This section of the book includes three chapters focusing on equity issues associated with biological factors. The contents are at the cutting edge of research on equity with respect to biological determinants. In earlier research on biological factors, the focus was on trying to explain gender differences in performance by biological differences associated with spatial capabilities (e.g., Benbow and Stanley 1980). At the time, critics of biological explanations (e.g., Meyer and Fennema 1988) pointed to the lack of supportive scientific evidence for the claims. Other detractors (e.g., Selkow 1985) outlined the psychological and social consequences for women if genetic explanations for gender differences were embraced. One of the chapters in this section is consistent with these earlier criticisms of biological determinism. The other chapters included here go beyond gender differences to examine other aspects of biological factors. The work discussed contributes to emerging and important understandings of the interaction of biology and equity considerations in the learning of mathematics education.

In their chapter, *Gender differences in mathematics and science achievement across the distribution: What international variation can tell us about the role of biology and society*, Andrew Penner and Todd Cadwallader Olsker focus on the potential of biology and/or social factors on mathematics proficiency. They provide an overview of the literature on genetic theories associated with gender differences in mathematics achievement, and the literature on social factors. Using TIMSS 1995 data, variation and gender differences in international mathematics achievement were examined using two analytical approaches: descriptive statistics, and modeling using country level predictors. Patterns were evident that were inconsistent with the implications suggested by biological theories: i. the magnitude of the gender differences varied widely across countries; ii. the variation in scores was not always highest for males; iii. females in some countries scored higher than males in other countries; and iv. contextual, societal factors may impact differentially on the possibilities for high achieving girls and boys.

The chapter by Marjorie Montague and Asha Jitendra, *Research-based mathematics instruction for students with learning disabilities*, provides valuable insights into an under-researched field affecting between 5% and 8% of children in the general population. The authors describe the difficulties experienced by children with mathematics learning difficulties that put them at risk educationally. An overview of the existing research literature identifying evidence-based practices that are ef-
fective in teaching these students is presented. This is accompanied by descriptions of two programs designed to improve the mathematics learning of students with learning difficulties: i. Solve It!, founded in cognitive strategy instruction (CSI) designed for secondary students to improve their mathematical problem solving; and ii. a four step schema-based instruction (SBI) intervention to assist children to identify a problem types or problem schema. As children with learning disabilities move into mainstream schooling, the authors recommend that classroom teachers and specialist remedial teachers need to work collaboratively. The success of interventions, they claim, “often depend on how, when, and by whom they are provided to students”.

A synopsis of research on brain-related explorations within the general field of neuroscience as it has been applied to understandings of mathematics learning is provided by Ferdinand Rivera in his chapter, *Neural correlates of gender, culture, and race and implications to embodied thinking in mathematics*. Rivera believes that information about the “neural mechanisms that support cognitive processes in mathematical thinking and learning” will be derived from such studies. Of particular interest in the chapter is the overview of research that “provide a neural grounding of gender, culture, and race” within and outside mathematics education. Rivera concludes with implications for mathematics education of the neuroscientific approach and, quoting Eliot (2010), notes that “[B]rain differences are indisputably biological, but they are not necessarily hardwired”; experience changes the structure and functioning of the brain.

**References**


