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The Intellectual Power of Bilingualism

It is often heard (at some rather smart cocktail parties) that while the definition of bilingual is "a person who speaks two different languages", monolingual could be adequately defined as "an American." This half-joke, however, is only half-true. At the end of 1979, close to four million children in the U.S. were considered bilingual or in the process of learning a second language (Pifer, 1980); the numbers are rapidly growing. The joke is definitely not true in the Southwest, where history could be written in at least four different languages as the encounters of Hispanic, Anglo and Native-American cultures.

The fact of multilingualism in the Southwest cannot be denied; the fact, nonetheless, remains controversial. No one seems to question the value and benefits of knowing two different languages in adulthood. On the other hand, childhood bilingualism is often criticized as a source of linguistic confusion that might result in serious intellectual deficits. Almost everyone agrees that young children are gifted language learners. The issue remains, however, as to whether educating our children bilingually enhances or detracts from their academic performance and intellectual development.

Based on several decades of linguistic, educational and psychological observations, the present paper argues that growing up with two languages is, indeed, an asset to children's intellectual development. The paper will report linguistic and cognitive advantages observed in bilingual children and discuss the processes through which bilingualism might have a positive effect on children's intelligence. The paper will conclude with a plea to support bilingual educational efforts in the Southwest. But first, the controversy.

Childhood Bilingualism: Asset or Handicap?

Both praise and attacks against childhood bilingualism are often biased by cultural, political and socioeconomic ideologies. Not surprisingly, those who value cultural pluralism will most likely notice the increased awareness and flexibility involved in the ability to function in more than one language. By the same token, those who perceive diversity as a direct threat to their identity and power will most frequently note the possible confusion and linguistic interference that a bilingual child might suffer. Nevertheless, beyond ideologies, prejudice and fear, we must recognize that our knowledge regarding the effects of a bilingual upbringing and education has been clouded mostly by a long history of contradictory findings in the empirical literature. Consider the following statements:

> There can be no doubt that the child reared in a bilingual environment is handicapped in his language growth. One can debate the issue as to whether speech facility in two languages is worth the consequent retardation in the common language of the realm. (Thompson, 1952, p. 367)

> The picture that emerges of the French-English bilingual in Montreal is that of a youngster whose wider experiences in two cultures have given him the advantages which a monolingual does not enjoy. Intellectually his experience with two language systems seems to have left him with a mental flexibility, a superiority in concept formation, and a more diversified set of mental abilities... In contrast, the monolingual appears to have a more unitary structure of intelligence which he must use for all types of intellectual tasks. (Peal & Lambert, 1962, p. 20)

On one hand, linguists' case studies of bilingual children have praised the advantages of acquiring simultaneously two, or even three,

languages in infancy. The eminent linguist Werner Leopold (1949b), commenting on the bilingual upbringing of his two daughters, noted that by the age of three both girls had an awareness of dealing with two different languages and that, from then on, both languages developed appropriately as two independent systems. Observing no signs of linguistic interference or retardation, Leopold regarded his daughters' bilingualism as a genuine asset to their mental development. Moreover, Leopold argued that since bilingual children had two different words for each referent, they learned early on to separate the sound of the word from its meaning and this, in turn, forced children to focus on essentials, on "content instead of form" (p. 188). Leopold's conclusion echoed the work of the Russian psychologist L.S. Vygotsky (1932/1962), who claimed that bilingualism accelerates the development of abstract thinking by freeing the child's thinking from the concreteness and "tyranny" of words.

On the other hand, in direct contradiction to linguists' case studies, psychological and educational studies done during the first half of this century often reported overwhelming evidence for a so-called "language handicap" in bilingual children (see Darcy 1953, 1963 for reviews). When compared to monolinguals, bilingual children appeared inferior on a wide range of linguistic abilities. Among other things, bilinguals were shown to have a poorer vocabulary (Barke & Perry-Williams, 1938; Grabo, 1931; Saer, 1923), deficient articulation (Carrow, 1957), lower standard on written composition and more grammatical errors (Harris, 1948; Saer, 1923). For a long time children's bilingualism was considered as some kind of social plague (Epstein, 1905), "a hardship devoid of apparent advantage" (Yoshioka, 1929, p. 476). The language handicap of bilinguals was interpreted as a linguistic confusion that affected children's intel-

lectual development and academic performance up to the college years (Saer, 1923). Beliefs about the negative effects of early bilingualism were further confirmed when several studies showed that bilinguals also performed lower than monolinguals on tests of nonverbal abilities, such as tests of dextrality (Saer, 1923) and mathematical competence (Carrow, 1957; Manuel, 1935).

