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Bilingualism is Good for Training for Mind—Discuss with Reference to Different Age Groups

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Abstract: *Many people around the world are bilingual and study the impact that bilingualism brings to all ages. For children, there are benefits in creativity, TOM and intelligence. For young adults, bilingualism is also beneficial for brain training, helping with working memory and selective attention. For older adults, bilingualism can not only improve their cognitive reserve but also alleviate dementia, and even bilingualism can affect memory. This research paper will examine the benefits of bilingualism for all ages.*

Keywords: *Bilingual, Children, Intelligence, Alzheimer's disease, Old people*

1. Introduction

With the increasing penetration of globalisation, more than half of the world's population speaks more than one language [1]. The multilingual environment includes not just one, but multiple or more languages. A survey from the European Commission in 2006 showed that 56% of respondents reported being able to speak two languages fluently. This ratio is significantly greater in several nations; for example, 99 percent of Luxembourgers and 95 per cent of Latvians speak multiple languages [2]. Being bilingual might take advantage of our life, for example, bilinguals enjoy greater scope for development in social interaction. In addition, early research has found that bilingualism is beneficial to children's cognitive abilities, knowledge retention and creativity. However, the benefits of bilingualism may decline in comparison to middle age, for example, cognitive abilities decline in middle age, particularly in terms of processing differences in language access efficiency. While the effect is greater and more obvious in older age, Valenzuela & Sachdev argue that bilingualism can prevent cognitive decline, a concept known as 'cognitive reserve' [3]. This essay argues that bilingualism has advantages for training the brain, but that these benefits will be different for different age groups. Firstly the concept of bilingualism will be discussed. Secondly, the benefits of bilingualism will be reviewed and finally, the benefits of bilingualism for different age groups in children and older adults will be discussed.

2. Overview of Bilingualism

Bilingualism can means variously. It includes the knowledge and use of two or more languages, the presentation of information in both languages, the need for both languages, and the perception of two or more languages [4]. A broad definition refers to a group of people who have learned and can communicate in more than one language [5]. The term bilingual refers primarily to people who can speak two languages; it can include the many people in the world who have different levels of proficiency and alternate between three, four or even more languages [6].

Bilingualism is a complex psychological and social behaviour that needs to be explored in a multi-dimensional way. Firstly, the number and range of bilinguals is large, and educational and cultural factors result in it. For example, many learners study in places where multiple languages are spoken, or intermarriage and professional advancement lead to linguistic contact and bilingualism, like American-Bron Chinese (ABC). Secondly Grosjean & Li define bilingualism as considering fluency and language use [4]. However, this paper does not discuss people who are not acquired, or whose second language fluency does not reach that of bilinguals. This essay mainly pay attention to the question "would bilinguals have advantages for brain development training besides in social communication?"

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3. Overview of the Advantages of Bilingualism

Bilingual people seem to have an advantage when it comes to brain training. Bilingualism affects language and cognitive performance across the lifespan [7]. Firstly bilingualism has a significant impact on the process of cognitive control, defined as the coordination and regulation of thoughts, as well as responding appropriately to overwhelming stimuli in the environment and maintaining attention to goal-directed behaviour. Inhibitory control, attention, working memory, cognitive flexibility, planning, reasoning, and problem-solving abilities are all included [8]. Bilinguals must maintain and process both language systems in everyday life, thus they must prevent nonverbal targets from interfering with their speech [9]. When compared to monolingual speakers, bilinguals can strengthen their cognitive control in everyday life through this training, giving them an advantage [10].

The second one is that the benefits of bilingualism are also reflected in the area of creativity. Creativity is frequently regarded as a mental process involving the development of new ideas or new connections between previously held ideas or notions [11], and Guilford established a distinction between convergent and divergent thinking [12]. In the psychological literature, divergent thinking is sometimes used as a synonym for creativity. This means that creativity is increased at the same time as divergent thinking is increased. For example, Simonton (2008) found that bilinguals scored higher than monolinguals in the areas of linguistic originality and flexibility, as well as image originality and fluency. The third point is that bilingualism can facilitate the development of the theory of mind (TOM), which refers to the ability to ascribe mental states to others and to predict and explain their behaviour using these attributed mental states as a foundation. For example, Chang found that bilingual children scored higher on the ToM task in an experiment with four-year-olds [13]. The results demonstrate that bilingualism accelerates psychological development.

