Foreword

When I was a PhD student, the first study that I designed was about the meanings that young children attribute to number words. I put together some tasks, went to some preschools, and tested some children. But when I analyzed the data, I found nothing: no interpretable patterns, no confirmation or disconfirmation of my hypotheses. I took the results to my faculty advisors. "Look," I said. "Nothing. I guess I have to think of a new study and start over."

"Well, wait a minute," my advisors said, looking closely at the data. "It looks like half of these kids are bilingual. Did you exclude them?" I had not. My advisors told me to run the analyses again, using data only from monolingual children. I followed their instructions, and *voila*! Clear results. The results were the opposite of what I predicted, but I didn't care – results are results! By eliminating one dimension of variation (multilingualism) from the sample, I had turned an unpublishable study into a publishable one.

I believe that experiences like these are the reason why so many developmental researchers have shied away from studying diverse dimensions of mathematics and language learning. Research is difficult to begin with, and every dimension that we include just makes it more difficult. After my first study, I spent the next handful of years studying language and number development only in monolingual English-speaking, typically developing children. I knew that most of the world's children are not monolingual, and I knew that development takes many different paths besides the path we call normal. But I wanted to simplify my work however I could.

Then I got a job in Southern California. Suddenly, 85% of the preschoolers in schools I visited were bilingual or multilingual. So I had a choice: I could either exclude data from 85% of children, or I could try to study multilingual development.

I think a similar thing is happening to our whole field. Experimental psychologists have always created artificial situations to study; our analytical methods require experiments to be simpler than real life. But real life now in many of our communities is so diverse that when we abstract away from dimensions like multilingualism or atypical development, the picture that we end up studying seems utterly divorced from the reality that we all live in.

The authors of these chapters know well that studying realistic diversity is difficult, and that it would make things simpler if we pretended that all children grew up monolingual and developed along a typical path, which we could all study using one agreed-upon research method. But the world is not so simple. We must find ways to handle the diversity of mathematics and language learning

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in our research because that is the only way to gain real wisdom about both the universals and the particulars of human development.

The editors of this book have done us all a service by bringing together scholars who use different methods and address different topics. Each of us has only a narrow band of expertise. We are trained in particular methods that limit the kinds of questions we can ask, and we have deep knowledge of only a small corner of the scientific literature. As the old joke says, a researcher learns more and more about less and less until eventually she knows everything about nothing. This unavoidable narrowness in our individual expertise means that a truly diverse picture of mathematics and language learning can only come from a whole community of researchers in conversation with each other. That is what the editors have created in this book.

I conclude this foreword with the hope that this book will be starting a conversation that continues for many years, inspiring new collaborations and new lines of research that lead us back to real wisdom. When I teach human development to undergraduates, I start by saying that all human beings on earth only differ from each other by 1–1.5% of their genes. Although diversity is fascinating, the most important truths of human experience are true for all of us – everyone wants to be safe, everyone wants to be loved, everyone wants to be heard. Even as our studies of mathematics and language learning become more sophisticated and more able to handle the diversity of real life, I suspect that they will keep bringing us back to certain home truths – that the human brain is amazingly plastic; that learning the representational systems of mathematics and language actually transforms the way we think; and that human development is simultaneously the most complicated research topic in the world, and also the most important.

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