

= Irving Gottesman =

Irving Isadore Gottesman (December 29 , 1930 ? June 29 , 2016) was an American professor of psychology who devoted most of his career to the study of the genetics of schizophrenia . He has written 17 books and more than 290 other publications , mostly on schizophrenia and behavioral genetics , and created the first academic program on behavioral genetics in the United States . He has won awards such as the Hofheimer Prize for Research , the highest award from the American Psychiatric Association for psychiatric research . Lastly , Gottesman was a professor in the psychology department at the University of Minnesota , where he received his Ph.D.

A native of Ohio , Gottesman studied psychology for his undergraduate and graduate degrees , became a faculty member at various universities , and spent most of his career at the University of Virginia and the University of Minnesota . He is known for researching schizophrenia in identical twins to document the contributions of genetics and the family , social , cultural , and economic environment to the onset , progress , and inter @-@ generational transmission of the disorder . Gottesman has worked with researchers to analyze hospital records and conduct follow @-@ up interviews of twins where one or both were schizophrenic . He has also researched the effects of genetics and the environment on human violence and variations in human intelligence . Gottesman and co @-@ researcher James Shields introduced the word epigenetics ? the control of genes by biochemical signals modified by the environment from other parts of the genome ? to the field of psychiatric genetics .

Gottesman has written and co @-@ written a series of books which summarize his work . These publications include raw data from various studies , their statistical interpretation , and possible conclusions presented with necessary background material . The books also include first @-@ hand accounts of schizophrenic patients and relatives tending to them , giving an insight into jumbled thoughts , the disorder 's primary symptom . Gottesman and Shields have built models to explain the cause , transmission , and progression of the disorder , which is controlled by many genes acting in concert with the environment , with no cause sufficient by itself .

= = Background = =

Gottesman was born in Cleveland , Ohio , in 1930 , to Bernard and Virginia Gottesman (née Weitzner) , who were Hungarian ? Romanian Jewish immigrants . He was educated at Miles Standish Elementary and a public school in Cleveland 's Shaker Heights . After leaving school , Gottesman joined the United States Navy , where he was given a scholarship and the rank of midshipman , and was assigned to the Naval Reserve Officers Training Corps at the Illinois Institute of Technology in Chicago . He first specialized in physics but changed to psychology , receiving his B.S. degree in 1953 .

Gottesman did his graduate work at the University of Minnesota , which then patterned its clinical psychology program on the Boulder model , which emphasized research theory and clinical practice . He joined the graduate program in 1956 after three years with the Navy , supported by the Korean War G.I. Bill . He began investigating personality traits in identical and fraternal twins who had filled out the Minnesota Multiphasic Personality Inventory (MMPI) . His Ph.D. thesis , submitted to Psychological Monographs , was rejected before a review on the grounds that the nature ? nurture issue it addressed had already been settled in favor of nurture . On appeal , the thesis was reviewed and accepted for publication .

Gottesman began his career at Harvard University as a social relations and psychology lecturer . This non @-@ tenure @-@ track position ended after three years . Then he worked with researcher James Shields at the Maudsley ? Bethlem hospital complex in London , using its twin registry to analyze traits of identical and fraternal twins at the lab of Eliot Slater , whom Gottesman met in Rome at the Second International Congress on Human Genetics in 1961 . After his return to the University of Minnesota in 1966 , Gottesman created a program on behavioral genetics , the first in the U.S. In 1972 ? 1973 he received a Guggenheim fellowship to work with K.O. Christiansen in Denmark . In 1980 he left to join the Washington University School of Medicine , then moved to the

University of Virginia in 1985 , where he started the clinical psychology training program . Gottesman continued visiting London and collaborating with Shields , with whom he co -@-@ wrote a series of books. After spending 16 years at the University of Virginia , Gottesman retired from an active role after 41 years of research , but continues research part @-@ time in psychology and psychiatry .

