

# Annual Review of Applied Linguistics

Volume 6

1985

Cambridge University Press

## BILINGUALISM AND COGNITIVE DEVELOPMENT<sup>1</sup>

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The study of the relationship between bilingualism and cognitive development has struggled with the dual definitional problems of the key component concepts. Bilingualism has been defined at various levels of functional definition. These include linguistic, cognitive, and social-psychological characteristics of individuals, as well as societal characteristics such as ethnicity and other sociodemographic variables. Failure to distinguish between these various definitions of bilingualism has led to confusion in deciphering the relationship of this elusive concept with cognitive development.

At the same time, there have been different conceptions of what constitutes cognitive development. In the beginning of this century, whence can be found the earliest systematic attempts to document the relationship, the primary definition of what we now call cognitive development was a psychometric one, based on differential performance of individuals within a defined population on IQ tests. Learning theory, Piagetian operational thought, Chomskyan rationalism, and Vygotsky's views of mind and society have all offered subsequent and different conceptions of what cognitive development might be the development of.

The factorial combination of variation in the definitions of bilingualism and cognitive development, overlaid with historical fluctuations in the motivations behind why one would want to explore the relationship between them in the first place, make a simple account of this literature difficult. A survey of the definitional issues and the historical context of the research appeared in Hakuta (1985).

In this review of the recent literature, we will first discuss the recent trends in definitions of bilingualism and of cognitive development.

### DEFINITION OF BILINGUALISM

Ever since the publication of Peal and Lambert's (1962) classic work, there has been a tendency to define bilingualism in terms of linguistic proficiency. In Peal and Lambert's work, a group of "balanced" bilingual children (judged to be equivalent in their proficiency in both languages) were compared to a group of monolingual children (matched on background variables). This definition in terms of linguistic proficiency was an important change from the earlier work at the turn of the century where a societal definition of bilingualism was adopted. In these studies, motivated by the concern over the IQ test performance of immigrant children, bilingualism was determined on

the basis of ethnic group membership, which was confounded with socio-economic status. Very few attempts were made to determine the actual linguistic status of the bilinguals.

Recent work continues the tradition of Peal and Lambert's original definition, matching as carefully as possible the bilingual and monolingual groups in an attempt to measure the "pure" effects of having learned two languages (Bain and Yu 1984, Bialystok 1984, Galambos and Goldin-Meadow 1983, Rosenblum and Pinker 1983). Several reviews of the literature using this definition of *bilinguals* have also been published in this period (Diaz 1983, Grosjean 1982, Hakuta 1985, McLaughlin 1984). In general, these studies show superior performance of bilinguals on the various dependent measures of cognitive ability. However, cause-effect relationships have not been established since they are cross-sectional and, furthermore, assignment to conditions is not random (McNab 1979).

In part as an attempt to avoid the issue of experimenter control over assignment to the "conditions" of bilingualism versus monolingualism, some recent studies have compared sub-groups within samples of bilinguals. For example, Duncan and De Avila (1979) classified Spanish-English bilingual students into high and low bilinguals based on their proficiency in the two languages. Similarly, Hakuta and Diaz (1985) operationally defined degree of bilingualism in Puerto Rican children in a transitional bilingual program as proficiency in English, statistically controlling for proficiency in Spanish. In both of these studies, degree of bilingualism was positively related to performance on the dependent measures tapping cognitive performance.

#### DEFINITION OF COGNITIVE DEVELOPMENT

The particular domain of child development that we currently call the cognitive domain took on a psychometric, IQ-based definition in the early literature. With the increasing refinement of both testing instruments and statistical analysis, the unitary IQ of Binet's era gave way to the notion of varying ability according to task. As a result of numerous studies using factor analysis to examine performance on different kinds of intelligence subtests, the construct of intelligence became differentiated into verbal and nonverbal (or quantitative) components. Some recent theories of intelligence (Gardner 1983, Sternberg 1985) acknowledge these components within the contexts of everyday life. Sternberg notes that what is intelligent behavior in one situation may well be unintelligent behavior in another, while Gardner claims the existence of multiple intelligences (such as verbal, spatial, musical, and social), each of which involves a different set of abilities.

