

A quiet revolution: finding boys and girls who reason exceptionally well and/or verbally and helping them get the supplemental educational opportunities they need

Julian C. Stanley^{*}

Center for Talented Youth, Johns Hopkins University

The antecedents for the four regional annual talent searches for boys and girls who reason exceptionally well mathematically and/or verbally began in 1971 at Johns Hopkins University in Baltimore, Maryland, with the creation of the ‘Study of mathematically precocious youth’ under the direction of the author of this article, its originator. Here he traces the development and expansion that led to much experimentation during the 1970s and the formation in 1979 of what is now called the Center for Talented Youth and similar programs based at three other private universities in the United States. These cover the entire USA and cooperate with educators in a number of foreign countries, especially England, Ireland and Spain.

Introduction

The modern form of this ‘quiet revolution’ began in 1971, but its roots go very far back into the past. Every culture, including even the caveman’s, must have been concerned with identifying those youths and adults who excel in ways essential for the survival of the clan, tribe or nation. Spear throwing, tracking game animals, club wielding, pictorial representation, mystical acumen, musical performance and other prized attributes marked off some individuals as being especially talented. Fear of death motivated much of art, astronomy and religion.

Later, some affluent parents hired tutors to teach their children to read and write and to further the development of whatever talents their sons (occasionally also a few daughters) seemed to manifest. Some tutors were outstanding, even eminent, mathematicians, musicians, artists, etc. Their ablest students were trained to pass

^{*}Center for Talented Youth, Johns Hopkins University, Baltimore, MD 21209, USA. Email: jstanley@jhu.edu

university entrance examinations, largely without regard to how young they were. For example, the writer James Fennimore Cooper entered Yale College at age 13, but was dismissed before graduation because of 'a boyish prank'. Thus, the world enjoyed his authorship instead of his becoming a parson. The renowned theologian Cotton Mather had graduated from Harvard College at age 15. His distinguished father, Increase Mather, had graduated at 17 (Harris & Levey, 1975).

Gradually and slowly, public education arose via one-room schools, most of them offering only seven grades. Many children got even less than that and illiteracy was common. Around 1845 a great educator, Horace Mann of Boston, pioneered reformation of the public school system (Harris & Levey, 1975). Kindergarten through Grade 12 came to be the norm, but as late as 1934 I graduated from an 11 year school system (no kindergarten, high-school Grades 8 through 11) in a suburb of Atlanta, Georgia, a region made persistently poor by Sherman's dread march to the sea during the War Between the States. In fact, the first teaching position I was offered (but did not have to take) in 1937 was in a 7 months a year school system in a small south Georgia town, at \$75.00 per month!

Some antecedents of the gifted child movement

Let's go back now, however, to the origins of the modern gifted child movement. From the beginning it was tied to the development of testing. A major early pioneer was Sir Francis Galton of England, during the latter half of the 19th century. He favoured sensory measures, unlike the later tests. He was also a strong hereditarian, genealogist and eugenicist. One of his disciples was an American, James McKeen Cattell, who in 1890 published a well-received article entitled 'Mental tests and measurements' (Cattell, 1890).

Galton and Cattell were on the wrong track, but soon both test theory and a practical test of intelligence arose and developed rapidly. Charles Spearman of England startled the psychological world in 1904 with what has proven to be the vital underpinning of modern testing (Spearman, 1904). The next year French psychologists Alfred Binet and Theodore Simon produced the first true intelligence test (Binet & Simon, 1905). By 1911 they had revised it twice. This remarkable, but by present standards primitive, test measured vocabulary knowledge and thinking skills, which the sensory tests had not.

Considerable use of the Binet-Simon scale was made in this country, especially by Henry Goddard (see, for example, Goddard, 1911), but it remained for Stanford University psychologist Lewis M. Terman in 1916 to revise the French version, improve it and adapt it for testing children and, to some extent, adults in the USA (Terman, 1916). Terman benefited from the pioneering item construction work of Arthur S. Otis and extensive use of the Army Alpha and Beta Tests during World War I, with which he was very familiar (Stanley, 1954c, pp. 35-37).

Terman was the father of the gifted child movement across the globe. His search during the 1920s for boys and girls with IQs of at least 135, and preferably 140, stands to this day as the greatest initial achievement of the gifted child field. The (in

my opinion unfortunately named) *Genetic studies of genius* five volume work (Terman 1925, 1926, 1930, 1947, 1959), the concise, informative monograph by his assistant Melita H. Oden (1968) and the later study by Holohan and Sears (1995) set the tone and message for the field. They are mandatory reading for serious students of intellectual talent. Also available are biographies of Terman by Seagoe (1975) and Minton (1988), plus, of course, many professional articles about his contributions.