From 2011 till his death , Gottesman was a professor with an endowed chair in adult psychiatry and a senior fellow in psychology at the University of Minnesota ; a fellow of the American Association for the Advancement of Science , the Academy of Clinical Psychology , and the Center for Advanced Study in the Behavioral Sciences at Stanford University ; a Guggenheim Fellow for 1972 ? 1973 at the University of Copenhagen ; an emeritus in psychology with a chair endowment at the University of Virginia ; and an honorary fellow at the London Royal College of Psychiatrists . He has advised 35 graduate students , and an annual lecture on behavior and neurogenetics has been established in his name by the University of Virginia . Gottesman was married to Carol Applen , whom he wed on December 23 , 1970 ; they had two sons . Gottesman died June 29 , 2016 .

= = Scientific contributions = =

= = = Studies on schizophrenia and psychopathology = = =

Gottesman first studied the genetics of schizophrenia on a large scale using the Maudsley ? Bethlem register of twin admissions for 16 years . Later he worked on psychiatric genetics and genomics . In his Twin Cities MMPI study , part of his Ph.D. thesis , Gottesman found high levels of inheritance in the scales related to schizophrenia , depression , anti @-@ social personality disorder , and social introversion . Genes strongly influenced social introversion and aggressive tendencies . This led to further studies on personality traits of identical twins such as the Minnesota Study of Identical Twins Reared Apart .

Analyzing the results of the Maudsley ? Bethlem study , Gottesman and Shields devised the multi @-@ element , polygenic causation model for schizophrenia by modeling schizophrenia diagnoses using the recently introduced liability @-@ threshold model . The book that summarized and expanded on the study , Schizophrenia and Genetics : A Twin Study Vantage Point , argued that schizophrenia is a product of several genes acting together , and introduced the techniques of precise analysis in the field of behavioral genetics. Gottesman and Shields introduced terms such as " reaction ranges / surface " , " endophenotype " and " epigenetic puzzle " into the behavioral sciences . The threshold model hypothesized that both genetic and environmental risks combined to produce schizophrenia , and pushed an individual into a diagnosable condition when their influence grew strong enough . The reaction range concept is the idea that the genes and the environment control behavior , but with separate upper and lower limits on the strength of that control in each case , a concept now part of basic psychology . Before the study , the prevailing opinion was that schizophrenia originated from bad parental relationships . The researchers showed identical twins were more likely to either have or not have schizophrenia together , concluding the disorder was the " outcome of a genetically determined developmental predisposition " .

The Maudsley ? Bethlem study also hypothesized that schizophrenia was caused by a mixture of many small traits working together . These endophenotypes could be used for diagnosis . Endophenotypes have been interpreted as a link between genes and the final behavior , acted on by the environment and chance elements , with biochemical and epigenetic influences changing the genome but not being passed on to children . Molecular @-@ biological studies in genetics have referred to endophenotypes to explain genetic causes of psychopathology . The researchers also examined how schizoids , those with mild , schizophrenia @-@ like personality disorders , were linked to schizophrenics . Gottesman and Shields extended the term to classes of mild psychological disorders in twins and relatives of schizophrenics . The researchers had hypothesized that schizoida in a twin was how a schizophrenia carrier gene , one in a non @-@ schizophrenic still passing on a genetic risk , expressed itself . The twin study did not confirm this .

In the Denmark study , the researchers evaluated the extent to which genes underpin psychopathology . Their twin studies of criminality found that a genetic disposition to poor self @-@ control caused both identical twins to become felons , or to not become felons . They also studied identical twins who were discordant for schizophrenia , where one twin was schizophrenic and the other not , and found children of such twins had equal genetic vulnerability to the disease . A later study in the mid @-@ 1980s , resulting in a paper awarded the Kurt Schneider Prize , concluded that children of identical twins were at higher risk than those of fraternal twins , indicating the non @-@ schizophrenic identical twin passed on a latent genetic disposition , even if it had not been expressed through schizoida . The Denmark study introduced the concepts of " unexpressed genotypes " ? the latent genetic risk , and " epigenetic control " ? the biochemical regulation of how genes work , into the new field of behavioral genetics .

