

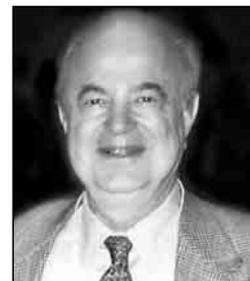
Behaviour Genetic Principles — Development, Personality, and Psychopathology: A Festschrift in Honour of Prof. Irving I. Gottesman

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Reflections: An Interview with Professor Irving I. Gottesman on the Occasion of His Festschrift

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How shall we view the life work of Professor Irving I. Gottesman on the eve of his retirement? How shall we judge his contributions to twin research at the juncture of genetics, development, personality and psychopathology? One way is to review Dr. Gottesman's curriculum vitae that boasts 16 ongoing research collaborations (“[list] not complete”), 19 books and monographs, 181 articles, 76 book chapters and 23 book reviews. Most, if not all twin investigators, would note his seminal work, *Schizophrenia and Genetics: A Twin Study Vantage Point*, co-authored with James Shields (Gottesman & Shields, 1972). (This book is often known simply as “Gottesman and Shields,” having attained stellar status in the field). Others might recall that the common neuroscience terms “reaction range”, “endophenotype” and epigenetic puzzle” derive from Gottesman and Shields's adaptation of these terms from plant and animal genetics (Gottesman, unpublished biography). Still others would highlight his creative collaborations with Aksel Bertelsen in Denmark, comparing risk for schizophrenia in children of disease-discordant monozygotic (MZ) and dizygotic (DZ) twins. Using these yardsticks would be well-intentioned, even right, but not entirely to the point.

Even more compelling than Dr. Gottesman's professional achievements are his reflections on where he has taken twin research and where twin research has taken him. These thoughts, shared with me on the occasion of his June, 2001 Festschrift at the University of Minnesota, add depth and meaning to his many lectures and publications. Reproducing Dr. Gottesman's words in *Twin Research* will, hopefully, preserve them as part of his invaluable legacy to International Twin Society members and to twin researchers everywhere.

How did Gottesman first become involved in twin research? Smiling, he admitted that he had “no idea he was starting an avalanche of twin studies by both psychologists and psychiatrists.” A University of Minnesota course in individual differences taught by James Jenkins, introducing the twin studies of psychoses by Franz Kallmann and Eliot Slater, set him on his way — but the real triggers were the work and inspiration of Professor Sheldon Reed. Reed, a former *Drosophila* geneticist, was involved in family studies of mental retardation when Gottesman enrolled in his human genetics class (Healy, 1998). “Sheldon was eager to capture a psychology student and I came at the right time.” (Reed had recently mentored twin-based dissertation research on multiple sclerosis by another notable in the field, Ntinos Myrianthopolous, who

went on to study behavioral correlates of low birth weight in young twins; Myrianthopoulous et al., 1972.). Gottesman's adolescent twin analysis of personality, using the MMPI, was the first such American study since Newman, Freeman and Holzinger's classic 1937 study of 19 reared apart MZ twin sets (Newman et al., 1937).

I wondered if there were favorites among the many twin studies Prof. Gottesman had conducted over the years. I was not surprised to learn that he “loves all his twin studies,” but that the highlight remains the Gottesman and Shields collaboration that began in 1964. “We were able to do research in a treasure trove.” He explained that, in 1948, Eliot Slater, at the MRC Unit in Psychiatric Genetics, established a unique twin registry based on consecutively admitted psychiatric patients. Intake workers recorded whether these patients were members of a twin pair (Healy, 1998). Virtually all schizophrenic outpatients eventually become inpatients given the debilitating nature of the disorder. Gottesman and Shields benefited from access to the “best sample for schizophrenic twin studies,” amassed over a 16-year period. Upon conclusion of their work, all twins had been hospitalized.