These two theories exemplify the trend in contemporary psychology, often the outcome of contextualist approaches to traditional issues, toward ever more complex, interactionist theories. In fact, the construct of intelligence is no longer under sole jurisdiction of cognitive psychology. When viewed as adaptation to the environment, which is largely social for humans, intelligence becomes a central focus of social cognition. Wagner and Sternberg (in press) outlined a theory of practical intelligence involving a large proportion of tacit knowledge about one's living and working environments and a relatively small proportion of the academic skills formerly held to comprise intelligence. Such tacit knowledge is acquired over the years of schooling and beyond, suggesting the need for an approach to cognitive development

across both the lifespan and the entire range of human environments. Rogoff and Lave (1984) present an equally wide-angled perspective on the practical aspects of intelligence, or in their term, everyday cognition. Their book includes studies of mathematical problem-solving by dairy warehouse workers and drivers, decision-making in school systems, and the sensitivity of ski instructors to their students' needs, all of which are part of an increasingly broad and differentiated concept of intelligence.

Cognitive development, when broadly construed to mean the development of all forms of mental representation, properly includes the development of linguistic knowledge and skills. Much of the current work in bilingualism and cognitive development refers to the linguistic domain, generally referred to as *metalinguistic awareness*. The term refers to the ability to go beyond the communicative use to which language is put, and to appreciate the various qualities of language, such as grammatical and phonological properties, as well as to appreciate linguistic ambiguities and other subtleties prized by professional linguists. Studies using various measures claiming to assess *metalinguistic awareness* of recent years include Bialystok (1984; in press a; b), Diaz (in press), and Galambos and Goldin-Meadow (1983).

A few studies attempted to assess broader aspects of cognitive development. Hakuta (1984) looked at a measure of social perspective-taking, and found statistically unreliable effects of degree of bilingualism. Kessler and Quinn (1980) measured science problem solving. Dawe (1984) examined the effects on mathematics learning. Bain and Yu (1984) investigated the effects on the body percept.

#### THE SOCIETAL CONTEXT

In the early studies, researchers were willing to confound the supposed treatment variable, bilingualism, with the societal variable, ethno-linguistic membership. The willingness to do so--that is, to treat bilingualism as a variable not randomly distributed in the population--reflected the societal orientation that the studies were taking where, in effect, bilingualism was defined by membership in the ethno-linguistic group, rather than by the linguistic composition of the individuals. Later researchers, with a more individual linguistic orientation, clearly found this approach unacceptable (Peal and Lambert 1962). In order to assess "pure" effects of proficiency in two languages, then, one had to recognize the fact that bilingualism is non-randomly distributed in the population, and to study populations where social class and other backgrounds were taken into account. If the purpose was to conduct a pure assessment of linguistically bounded bilingualism, this would be the appropriate procedural direction.

On the other hand, recent work is beginning to recognize the importance of the inherent correlation between bilingualism and social psychological (Ball, Giles, and Hewstone 1984) as well as societal (Ferdman and Hakuta 1985) variables. This interest in the social psychological and societal correlates of bilingualism stems from several concerns. First, there is a general trend in psychology at present to consider the importance of the interaction of cognitive and social/affective parameters (e.g., Zajonc 1984). Second, there is concern over the artificiality of studies which pretend that bilingualism is a treatment variable that can be randomly assigned. Studies that directly address the natural covariation between bilingualism and socio-

economic status may be more ecologically valid. And third, since bilingualism can be operationalized at both the individual and the societal levels, simultaneous consideration of the two levels can serve as a prototype of the general social science problem of how to span levels of analysis.

Examples of recent work that convey the importance of the societal context of bilingualism and cognitive development can be found in Cummins' (1984b) excellent review of the literature, as well as in Bain and Yu (1984), De Avila (1985), Ferdman and Hakuta (1985), and Skutnabb-Kangas (1979).

#### BILINGUAL EDUCATION

Research on bilingualism and cognitive development has had sizeable impact on the debate over bilingual education in the United States. Exemplary in this regard is Cummins' (1984a) synthesis, which follows on the tail of his earlier work aimed at the practitioner and disseminated by the State of California (Cummins 1981). In these works, Cummins has argued for the implications of the role of primary language development for language minority students in bilingual education. Research in this area has also been applied to bilingual education by De Avila (1985), Hakuta (1985), and McLaughlin (1985).

