



Research Article

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Bilingualism and Intelligence: An Examination with a View of Peal and Lambert's Study: The Relation of Bilingualism to Intelligence

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Abstract

Bilingualism is based on a description of the linguistic situation in a speech community that consists of colloquial and standard language, ultimately resulting in the existence of two different languages that are used alternatively in speaking, writing, listening, and reading. The acquisition of another language will cause changes on the brain. Studies have been inquiring into the pros and cons of having two or more different languages. The study of Peal and Lambert supported significant structural changes involved in the acquisition of another language form, and that it guaranteed the enhancement of intellectual capacity, cognitive ability, and intelligence. The present study aims to shed light on the effects of bilingualism on the intellectual functioning in the brain and the life of bilingual as a whole. It adopted the descriptive method of the relation of bilingualism to intelligence. The study concluded that bilingualism could enhance life by improving cognitive abilities. It recommends conducting further studies to explore bilingualism, intelligence, and other areas, including passive vs. active, sequential vs. simultaneous, and receptive vs. productive bilingualism.

Keywords: *Bilingualism, Intelligence, E. Peal and W.E Lambert, Additive, Subtractive*

1. Introduction

It is generally believed that more than half of the world's population is bilingual (Grosjean, 2010). It facilitates cross-cultural communication and positively affects cognitive abilities (Marian & Shook, 2012). Thus, bilingualism has drawn global attention, especially in relation to the development of cognitive capabilities. Bilingualism is highly significant in the contextual and experiential variables that are currently investigated by research into child development, especially cognitive development in terms of prevalence, intensity, and distribution (Bialystok & Werker, 2017).

It seems at first glance that the explanation of how bilingual minds operate is an easy task, but the nature of bilingual development is still a mystery that needs further exploration. The research about the brain of bilinguals and its impact on their intelligence, in comparison with monolinguals, has arisen from the growing interest in bilingualism over the last few decades to synthesize available studies systematically and arrive at significant conclusions thereon.

Many authors believe that bilingualism helps, among other things, promote social competence (Howard et al., 2018) and triggers academic performance (Esposito, 2020). Xia et al. (2022) report a

correlation between bilingualism and creativity. Bilingual children demonstrate better planning and organization skills, such as task-switching and inhibitory control, compared to monolingual children (Ali, 2023). Furthermore, Ortiz et al. (2011) report that bilingualism helps teachers prevent inappropriate referrals of language learners to special education.

This paper starts with a definition of bilingualism; then, a fairly comprehensive view of the phenomenon is provided. Next, the structural changes that occur in a bilingual's brain are explored, encapsulating the findings of previous research about the positive and negative effects of bilingualism on cognitive and intellectual ability.

2. Method

The present study adopted the descriptive method. It reviews bilingualism in terms of prevalence worldwide and definition. It delves into the brains of bilinguals and the structural changes of bilingualism. It also highlights the negative and positive aspects of bilingualism. It shows how the study of Peal and Lambert agrees or disagrees with the findings of the literature. It concludes with the findings.

3. Significance

The present study is significant because it reviews the relevant literature comprehensively. It relates bilingualism to intelligence, supporting the findings that there is a positive relation between both aspects. Conducting studies like the present one may help advance the field of research on bilingualism by linking it to cognitive and non-cognitive fields.

4. An Overview of Bilingualism

According to Leikin et al. (2012), bilingualism as a phenomenon must cover social, cognitive, and linguistic aspects and incorporate such fields of knowledge and disciplines as linguistics, sociolinguistics, education, and cognitive psychology (De Groot, 2011). Children mostly grow bilinguals not because of attending schools but because they speak their native language and may tackle another on the street, in school, etc. However, bilingual infants readily distinguish their two languages and show no evidence of confusion (Byers-Heinlein & Lew-Williams, 2013). Currently, the world's monolinguals, who are the minority, as the majority of the world's population, grow up speaking more than one language (Ortega, 2009). Learning a second language differs from children to adults, but overall, adults can be just as good as second language learners as children (Kerschen, 2022).