There are three main reasons for the advantage of TOM. Firstly, better linguistic and social skills can increase the bilinguals' linguistic knowledge through more conversations. This recognition that two persons can have distinct (or similar) linguistic knowledge could lead to a broader recognition that two people can have different (or similar) mental states [14]. The second is that meta-linguistic awareness is increased and that it is associated with mental development [15]. Meta-linguistic awareness helps two people to understand something differently. The third is 'executive functioning', based on evidence that bilingualism enhances executive functioning [16]. Bilingual people can regulate their mental state with enhanced attention control. However, it is undeniable that bilinguals have some disadvantages in terms of language use. Firstly, monolinguals perform less well on verbal recall memory tasks than bilinguals. Secondly bilingual children have less control over vocabulary than their monolingual peers [17]. For example, if one child speaks English and Chinese and the other only Chinese, a conversation reveals that the Chinese only child uses a more varied and richer vocabulary. The third is that bilingual adults perform worse on rapid vocabulary retrieval tasks [7]. Because Bilinguals build poorer linkages in the essential connections needed for quick and fluent language creation since they utilise their language less than monolinguals [18]. However these disadvantages are reflected in terms of monolingual language use, and it is clear that bilinguals have an advantage in terms of how the brain is trained. The above statements suggest that bilinguals are somehow better than monolinguals in terms of creativity, cognitive ability, and TOM.

4. Discussion of Different Age Groups

4.1. Bilingualism for Infants

Bilingualism also has an impact on infants. Is it an exception or a general potential of infants that bilingual environments affect their ability to acquire two languages at the same time? Bilinguals, according to Chen, use the same areas to represent both languages, demonstrating a brain representational advantage over other bilinguals [19]. The indicators such as sex hormone levels and brain structure and function can help assess the risk of simultaneous bilingual acquisition in infants and avoid the acquisition of a second language affecting the first language. In an Italian experiment by Miyake, seven-month-old infants were divided into a monolingual group and a bilingual group to compare their ability to identify sounds by listening to sounds, which was found to be faster in bilingual families than in monolingual families [20]. This research demonstrates the advantages of a bilingual child's environment in terms of executive skills from early infancy. In addition, Kovacs & Mehler (2009) found that bilingual infants at seven months of age were able to switch languages more efficiently than monolingual infants. Because the representation of each language is established in mixed speech input, infants draw on executive

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control and monitoring functions to enhance their executive functions. Therefore, bilingual infants are better at language switching.

4.2. Bilingualism for Children

Bilingualism is beneficial for children's brain training. Firstly, bilingualism is useful for enhancing creativity. Argondizzo argues that there is a clear link between multilingualism and creativity, linguistic knowledge gives people the opportunity to be exposed to other ways of thinking and other cultures [21]. It allows bilinguals to increase creativity by exposing themselves to a wider range of ways of thinking and cultures. Guilford used early research to apply the cognitive study of creativity to divergent thinking and discovered that lengthy searches for information and the production of many innovative alternative answers or solutions to issues were associated with divergent thinking [12]. This research found bilingualism to be helpful for children's creativity. A research study with preschool children aged 4 to 6 years showed that Hebrew-Russian bilinguals are better at mathematical creativity than Hebrew monolinguals [22]. Also, Adi-Japha compared English-Hebrew and Arabic-Hebrew bilingual 4 and 5-year-olds and their monolingual English or Hebrew to create a drawing of a flower [23]. During the drawing process, the children freely inserted other elements into the picture. The findings indicate that the bilingual pupils used a wide range of different shapes to decorate the pictures, in contrast to the monolingual children for whom the drawing was too homogeneous.

