Laplace contain ideas and problems not well understood today: for example, Bernoulli's work with nonadditive degrees of belief in part 4 of his *Ars Conjectandi* and Demoivre's proof of an L^1 limit theorem in *The Doctrine of Chances*. Work by G. Shafer, O. B. Sheynin (cited in Maistrov's bibliography), and S. Stigler affirms that probability theory is a rich field for creative historical research.

Maistrov's book tends to be a careful repetition of known material drawn from a collection of sources both extensive and peculiar. Its many references to more detailed specialty studies are particularly useful and it fills the need for a readable overview of this large field.

PERSI DIACONIS
Department of Statistics,
Stanford University,
Stanford, California

Precocity at Mathematics

Mathematical Talent. Discovery, Description, and Development. JULIAN C. STANLEY, DANIEL P. KEATING, and LYNN H. FOX, Eds. Johns Hopkins University Press, Baltimore, 1974. xx, 216 pp., illus. Cloth, $10; paper, $2.95.

Extraordinary talent of any kind is inherently fascinating. Consequently this report of a project in the state of Maryland to identify and develop mathematically precocious 12- to 14-year-olds—the upper one-half of 1 percent of this age range—will interest anyone concerned with the nurturance of talent, especially scientific talent.

The mathematical prowess of the students described here seems almost incredible, until one realizes that miracles must be occurring daily within every area of talent in the upper tail of the normal curve. The bell-shaped distribution of talent is an immutable law, guaranteeing that someone is going to be up there, five or six standard deviations above the average, whether it be a 7-foot-tall high school basketball star or a 12-year-old seventh grader who scored 800 on the SAT-Math test, 800 on the CEEB Math I Achievement test, and 800 on the CEEB Math II Achievement test. A 12-year-old!

This project ferreted out such people, then energetically intervened in their education to make further mathematics training available for them.

It was not a "gifted child" project in the usual sense because these extraordinary precocious students differed as much from the gifted child as usually defined (say, the upper 5 percent) as the gifted child does from the average. In fact, these precocious children differed as much from each other as the gifted differ from the average. One of the interesting facts you can learn by inspecting the normal curve is that there is as much variation within the upper one-half percent of the population as there is within the upper one-third of the usual classroom. Consequently, when dealing with this rare group educators must use a wide range of techniques.

The techniques used here ranged from suggesting a year's acceleration in grade, to providing accelerated courses in mathematics and science only, to offering junior college courses at night, to making arrangements for university-level courses during the summer, to, finally, arranging for early university admission.

This project, which was supported by the Spencer Foundation of Chicago, had three aims: "to discover, describe, and develop" mathematically precocious youth. The discovery was achieved by a large testing program designed to locate highly able students in the state of Maryland. In an energetic program, several dozen were identified, probably the largest such group ever assembled in one place. The description was accomplished by systematically studying these boys and girls by means of psychological tests and inventories. This was the weakest part of the study, partly because the investigators were not very comfortable with measures other than performance on mathematics and IQ tests (which they used in abundance, usually giving four or five to each child), and partly because the investigators were too "scientific" to let much human flavor of these extraordinary children show through. For example, although this entire book is about extremely gifted young mathematicians, there is not a single instance reported of the application of this talent, other than test scores. With several bright 12- to 14-year-olds taking a university computer science course, at least one of them must have used the computer to play backgammon, or to design a perpetual calendar, or to tally the word counts in the Watergate transcripts—or were these students merely savvy test-takers with no original thoughts?

The third phase of the study, to develop these students, was easily the most important; the staff carried this portion far beyond the activities found in most studies of talent. By their accounts, they really made a difference in the rate of development of the students by smoothing their way into accelerated courses and onto university campuses. They did this by working with each student personally, suggesting a prescription that best fit his or her talents, social skills, and motivation. Stanley and his colleagues clearly cared about these budding Ph.D.'s as individuals.

In one area they cared too much about being decent; they worked too hard at avoiding a possible charge of male chauvinism. Males score higher on mathematical aptitude tests than do females; that is well known. (Females score higher on measures of verbal aptitude—neither sex excels in any general sense.) In this testing program, about five times as many boys as girls scored high. Further, the boys were more intense in their mathematical interests and more persistent in seeking further training. These findings pained the investigators, and in their anguish to be sexually fair they talked themselves into statements such as, "An unexpected and disconcerting finding . . . was an inescapable sex difference." And they asked two prominent female psychologists, Helen Astin and Anne Anastasi, to write chapters for them, one supposes to further document their fairness toward women.

Both Astin and Anastasi point out that the male superiority on the math tests is not surprising; as the latter says, "It is certainly consistent with the published research accumulated over many decades."

All the writers, in attempting to explain the sex difference, point to the different socialization patterns of boys and girls, and one of the regretable lapses in the study is the failure to accumulate any systematic data on this issue. If early socialization is an important factor in mathematical precocity, this would have been the perfect sample with which to document that. However, in the few comments made about the families, there is no hint that these children were treated much differently from other bright children.

The lengthy agonizing over sexual differences is even more puzzling when compared with the treatment of racial differences; even though this study was carried out in Baltimore, which is 46 percent black, there is not a mention of race in the entire book.

In the last chapter, Keating, Wiegand,

and Fox report on the experience of arranging for five students—averaging about 14 years old, with CEEB Math II scores *averaging* 740—to be enrolled in a college algebra and trigonometry course. To study their classroom behavior, Wiegand sat in on the course as an observer, unknown to either students or teacher. He found that these students participated more than the average student, they all earned A's, and the teacher and other students were unaware that there were five 13- to 14-year-olds in the class. Indeed, when the course was completed the teacher expressed the opinion that the class was more able than usual. All the results supported the usefulness of providing accelerated experiences for these students.

This project on mathematically talented youth continues at Johns Hopkins, and Stanley and his associates can take pride in demonstrating how extraordinary youth can be identified and their educational progress dramatically accelerated. Other states might well follow suit.

DAVID P. CAMPBELL
Center for Creative Leadership, Greensboro, North Carolina

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