Whereas Terman started the gifted child movement, gifted child education was pioneered by Leta Stetter Hollingworth, a most remarkable professor of Education, at Teachers College of Columbia University, all the way across the country from Terman's Stanford University (Hollingworth *et al.*, 1917; Hollingworth, 1926, 1942, 1943). Born in 1886 in a sod hut in Nebraska and educated in a one-room school, this brilliant woman became an eastern intellectual of widely varied interests. Unlike Terman, who wanted mostly to study high IQ children to determine whether or not the many prejudicial claims about them were true ('early ripe, early rot', 'genius is akin to madness', etc.)—he concluded that they weren't—Hollingworth found very bright children in order to further their education (Klein, 2002). Although Hollingworth used Terman's revision of the Binet-Simon scale extensively, they never co-authored a book or an article. Their contact seems to have been minimal. Both have had great influence on the identification and educational facilitation of intellectually talented boys and girls right up to the present day.

More recent developments

Of course, since the work of these two great pioneers there have been major advances in testing and other ways of finding youths who could benefit from educational and social supplementation. Many of these are set forth in Boothe and Stanley (2004).

Let me now sketch the origin of the Center for Talented Youth (CTY) of Johns Hopkins University and its offshoots. My preliminary thinking about intellectual talent or lack of it began when I was an 18-year-old senior in college in 1937, reluctantly going to the library to study for a dull course, 'rural sociology', and getting distracted by coming across Henry H. Goddard's (1926) popular (but, I later learned, fallacious) book *Feeble-mindedness: its causes and consequences*. This kept me spellbound, but did not improve my grade in the sociology course.

My real indoctrination in intelligence testing occurred during the summer of 1938, a year after I began teaching in an Atlanta high-school and was taking a 'tests and measurements' course at the University of Georgia taught by Professor Herbert Bonar Ritchie. He plied us with such tests and discussions of them. This was an eye-opening experience for me, perhaps especially so because I scored well on such tests.

My greatest interest in graduate school at Harvard (1945-1949) and beyond was, however, in experimental psychology (Jenkins & Stanley, 1950), research methodology, statistics, the design of experiments and test theory, so my activity in the field of giftedness from 1949 until 1971 was more a sporadic hobby than a

vocation. I did publish several light articles and reviews (Stanley, 1951, 1953, 1954a,b, 1958, 1959a,b,c,d) bearing on various issues in giftedness, but none of them revolutionized the field!

Then, nearly 20 years into my flourishing career as a research methodologist and test theorist (see, for example, Stanley, 1961, 1971; Campbell & Stanley, 1966), I had the same kind of conversion that had transformed Terman and, especially, Hollingworth into ardent advocates for the intellectually talented. I was told about a very precocious 12-year-old rising Grade 8 student, Joe, who during the summer of 1968 was observed by a perceptive Towson State University computer professor, Doris K. Lidtke, to be the truly outstanding member of her computer science programme at Johns Hopkins University. She called him to my attention and sought my assistance. At first I was somewhat hesitant, and perhaps even reluctant (and slow), to get involved; there were too many other pressing duties. But I did, and my life and career thereafter have never been the same.

By January of 1969 I met with Joe, by then a Grade 8 student, and his parents. The challenge was how to help him. I had little knowledge to draw on, since until that time most of my work was limited to measurement and statistical issues. I let my interest and experience in measurement guide me (I had, for example, chaired the College Board's Committee of Examiners for the Aptitude Tests and served on ETS's Research Committee). It was obvious that I needed to know more about Joe. I decided to have him take the College Board Scholastic Aptitude Test (SAT) of mathematical and verbal reasoning ability, usually reserved for college-bound Grade 11 and 12 students, several College Board achievement tests and some other standardized exams. It seemed to many persons then, including me, that this was a bold, perhaps rash, move. After all, Joe was only 13¼ years old. Nevertheless, because he was taking some college courses part-time I reasoned that, if he could handle college level subject matter, then why not college level tests?

Fortunately, my inferences did not lead me astray. Joe's scores were startlingly high, well within the range of those earned by entering students at selective colleges such as Johns Hopkins. This sparked my interest and commitment. I began casting around for high schools, public or private, that would allow Joe to take mainly Grade 11 and 12 'Advanced placement program' or other honours courses, rather than just being a regular Grade 9 student the following autumn. Principals and headmasters thought this a ridiculous proposal (probably as ridiculous as taking college level tests!)