However, in a study by Hommel, it was suggested that the mechanisms behind creative behaviour and how these mechanisms are influenced by bilingualism need to be further investigated, such as whether bilingualism is the most important factor in children's creativity [24]. There is no doubt that bilingualism is not necessarily the most important factor influencing creativity. Genetic and environmental factors also influence children's creativity. For example, a monolingual Katsushika Hokusai, who is a famous Japanese painter, he is also highly gifted in creativity, so bilingualism cannot be identified as the main factor influencing creativity. However, Leikin & Tovli argue that bilingual children are more flexible and original than monolingual children [25]. Even though the bilinguals were disturbed by some external factors, the results of these experiments show that bilingualism helps children in mathematics and drawing. Although bilingualism is not the most important factor affecting bilingual creativity, it is one of the factors affecting children's creativity. Experiments have found that bilingualism can increase children's creativity.

The second aspect of bilingualism is that it is very beneficial for cognitive control. In an experiment studying children who were taught English as their primary language, even while speaking with an accent, bilingual children were considered to have higher cognitive control (inhibition) and were able to concentrate on the task (understanding who was speaking) while preventing unnecessary data [26]. The results of this experiment suggest that bilingual children have better cognitive control than monolingual children. Furthermore, Kapa & Colombo discovered that when the Attention Network Test (ANT) was applied to test children's attentional control, bilingual children were better than monolingual children in the area of attention [27]. It was further suggested that bilingualism stimulates the left prefrontal cortex during early development, thereby enhancing language learning and memory. Language learning remains with a person throughout their life regardless of the period, so bilingualism plays a large role in childhood.

Bilingualism promotes the development of TOM. As Kovács states, twice as many early bilingual children pass the TOMs task as monolingual children [28]. And Dahlgren tested monolingual and bilingual children in an experiment by TOM, with bilingual children outperforming monolingual children [29]. Andreou studied the relationship between TOM and bilingual children in an experiment [30]. The experimental study found that children with bilingual autism were better performers than the monolingual autism group in the low language ToM and bidirectional tasks [30]. It is undeniable that bilingualism is beneficial for TOM development regardless of the population.

Finally, bilingualism has been shown to have an impact on children's IQ. Firstly Saer found in an early experiment that monolingual children had a higher IQ than bilingual children by comparison [31]. However, there was a single sample and a cultural bias in the experiment. Peal & Lambert found that bilingual children generally performed better than monolinguals in their experiments by controlling for language ability and other variables [32]. And a later experiment by Murphy, using Raven's Standard Progressive Matrices and Vocabulary Scales, found that the average IQ of bilingual primary school children was higher than the average IQ of monolingual children [33]. Moreover, Morton & Harper found that bilingual children were better performers than monolingual children when ethnic and socio-economic differences were taken into account in the experiment [34]. Furthermore, when controlling for experimental variables and refining the experimental sample, bilingual children's IQ was shown to be

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dramatically higher than monolingual child's. This indicates that bilingualism is beneficial for increasing IQ.

4.3. Bilingualism for Young Adult

Bilingualism has an impact on working memory (WM) in young adults. From some experiments, bilinguals appear to benefit from their unique language environment, they exceed their monolingual peers in working memory in this situation [35]. Ljungberg explored the effects of bilingualism in adult WM with a longitudinal perspective and found that on multiple tasks using situational memory and letter fluency tests, bilinguals systematically outperformed monolinguals aged 35 to 80 [36]. Ljungberg explored the effects of bilingualism in adult WM from a longitudinal perspective, Using situational memory and letter fluency tests, researchers discovered that bilinguals aged 35 to 80 exceeded expectations of monolinguals on a variety of tasks [36]. And Hansen and colleagues wanted to explain variation in working memory while adjusting for external influences. 152 native Spanish young people were tested, 50% of them were enrolled in a bilingual language class (i.e., students were taught in both English and Spanish), while the other half was exclusively taught in Spanish. Both groups of young people were matched on a variety of demographic factors including socio-economic status and intelligence, and they were all from the same city. They were put through a reading span test (in which they had to remember the last letter of a series of paragraphs) as well as a quick automatic naming exercise to assess their language processing speed. They discovered that the younger bilinguals outperformed the monolinguals in the task [37]. However, the advantage of older age was found to be more pronounced in terms of the reading span task in the experiment. This is because language processing and language storage skills are inseparable when it comes to language learning [37].

