

**HISTORIA DE LA TEORÍA PSICOLÓGICA Y DE LA
INVESTIGACIÓN EN RETRASO MENTAL DESDE LA
SEGUNDA GUERRA MUNDIAL**

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**A HISTORY OF PSYCHOLOGICAL
THEORY AND RESEARCH IN MENTAL
RETARDATION SINCE WORLD WAR II⁽¹⁾**

Donald K. Routh

Department of Psychology University of Miami Coral Gables, Florida

Stephen R. Schroeder

Life Span Institute of Kansas Lawrence, Kansas

RESUMEN

En este artículo se presenta un meta-análisis de la investigación psicológica sobre el retraso mental, llevada a cabo desde la Segunda Guerra Mundial.

Fundamentalmente, el estudio se ha basado en los artículos publicados en *American Journal on Mental Retardation*.

PALABRAS CLAVES

Historia. Retraso mental. Meta-análisis.

ABSTRACT

In this study, a meta-analysis about the psychological research on mental retardation is shown, since world war II.

1. Este artículo apareció publicado por primera vez en *International Review of Research in Mental Retardation* (vol. 26, 2003). Para su publicación en este Anuario se solicitó permiso a la AAMR.

Basically, the study is based on the papers published in the *American Journal on Mental Retardation*.

KEYWORDS

History. Mental Retardation. Metanalysis.

I. INTRODUCTION

Although concepts of mental retardation are quite ancient, modern scientific psychology, including its concern with mental retardation, developed only in the late 19th century. In the early 20th century, psychometrics and the measurement of intelligence dominated the interest of psychologists concerned with mental retardation. Most of their research consisted of the development and refinement of such “intelligence” tests and measures of adaptive behavior (e.g., Doll, 1935; Wechsler, 1939). The activities of psychologists employed in institutions for persons with mental retardation or in school systems consisted largely of administering such tests. Relatively little formal psychological research in mental retardation was published during this era.

2. THE 1940s, 1950s, AND 1960s

Although it is frequently difficult to pinpoint the beginning of historical eras, the golden era of psychological theory and research on mental retardation may have begun with the founding in 1946 of the new National Institute of Mental Health (NIMH) in the United States, with millions of dollars allocated to be used to support scientific activities and with research in mental retardation included among its responsibilities. In 1955, Peabody College, in Nashville, Tennessee, received an NIMH grant to train graduate students in psychology in research on mental retardation.

After World War II, all over the world, groups of parents of children with retardation began to organize themselves in order to advocate for better services, to support litigation, and to encourage the provision of more funds for research. The National Association for Retarded Children (NARC), founded in 1950 in the United States, was one of these organizations. Its name was later changed to the National Association for Retarded Citizens and, most recently, to just the Arc. In 1958, the NARC commissioned the publication of a book by neurologist Richard L. Masland, psychologist Seymour B. Sarason, and anthropologist Thomas L. Gladwin surveying the literature on biological, psychological, and cultural factors in mental retardation. In 1959, the *American Journal of Mental Deficiency* (its precursor was founded in 1876, and it is presently called the *American Journal on Mental Retardation*) under editor William Sloan, a psychologist, became a peer-reviewed scientific journal

(Sloan, 1959). It continues to be published by the American Association on Mental Retardation. The subsequent editors (all psychologists) include H. Carl Haywood, Nancy M. Robinson, Earl C. Butterfield, Stephen R. Schroeder, Donald K. Routh, and William E. MacLean, Jr.

In 1960, with the election of John F. Kennedy as president of the United States, retardation assumed a new prominence. Kennedy's sister, Rosemary, had mental retardation, and the family had established the Joseph P. Kennedy Foundation to make research grants and give awards for research in mental retardation. Responding to the urging of another sister, Eunice Kennedy Shriver, President Kennedy put mental retardation research high on his agenda (Shorter, 2000). The new National Institute of Child Health and Human Development (NICHD), founded in 1963, was given the responsibility of coordination. The Kennedy family shared the negative reaction to psychiatry on the part of many in the parents' movement. Hence, it preferred to have pediatrics take over from psychiatry the coordination of the medical aspects of the field. Twelve mental retardation research centers were funded by the NICHD, and this agency also took over the responsibility for extramural research grants from the NIMH. The lion's share of mental retardation research funds from NICHD has always gone for biomedical research, but a significant amount (although decreasing somewhat over the years) has supported psychological research (Baumeister, Bacharach, & Baumeister, 1997).