How could we interpret such contradictory findings by linguists and psychologists? Interestingly enough, the answer is found by taking a closer look at the pitfalls of empirical methodology. Most early studies in this area suffered from a wide range of methodological problems; so much so that at present most investigators in the field regard the findings of early studies as totally unreliable (see Cummins, 1976; Diaz, 1983). Many studies, for example, failed to control for group differences in socioeconomic status between bilingual and monolingual samples. As early as 1930, McCarthy pointed out that bilingualism in the United States was seriously confounded with low socioeconomic status. She found that more than half the occurrences of bilingualism in school children could be classified as belonging to families from the unskilled labor occupational group. Along the same lines, Fukuda (1925) alerted researchers to the fact that high-scoring subjects were mostly in the occupational and executive classes; he reported a significant high correlation between the Whittier (Socioeconomic) Scale and the Binet IQ measure for this population. Nonetheless, prior to the early 1960's, most studies investigating the effects of bilingualism in children's intelligence did not account for bilingual-monolingual group differences in socioeconomic status. The negative findings, therefore, could be attributed to bilinguals' economic disadvantage rather than to their exposure to

a second language.

A second major methodological flaw of early studies was that investigators consistently ignored children's actual degree of bilingualism or failed to measure children's relative competence and fluency in the two languages. An extreme example is a study done by Brunner (1929) where degree of bilingualism was determined by the foreigness of parents. Brunner divided his bilingual sample into three categories: (1) both parents born in this country, (2) one parent born here and the other abroad, and (3) both parents born abroad. The classification was simply (and naively) assumed to represent children's varied degrees of bilingual proficiency. In other studies, the sample's bilingualism was determined through family names or even place of residence! (see Darcy, 1953 for a review). For obvious reasons, it is impossible to ascertain if the bilingual subjects of many studies were indeed bilingual or just monolingual of a minority language who barely spoke the language of the cognitive tests they were given.

In the early 1960's, the field took a different (and fortunate) turn. Aware of the potential advantages of bilingualism for children's cognitive development, Peal and Lambert(1962) attributed the negative findings of early studies to the failure of researchers to differentiate "pseudo-bilinguals" from truly bilingual children. "The pseudo-bilingual knows one language much better than the other, and does not use his second language in communication. The true bilingual masters both at an early age and has facility with both as means of communication" (p.6). Peal and Lambert believed that while pseudo-bilingualism might be a serious problem that could result in intellectual retardation, genuine bilingualism may be a real asset to children's intellectual development. Because early stu-

dies had been lax in their definition of bilingualism and in the assessment of their sample's degree of bilingualism, negative findings could be attributed to a situation of pseudo-bilingualism.

To test their hypothesis, Peal and Lambert (1962) administered several measures of degree of bilingualism to 364 10-year-old children in Canada. Three tests were used to determine whether children were "balanced" bilinguals, that is, had age-appropriate abilities in both French and English, or whether they were monolingual. The final sample was composed of 164 children; 75 monolinguals and 89 (genuine or balanced) bilinguals. Children in the sample were administered a modified version of the Lavoie-Larendau (1960) Group Test of General Intelligence, the Raven's Coloured Progressive Matrices (a widely used nonverbal test of intelligence) and a French version of selected subtests of the Thurstone and Thurstone (1954) Primary Mental Abilities test.

Contrary to the findings of earlier psycological studies, the results of the Peal and Lambert study showed that bilingual children performed significantly better than monolinguals in most of the cognitive tests and subtests, even when group differences in sex, age and socioeconomic status were appropriately controlled. Bilingual children performed significantly higher than monolinguals on tests of both verbal and nonverbal abilities; the superiority of bilingual children on the nonverbal tests was more clearly evident in those subtests that required mental manipulation and reorganization of visual symbols, rather than mere perceptual abilities. A factor analysis of test scores indicated that bilinguals were superior to monolinguals in concept formation and in tasks that required a certain mental or symbolic flexibility. Overall, bilinguals were found to have a more diversified pattern of cognitive abilities than their monolingual

peers.

In 1962, after forty years of negative statements in the literature, linguists, psychologists and educators agreed on the fact that bilingualism has a positive effect on children's cognitive development.