There were two more twin research favorites, however. One was a tripartite event, involving Irving Gottesman,

Aksel Bertelsen and Margit Fisher (Gottesman & Bertelsen, 1989). At issue was the relative risk of schizophrenic disorder among the offspring of disease-discordant MZ and DZ twins. The research logic flowed from recognizing that the children of MZ twins are genetically equivalent to half-siblings, in addition to being legal first cousins (Segal, 2000). Twin mothers and fathers in these special families assume the genetic equivalence of “mothers” and “fathers” of their nieces and nephews who, in turn, become their genetic “children.” These relationships do not apply to DZ twin families whose members retain the same kinship connections generated when ordinary non-twin siblings marry. The results were provocative: The children of affected and unaffected MZ co-twins were at similar risk for inheriting the schizophrenic predisposition (16.8% and 17.4%, respectively). In contrast, the children of affected and unaffected DZ co-twins were at dissimilar risk (17.4% and 2.1%, respectively). These findings lead to the “fortifying notion already common in plant and animal genetics that organisms may carry unexpressed genotypes.”

Gottesman’s final research favorite involved reconceptualization of co-twins as “co-clones.” He saw twin research become more exciting in the wake of tools such as PET (positive emission spectrometry) scans, MRI (magnetic resonance imaging) and other techniques for assessing genetic expression. Such developments have lead Gottesman to turn again to the discordant twin design to apply these methods with exquisite genetic control. He is adamant that twin studies have not stood still following introduction of these sophisticated procedures. “Looking at problems from a twin vantage point always offers extra mileage.”

What other twin research topics does he find exciting? Gottesman is fascinated with the merging of epigenesis (which comes from plant and animal genetics) and medical genetics, and applying those ideas and explanations to degrees of difference in disease-discordant MZ twin pairs. He believes such efforts will have wide application in our understanding of cancer and cardiac disease, as well as in neuroscience research. Extending this

line of work to intelligence and personality seems farther in the future, although some pioneering efforts have been made. Public health issues are presently of greatest concern to him.

Who in the world of twin studies has had the greatest impact on his thinking and his research activities? James (Jerry) Shields was the easy answer. “He [Shields] knew the twins themselves and he knew the methodology.” Many people may be unaware that Shields interviewed all his reared apart twins himself, despite eventual confinement to a wheelchair due to polio. Gottesman told me he possesses a duplicate set of Shields’s precious research archive, an arrangement prompted by practical, as well as personal considerations: Behavioral genetic findings in general, and twin research data in particular, have been seriously challenged, occasionally attacked, by individuals indifferent to biological explanations of human behavior. Access to original data files allows new analyses that can counter old criticisms. It also offers opportunities to test fresh ideas about behavior, as evidenced by a 1991 paper on reared apart twins weight and body mass index, completed with Dr. Arlen Price (Price & Gottesman, 1991). Analyses of twins’ answers to original items included in early versions of Hans Eysenck’s personality questionnaire have never been attempted, but may be undertaken in the future.

In recognition of his friend’s stunning contributions to twin research, Gottesman established the *James Shields Memorial Award* for twin research in behavioral genetics. This honor is accepted with great pride and humility, given its association with so distinguished a figure in our field.

Gottesman’s transition to retirement predicts a profusion of research activities that we can all anticipate. An unfinished twin project that will edge toward completion includes studying epigenetic processes relevant to schizophrenia, cancer and heart disease. This work will be conducted in collaboration with Dr. Art Petronis at the Center for Alcohol and Mental Health at the University of Toronto School of Medicine, in Canada. Analyses of DNA from twin participants in the landmark study of schizophrenia and manic depressive order, published with E.

Fuller Torrey and colleagues (Torrey et al., 1994), will also commence. Finally, together with graduate student Jim Reilly, Gottesman will try to “add meat to the bones” of what is a neurodevelopmental theory of schizophrenia that accords proper weight to genetic ideas already in place.

There is a certain symmetry to the fact that this Sherrell J. Aston Professor of Psychology Emeritus from the University of Virginia is returning to the University of Minnesota, the setting of his first twin study. In addition to the research activities mentioned above, Gottesman will team teach a research seminar in behavioral genetics with Profs. Thomas J. Bouchard, Jr. and Matt McGue, and spend one day each week in the Psychiatry Department and one day each month at the Minneapolis Veterans Medical Center. He will continue his service as Chair of the Twins Committee of the Institute of Medicine/National Research Council and as board member of the IOM Medical Follow-Up Agency. He will, despite his relocation to the midwest, retain a significant presence at the University of Virginia due to endowment of an eponymous lecture series.