3. THE ROLE OF NORMAN R. ELLIS

At the forefront of this prominent role of psychological research in mental retardation was Norman R. Ellis. Ellis received his Ph.D. in experimental psychology from Louisiana State University in 1957. From 1956 to 1960, he served as director of psychological services at the State Colony and Training School at Pineville, Louisiana, an institution for persons with mental retardation. In 1960, he became associate professor of psychology at George Peabody College for Teachers (as noted, an early recipient of NIMH grants related to mental retardation). In 1964, he became professor of psychology at the University of Alabama, where he set up an NICHD funded program for training psychologists interested in research in mental retardation. In 1963, Ellis published the first edition of his *Handbook of Mental Deficiency*, with 21 chapters by various authors reviewing psychological theories and research in this area. It would be hard to find a psychologist studying mental retardation in that era who did not own a copy of this book. A second edition was published by Ellis in 1979, and a third, called *Ellis' Handbook*, was published under the editorship of William E. MacLean, Jr., in 1997. In 1966, Ellis founded this serial, the *International Review of Research in Mental Retardation*, which he continued to edit for 20 years.

ars before enlisting others to carry it on (the subsequent editors were Norman W. Bray, 1987-1997, and Laraine M. Glidden, 1997—present).

In 1968, Ellis established the annual Gatlinburg Conference on Psychological Theory and Research in Mental Retardation. This conference continues up to the present, run by an executive committee no longer including Ellis in recent years. It has come to be considered by many to be the best forum of its kind. Ellis was dissatisfied with the other alternatives, such as the meetings of the American Association on Mental Retardation and the American Psychological Association. The International Association for the Scientific Study of Intellectual Disability (IASSID) meets only once every 4 years. The Gatlinburg Conference in 1974 received a grant from NICHD so that it could sponsor invited speakers. The conference gives annual travel awards to graduate students and postdoctoral fellows based on the quality of the research they submitted for presentation. In its early days, the Gatlinburg Conference tended to focus on cognitive psychology and applied behavior analysis. In more recent times, the topic of mental retardation and the family has also become popular, and a sizable group of psychologists are doing this type of research. Ellis directed many of the Gatlinburg conferences; subsequently they have been directed by Douglas Detterman, Gershon Berkson, Stephen R. Schroeder, and Travis I. Thompson.

4. DEVELOPMENTS IN THE UNITED KINGDOM AND ELSEWHERE

Parallel to these events in the United States, in 1948, in London, psychiatrist Aubrey Lewis hired two experimental psychologists, Jack Tizard and Neil O'Connor, and directed them into the neglected field of mental retardation (Clarke & Clarke, 1980). One major thrust of the research was to show that people in institutions with only mild mental retardation were generally capable of performing relatively complex tasks, given adequate incentives. They encouraged the administration to discharge such individuals and help them find employment (Tizard & O'Connor, 1956). In the United Kingdom, as in the United States after World War II, a government agency, the Medical Research Council, began to support research on mental retardation. A series of volumes edited by Ann M. Clarke and Alan D.B. Clarke (1958, 1965, 1975; Clarke, Clarke, & Berg, 1985) was published there that in some ways parallels the Ellis handbooks in the United States, although the Clarke and Clarke volumes are interdisciplinary rather than being focused on psychology. In 1960, the first international conference of researchers in mental retardation met in London, with over 600 delegates from 27 countries. In 1964, there was a similar conference in Copenhagen, and what is now called the International Association for the Scientific Study of Intellectual Disability (IASSID) became a permanent organization. It has met every 4 years since that time. One of the most prominent scientific journals in the field, the *Journal of Intellectual Disability Research*, a British publication, is now sponsored

by the IASSID. This journal is somewhat more medically oriented than the *American Journal on Mental Retardation* and devotes two issues per year to mental health and one to epilepsy and mental retardation. Significant government—supported psychological research on mental retardation since World War II has also occurred in several British Commonwealth countries, including Australia and Canada. In the United Kingdom, the terms “learning disability” and “intellectual disability” are used in preference to “mental retardation”.

Mental retardation research, including some behavioral research, is also found to a variable extent in other nations, including The Netherlands, the Scandinavian countries, France, Germany, Poland, Austria, Spain, Italy, Ireland, Japan, Saudi Arabia, United Arab Emirates, and Pakistan. At least these countries are represented on the board of the journal published by the IASSID. According to Parmenter (1999), the IASSID was founded mainly by researchers from North America and western Europe and continues to be dominated by them.

5. STRUCTURE OF THIS CHAPTER

The structure and timing of the three Ellis handbooks provide a convenient way to organize the present chapter. With few exceptions (e.g., Skinner’s Approach, Deinstitutionalization), its sections correspond with chapters appearing in one or more of the handbooks, following the continuation, development, or loss of each topic up to the present. Some supplemental material was taken from the Clarke and Clarke volumes. In addition, the 24 volumes of the *International Review* provided a convenient way to amplify the content of the handbooks and to link it to standard scientific journals. Given the comprehensive and wide influence of these handbooks, it seems unlikely that many significant topics related to research and theory in mental retardation were omitted. The overall question to be addressed is simply what have been the most influential psychological theories and research findings that have emerged from this era of generous federal support?