#### THE FUTURE

The future of this area of research promises to be a complex one. Our view of what constitutes language proficiency is becoming increasingly sophisticated. For example, Snow (in press) demonstrated the importance of distinguishing between contextualized and decontextualized language skills when assessing both languages of bilingual children. In another development, Goldman (Goldman, Reyes, and Varnhagen 1984) has expanded the domain of language performance to narrative comprehension skills. As we broaden our linguistic horizons, the operationalizations of bilingualism will become increasingly complicated. Furthermore, the increasing awareness of the societal correlates of individual bilingualism is likely to add to the complexity of the definition.

Similarly, our views of what constitutes cognitive development are changing. We are currently undergoing a phase where general theories of development, such as Piaget's, are seen as less useful than specific theories about cognitive skills. The notion of cognitive stages, for example, is being replaced by the difference between experts and novices at particular tasks (such as chess or abacus). We are also witnessing a revitalization of interest in the social origins of cognition, most notably associated with Vygotsky. Statements about the relationship between bilingualism and cognitive development will clearly have to go beyond the simple question of whether the relationship is negative, nonexistent, or positive, to the question of how knowledge and skills are represented in bilinguals with respect to their languages. As we gain a better understanding of the workings of bilingualism within society, and the workings of the two languages within the individual mind, our need to ask the question of whether bilingualism is good or bad for cognitive development should decrease proportionately.

## NOTE

<sup>1</sup>Preparation of this manuscript was supported in part by Grant NIE-G-81-0123 from the National Institute of Education, Kenji Hakuta, Principal Investigator.

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Bain, B. and A. Yu. 1984. The development of the body percept among working- and middle-class unilinguals and bilinguals. In M. Paradis and Y. Lebrun (eds.) *Early bilingualism and child development*. Lisse: Swets and Zeitlinger. 193-212.

The research attempts to extend the comparison of bilinguals and monolinguals to the study of the body percept, where the perception of one's body is considered to be a special case of more general perception. Subjects were 660 students from grades 1-3, chosen to represent diversity on ethnic (Italian, German, and Canadian), social class (working-class and middle-class), and language (monolingual versus bilingual) backgrounds. Measures included the Uzdaze Haptic-Kinesthetic Test and the Fields Expressive Faces Test. The major result was that middle-class bilinguals showed superior performance over middle-class monolinguals as well as over working-class monolinguals and bilinguals. No significant differences were observed between the latter three groups. The study represents a bold attempt to generalize findings across cultures and social classes, and the write-up shows high author awareness of the societal context of bilingualism. However, the authors present little information on the differences that might exist between the middle-class monolinguals and bilinguals on sociological variables.

Bialystok, E. 1984. Influences of bilingualism on metalinguistic development. Paper presented at the National Reading Conference Meeting, St. Petersburg, Florida.

This paper reports two sets of studies investigating the specific question of the locus of advantages for bilinguals in tasks employing metalinguistic skills. Monolingual and bilingual students in grades K-3 judged sentence grammaticality or corrected anomalous or ungrammatical sentences in the first set of studies; in the second set of studies, subjects counted words in normal or scrambled sentences. Results supported the hypothesis that bilinguals are more skilled at controlling linguistic processes (such as focusing on form to the exclusion of meaning) than are monolinguals of the same age, but that there is no difference between monolinguals and bilinguals in ability to construct analyzed representations of linguistic knowledge (i.e., solving problems where the level of linguistic knowledge--explicit vs. implicit--is the basis for the solution). Although the paper clearly shows an interaction between bilingualism and metalinguistic ability, several potentially difficult questions are left unanswered,

among them the possible effect of SES or sociocultural differences between the subject groups and, at a more theoretical level, the mechanism of the developmental difference (that is, why linguistic knowledge--as opposed to control processes--is not more sophisticated in bilinguals than in monolinguals).

Cummins, J. 1984b. *Bilingualism and special education: Issues in assessment and pedagogy*. San Diego: College-Hill Press.

The term *special education* has as its strongest associate *mental retardation*, but this important book is concerned with much more wide-ranging pedagogical issues, most specifically the labeling of minority-language students as "learning disabled." Cummins' claim is that such labeling, and the theoretical basis for assessment of the cognitive development of bilingual children, is grossly oversimplified. He surveys data and theoretical arguments for an approach to bilingual education that takes into account social, cultural, educational, and linguistic factors.

Diaz, R. M. 1983. Thought and two languages: The impact of bilingualism on cognitive development. *Review of research in education*. 10.23-54.

Clear and thorough review of the recent literature (through 1983) on bilingualism and thought. Discussion is divided into: the effects of bilingualism on cognitive flexibility, linguistic and metalinguistic abilities, concept formation, divergent skills and creativity, and cognitive style.