When pressed to reflect upon his thoughts at this celebration by friends and colleagues, Gottesman revealed an inquisitive clinical side that has served him well throughout his career. (He is, in fact, a trained clinical psychologist with a doctoral degree from the University of Minnesota, awarded in 1960, and an honorary fellow of the Royal College of Psychiatrists.) True to fashion, his answer reached beyond the obvious pleasure anyone would draw from such a gathering to tap a deeper truth. Famous for his oratory skills, he voiced the sentiments other honorees might experience, but might fail to convey to listeners. “This is more awkward [for me] than it might be for someone not trained as a clinical psychologist.” He explained that we sensitize ourselves to the notion that symptoms of narcissistic personality disorder include feelings of entitlement. As a clinical psychologist, sensing these feelings in oneself suggests going beyond an acceptable threshold. He was, thus, presented with a dilemma: Feelings of entitlement had been thrust upon him, but

perhaps they were legitimate and not to be feared as symptoms. He hoped to fully embrace and enjoy these feelings, yet the cool hand of caution kept them in partial check.

I have known Irving Gottesman for many years. The weight of his scholarship is evident, perhaps best demonstrated by his receipt of the 1997 *Lifetime Achievement Award* in Psychiatric Genetics from the International Society for Psychiatric Genetics — the only such honor ever received by a psychologist. Like Gottesman, I would, however, go beyond the obvious to note that no one has grasped the texture of science, the culture of the field or the rules of research better than he has — he is a master at it. In conclusion, I would urge him to relish the recogni-

tion accorded him by Festschrift attendees; the crowd of colleagues, students and friends knew his feelings were/are legitimate.

Additional information about the life and work of Professor Irving Gottesman can be found in the references listed at the end of this article and on his homepage: <<http://www.people.virginia.edu/~iig>>

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Abstracts from the Festschrift — Foreword

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The purpose of this Festschrift was to honor the distinguished scientific career of Dr. Irving I. Gottesman, whose work on schizophrenia and the behavior genetics of personality and psychopathology, primarily through twin research, has permeated the thinking of both the scientific community and the public at large. The Festschrift was held in Minneapolis, MN, on June 8th and 9th, 2001, and brought together a remarkable group of researchers whose work has been touched, both directly and indirectly, by Dr. Gottesman over the past 35 years. The title of the Festschrift reflects the many areas of research in which Dr. Gottesman has been actively involved. Speakers came from all over the world to present research and to re-establish ties with each other and with Dr. Gottesman. The conference was held in Minneapolis because, following his retirement this spring from the

University of Virginia, Dr. Gottesman returned to the University of Minnesota where he was formerly a Professor of Psychology. He will have appointments at the Psychiatry Department at the University of Minnesota School of Medicine and at the Veterans Administration Hospital in Minneapolis, where he will continue his research and collaborations.

The presenters at the Festschrift were Dr. Gottesman's students, colleagues, and friends. They included Drs. Aksel Bertelsen (Aarhus Psychiatric Hospital, Denmark), Thomas J. Bouchard, Jr. (University of Minnesota), Greg Carey (University of Colorado), David DiLalla (Southern Illinois University), Niki Erlenmeyer-Kimling (Columbia University), Anne Farmer (King's College London), H. Hill Goldsmith (University of Wisconsin), Matt McGue (University of Minnesota), Peter McGuffin (Kings College London), Hans Moises (Kiel University

Hospital, Germany), Susan Trumbetta (Vassar College), and Eric Turkheimer (University of Virginia). The symposia discussants were Drs. Lisabeth DiLalla (Southern Illinois University School of Medicine), Dan Hanson (University of Minnesota), William Iacono (University of Minnesota), Sandra Scarr (Emerita, University of Virginia), and S. Charles Schulz (University of Minnesota School of Medicine). Lunch discussion group leaders were Drs. Sheri Berenbaum (Southern Illinois University School of Medicine), Leonard Heston (Emeritus, Univ. of Washington School of Medicine), Ann Masten (University of Minnesota), Vishwajit Nimgaonkar (University of Pittsburgh), Susan Resnick (National Institutes of Health), and Nancy Segal (California State University, Fullerton).

Dr. Gottesman is internationally renowned for his extensive and innovative work in many areas of psychopathology, most notably his twin