tends to benefit late bilinguals over early bilinguals. This finding provides us with a more objective view of the bilingualism impacts: Not all cognitive benefits belong to early bilinguals. In general, late bilinguals may have all kinds of cognitive abilities that affected by bilingualism developed throughout the learning process. The nuanced differences exist in the general degree of those cognitive advantages and the degree of some specific cognitive benefits. It seems that late bilinguals could gain those bilingual cognitive advantages only if they become active bilinguals and achieve a proficient level of their second language. However, what is still unclear is whether there exists an exact crucial period of being an active bilingual in which cognitive advantages are found only before that period. If yes, what are those advantages? This will contribute to exploring more cognitive differences between early and late bilinguals. Thus parents may grasp the opportunity to raise their children bilingual before that period in order to let them enjoy those cognitive benefits that late bilinguals cannot have. However, if you unfortunately miss the opportunity and have moved to a foreign country in your adulthood, you should keep yourself being exposed to your foreign language environment. In this case, you could become an active bilingual and thus you could get your cognitive abilities developed through the constant language immersion. The most important thing for you is to do it right now so as to grasp the age advantage and develop your cognitive abilities as much as possible!

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