Bilingualism and the Effects: Two Languages, One Brain, The World

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ABSTRACT

Although a relatively new area of interest, researchers are finding positive correlation between bilingualism and the effect it has within certain cultures. Over the seven literature reviews studied and noted from various authors, a common theme emerged. Bilingualism not only effects the cognitive functions through executive functions, it also provides understanding in the way it works within cultures and affects creativity in profound ways. Majority of the research uncovered studied children under the age of 8, for reasons that cognitive functions are still developing and their exposure to a bilingualism culture is still unraveling. As these children progress through their adolescent and adult years, bilingualism will continue to rewire their cognitive pathways, fine-tuning these executive functions, to adapt to the ever-changing environment. The effects of bilingualism have broader implications, but those implications vary from culture-to-culture. One broader implication is the co-existence of bilinguals and monolinguals living within cultures that are fully diverse, such as university campuses, and how it affects their ability to be a successful graduate.

Keywords: executive function, bilingualism, monolingual, creative styles

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The study of bilingualism and the profound effects it has on the individual as well as their culture, has kept many researchers in the field of sociology, anthropology, and psychology intrigued. It is known that culture shapes the brain in profound and mysterious ways. From birth, our neurological pathways are shaping to the culture around us and the development of language begins during our sensitive periods. Per Heine, humans are born into this world ready to perceive language and distinguish sounds from all the others, which makes learning and mastering language easier early in life. What happens when a second language is introduced? As it was expressed by Kitayama, our neural pathways are constantly rewiring themselves through repetition and our brains are being shaped by the culture around us. Tran, Arredondo, and Yoshida conducted a research that studied differential effects of bilingualism and culture on early attention. They included children with a mean age of 38.78 months from the United States, Argentina, and Vietnam. This paper examines Tran et al. and various researchers on the children's ability to process cognitive functions such as: alertness, orientation, executive control, processing, attention, visual perception, and creative styles.

Literature Review

In the present longitudinal study conducted by Tran et al., Attention Network Test (ANT) was given to ninety-seven 3-year-olds from the United States, Argentina, and Vietnam. The purpose of the study was to measure the children's attentional attributes in relation to language and culture, such as: alertness, orientation, and executive control. Per Wang and Fan, the ANT encompasses "inhibition, conflict resolution, planning, and cognitive flexibility, and is important for one's ability to monitor and resolve conflicts in planning, decision-making, error detection, and overcoming habitual actions". In executive control network, specifically inhibition and

cognitive flexibility, bilinguals were shown to outperform monolinguals significantly when completing a lexical task. However, the research is inconclusive to determine if bilingualism is the loan factor in the development of executive control or if the interaction between bilingualism *and* culture together produce a stronger outcome in development tasks (Tran et al., 2015).

Alertness, as cited in Tran et al.'s journal, is "responsible for achieving and maintaining *broad sensitivity* to incoming information" (Wang and Fan, 2007). Previous studies indicated that bilingualism had some advantage in adults, but in children, not so much. In this present study, the design was structured around Eastern cultural influences because Westerners processed information from an analytical approach and Easterners processed information on a holistic approach. There is belief that cultural influences impact the ability to process incoming information in bilingual children differently than in monolingual children. Within the orienting network, which is the visual perception area, previous studies indicated that children between the ages of six and 10 were shown very little development overtime, but it is suggested that orientation is developed during early developmental stages. The current test administered indicated that language and culture had very little effect in orientation.

The research presented by Tran et al., focused primarily on children in three different countries, but Yang, Yang, and Lust focused on four-year-old Korean-English bilinguals and monolinguals living in America and South Korea. These children were compared to three monolingual groups – English and Korean monolinguals in America and another Korean monolingual group in Korea. The Attention Network Test was administered to these children and was based on the cognitive test, "Eriksen Flanker Task". This task comprised of four cues and three flanker types. Like the study conducted by Tran et al., the test focused on: alerting, orienting, and executive control. The test results varied across the three groups, but they found

that American-based Korean-English bilinguals scored the highest in executive attention accuracy and response time than bilinguals and monolinguals living in South Korea. Monolinguals in South Korea scored higher overall in accuracy and Korean monolinguals in America "behaved similarly to English counterpart monolingual" (Yang et al., 2011).

Smithson, Paradis, and Nicoladis looked specifically at French-English bilinguals and receptive vocabulary achievement in adults and children living in Edmonton, Canada. Using a standardized test, Smithson et al. measured the receptive vocabulary in preschool, early-elementary, and late-elementary bilingual children and bilingual adults. Across all bilingual languages, the mean scores were above or equivalent to the standard mean in French and English, except for early-elementary bilinguals. These children were compared to the results of monolinguals and scored lower or equivalent across the board. There were several factors involved into reasons why the test scores varied so much between educational levels, one of them being limiting factors in homes (i.e. dominant language spoken, consistency, community influence). A lot of quantitative data were presented, but in relative context, results were consistent or showed little difference from previous studies.

Another area that is of interest is bilingualism and creativity. Lee and Kim explored such dimension to uncover truths between bilingualism and adaptive and innovative creative style and creative strengths among Korean-American students. As cited in Lee et al.'s journal, Gelade (2002) stated that "creativity is a multidimensional ability that is influenced by various factors of specific social environments such as culture or language". Creativity by itself is only the vehicle without an engine, add cultural influences and you have the force that moves creativity. American students compared to Asian students in creativity showed "superiority in flexibility (ability to shift categories of ideas)" an independent characteristic that is found in Western

cultures. Asian students showed "superiority in elaboration (ability to add details to ideas)" an interdependent characteristic that is found in Eastern cultures. 116 Korean-American students, 49 boys with the mean age of 11.8 and 65 girls with mean age of 11.3, were given the Word Association Test and Subjective Self Rating to determine degrees of bilingualism and the Torrance Test of Creative Thinking-Figural to measure creative potential. The results varied in the three different creative styles. Balanced bilinguals scored higher in adaptive and innovative creative style and creative strengths. Monolinguals compared to the balanced bilinguals and unbalanced, scored lower in all three categories.

