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The Systematic Effects of Bilingualism on Children's Development

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Developmental science has deep historical and philosophical roots, having been born from the interface of many different disciplines. From early discussions about the origins of perception and complex thought, a recurring debate has focused on the extent to which developmental achievements are tightly constrained and hence largely universal versus the extent to which specific environmental input and different types of experience direct and shape behavior and individual capabilities.

With the recognition that virtually all aspects of development reflect both universal forces at the same time that they reflect shaping and influence from the environment, contemporary research and theorizing have begun to move beyond these largely unproductive debates. The current challenge for developmental science, therefore, is not to argue over “which” it is, but instead is to better understand how environmental conditions, genetic predispositions, educational and social opportunities, and unique experiences work together across development. These interactions are multivariate and often bidirectional, so the task can appear daunting. But without a more complete description of development that attempts to include this complexity, our theories and descriptions of child development will remain limited and incomplete. The papers in this Special Issue are an attempt to understand one such factor and examine its role in the network of forces that underlie children's language and cognitive development in the early years. The question addressed by the papers in this issue is whether early childhood bilingualism influences the manner or timing of language acquisition and cognitive development for young children.

Bilingualism is unique among the contextual and experiential variables that are now included in research into child development. First, it is unique because of its *prevalence*. It is generally believed that more than half of the world's population is bilingual (Grosjean, 2010). Even “monolingual” North America includes a surprising degree of bilingualism: In each of the U.S. (U.S. Census Bureau, 2010a) and Canada (Statistics Canada, 2007), approximately 20% of the population speaks a language at home other than English. These figures are higher in urban areas, rising to about 60% in Los Angeles (U.S. Census Bureau, 2010b) and 50% in Toronto (Statistics Canada, 2007). Second, it is unique because of its

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intensity. Many aspects of language and cognition are inextricably interconnected, such that ongoing modulation in one system will have repercussions for the other. Language is arguably the most intensely-used system we have as it is part of all out meaningful interactions with the world, even non-verbal ones. Finally, it is unique because of its *distribution*. Unlike other experiential factors such as educational opportunity, musical training, or enriched environments, bilingualism is not limited to individuals with certain levels of socioeconomic support, individual talent, or privileged opportunity. The most common form of bilingualism, heritage language bilingualism, comes as a natural consequence of being raised in a home where the majority community language is not the language of the home. Because of these factors – prevalence, intensity, and distribution – bilingualism is an ideal topic to examine at this juncture in the history of developmental science.

These three factors make bilingualism a particularly useful lens of advancing understanding child development. Yet, at the same time it is one of the most difficult variables to study empirically. Unlike most independent variables in psychology, bilingualism is neither strongly categorical nor clearly quantifiable. Children being raised in homes where heritage languages are spoken but attend school and participate in social activities in the majority language develop varying levels of proficiency in the heritage language. Although these children are not monolingual, they are not always completely bilingual either. If the home language and school language use different writing systems, then children require special instruction in the home language literacy, something that is not always provided. These children, therefore, may be bilingual but not biliterate. There is furthermore no defined starting point for bilingualism: some children learn two languages from birth in the home and others begin with one language and add a second at some later point. There may be sensitive periods for the timing of bilingual exposure, yet they could vary for different aspects of development. Thus, even if similar levels of proficiency are achieved, if the timing of early experiences is not the same there may be different consequences for bilingualism itself, and for the impact of bilingualism on other aspects of child development. The range of bilingual experience, therefore, is the first obstacle in conducting this research. The second obstacle is perhaps more overwhelming: bilingualism cannot be randomly manipulated as an independent variable, the ultimate criterion for clinical trials. Without random assignment to groups, there is always a possibility that some hidden factor is undermining the results. Bilingualism researchers are aware of this issue and go to great lengths to match samples for education, socioeconomic status, immigration levels, and other such factors that might potentially be confounded with bilingualism.

The papers in this Special Issue focus on the language and cognitive outcomes of being raised in bilingual environments. There are other aspects of bilingual experience in development that are not included in these papers, such as social development, emotional control, and reasoning, all of which have their own relationship to experience in general and bilingualism in particular. Our focus on language and cognition reflects their prominence in this literature and the interactions between them.

Consider first the implications of bilingualism for language acquisition. Much of the research to date on language acquisition has focused on children growing up monolingual,

and within that, learning English. From this literature, generalizations have been drawn that do not necessarily capture acquisition in other languages, and certainly do not begin to characterize what it is like to grow up with two languages. Yet, the experience of acquiring two languages has been shown to influence the process of language acquisition itself to some degree, and also to influence the cognitive systems related to language use, language application, and encoding and reasoning about the world.

All languages allow encoding of the properties of the world, our relations with that world, and our relations with one another. All support a form (phonology) to meaning relation, and highly specific rules for word order and morphological processes for achieving this. Yet each language does so in somewhat different ways. Therefore, the bilingual child acquires two sound systems, two sets of rules for word order, two lexicons, and the myriad other differences in the way their two languages encode and represent the world. While the mind is (arguably) just as prepared to acquire multiple languages as it is one, questions of how the multiple languages interact and influence one another both in acquisition, and in the transition to – and learning in – school need to be answered.