Bilingualism also affects young adults in terms of selective attention. Chun et al. studied the perception of ambiguous shapes and discovered that bilingual young people do better in this task than monolingual young people and that bilingual young adults were better able to dissociate attention from non-task-related distractions [38]. And Friesen, Friesen et al. require bilingual and monolingual young people to find goals that require bottom-up automatic (feature search) or top-down selective attention (connective search) [39]. In conjunctive search requiring top-down selective attention, bilinguals identified targets more quickly than monolinguals. Based on these findings, bilingual young people outperformed monolingual young people in selective attention ability, both in terms of ambiguous graphics and selective word search ability.

4.4. Bilingualism for Older People

Bilingualism is also significant for memory. Schroeder & Marian compared the situational memory of bilingual and monolingual older people by using picture recall and the Simon task, in which bilingual older people were able to recall more photographs [40]. monolingual older people showed better situational memory. For the work memory, Grundy & Timmer found in their study that bilingual older people had better working memory skills than monolingual older people [41]. This is on the ground of the experience of managing two competing choices of language over time leads to greater working memory capacity. Another study selected 108 participants to perform a complicated working memory task based on verbal or non-verbal stimuli. Bilinguals showed less disturbance than monolinguals, and bilingual older people had a greater advantage in terms of working memory [42]. Even though bilingualism influences memory, memory is also influenced by environmental, genetic, and educational factors.

Bilingualism can train the adult brain, it can also be useful for older adults. In one study, monolingual patients with cognitive problems were compared with bilingual patients, assessed by history, physical and mental status assessments, CT, SPECT and screening blood tests. The results of his study suggest that older people's bilingual experiences might enhance cognitive reserve, a mechanism of protection that improves the brain's abilities to deal with pathology [43]. Stern defines cognitive reserve as individual variation in the way people approach the task, which makes some people better able to deal with brain lesions than others [44]. In other words, older people with the higher cognitive reserve are better able to prevent brain lesions. Furthermore, the underlying mechanisms of the cognitive reserve are assumed to be quantitative: persons with more neurons, synapses, and higher resistance to apoptosis, for example, use more neurons, synapses, and better resistance to apoptosis to prevent age-related deterioration [45]. So there is objective evidence for a bilingual ageing mechanism brain.

Bilingualism can also be very helpful in alleviating dementia. Because bilingualism contributes to neuroplasticity, as age increases, cognitive function affects grey matter, white matter, brain signal

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complexity, and functional connectivity between brain regions. These losses affect language , memory , and motor control higher order executive processes [46]. A researchers compared monolingual and bilingual older persons on measures of cognitive performance and brain anatomy concluded that bilingualism was a protective measure against dementia symptoms [47]. Another trial compared bilingual and monolingual older adults and discovered that lifelong bilingualism improved white matter integrity and that patients with Alzheimer's disease could remain symptom-free for longer than expected given the degree of brain atrophy [48]. And Woumans et al. also argues that bilingualism helps delay dementia symptoms, even though people with Alzheimer's disease are non-immigrants living in an L1-dominated environment [49]. In most of these studies, it was brain images, but few other factors were considered. Yet the brain is the factor that controls cognitive ability, with other factors being secondary. Further, the brain is plastic and it can control cognitive ability. Bilingualism can delay the symptoms of dementia in the elderly.

5. Conclusions

In conclusion, bilingualism is beneficial in training the mind at all ages, especially in old age and childhood. In infancy period, bilingual experiences promote the development of the brain and its cognitive functions, especially in the area of executive control. For children, there are advantages in creativity, TOM, intelligence and cognitive control over monolingual children. For young adulthood, bilingualism also has benefits for brain training, helping with working memory and selective attention. For older age, bilingualism not only improves the cognitive reserve of older people, but it can also alleviate dementia and even bilingualism can influence memory. Bilingual young people may not have an as significant effect as bilingual older people, but it can also affect aspects of working memory and selective memory. This study shows that bilingualism has different levels of impact on mind training at different ages and even can contribute to Alzheimer's disease. At the same time language learning is something that accompanies people throughout their lives and it affects the brain at all times. This essay thinks through various disciplines to demonstrate the benefits of bilingualism for mind training. And a large amount of experimental data shows that dual with does show benefits. At the same time, there are some limitations, such as the fact that bilingualism has been poorly studied in young people compared to older people and children. We hope you find the information in this template useful in the preparation of your manuscript.

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