Bilingualism is defined as having another learned language to the already native tongue. The definition has to address categories and scales relevant to factors such as proficiency and function. According to Bhatia and Ritchie (2006), early linguists suggested some alternative definitions of bilingualism to tether this vague term. The study points out that Bloomfield (1935) considered bilingualism the result of the addition of a "perfectly - in a relative way" learned foreign language to one's own language without damaging the original one. On the other hand, Weinreich (1968) defined it as the switch between two languages. Comparing these two definitions, the study found that Weinreich's explanation focuses on the alternative use of two languages, whereas Bloomfield's definition specifies bilingualism as the "native-like control" of two linguistic systems.

Previously, Kaye (2001) demonstrated that the term *bilingualism* is a literal translation of the French word *diglossia*. He stated that Ferguson's (1959) original point of view about bilingualism sharply diverges from diglossia. Thus, bilingualism is the use of two distinct languages side by side throughout a speech community with an obviously specific role; however, some particular approaches consider bilingualism behavior to be diglossic. Yet, it is useful to think of diglossia as the existence of two varieties of the same language, one high and the other low, each restricted to certain

domains. However, in drawing a distinction between subtractive and additive bilingualism, Lambert (1981) noted that learning a second language can either lead to bilingualism or monolingualism as the home language erodes.

From its nature to its outcomes, it is essential to shed light on the effects of bilingualism on the intellectual functioning of the brain, which is the purpose of this paper. Ferguson (1959) hypothesizes that human abilities and capacities are learned and acquired through experience. Factors of intellectual development are gradually shaped by groups of situations (that could be dubbed *scripts* or *frames*) that differ from one individual to another; therefore, the development processes for monolinguals and bilinguals are not the same since they are exposed to distinct linguistic systems and different linguistic environments. Accordingly, the cognitive ability of monolinguals and bilinguals will not be identical.

5. A Bilingual's Brain

Psycholinguistics, as argued by Cook and Bassetti (2011), mixes both psychological and linguistic approaches by investigating the cerebral processes and the form of knowledge involved in mastering the language.

According to Heredia and Altarriba (2014), the monolingual native-like speaker uses the different linguistic levels, namely: phonology, morphology, syntax, semantics, and pragmatics. They argue that the cerebral processes of these levels are the same in both monolingual and bilingual brains.

The hypothesis of Kormi-Nouri et al. (2008) suggests that both adult and newly born humans exhibit strong changes in the left hemisphere of the brain. With respect to morphological changes, the two hemispheres of the brain seem to be connected to enhance various cognitive skills and competencies.

In processing two languages, Javier (2007) points out, that a bilingual brain does not recruit similar mechanisms as a monolingual brain does.

6. The Positive and Negative Effects of Bilingualism

There is a continuous investigation of the intellectual superiority of bilinguals over monolinguals. Gray matter, indicating better mental abilities, has been shown to be greater in bilinguals relative to their monolingual peers in regions associated with language (Mechelli et al., 2004). This part will review the literature and results of previous studies on this issue.

The study conducted by Kovács in Kecskes (2007) indicated that acquiring two languages gives a significant viewpoint on the cognitive processes and their positive and negative consequences. Researchers have shown that the bilingual brain can have better attention and task-switching capacities than the monolingual brain, thanks to its developed ability to inhibit one language while using another (Marian & Shook, 2012). According to Peal and Lambert (1962), bilingualism is classified into two types. The first type is early-age bilingualism, i.e., genuine (true) bilingualism, where a bilingual's proficiency degree is native-like. The second is late-age bilingualism, or "pseudo" bilingualism, where a bilingual does not master both languages fully.

Johnson and Newport (1989) came up with the "maturational hypothesis." Based on this hypothesis, there is a negative relationship between brain maturation and language proficiency. Language acquisition capacity decreases gradually during the developmental stages through age; in other words, children acquire the language with native-like competence, and this explains why the cognitive ability of genuine bilinguals (i.e., bilingual children) is better than that of the pseudo bilinguals (i.e., adult bilinguals).