So, after much discussion and many misgivings, Joe, his parents and I decided to let Joe try being a regular student at Johns Hopkins, seemingly an even more hazardous course of action. We feared that he would find the courses that seemed best for him initially (calculus, computer science and physics) too difficult, but our options were severely limited. Yet, to our pleasant surprise, Joe thrived and went on with good grades to receive both his B.A. and Master's degrees in computer science in 4 years at age 17. Then, still 17, he became a doctoral student in computer science at Cornell University. Now, almost 50 years old, Joe has had, and continues to have, a computer science career bringing drama to 'virtual reality' (see Peterson, 1992).

Joe's success as a freshman got me thinking. I remembered the old proverb, 'one swallow does not a summer make'. Fortunately, Jonathan and his mother entered the scene, having heard of Joe. They insisted that the 13-year-old Jonathan be given the same opportunities Joe had received. At first I was skeptical, but extensive testing and summer courses taken in 1970 by Jonathan convinced me that he was as academically promising as Joe. Jonathan, too, earned excellent grades. He too majored in computer science and in 1974 became a computer consultant. Then he helped found a large computer software company, serving mainly banks. In recent years it was sold for a large sum, thereby giving Jonathan independence to do as he pleases.

The founding of the 'Study of Mathematically Precocious Youth' (SMPY)

These experiences, augmented by my longstanding latent interest in intellectually talented boys and girls, made me receptive in 1970 to a call for grant proposals from the newly founded Spencer Foundation of Chicago. It had plenty of money but no established list of grant seekers; I had some tentative ideas about how to find 'youths who reason exceptionally well mathematically' and to provide them the special, supplemental, accelerative 'smorgasbord' of educational opportunities they sorely need and, in my opinion, richly deserve for their own optimal development and the good of society. Fortunately, I was acquainted with the president of the foundation and, while a graduate student at Harvard, had asked a cute young secretary for a date (she told me she was engaged but appreciated my interest); she was now the executive secretary of the foundation. Serendipity, a propitious *zeitgeist* and the above good luck combined to win my four and a half page, double-spaced, hastily assembled proposal a 5 year (September 1971–1976) grant of \$266,100. Generously, the Spencer Foundation renewed its support until 1984, but at lower levels.

With that bountiful funding I created SMPY. Quantitative psychology was my specialty, so I helped colleagues at Johns Hopkins obtain a 5 year Spencer Foundation grant to seek verbally precocious youth. This lasted only from 1972 to 1977, but constituted the base for later searches (McGinn, 1976). (Actually, SMPY started as SMSPY, the 'Study of Mathematically and Scientifically Precocious Youth', but from our first talent search, in March of 1972, we discovered that some participants knew much about science but did not reason especially well mathematically, so we restricted science knowledge testing to those who scored well mathematically.)

From the pool of applicants for graduate study in the Department of Psychology at Johns Hopkins University in 1971 I recruited two outstanding doctoral aspirants, Lynn H. Fox and Daniel P. Keating. Both earned their Ph.D. degrees in psychology in 3 years or less while spending an enormous amount of time and high-level effort developing SMPY (see Keating & Stanley, 1972; Stanley *et al.*, 1974; Keating, 1976; Fox *et al.*, 1980; Stanley & Brody, 1986; Brody & Stanley, 2005). I am convinced that without their intelligence, dedication and hard work and that of William C.

George, our office manager, and Lois S. Sandhofer, my faithful secretary for 29 years, SMPY and its successors would not have succeeded nearly as well as they have. Much of our success is probably attributable to the intensive and extensive study of the gifted child literature that Dan and I conducted together during the summer of 1971, preceding the formal start of our grant. We set forth fundamental principles then that have guided the talent searches and educational supplementation ever since.

For SMPY the period 1971–1979 was one of intense and extensive experimentation to determine how best to find excellent mathematical reasoners and help them educationally. We tried many, varied approaches in order to settle on the ones that have persisted to this day, nearly 34 years later (see Benbow & Stanley, 1983). Keating, Fox, George and Sandhofer were joined in this endeavor by a succession of highly able undergraduate student assistants, graduate students and postdoctoral fellows. Quite a few of them are now national and international leaders in the gifted child field.