Diaz, R. M. and K. Padilla. 1985. The self-regulatory speech of bilingual preschoolers. Paper presented at the Society for Research in Child Development, Toronto, April 25-28.

The study analyzed the private speech of bilingual preschoolers with respect to their self-regulatory functions. Subjects were 54 bilingual preschoolers in Texas. Assessment of self-regulatory speech during performance on cognitive tasks (block design, classification, and sequencing of story cards) showed that the private speech of bilingual children has the same characteristics as that of monolingual preschoolers, that language switching rarely occurs in private speech, and that code-switching in private speech bears no relation to success in the tasks. The study is important in ruling out the possibility that the positive effects of bilingualism on problem solving might come about because of switching between the two languages.

Duran, R. P. 1984a. An information-processing approach to the study of Hispanic bilinguals' cognition. In J. L. Martinez and R. H. Mendoza (eds.) *Chicano psychology*. 2nd ed. New York: Academic Press. 409-425.

This paper reports studies examining the implications of bilingualism for cognitive processing with standard paradigms from cognitive psychology. In the first study, performance on psychometric tests, administered in both languages, of syllogistic reasoning and inferential logic was modeled with a variety of reading comprehension measures. In the second study, comparisons were made across languages of performance

on word recognition and sentence verification tasks. Results from both studies suggested that, at least among adult bilinguals, the same cognitive processes might be required for problem solving regardless of the language of input. While these findings are not extraordinary, the paper is noteworthy for its application to the study of bilingualism notions of component processes and problem solving strategies from contemporary psychology; although some specific processing issues are passed over (for example, why simple sentences might be processed differently in Spanish and English), the approach deserves wider attention.

Ferdman, B. and K. Hakuta. 1985. A population perspective on bilingualism in Puerto Rican children. Paper presented at the Society for Research in Child Development, Toronto, April 25-28.

Using supplemental data collected by Hakuta (1984; q.v.), the authors argue for the importance of examining the societal context in which bilingualism occurs when testing for its cognitive consequences; specifically, a demographic study of the entire Hispanic population in which the original study was conducted with 1726 subjects. Systematic patterns emerged in the distribution of language use that are related to parental birthplace, length of residence in the U.S. mainland, and a host of other home characteristics. Authors argue that such factors are important in affecting whether or not children will become bilingual and, in turn, what effects their bilingualism will have on subsequent development.

Galambos, S. and S. Goldin-Meadow. 1983. Learning a second language and metalinguistic awareness. In A. Chukerman (ed.) *Nineteenth regional meeting of the Chicago Linguistic Society*. Chicago: Chicago Linguistic Society. 117-133.

The study attempted to assess the relationship between bilingualism and metalinguistic awareness as measured by the ability to notice, to correct, and to explain sentences that were ungrammatical. Various types of grammatical violations were used. Subjects were 23 Spanish-English balanced bilingual children in El Salvador, compared with Spanish monolinguals in El Salvador and English monolinguals in the United States. All were from middle-class backgrounds. Age groups were pre-schoolers and first graders, ranging from 4-1/2 to 7-1/2. Bilinguals outperformed the monolinguals in noticing errors across age groups; the pre-school bilinguals were also better than monolinguals in making corrections and in explaining the errors, although there were no differences in the first graders.

Genesee, F. 1983. Bilingual education of majority-language children: The immersion experiments in review. *Applied psycholinguistics*. 4.1-46.

This paper summarizes the last 20 years of research comparing three kinds of bilingual immersion programs: those involving early, delayed, and late introduction of the second language as a medium of instruction. The long-term effects on first and second language skills and general academic achievement suggest that the rule for majority-language children is "the earlier, the better." Not only does early bilingualism result in greater second language proficiency, but there is no long-term



deficit in native language skills or general academics, as has been observed in immersion programs for minority language children (often called "submersion" programs). The tone of the paper is cautiously optimistic with respect to both cognitive and social issues in bilingualism. Genesee stresses the importance of considering socio-psychological and socio-economic differences between majority- and minority-language children in policy formation and program implementation, but generally finds immersion programs a "feasible" alternative.

Goldman, S. R., M. Reyes, and C. K. Varnhagen. 1984. Understanding fables in first and second languages. *NABE journal*. 8.35-66.

