



Review

The cognitive development of young dual language learners: A critical review



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ABSTRACT

Dual language exposure and bilingualism are relatively common experiences for children. The present review set out to synthesize the existing research on cognitive development in bilingual children and to identify the gaps and the methodological concerns present in the existing research. A search of major databases for research conducted with typically developing, preschool-age dual language learners between 2000 and 2013 yielded 102 peer-reviewed articles. The existing evidence points to areas of cognitive development in bilingual children where findings are robust or inconclusive, and reveals variables that influence performance. The present review also identifies areas for future research and methodological limitations.

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1. Introduction

The study of cognitive consequences of bilingualism has a relatively long history that dates back to the beginning of the 20th century, but the effects of bilingualism on executive functions and other non-verbal abilities has only recently become a topic of research. From the beginning, bilingual research with children was concerned with the domains of intelligence and linguistic and metalinguistic performance, just as it is now. This trend reflects an intuitive understanding that bilingualism, essentially a linguistic experience, must affect linguistic performance and also an unfounded fear that managing two languages is a demanding task that may exceed children's cognitive resources and thus could potentially lead to intellectual impairment. With a few exceptions that remained largely ignored (Arsenian, 1937; Hill, 1936; Pintner & Arsenian, 1937; Stark, 1940), the majority of early studies on bilingualism in children reported superior performance in monolingual children (review in Barac & Bialystok, 2011). This monolingual advantage was found on a range of tasks such as IQ tests (Graham, 1925; Jones & Stewart, 1951; Lewis, 1959; Saer, 1923; Wang, 1926), verbal intelligence (Darcy, 1953) arithmetic and reading achievement (Macnamara, 1966; Manuel, 1935).

One of these early studies (Saer, 1923) compared the performance on the Stanford-Binet Scale of Intelligence in over one thousand English monolingual and Welsh-English bilingual school-aged children from rural and urban backgrounds in Wales. The findings showed lower intelligence scores in bilingual children from rural areas at all ages tested (i.e., 7–11 years), with the gap in performance between the two language groups becoming larger with age. The author interpreted this finding as a sign of "mental confusion" encountered by the bilingual child. Later analyses of this study pointed out several methodological flaws that essentially applied to most early research on bilingualism: (a) the groups of comparison were not properly matched on variables such as age, gender, and socio-economic status, (b) the testing was typically conducted solely in one language (L2), and bilingual children varied in the degree to which they comprehended and produced the language of testing, and (c) bilingualism was not properly defined and quantified, and sometimes bilingualism was simply assumed in children based on parents' names and country of birth (Darcy, 1953; Peal & Lambert, 1962). Interestingly, two extensive reviews (Darcy, 1953, 1963) clearly blamed early negative outcomes to methodological flaws and pointed out an important dissociation in the results: typically bilingualism was found to produce costs in verbal intelligence tests but there were no differences between monolingual and bilingual children in non-verbal intelligence. This observation set the stage for finding cognitive benefits of bilingualism or at least for distancing from the early notion of pervasive bilingual cognitive disadvantages.

A landmark study that contributed significantly to the change in attitude from believing that bilingualism was a negative experience for children to one in which it is now seen as a positive boost to cognitive functioning was conducted by Peal and Lambert in 1962. They gave a battery of intelligence tests to 10-year-old French-speaking children in Montreal, some of whom were also fluent English speakers. The authors carefully measured language experience and proficiency, quantified the degree of bilingualism and matched the groups on gender, age and socio-economic class. This resulted in a sample of 75 French monolinguals with about half a year of English experience and 89 French-English bilinguals with an average of six years of English language experience.

Peal and Lambert (1962) hypothesized that there would be no differences between the groups on measures of nonverbal intelligence but there would be a monolingual advantage in verbal intelligence. Contrary to these predictions, bilingual children outperformed monolinguals on two measures of nonverbal

intelligence (Raven Progressive Matrices and the Lavoie-Laurendeau Nonverbal IQ), as well as on measures of verbal intelligence (Lavoie-Laurendeau Verbal IQ). More detailed analyses of children's performance on each subtest revealed that bilingual children generally had higher scores than monolinguals on subtests that required symbolic manipulations and reorganization but not on measures with high spatial-perceptual demands. In contrast, monolinguals did not surpass bilinguals on any of the subtests. On the basis of these findings, Peal and Lambert suggested that bilingual children may actually show *enhanced* cognitive ability, especially on tests of concept formation and symbolic flexibility. The authors further speculated that bilingual children's early and sustained experience with two linguistic symbols standing for every one thing in the world coupled with the exercise of switching between the two languages might be at the root of their advantage in nonverbal intelligence. This was the first evidence that not only was bilingualism not damaging to children's cognitive growth but also it might be a positive experience that led to cognitive benefits.

Although Peal and Lambert identified and controlled many of the methodological issues from past research, the study was not flawless. The authors used strict selection criteria to assign children in the monolingual and bilingual groups and to ensure that the bilingual children formed a homogeneous group with equal proficiency in French and English (i.e., "balanced bilinguals"). However, it is possible that applying these strict criteria might have led to the selection of a special subset of the bilingual population in that the authors excluded more than half of the original sample: 200 children out of 364 were classified as having ambiguous language experience. Thus, it is possible that the bilingual children in the study were a particularly high achieving group who may not be completely representative of the bilingual population in general whose proficiency in two languages is more average.

After 1962, bilingualism research focused on linguistic and metalinguistic performance for a few more decades, generally showing lower linguistic proficiency and more precocious metalinguistic development in bilingual children (review in Bialystok, 2001). A key advance in bilingualism research which contributed significantly to the active interest in the nonverbal cognitive effects of bilingualism from the last two decades was the development of a framework for understanding metalinguistic development. Bialystok (1986, 1993) proposed a distinction between *representation of linguistic knowledge* and *control of attentional resources*. Analysis of linguistic knowledge is the process by which implicit mental representations are reorganized and refined so that they become more explicit. Children learning to write, for instance, require more explicit knowledge (or higher levels of analysis) of the same rules that can be successfully used in an implicit way when engaging in a conversation. Control of processing refers to focusing attention selectively on different representations or different aspects of representations (focus just on form, or just on meaning) and switching back and forth as needed. Bialystok (1986, 1993) further argued that the bilingual advantage on metalinguistic tasks was in fact due to children's enhanced control skills. This is why bilingual children surpassed monolingual peers when judging the grammaticality of sentences that contained semantic errors, thus having the added demand of ignoring the unusual meaning, but did not differ from monolinguals when the sentences were semantically intact.

Research with metalinguistic tasks led to the hypothesis that the effect of bilingualism was to enhance the performance of the executive function system, not just for linguistic processing, but for nonverbal processing as well (Bialystok, 2001). This proposal represents a new conceptualization of the effects of speaking two languages and over the past two decades has been empirically supported by a growing number of studies with both children

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