Terman had conducted just one talent search in a single state (California). We conceived of an annual search; by 1983 it had become national. Terman had used his own individually administered intelligence test, which was time consuming to conduct and score. Despite hard work and trained administrators, this limited the number of students who could be tested. We chose a difficult, nationally offered, secure, multiple choice test, the College Board Scholastic Aptitude Test–Mathematical (SAT-M), and restricted the examinees to Grade 7 students (Stanley, 1990). Then we created or devised many ways to supplement the education of the high scorers, eventually culminating (among other means) in intensive 3 week academic summer courses. We’ve always urged our ‘prodigies’ to make full use of ‘College board advanced placement program’ courses, now 35 in number and covering a wide variety of college level subjects, plus distance learning courses and academic competitions. We’ve found some 20 different ways to accelerate one’s educational progress, only a few of which involve skipping school grades (Southern *et al.*, 1993).

Let me try to correct a widespread, persistent misimpression about our innovations. We do not compete with school-based efforts to provide stimulation for the gifted, such as those of Renzulli and Reis (2004). Our major work is carried out during the summer. Our intent is to supplement and complement school-based instruction, not supplant, criticize or ‘invade’ it.

The MVTD⁴ model

From the beginning we conceptualized our efforts as being mathematically and/or verbally talented: discovery, description, development and dissemination, i.e. MVT followed by four Ds. Discovery is the finding of the talented, description is learning more about them, development is helping them educationally and dissemination is letting others know what we consider works well. We have done the latter in newsletters, books, many professional articles and almost countless talks and

lectures. In these ways we have had an appreciable influence on the practices of schools and colleges. Our intent was not to influence school boards directly. There are far too many and their composition changes too often. To coin an oxymoron, we meant to be ‘benignly insidious’, i.e. to burrow up under school systems to coerce changes there in curricular flexibility and articulation of in-school with out-of-school educational experiences. Thus, from the standpoint of the students we served, who themselves received our score reports, and their parents, our influence was usually considered benign. When they brought pressure on schools to provide accelerative opportunities, however, school personnel sometimes thought our influence insidious. Let me emphasize that we did not try to interfere directly with extant gifted child programs. Many of our top scorers, rare in their schools, were too advanced mathematically and/or verbally for even excellent in-school programs to meet their academic needs fully (Stanley & Brody, 2005).

Expansion after 1979

By 1979 we of SMPY were nearly exhausted from our efforts. The first mathematics and general science talent search, in March of 1972, had attracted 450 entrants (Stanley *et al.*, 1974). The first fast paced mathematics class, begun a month later, enrolled 20 students. Even though none of our programs was residential and, therefore, some parents had to drive long distances to enable their children to take advantage of them, and even though the summer programs were non-residential and also had such distance problems, the number of participants continued to grow rapidly. We administered the SAT-M ourselves and scored them ourselves to save in turnaround time; this was tedious and time consuming. We also did much other testing of the high scorers.

For these and other reasons we decided to create a many-state larger identification and facilitation program that would search as much for verbal reasoning ability as for mathematical. It would use Educational Testing Service’s national testing program and cover the states from Maine to Virginia and out to the District of Columbia and West Virginia. Students would take both parts of the SAT, testing both mathematical and verbal reasoning ability. The summer programs would be residential and offer a wider variety of courses. (Later, CTY gerrymandered territory to include Alaska, Arizona, California, Hawaii, Oregon and Washington. The reasons for that are interesting, but won’t be discussed here.)

The transition from SMPY to what is now called the Center for Talented Youth (CTY) went smoothly and greatly enlarged the annual talent search and enrollment in summer programs. In 2004 about 85,000 boys and girls entered the talent search, and close to 10,000 took summer courses conducted by CTY on 23 college campuses across the country. During the 1990s SMPY moved to Vanderbilt University under the auspices of Dean of Peabody College Camilla P. Benbow, a long-time SMPY colleague, and psychologist David Lubinski, as part of their massive 50 year (1972–2022) follow-up study of high scorers (see, for example, Lubinski *et al.*, 2001).

The other three regions

By 1980 Duke University had established its 'Talent identification program' (TIP), based on the CTY model. Northwestern University followed in 1981 with its 'Center for talent development' (CTD). Shortly thereafter the University of Denver established the 'Rocky Mountain talent search' (RMTS), making complete full coverage of all 50 states and Puerto Rico, plus involvement in several foreign countries, notably Ireland and Spain.