Experiments using cognitive psychology methods for assessing narrative comprehension are reported with Spanish-English bilingual children between kindergarten and fifth grade. The studies collectively demonstrate that there is transfer of knowledge across first and second language inputs, an important concept in the rationale for bilingual instruction. Bilingual children demonstrated similar comprehension patterns in both languages. There was also a positive correlation between performance in the two languages. The authors discuss the important implications of this research for language proficiency assessment in encouraging a more differentiated picture of comprehension.

Hakuta, K. 1984. The causal relationship between the development of bilingualism, cognitive flexibility, and social-cognitive skills in Hispanic elementary school children. Final Report, National Institute of Education, NIE-G-81-0123, December 31. [Available from the National Clearinghouse for Bilingual Education.]

The study attempted to look at the effects of bilingualism on nonverbal intelligence, metalinguistic awareness, and social-cognitive skills within a group of bilingual Puerto Rican children in a transitional bilingual education program. Subjects were 392 children between kindergarten and sixth grade who were observed longitudinally over three years. The effects of bilingualism on the dependent measures were assessed through regression (the correlation with English, controlling for Spanish and for age). There were statistically reliable effects of bilingualism for nonverbal intelligence and metalinguistic awareness in both cross-sectional and longitudinal analyses, though the magnitude of the effect varied over time and grade level. Longitudinal analyses to test for direction of causality yielded mixed results, in part due to the changes in reliability of measures over time. The longitudinal analyses provided support for the position of linguistic interdependence, with an increasing correlation between English and Spanish over time. An appendix to this study contains an annotated bibliography of the early research in this area.

Kessler, C. and M. E. Quinn. 1980. Positive effects of bilingualism on science problem-solving abilities. In J. E. Alatis (ed.) *Current issues in bilingual education*. Washington, DC: Georgetown University Press. 295-308. [Georgetown University Round Table on Languages and Linguistics.]

This paper reports a study comparing monolinguals and bilinguals on a hypothesis generation task. Subjects were 6th graders matched on several

IQ and academic proficiency measures, but no SES (which was held to be unrelated to hypothesis formation on the basis of earlier work by these researchers). Experimental groups received training in hypothesis formation; the hypotheses generated by subjects in both experimental and control groups were rated for their quality and syntactic complexity. Bilinguals far outperformed monolinguals on both dependent measures, which the researchers interpret as resulting from the greater divergent thinking facilitated by access to dual linguistic codes. Although in many ways a typical "bilingual advantage" study, this paper is noteworthy for its reference to Piaget's theory of cognitive development in the discussion of the interaction between verbal and nonverbal cognitive functioning.

Mace-Matluck, B. J., W. A. Hoover, and R. C. Calfee. 1984. Teaching reading to bilingual children study. Final Report to the National Institute of Education. [Southwest Educational Development Laboratory, Document No. BRS-84-R.]

This is a report in 8 volumes (only the first 5 of which are currently available) of a longitudinal investigation of growth in reading skills in both English and Spanish of Hispanic children in Texas school districts with varying demographic profiles and methods of reading instruction. Language skills were assessed yearly (through both oral proficiency tests and teacher ratings) and speech samples from classroom, playground, and home settings were gathered monthly. Reading skills were tested yearly, using standardized tests (in English) and performance indices and informal reading inventories (in English and Spanish). These data were analyzed together with student entry variables and classroom factors for "underlying regularities that are associated with success and failure, both in the early stage of reading instruction and in the year-to-year variations" (Vol. I, p. 7). The investigators found differing patterns and degrees of bilingualism (associated with the large site differences), with generally greater growth in English than in Spanish oral skills. Reading skills subtests showed substantial transfer for phonetic segmentation and visual matching across languages, but surprisingly little growth in the higher level task of text comprehension in Spanish compared to English. The final volumes of the report will relate the achievement patterns to instructional methods and draw the findings together. Despite the heft of the report, it is easy to read and provides a wealth of qualitative data even when it's hard to make sense of the numbers.

Paradis, M. and Y. Lebrun (eds.) 1984. *Early bilingualism and child development*. Lisse: Swets and Zeitlinger.

Contains papers by scholars including Cummins and McLaughlin (q.v.). Although much of the data and many of the theoretical arguments have appeared in print elsewhere, the volume provides a useful compilation of the state of the art. The introduction (titled "To be or not to be an early bilingual?") suggests the cognitive orientation of the volume, since it goes contrary to the sociological interpretation that would consider bilingualism to be less a choice than a social reality.

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