The Cognitive Advantages of Bilingual Children

Perhaps the most striking aspect of Peal and Lambert's pioneer study is the fact that their positive findings have been replicated time and time again in the last two decades of research. When compared to monolinguals, balanced bilingual children have shown advantages in measures of conceptual development (Liedtke & Nelson, 1968; Bain, 1974), creativity (Torrance et al, 1970), metalinguistic awareness (Cummins, 1978), semantic development (Ianco-Worrall, 1972) and analytical skills in matrix transformation tasks (Ben-Zeev, 1977b). Other studies have shown that, within groups of bilingual children, their degree of bilingualism is positively related to several cognitive and academic skills. For example, children with higher levels of bilingual proficiency perform at a higher level than their peers on measures of analogical reasoning and tests of spatial relations (Diaz, 1982). Let us now review a sample of these findings with greater detail.

As will be discussed below, the ability to objectify language (commonly referred to as metalinguistic awareness) is a crucial ingredient in the development of intelligence. Consistently, bilingual children have demonstrated a very special sensitivity to the nuances and objective properties of language. In an experimental study of English-Afrikaans bil-

ingual preschoolers in South Africa, Ianco-Worrall (1972) gave children the Semantic- Phonetic Preferences test. The test consists of eight sets of three words each; a typical set being the words cap, can and hat. Children were asked questions such as: Which word is more like cap, can or hat? Choosing the word can or the word hat respectively is an indication of the child's phonetic or semantic preferences in analyzing the similarity of words. The capacity to compare words on the basis of semantic dimensions is, developmentally, a more advanced ability than comparing words along a phonetic dimension. The results of the experiment showed not only that semantic preferences increased with age, but also that bilinguals outranked monolinguals in choosing words along semantic rather than phonetic dimensions. Bilingual children appeared two or three years ahead in semantic development.

A second study (Ben-Zeev, 1977b) done with Hebrew-English bilingual children provides further evidence for bilingual's special awareness of linguistic features. When compared to monolinguals, the bilingual children in this study showed significant advantages on symbol substitution and verbal transformation tasks. The symbol substitution task involved children's ability to substitute words in a sentence according to the experimenter's instructions. In a typical instance, children were asked to substitute the word "I" with the word "spaghetti." Children were given correct scores when they were able to say sentences like "Spaghetti am cold" rather than "Spaghetti is cold" or a similar sentence that, although gramatically correct, violated the rules of the game. The verbal transformation task involved the detection of changes in a spoken stimulus that is repeated continously by a tape loop. Both symbol substitution and verbal transformation tasks require enormous attention to the structure

and details of language data.

Ben-Zeev noted that, throughout the study, bilinguals approached the tasks in a truly analytic way, attentive to unusual cues from both the tasks and the experimenter. The author explained these improved abilities in terms of bilinguals' confrontation with their two languages. She argued that, in order to avoid linguistic interference, bilingual children must develop a special sensitivity to linguistic feedback from the environment. This well-developed analytic strategy toward linguistic structures is then transferred to other structures and patterns in different cognitive tasks. Ben-Zeev summarized her results as follows:

> Two strategies characterized the thinking patterns of the bilinguals in relation to verbal material: readiness to impute structure and readiness to reorganize. The patterns they seek are primarily linguistic, but this process also operates with visual patterns, as in their aptness at isolating the dimensions of a matrix. (p.1017)

Several studies have explored the relationship between children's bilingualism and cognitive processes involved in concept formation. In one study of French-English balanced bilingual children in Canada, Bain (1974) examined the effects of bilingualism on "discovery learning" tasks (see Gagne & Brown, 1961, for a detailed description of such tasks). The paradigm of Bain's study was to discover the rules that lead to solution of linear numerical problems such as:

A. 1, 3, 7, 15, ___

B. 1, 3, 6, 10, ___

Children were presented with two sets of items on 2 different days. On the second day of testing, children were told to "use the rules that

you learned last day to help you solve the problems" (p.123). The task was chosen because it involved the ability to discover a rule and then use the rule to deduce a certain outcome. In Piagetian terms, the task involved concept formation abilities such as classification and generalization of rules. Throughout the study, bilingual children showed superior performance on several concept formation abilities. For example, on the average, bilingual children were able to discover the additive rules eight minutes earlier than the monolingual children in the study. Similar concept-formation advantages have been observed by Liedtke & Nelson (1968) in bilingual first-graders on concepts of linear measurement.