The unbroken chain of success for the model, dating from 1971 to the present, is remarkable testimony to the great need that intellectually talented youths have for identification and excellent educational supplementation to keep them from becoming bored and uninterested in school work. It is evident that we have contributed substantially to their cumulative, monotonically accelerating educational advantage (Zuckerman, 1977). Many of our former participants rank high in academe, finance and other areas. Two are perhaps among the finest young mathematicians in the world (Muratori *et al.*, in press). Many are professors; at least one is a wealthy software developer; and so on. SMPY at Vanderbilt University is documenting such achievements on a large scale (see, for example, Lubinski *et al.*, 2001).

The future of CTY and the three similar programs seems as bright as the minds of its 'prodigies'. In the following articles in this issue much more is said about the origins and development of CTY, TIP, CTD and MWTS.

References

- Benbow, C. P. & Stanley, J. C. (1996) Inequality in equity: how requality can lead to inequity for high-potential students, *Psychology, Public Policy and Law*, 2, 249–292.
- Binet, A. & Simon, Th. (1905) Methodes nouvelles pour le diagnostic du niveau intellectuel des abnormaux, *Année Psychologique*, 11, 191–244.
- Boothe, D. & Stanley, J. C. (2004) *In the eyes of the beholder: critical issues for diversity in gifted education* (Waco, TX, Prufrock Press).
- Brody, L. E. & Stanley, J. C. (2005) Youths who reason exceptionally well mathematically and/or verbally: using the MVT:D⁴ model to develop their talents, in: R. J. Sternberg & J. E. Davidson (Eds) *Conceptions of giftedness* (2nd edn) (New York, Cambridge University Press).
- Campbell, D. T. & Stanley, J. C. (1966) *Experimental and quasi-experimental designs for research* (Chicago, IL, Rand McNally).
- Cattell, J. McK. (1890) Mental tests and measurements, *Mind*, 15, 373–380.
- Fox, L. H., Brody, L. E. & Tobin, D. (Eds) (1980) *Women and the mathematical mystique* (Baltimore, MD, Johns Hopkins University Press).
- Goddard, H. H. (1911) Two thousand normal children measured by the Binet Measuring Scale of Intelligence, *Pedagogical Seminary*, 18, 232–259.
- Goddard, H. H. (1926) *Feeble-mindedness: its causes and consequences* (New York, Macmillan).
- Harris, W. H. & Levey, J. S. (Eds) (1975) *The new Columbia encyclopedia* (4th edn) (New York, Columbia University Press).
- Hollingworth, H. L. (1943) *Leter Stretter: a biography* (Lincoln, NE: University of Nebraska Press).
- Hollingworth, L. S. (1926) *Gifted children: their nature and nurture* (New York, Macmillan).
- Hollingworth, L. S. (1942) *Children above IQ 180 Stanford-Binet* (Yonkers, NY, World Book Co.).