The results of De Groot's study (2011) showed that bilingualism has a positive effect on cognitive functioning. De Groot reviewed previous related studies in order to identify certain structural differences in a pair of languages. The study concluded that bilingual studies have become more

interested in discussing the impact of mastering language-specific structuring differences on intelligence within one and the same bilingual who masters two or more languages or among bilinguals and monolinguals.

Peal and Lambert (1962) concluded that a bilingual has an advantage over a monolingual because the bilingual's dual linguistic repertoires ensure intellectual flexibility and enhance a diversified set of mental abilities. One question in this regard is whether the more intelligent individual became bilingual or whether bilingualism promotes intellectual and cognitive development.

In their comparative study, Kormi-Nouri et al. (2008) investigated the influence of bilingual ability on cognition. The results obtained through gathering a group of bilinguals and a suitable control group of monolinguals, where the differences in socioeconomic status, social class, age, and sex among the two groups were controlled, indicate that the broader intellectual capacity of bilinguals in comparison to monolinguals leads them to relatively elevated levels of thinking and results in superior processes of attention cognitive control.

An old publication of Lambert during the sixties shed light on the nature of intelligence and being bilingual. The results of this study confirmed the positive effect of bilingualism on intelligence. Lambert concluded his investigation by saying that the process of learning English by the French Canadian people does not entail any risk of losing any part of their French competence; quite on the contrary, it enriches their linguistic repertoires by adding a new language to the old one. Lambert called this form of bilingualism *additive bilingualism*, which has a positive effect on cognitive functioning. On the other hand, the form of bilingualism "experienced by ethnolinguistic minority sects" is called *subtractive bilingualism* (De Groot, 2011).

Leikin et al. (2012) claimed that minority language speakers feel forced to be bilingual because of educational policies and social pressures to adopt the more prestigious national language and enjoy the privilege of being part of that nation. Since a language enhances and supports intellectual ability, subtractive bilingualism weakens the native language and will restrict cognitive functioning ability.

Furthermore, Peal and Lambert (1962) argued that the phenomenon of bilingualism has a great benefit on language competence and cognitive functioning. Bilingual children outperform their monolingual counterparts on almost all tests and show a more diversified set of mental capabilities. Even within the linguistics field, bilinguals can judge the grammaticality of sentences with semantics anomalies better than monolinguals because they can overlook this irregularity before conducting the analysis. Additionally, bilingualism significantly affects intellectual, especially linguistic, abilities (Pliatsikas et al., 2020).

Regarding the bilinguals, Cummings' "threshold hypothesis" (2001) indicated a significant connection between academic achievement and bilingualism. Bilingualism may either boost or inhibit bilinguals from success. Han (2012) suggested that if a bilingual reaches a "threshold" proficiency in the two languages, s/he will have high cognitive and intellectual ability reflected directly in their academic achievement. Otherwise, s/he will encounter obstacles in the academic materials.

It is worth mentioning that the impact on cognitive ability may differ from one language to another. For instance, there is a direct relationship between intellectual ability and divergent languages from distant origins. More specifically, cognitive development has an inverse relationship with languages with close origins; closely related languages with similar cross-language structures lead to an increased risk of cross-linguistic interference (Cantone, 2007).

Bialystok (2001) pointed out that research studies in the field of bilingualism have recently focused on the impact of bilingualism on cognitive ability and paralinguistic development. Her research findings demonstrated that the positive effect of bilingualism not only affects the domain of metalinguistic awareness, but also affects overall mental functioning activities.

Gorter, et al. (2014) argued that educators, supervisors, parents, and policymakers should benefit from the vast number of research studies in the field of bilingualism and its notable impact on

the cognitive ability of a bilingual. The results of those studies highlighted that the earlier the learner acquires the language, the higher the cognitive ability and the more intelligent it will be. Moreover, May, Hill, and Tiakiwai (2004) indicated that bilingualism helps uncover, boost, and strengthen the individual's socio-cognitive ability and control of complex language functions.