Most theorists of intelligence (e.g., Guilford, Spearman, Piaget) have stressed the central role of analogical reasoning in human cognition. It is appropriate, therefore, to conclude our brief review of the empirical literature by pointing out the positive relationship between childhood bilingualism and the capacity to reason by analogy. In a longitudinal study of one hundred Spanish-English bilingual children, ages five to seven, the present author investigated the effects of learning a second language on analogical reasoning ability. Children were asked to complete sentences such as ,

A. The princess is beautiful, the monster is _____

B. Snow is ice, rain is _____

The results indicated that children with greater bilingual proficiency scored significantly higher on the analogy test. Furthermore, progress in the second language during the course of one academic year produced significant increases in children's analogical reasoning abilities as measured at the end of the one-year study.

In conclusion, the last two decades of educational and psychological research have consistently indicated that bilingualism promotes the development of children's cognitive abilities such as metalinguistic awareness, concept formation and analogical reasoning. Moreover, studies of cause-effect relations using longitudinal data present bilingualism as the causal factor affecting children's intelligence. The question remains, however, as to how or why bilingualism has such effects on children's cognitive development. We turn now our attention to such question.

Three Explanatory Hypotheses

In the present literature, it is a well established fact that bilingualism has a positive effect on children's intellectual development. On the other hand, little is known as to how or why it happens. The gap in our knowledge is due in part to the fact that research has focused mostly on outcome rather than process variables. That is, most studies of bilingual children have examined the outcome of children's performance on a wide range of cognitive and academic tasks, rather than examining children's performance in process. It is not clear, therefore, whether bilingual children approach and solve cognitive tasks differently than their monolingual counterparts, or whether the positive effects could be simply explained by a faster rate of cognitive development triggered by the bilingual experience.

The almost exclusive attention to balanced bilingual children has yielded information only about the final product of second language

aquisition in childhood. There is virtually no information about the processes (or struggles!) that a young child might go through while beginning to learn the second language, nor how the cognitive effort involved might affect or interact with the developing intellect. The present section attempts to fill this gap by proposing three processes through which bilingualism might affect a child's cognitive development. Due to a lack of empirical evidence, the processes will be presented as hypotheses pending empirical observation and verification.

1. Two Worlds of Experience

Language is certainly much more than an arbitrary set of symbols arranged according to grammatical rules. Above all, language is the most important vehicle of human communication and, as such, contains the history and living experiences of a given speech community and culture. At the very heart of bilingualism, there is a bicultural experience. By learning a second language, the bilingual child is exposed to the perceptions and awareness of a different culture.

Two languages are different not only on account of their different grammars and vocabularies. The difference between two languages also represent deeper cultural differences that the bilingual child must assimilate and accomodate to in order to achieve proper mastery of the two languages. In Arsenian's (1937) words:

> The degree of difference between the two languages of a bilinguist is important not only from the point of view of the learning mechanism, but also of the thinking process... the difference between two languages usually denotes a difference in the culture and civilization of the two people using them, and hence denotes also a difference in the connotation of

> words which will influence the direction and the content of thought in the two languages. (p.20)

The bilingual-bicultural child is able to experience the world from two different perspectives. This possibility touches a central process of cognitive development. According to the famous Swiss psychologist Jean Piaget, young children are by nature egocentric. By egocentric, Piaget did not mean selfish or self-centered in a moral sense. Rather, Piaget meant that children's intelligence is seriously limited by their inability to take the perspective of another person. In Piagetian terms, intellectual development is marked by a "decentering", that is, a gradual movement away from one's own limited point of view towards an increasing awareness and coordination of different perspectives. Most likely, the bilingual-bicultural experience forces young children to decenter and move out of egocentric perspectives at a much earlier age than their monolingual peers.

2. Code-switching

Code-switching refers to the observation that bilinguals can move from one laguage to the other with relative ease. As an explanatory hypothesis, code-switching was proposed first by Peal and Lambert (1962) when explaining their pioneer findings. The investigators believed that the possibility to change linguistic codes while performing cognitive tasks gave bilingual children an added flexibility that monolingual children did not enjoy. In Peal and Lambert's words:

> The second hypothesis is that bilinguals may have developed more flexibility in thinking... bilinguals

> typically acquire experience in switching from one language to another, possibly trying to solve a problem while thinking in one language and then, when blocked, switching to the other. This habit, if it were developed, could help them in their performance on tests requiring symbolic reorganization since they demand a readiness to drop one hypothesis or concept and try another. (p.14)

More often than not, errors in cognitive and academic tasks are caused by children's perseveration on the wrong hypotheses. Bilingual code-switching might indeed facilitate the development of a more flexible "mental set" to approach cognitive tasks. Furthermore, when a bilingual child is frustrated or blocked when performing a task verbally, he has the possibility of switching to the second language, starting the problem once again with a fresh and different perspective.