Until recently, there was little research on simultaneous bilingual first language acquisition. Much of the early work focused on descriptive studies of toddlers and young children, comparing the onset of canonical babbling and the acquisition of vocabulary, syntax, and phonology in bilingual and monolingual populations (see Genessee & Nicoladis, 2006, for a review). It was not until the 1990s that laboratory studies began in earnest, allowing both the testing of timing of achievements in preverbal populations (see Bosch & Sebastian-Galles, 1997, for one of the earliest empirical studies with infants), as well as studies probing whether the processes by which language acquisition ensues are the same or different in bilingual populations. There has now been an explosion of research comparing monolingual and bilingual acquisition, including bimodal bilinguals (those acquiring both a signed and a spoken language). While the timing of achievements has been shown to be, by and large, comparable in the two groups, the perceptual, attentional, and conceptual processes infants and young children bring to acquisition differ in some important respects between monolingual- and bilingual-learning children.

As with language acquisition, much of the research on cognitive development has focused on monolingual children in monocultural environments. However, the notion that early childhood bilingualism impacts children's cognitive development has existed for almost a hundred years. Beginning in the 1920s, warnings of "mental confusion" (Saer, 1923) and "retardation" (Goodenough, 1926) were expressed by psychologists and educators, and for the most part, accepted as sufficiently valid by the public to create anxiety in parents about creating bilingual home environments. This fear existed despite the fact that generations of immigrants, including in many cases these same parents, grew up speaking a minority language at home. In contrast, research in the second half of the twentieth century took the opposite view. Beginning with a study by Peal and Lambert (1962) demonstrating that bilingual children outperformed their monolingual peers on both verbal and nonverbal measures of intelligence, studies demonstrating a wide range of tasks, skills and abilities in which bilingual children were claimed to outperform monolinguals began to appear (for a timeline of this research, see Barac & Bialystok, 2011). However, in many cases the claims

for positive cognitive effects of bilingualism were as reflexive and over-stated as were the negative claims that preceded them.

The more recent research comparing the cognitive skills of monolingual and bilingual children has focused on the fundamental components of cognitive development, including memory, attention and executive function. At first, investigators asked the simple question of whether one group had advantages over the other, but it became clear that the problem required a more complex approach. Issues such as determining the most appropriate model for examining executive functioning and the types of tasks most sensitive to those processes needed to be solved before group comparisons could be interpreted. Similarly, specific features of the bilingual experience, such as when the second language was learned and how much each language was used, needed to be incorporated into the designs. The question now is to determine how cognitive processes and different kinds of language learning environments interact.

In this volume we bring together some of the most recent work addressing these questions, sampling widely across a variety of topics on bilingualism, and from different researchers around the world. Papers that are included represent some of the advances in the precision of the questions asked, using carefully titrated methodologies, new approaches to data analysis, and nuanced interpretation of the findings. In addition to standard behavioral studies that compare performance across groups, the methodologies include studies that use neuroimaging (Ramirez, Ramirez, Clarke, Taulu, & Kuhl), eye tracking (Ayneto & Sebastian-Galles; Yow), and longitudinal designs (Paradis & Jia; Savage, Kozakewich, Genesse, Erdos, & Haigh), including one paper that compares recorded speech to parent report (Marchman, Martinez, Hurtado, Gruter, & Fernald). The populations tested include infants (e.g., Ayneto & Sebastian-Galles; Byers-Heinlein; Polka, Arena, Sundara, & Worrall; Ramirez et al) as well as young children, and even adults who had different types of early experience. Finally, the research investigates executive function (Grundy & Keyvani Chahi; Sorge, Toplak, & Bialystok; White & Greenfield), attention allocation (Ayneto & Sebastian-Galles), written (Hansen, Morales, Macizo, Dunabeitia, Saldana, Carreiras, Fuentes, & Bajo; Savage, Kozakewich, Genesse, Erdos, & Haigh) and spoken (Paradis & Jia) language proficiency; perception (Ramierz, et al) and segmentation (Polka, et al) of speech; the relation between language and both concepts (Byers-Heinlein) and word meaning (Kandhadia, Hall, & Werker), and the impact of bilingualisms on communicative (Lieberman, Woodward, Keysar, & Kinzler) and referential (Yow, Li, Lam, Gliga, Chong, Kwek, & Broekman) sensitivity. Our goal in putting together these papers is to advance the discourse around bilingualism and position developmental scientists to better study language and cognitive development through the lens of different types of experience, including bilingualism.

Beyond the scientific value of understanding the relation between bilingualism and language and cognitive development, there are real consequences for knowing precisely how development may be different for bilingual children than for monolinguals. Theoretically, a better understanding of how bilingual experience informs even “universals” in development positions us to probe more deeply into exactly how the mind is organized for complex cognitive operations. Clinically, current assessment and diagnostic criteria are based on

normative data obtained from monolinguals. Those scales may not be valid for bilingual children, so the consequences of missed diagnoses or over diagnosis are real. In our increasingly global society, understanding these issues is imperative to ensure the success and well-being of immigrant populations. We hope this collection of papers makes some small contribution to these goals.

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