Bilingualism is somewhat challenging. Bilinguals may confront some obstacles in structuring two language systems within different linguistic environments. The obstacles that bilinguals face may, at an early age of acquisition, affect the bilingual's cognitive system positively (the corresponding brain structures), or at a late age of acquisition, lead to differential functional specialization of the two languages and of the structural organization of the brain (Grosjean & Li, 2013).

Cunningham-Andersson and Andersson (2002) indicated that a bilingual cognitive system exhibits weak intellectual performance and cognitive confusion as a result of the overload of the linguistic complex input they receive since the two languages compete for mental resources. Yet, such deficiency is related to weak mastery of one or both languages, leading to attrition, interference, and language mixing.

7. Discussion and Results

Several studies conducted from the early 1920s to the present have speculated on the negative outcomes of inappropriate measures of bilingualism on intelligence. According to Chin and Wigglesworth (2007), Saer (1923) and Smith (1931) concluded their studies by claiming that bilingualism has a detrimental effect on intellectual functioning. Before Peal and Lambert (1962), researchers argued that bilingualism may negatively affect intellectual development. On the contrary, Peal and Lambert (1962) showed that earlier research was flawed and that when controlling for confounding factors (i.e., SES, gender, and urban-rural contexts), bilingual children performed better on verbal and nonverbal intelligence tasks than their monolingual peers.

Al-Amri (2013) stressed that bilingualism is a great help to the child. Later, Kecskes (2007) pointed out that there is no positive effect of bilingualism on executive processing where both bilinguals and monolinguals showed identical performance on Raven's Advanced Matrices test (DCT) – the best single test of general intelligence. Thus, the debate is still active until now about the issue.

It can be argued that the positive effect of bilingualism on cognition contradicts the old beliefs of researchers who were affected by the findings of previous studies, which state that monolinguals perform better in cognitive functioning tasks measuring verbal intelligence than bilinguals do. So, bilingualism affects intelligence negatively. Such findings were based on earlier studies that lacked experimental rigor. In addition, the differences in age, educational level, and socio-economic status were not strictly controlled in almost all the studies, which concluded that bilingualism has a negative effect on cognitive ability. On top of that, the bilingual participants in those studies poorly mastered one of their languages; consequently, intelligence was measured in light of the language registering lower scores on verbal intelligence.

Bilinguals are increasingly exposed to dual languages along with two different cultures in the early phase of development. According to Javier (2007), a bilingual brain does not recruit similar mechanisms as a monolingual brain does. This finding is highly important and urges educators to pay further attention to bilingualism. Therefore, the bilingual might exhibit another cognitive ability along with the linguistic one, which is their superior representational abilities (i.e., words and concepts). Grosjean (2010) highlighted the positive effects of being bilingual on the brain and on cognitive development.

Generally, bilinguals perform outstandingly in their academic fields of study, and they are more achievement-oriented than their monolingual peers. Behavioral studies imply that the proficiency of bilinguals entails a more advanced level of cognitive functioning system (such as higher flexibility in solving problems and creativity). As indicated above, in many ways, these research findings provided certain implications that bilingualism could enhance life by improving cognitive abilities.

Bilinguals can enhance intellectual capabilities. For instance, Xia et al. (2022) found that bilingualism can promote the development of different components of creativity through stronger cognitive inhibition and cognitive flexibility. They provided empirical evidence for the relationship and mechanism between bilingual learning and creativity. Furthermore, Andleeb et al. (2023) concluded that bilingual individuals performed significantly better than their monolingual counterparts on both tasks, suggesting that speaking multiple languages may enhance cognitive outcomes.

8. Conclusion

In sum, bilingualism can play a significant role in boosting cognitive abilities. Bilinguals can demonstrate superior representational abilities. Despite the important topic highlighted in the present study, future research may extrapolate those insights on bilingualism and intelligence and explore other areas of the phenomenon as well, e.g., passive vs. active, sequential vs. simultaneous, and receptive vs. productive bilingualism. Empirical studies may explore bilingualism and learning foreign sciences in schools but with large samples from different countries. The borderlines between bilingualism and diglossia may be further investigated as well. Furthermore, further studies could compare the effect of languages of the same family or different language families on the speed of bilingualism.

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