= = = Studies on delinquency and violence = = =

In a 1989 review of the research on juvenile delinquency and violence , Lisabeth DiLalla and Gottesman found delinquency could be transitory or continuous , and genes contributed more to the continuous type . In 1991 the same authors published a critique of the then @-@ prevalent idea of antisocialism being transmitted through generations by child abuse alone in antisocial families . They stated that a review by Cathy Spatz Widom and the studies she cited had missed an element : children maltreated in families might have been targets because their genes might have influenced them into committing antisocial acts and attracting such treatment from parents .

Gottesman was one of the presenters at the 1995 conference at the Aspen Institute in Maryland on how strongly genes controlled a person 's leaning toward violence and crime . Gottesman presented results from studies on the influence of genes in criminality , stating that identical twins separated at birth were likely to show similar levels of criminal behavior . This concordance indicated that genes influenced such behavior . He did point out that behavioral patterns were strongly influenced by the environment and not set by genes alone . The conference , funded by the National Institutes of Health , was contentious , with detractors arguing that such studies would lead to minority groups , more likely to be criminals because they had lower social status or were poor , being targeted with gene therapy for violence . Protesters disrupted the conference and swarmed into the auditorium . Gottesman reasserted his belief that scientists should proceed with the research , not waiting for humanity to become ethical enough not to misuse it .

= = = Work on IQ = = =

In 1972 , Gottesman was called before the United States Senate by senator Walter Mondale to discuss the then 15 @-@ point IQ gap separating African Americans and white Americans . Gottesman testified that genes influenced IQ , but only in conjunction with elements such as schooling , money , and nutritious food from childhood onwards . In 2003 , he and colleagues published a study showing that heritability was higher for IQ differences within high socioeconomic status (SES) people than among low SES people . Genes influenced differences in test scores more in high SES children than in low SES children . Gottesman said that this was because genes have a weaker influence than poverty .

= = = Humanistic views = = =

Gottesman has researched and published about the abuse of genetic research in Nazi Germany , and has provided expert testimony in a Chinese human rights case involving schizophrenia in the family . His scholarly books on schizophrenia have also focused on the human costs of the disorder . In *Schizophrenia Genesis : The Origins of Madness* , he provided chapters in which patients describe their experiences of the disease , and those of their families . Gottesman has emphasized that genetics influences patients ' behavior in concert with the family , social , economic , and cultural contexts . According to him , random events are the third element determining behavior and

destiny , and the interaction between these elements is known only at the level of probabilities , and not as fixed and precise quantities .

= = Books = =

Gottesman has authored nine books , all related to schizophrenia and psychiatric genetics .

= = = Schizophrenia and Genetics : A Twin Study Vantage Point = = =

Gottesman and Shields published Schizophrenia and Genetics to document their twin @-@ study research at the Maudsley Hospital in London , the work that in part earned them the Hofheimer Prize for Research , the highest award for psychiatric research from the American Psychiatric Association . The study expanded on an earlier one by Eliot Slater at the same hospital , covering 24 identical and 33 fraternal twins , with at least one from every pair a schizophrenic being treated at the hospital between 1948 and 1964 . This study was one of eleven such in the contemporary literature , and the book detailed the methodology and analytic detail differentiating it from the others .

Chapters on methodology comprise a third of the book 's core . Identical and fraternal twins were classified using fingerprints and blood groups . Follow @-@ up interviews were recorded to monitor the progress of their patients (the probands) and their twins , some schizophrenic and others not . Two psychological tests ? the MMPI and the Object Sorting Test (Goldstein Scheerer Test of Concept Formation) ? were used to measure mental traits and functioning . Case summaries were prepared by the Scandinavian psychiatrist Erick Essen @-@ Moller , and these were sent , with data on identical @-@ or @-@ fraternal @-@ twin status and diagnosis @-@ of @-@ schizophrenia removed , to six judges from the U.S. , U.K. and Japan . The judges independently evaluated whether the patients were schizophrenic .