The claim that code-switching might facilitate the development of a more flexible mental set or approach to cognitive problems is, indeed, a very attractive hypothesis. Unfortunately, the literature contains only one datum of empirical observation to support such contention. In support of their explanatory hypothesis, Peal and Lambert (1962) cited the case of a Gaelic-speaking boy eleven years old (originally cited in Morrison, 1958) who had just taken a nonverbal test of intelligence. According to Morrison, when the boy was asked whether he had done his thinking in Gaelic or in English, the boy replied, "Please Sir, I tried it in the English first, then I tried it in the Gaelic to see would it be easier; but it wasn't so I went back to the English" (p.280). The boy's candid and fascinating reply suggests that code-switching does take place while performing cognitive tasks, even while performing nonverbal tests of intelligence! The reply offers no information, unfortunately, as to whether such

language switch in fact facilitated the manipulation of visual-spatial symbols in the test.

3. Objectification

On many different studies, bilingual children have shown a particular advantage on measures of metalinguistic awareness. Once again, metalinguistic awareness refers to the ability to analyze objectively linguistic output; that is, "to look at language rather than through it to the intended meaning" (Cummins, 1978, p.127). The third hypothesis claims that bilinguals' objectification of language is conducive to higher levels of abstract thinking and concept formation.

When learning to drive a car, discrete actions are learned and gradually coordinated until they become an organized pattern of automatic actions. In driving a car, therefore, learning proceeds from the conscious and objective (not to mention clumsy!) to the unconscious and automatic. The development of intelligence, however, is not like learning to drive a car. In many instances, cognitive development is the product of objectifying concepts and abilities that are rather automatic and beyond deliberate control. Children's use of the word "because" is a case in point (see Vygotsky, 1962). Before entering school, children have been using the word "because" for years, and quite correctly in the context of their discourse. Even though the word "because" is used automatically and rather well, experimental studies show that young children do not fully master the concept embodied by such word. For example, when asked why a child fell from a bicycle, a preschooler is likely to answer "because he broke his leg." Through formal instruction and conflict with adult thinking, children are gradually forced to become aware of their automatic concepts

and mental operations. Only through this objectification process, children are able to bring their concepts to a higher level of abstraction, ensuring proper use of those concepts they already possess but do not fully master.

Bilingual children have two words for each referent and early on are forced to realize the conventional nature of language. Furthermore, as Vygotsky (1962) suggested, since bilinguals could express the same thought in different languages, a bilingual child would tend to "see his language as one particular system among many, to view its phenomena under more general categories, and this leads to an awareness of his linguistic operations" (1962, p110). The awareness of another language ultimately leads to an awareness of one's own language. For bilingual children, such objectification of otherwise automatic linguistic symbols ignites the motor of intellectual development and abstract thinking.

Finally, the objectification hypothesis recognizes that exposure to a second language leads not only to knowledge of a different language and culture, but also to self-knowledge. Such claim echoes Goethe's famous dictum, "He who knows no foreign language does not truly know his own."

The Case for Bilingual Education

The cognitive and academic advantages observed in bilingual children are usually the result of "additive" rather than "subtractive" bilingual situations. In other words, bilingualism promotes the development of cognitive abilities when the child's two languages are both developing and functioning in parallel (additive) rather than when mastery of a second language is achieved at the expense of competence in the first language

(subtractive). The product of subtractive bilingual situations is a "semilingual", that is, a child who, for a good number of years, cannot function adequately in either language. The results of semilingualism are, indeed, cognitive and academic retardation.

Close to four million children in the U.S are non-native speakers of English; the majority of these children are natives of the Southwest. These children are learning or acquiring English as their second language in school and other less formal settings. If educated bilingually, these children will participate in the cognitive advantages of a truly bilingual-bicultural experience. On the other hand, if formal education does not take into account their native language nor promotes the development of both languages in parallel, these children will be at a high risk for semilingualism. Needless to say, unless educated bilingually, these children will be at a high risk for cognitive and academic deficits.

Bilingual education is, first of all, a right: The right of several million American children who are non-native speakers of English and who are, by law, entitled to an education. Bilingual education is legally endorsed, and rightly so, as the only viable alternative to teach these children the majority language and ensure at the same time their fair participation in the educational process. In conclusion, however, I would like to endorse bilingual education under a different light. I would like to present bilingual education not only as a right, but also as an excellent tool to enhance the academic and intellectual potential of our children, whether our children are native speakers of Navajo, Spanish, English or Vietnamese.

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