Discussion

When examining these studies, each of the researchers found unique correlation between bilingualism and executive functioning. Tran et al. discovered that most of the previous bilingual studies conducted before did not take place outside of North America or other English-speaking countries. They recognized that diversity was key to the success of their study, but still used the United States so that it could be compared with similar research studies. Tran et al. focused primarily on two things for their research. First, they wanted to find correlation between bilingualism and cultural influence developmentally. Second, by focusing on specific components of attention, they can understand how "the bilingual advantage and cultural effect are similarly and differentially generated through the ANT components" (Tran et al., 2015). What they found was that culture and language did play a factor in certain areas of ANT but it was not the sole driving factor in orienting networks, however cultural background did play a vital role in the development of the alerting and executive control networks (Tran et al., 2015).

The study of Korean-English bilinguals and monolinguals conducted by Yang et al., presented similar results, but they found a stronger correlation between bilingualism and

executive attention especially in developing children. When looking at the results between two Korean ethnic groups, one from South Korea and the other from America, both groups showed a divergence in executive functioning, with South Korean children succeeding by 9%. One factor they contributed to this result was child-rearing practices between two Eastern parents, but living in separate countries. What they found was that Asian parents who immigrate to America, still hold on to their values and beliefs and therefore impress them upon their children while adopting new cultural values (i.e. Western). Further research is needed to conclude this finding.

When examining the study conducted Smithson et al. with French-English bilinguals living in Canada, the results were fairly level across the table between bilingual and monolingual children. Bilingual children who had the influence of both home language and maternal education scored relatively high on vocabulary tests, whereas monolingual children who had one or the other scored lower than the average mean. A previous study conducted by Thordardottir indicated that French-English Canadian bilingual children "scored comparably to monolingual children on vocabulary assessments" (Thordardottir, 2011) and that these bilingual children were learning their languages in a sociocultural context, meaning, within their longstanding bilingual communities. Smithson et al., wanted to find similar patterns with this study among a French minority context in Canada with 3 to 12-year-old children and bilingual adults. What they discovered was that preschool and adult bilingual groups scored evenly with their monolingual peers in either English or French. Early-elementary and late-elementary bilingual children scored much lower than monolinguals on the English vocabulary assessment (Smithson et al., 2014). The underlying reason, as indicated by Thordardottir, is the sociocultural context. French is the language predominantly used in school, while English is not introduced until later in a child's

education. The use of English in homes may play a factor as well, especially when the community has a strong French persona and English is almost nonexistent.

Lee et al. discovered that "the significantly negative correlation coefficients between the scores on the WAT and adaptive creative style, as well as creative strengths, indicate that the degree of bilingualism is positively associated with creativity" (Lee et al., 2010). This last statement is in reference to the balanced bilingual groups. The hope with this study is that it would one day help educators understand bilingual students better, certainly around creativity.

Limitations of These Studies

Within these studies, culture and language is just the icing on the cake in explaining some of the variations found within bilingual cultures. Tran et al., indicated that "factors such as simultaneous vs. sequential learning and/or unbalanced vs. balancedness between languages in bilingualism may be important factors to consider when accessing bilingual cognitive advantage" (Tran et al., 2015). Smithson et al. noted that one of their limitations was that they did not have exact information regarding the neighborhood of residence of our monolingual and bilingual participants. Another limitation was the availability of previous data regarding maternal education for monolingual groups. Yang et al. implied that their research did not attempt to answer how the cultural assimilation process and biculturalism impact the development of executive functioning during early childhood (Yang et al., 2011) and that it required further investigation. Another limitation was the sample size of their participants. Like Yang et al., Lee et al. also had limitations with sample size but they also believed that ethnicity was a limiting factor.

Conclusions and Future Study

Kroll and McClain believe that bilingualism does give us an insight into one's culture, cognition, and language but requires much further research. "A question for future research is to consider how the time course and scope of this inhibitory mechanism may be modulated by cultural cues and how that modulation may depend on the context of language use" (Kroll et al., 2013). Tran et al. concluded that language nor culture can alone account for cognitive advantages demonstrated in children, rather interactions between possible factors such as language and culture must be taken into consideration when considering bilinguals' development of attentional control (Tran et al., 2015). Smithson et al. stated that, "future research is required in order investigate the mechanisms underlying the differential effects of sociocultural support for languages on receptive and productive vocabulary" (Smithson et al., 2014). For Lee et al., "It is necessary to compare different ethnic groups in terms of their relationship between bilingualism and creativity, because each ethnic group has its own cultural background, which could influence the bilingualism and creativity of its members" (Lee et al., 2010).

Virginia Valian brought up theoretical issues that concerned executive function and bilingualism and I concur with her statement.

> About executive function: is there actually such a thing as executive function that can justifiably be separated from other cognitive processes? If so, what are the underlying cognitive mechanisms? By understanding what experiences, in what contexts, support superior executive function, and which do not, we can understand the underlying mechanisms. From the perspective of executive function, studying bilingualism effects would be similar to studying effects of any enriching cognitive experience.

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