Results of studies comprise another third of the core of Schizophrenia and Genetics . The data showed that genes made a person likely to develop schizophrenia under environmental pressures . The study was not designed to find the genes responsible , but the authors hypothesized there would be several acting in tandem.Contextual elements responsible could not be identified , though some , such as an overly protective mother , birth order , natal weight , and social and economic elements were ruled out . Gottesman and Shields found roughly half of identical twins had a shared schizophrenic or non @-@ schizophrenic status , but only one @-@ eleventh of fraternal twins had such a shared diagnosis . MMPI scales coincided among identical twin pairs but not among fraternal twin pairs . The Object Sorting Test showed no useful relations . Those meeker than their twins were more liable to develop schizophrenia where their genes already put them at risk .

The book presents case histories of all the twin @-@ pairs studied and the raw data from the analyses . Its last chapters put the results in the context of existing studies , and presented a new theory and model to explain the causes and continuance of the disorder . The environmental aspects the researchers checked drew on existing literature , and multiple judgments were pooled to both compare and mutually cancel differing criteria for diagnosing schizophrenia . The theory in the book was that many genes work together to dispose a person to the disorder under certain environmental pressures . The model provided no specific therapeutic insight , but was useful as a guideline for further study .

= = = Schizophrenia : The Epigenetic Puzzle = = =

Schizophrenia : The Epigenetic Puzzle outlined the approaches , conclusions and models Gottesman used in his study of schizophrenia . He co @-@ wrote the book with James Shields , who died before it was published . The book introduces methods for diagnosing schizophrenia in a research setting , taking into account national differences in how the disorder was defined , debunked myths such as the mother transmitting schizophrenia , and introduced the concepts of the threshold model and the reaction range .

The book provided a tutorial on genetics to make the material self @-@ contained . Family ,

adoption and twin studies were investigated to determine the ways vulnerability to the disorder changed with genetic similarity to the patient . Together they supported the presence of a genetic contribution to the cause and the progress of schizophrenia . Contextual elements such as birth problems and stressful incidents were also analyzed to help the authors build a combined model to explain the disorder . The researchers analyzed populations to determine the role of genes using simplified mathematical models of the influence of genes and the environment on each other , and with no biochemical signal of the disorder to guide them . Rue L. Cromwell , writing in *PsycCRITIQUES* , wrote that this approach lacked rigor . The role of genes was less emphasized in the results , with a heritability of 70 % , than in earlier studies by Kallman . The researchers investigated neuroanatomy , and specifically the neurotransmitter dopamine , as a possible route by which genes influence the functioning of the brain to produce the symptoms of the disorder .

The authors investigated autism and psychiatric disorders among children , but found little relation to adult schizophrenia or genetic influence . They also covered the social implications of the disease , concluding that most schizophrenics were poor because the disorder eroded their resources and abilities . A chapter was devoted to social issues , violence , illnesses , death rates , sexual aspects , and the ability to father or bear children affecting schizophrenics . The authors provided data on the chance of relapse after an episode of the disorder . The book covered new methods and new models for studying schizophrenia . Because the disorder had no unanimously accepted diagnostic criteria , the researchers asked six clinicians and three colleagues to provide their analyses on the reports on 120 twins , and found an agreement of 86 % among the clinicians . Averaging the criteria of the clinicians produced a set close to that of Manfred Bleuler , who had adapted it from Emil Kraepelin .