- Hollingworth, L. S., Garrison, C. G. & Burke, A. (1917) The psychology of the prodigious child, *Journal of Applied Psychology*, 1, 101–110.
- Holohan, C. K. & Sears, R. R. (1995) *The gifted group in later maturity* (Stanford, CA, Stanford University Press).
- Jenkins, W. O. & Stanley, J. C. (1950) Partial reinforcement: review and critique, *Psychological Bulletin*, 47, 193–234.
- Keating, D. P. (Ed.) (1976) *Intellectual talent: research and development* (Baltimore, MD, Johns Hopkins University Press).
- Keating, D. P. & Stanley, J. C. (1972) Extreme measures for the exceptionally gifted in mathematics and science, *Educational Researcher*, 1, 3–7.
- Klein, A. G. (2002) *A forgotten voice: a biography of Leta Stetter Hollingworth* (Scottsdale, AZ, Great Potential Press).
- Lubinski, D., Webb, R. M., Morelock, M. J. & Benbow, C. P. (2001) Top 1 in 10,000: a 10-year follow-up of the profoundly gifted, *Journal of Applied Psychology*, 86, 718–729.
- McGinn, P. V. (1976) Verbally gifted youth: selection and description, in: D. P. Keating (Ed.) *Intellectual talent: research and development* (Baltimore, MD, Johns Hopkins University Press), 160–182.
- Minton, H. L. (1988) *Lewis M. Terman: pioneer in psychological testing* (New York, New York University Press).
- Muratori, M., Stanley, J. C., Gross, M. U.M., Tao, T., Ng, L., Tao, B. & Ng, J. (in press) Insights from SMPY's former child prodigies: Drs. Terence ("Terry") Tao and Lenhard ("Lenny") Ng reflect on their talent development, *Gifted Child Quarterly*.
- Oden, M. H. (1968) The fulfillment of promise: 40-year follow-up of the Terman gifted group, *Genetic Psychology Monographs*, 77, 3–93.
- Peterson, I. (1992) Wizard of Oz: bringing drama to virtual reality, *Science News*, 142, 440–441.
- Renzulli, J. S. & Reis, S. M. (2004) Curriculum compacting: a research-based differentiation strategy for culturally diverse students, in: D. Boothe & J. C. Stanley (Eds) *In the eyes of the beholder: critical issues for diversity in gifted education* (Waco, TX, Prufrock Press), 87–100.
- Seago, M. V. (1975) *Terman and the gifted* (Los Altos, CA, Kaufmann).
- Southern, W. T., Jones, E. D. & Stanley, J. C. (1993) Acceleration and enrichment: the content and development of programs, in: E. A. Keller, F. K. Monks & A. H. Passow (Eds) *International handbook of research and development of giftedness and talent* (New York, Pergamon), 387–409.
- Spearman, C. E. (1904) "General intelligence" objectively determined and measured, *American Journal of Psychology*, 15, 201–293.
- Stanley, J. C. (1951) On the adequacy of standardized tests administered to extreme norm groups, *Peabody Journal of Education*, 29, 145–153.
- Stanley, J. C. (1953) Development and applications of tests of general mental ability, *Review of Educational Research*, 23, 11–32.
- Stanley, J. C. (1954a) Is the fast learner getting a fair deal in your school? *Wisconsin Journal of Education*, 86(May), 5–6.
- Stanley, J. C. (1954b) Identification of superior learners in grades ten through fourteen, in: *Promoting maximal reading growth among able learners*, Supplemental Educational Monographs no. 81 (Chicago, IL, University of Chicago Press), 31–34.
- Stanley, J. C. (1954c) *Ross's measurement in today's schools* (3rd edn) (Englewood Cliffs, NJ, Prentice Hall).
- Stanley, J. C. (1958) Providing for the gifted by means of enrichment of the curriculum, *Bulletin of the Wisconsin Association of Secondary School Principals*, Spring, 5–7.
- Stanley, J. C. (1959a) Enriching high-school subjects for intellectually gifted students, *School and Society*, 87, 170–171.

- Stanley, J. C. (1959b) Test biases of prospective teachers for identifying gifted children, *School and Society*, 87, 175–177.
- Stanley, J. C. (1959c) Review of Robert Havighurst (Ed.), National Society for the Study of Education Yearbook, *Education for the gifted, Educational and Psychological Measurement*, 19, 277–279.
- Stanley, J. C. (1959d) Review of James Gallagher's *The gifted child in the elementary school*, *Educational and Psychological Measurement*, 19, 467.
- Stanley, J. C. (1961) Analysis of unreplicated three-way classifications, with applications to rater bias and trait independence, *Psychometrika*, 26, 205–219.
- Stanley, J. C. (1971) Reliability, in: R. L. Thorndike (Ed.) *Educational measurement* (2nd edn) (Washington, DC, American Council on Education).
- Stanley, J. C. (1990) Leta Stetter Hollingworth's contributions to above-level testing of the gifted, *Roeper Review*, 12, 166–171.
- Stanley, J. C. & Brody, L. E. (1986) Youths who reason extremely well mathematically, in: R. J. Sternberg & J. E. Davidson (Eds) *Conceptions of giftedness* (New York, Cambridge University Press), 361–387.
- Stanley, J. C., Keating, D. P. & Fox, L. H. (Eds) (1974) *Mathematical talent: discovery, description, and development* (Baltimore, MD, Johns Hopkins University Press).
- Terman, L. M. (1916) *The measurement of intelligence* (Boston, MA, Houghton Mifflin).
- Terman, L. M. (Ed.) (1925) Mental and physical traits of a thousand gifted children, in: volume I of *Genetic Studies of Genius* (Stanford, CA, Stanford University Press).
- Terman, L. M. & Dden, M. H. (1947) The gifted child grows up, in: volume IV of *Genetic Studies of Genius* (Stanford, CA, Stanford University Press).
- Terman, L. M. & Dden, M. H. (1959) The gifted child of mid life, in: volume V of *Genetic Studies of Genius* (Stanford, CA, Stanford University Press).
- Zuckerman, H. (1977) *Scientific elite: Nobel laureates in the United States* (New York, Free Press).