== = Schizophrenia Genesis : The Origins of Madness == =

Schizophrenia Genesis : The Origins of Madness , written in 1991 , won the William James award from the American Psychological Association . It extensively reviewed how science has looked at schizophrenia . The book presented a vulnerability / diathesis ? stress model to explain the causes of the disorder and a many @-@ cause , many @-@ gene model to explain how it is passed from parents to children . The book has been translated into Japanese and German . *Schizophrenia Genesis* was written for both the lay person and the clinical professional , and provides data , methods of interpreting the data , and an introduction to genetic analysis as used to analyze role of inheritance in behavior . The book also contains accounts of schizophrenics , with an artist depicting own suffering , saying , " I know ... it is craziness when every laugh is about me ... newspapers suddenly contain cures ... sparkles of light are demon eyes . "

Schizophrenia Genesis starts with the history of schizophrenia . Gottesman takes the view that schizophrenia is a disease of the industrial world. because it is not mentioned in the Bible , by the ancient Greeks , the ancient physicians , or authors including Shakespeare . He saw it first mentioned by physicians in 1809 and by Balzac in a short story in 1832 , showing minimally the disorder had by then been recognized as such . In 1896 , Kraepelin defined its symptoms , and his student Ernst Rüdin began a genetic study of its transmission in 1916 . } The book noted that schizophrenia existed across cultures and its rates had stayed steady for fifty years .

A chapter was devoted to criteria for determining schizophrenia , with Gottesman preferring those developed by Bleuler to those in the American Psychiatric Association ? s *Diagnostic and Statistical Manual of Mental Disorders* (version III @-@ R) , the *International Classification of Diseases* (ICD @-@ 9) and Kurt Schneider ? s method . Diagnosis was based on the ways a person spoke and acted , and the standard measures were hallucinations , delusions , emotional apathy , jumbled thought , and sudden changes in a person . Gottesman mentioned a disparity in schizophrenia diagnosis after World War II across the Atlantic , when U.S. psychiatric diagnoses quadrupled those of British psychiatrists .

Family studies on schizophrenia were reviewed . That the disorder runs in families did not suggest it was genetically inherited , since cultural transmission occurs from parents to children . Twin and adoption studies were presented as the standard methods to disentangle contributions from genes

and the environment . Gottesman used a computer @-@ based method for calculating the odds of becoming schizophrenic based on the many causes . The book examines the problems caused by schizophrenia for relatives of patients and for society at large , larger @-@ scale ones exemplified by the eugenics policies of states such as Nazi Germany . Two final chapters cover molecular biology and neuroanatomy briefly . Newer methods of behavioral genetics being researched at the time of publication , such as linkage analysis which used the likelihood of neighboring genes being inherited together , were not covered .

= = Committees and organizations = =

Gottesman is or has been :

an attendee at the Society for the Study of Social Biology 1967 conference at Princeton University which laid the groundwork for the Behavior Genetics Association (BGA) ;
president @-@ elect and program chair of the BGA in 1976 ;
American Psychological Association (APA) member from 1958 , and a fellow since 1975 ;
a fellow of the American Psychiatric Association ;
a fellow of the American Psychological Society ;
the vice @-@ president of the Society for the Study of Social Biology for 1976 ? 1980 ;
the president of the Behavior Genetics Association in 1976 ? 1977 ;
member of the American Society of Human Genetics ;
the president of the Society for Research in Psychopathology in 1993 ; and
a fellow of the American Academy of Arts and Sciences .

= = Awards = =

Gottesman has been recognized by professional organizations in the United States , Britain , and Japan . He has received the following awards :

Hofheimer Prize for Research in 1973 from the American Psychiatric Association ;
Dobzhansky Lifetime Achievement Award in 1990 from the Behavior Genetics Association ;
William James Book Award in 1991 from the APA Division of General Psychology ;
Kurt Schneider Prize from the University of Bonn (Germany) (the first non @-@ German to win the prize) ;

Distinguished Scientific Contributions Award in 2001 from the APA , is highest honor (previous honorees include Jean Piaget and B.F. Skinner ;

Gold Medal Award for Life Achievement in the Science of Psychology in 2007 from the American Psychological Foundation ;

Outstanding Achievement for Research on Mental Health Disorders NARSAD (National Alliance for Research in Schizophrenia and Affective Disorders) Award in 2008 from the Brain & Behavior Research Foundation and

University of Louisville Grawemeyer Award in Psychology 2013

James McKeen Cattell Fellow Award from the Association for Psychological Science .

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