6. GESTALT THEORY

The initial chapter of the first Ellis handbook, by Herman H. Spitz (1963), was on field theory in mental deficiency and reviewed research, including that of Spitz and his colleagues, emerging out of the tradition of Gestalt psychology. The origin of Gestalt psychology is dated conventionally to about 1910, when Max Wertheimer began his experiments on phi phenomenon (apparent motion, the principle underlying motion pictures) with a tachistoscope in Frankfurt, Germany. Sometimes its origin is dated from 1890, when Wertheimer’s teacher, Christian von Ehrenfels, studied the phenomenon of melodies, which retain their identity even when every note is transfor-

med into a higher or a lower key. In any case, Gestalt psychology was particularly concerned with perception, which it approached wholistically, in contrast to the approaches of Wundt, Titchener, and also of the behaviorists. Interestingly, Gestalt psychology and behaviorism began at about the same time. Gestalt psychology waned after the death of Wolfgang Köhler, its main spokesperson; in 1967. The members of the principal Gestalt triumvirate, Wertheimer, Koffka, and Köhler, had all emigrated from Germany to the United States, fleeing Hitler, but none of them taught in U.S. universities with doctoral programs in psychology, and hence they were hindered in transmitting their approach to the next generation.

The particular Gestalt psychologist whose work was most focal to Spitz's chapter was the field theorist Kurt Lewin (1935), who had hypothesized that persons with mental retardation were characterized by a lesser "degree of differentiation" and greater "rigidity" than those without mental retardation. The degree of differentiation was symbolized by fewer "innerpersonal regions" in their "life space" usually operationalized in research by mental age (MA) attained. The greater rigidity or increased impermeability between the regions was symbolized by thicker lines in Lewin's diagrams and operationalized by IQ. The research cited most frequently was by Lewin's student Jacob Kounin (1941) in which groups with and without mental retardation were matched for MA and given several drawing tasks. First, they were asked to draw as many cats as they liked (until "satiated") and then to draw bugs, turtles, and rabbits. In terms of Lewin's theory, each of these tasks is considered to represent a different psychological region. A person without retardation, after drawing many cats, is less likely to draw as many of the other animals (the phenomenon of "cosatiation"), whereas the person with mental retardation would draw about as many of each animal. At least some of Kounin's research confirmed this prediction and hence provided preliminary evidence of "rigidity" in mental retardation. Other previous theorists with Gestalt connections whose writings focused on rigidity in mental retardation were Kurt Goldstein (1943) and Heinz Wemer (1946). Unfortunately, much of this work has proved difficult to replicate in other psychologists' laboratories.

Spitz's own initial research focused instead on a somewhat different Gestalt phenomenon, so called cortical satiation, as described by Kehler (1947). Spitz's research compared persons with mental retardation with control subjects of the same chronological age. Spitz and Blackman (1959) found that adolescents with mental retardation did not report perceiving visual figural aftereffects to the same extent as non-retarded adolescents of the same age. An experiment by R. S. Lipman (reported by Spitz, 1963) showed a drawing of a Necker cube to samples of adolescents with mental retardation and controls the same age but without retardation and demonstrated with an actual three-dimensional wire cube what was meant by a "reversal". Over a series of eight 30-second trials, those with mental retardation reported significantly fewer reversals of the cube in the drawing.

Within 10 years, Spitz (1973) had moved to an information processing approach. Within this framework, he began to think of mental retardation as a “thinking disability” as opposed to one in learning (Spitz, 1976). Spitz and colleagues found persons with mental retardation to be well behind MA-matched controls in their performance on games requiring foresight, such as tic-tac-toe (Spitz & Winters, 1977) and the Tower of Hanoi (Bymes & Spitz, 1977). In his chapter for the second edition of the Ellis handbook in 1979, he summarized this position, as did his later work (Spitz, 1986, 1988).

Perception research, although not necessarily inspired by Gestalt theory, continued to thrive in the 1980s and 1990s. For example, Ted Nettelbeck (1985) reviewed research on inspection time in visual perception using backward masking procedures, defined as “the minimum exposure duration at which discrimination in an easy task is virtually error free” (p. 137). His studies showed a marked deficiency in inspection time in mildly retarded adults, equivalent to a lag in MA of about 4 years compared to nonretarded persons.

Not long afterward, Robert Fox and Stephen Oross, III, reported deficits in performance on random dot stereograms and random dot kinetograms in adults with mild mental retardation, in comparison to nonretarded adults and children (Fox & Oross, 1988, 1992). The basic principles of stereoscopic vision (disparity between left and right retinas) were known well before the beginning of modern experimental psychology (Wheatstone, 1838). However, random dot stereograms were developed only much more recently (Julesz, 1960). In this procedure, each eye is presented with a display that looks meaningless, but certain parts of this vary systematically from the left to the right eye so that a three-dimensional form appears to float out from the display. The procedure for the detection of apparent motion via random dot kinetograms was also developed fairly recently. In this, the initial display is like a television screen with “snow” or visual noise, but certain dots suddenly appear in a new place, and a form thus appears to move from one place to another on the screen. Fox and Oross do not specifically mention Gestalt psychology, but their experiments on the detection of apparent motion clearly involve a sophisticated version of Maz Wertheimer’s phi phenomenon. One significant aspect of Fox and Oross’ research may be the demonstration of deficits in cortical functioning in individuals with only mild mental retardation, who have generally been considered to be physically intact. These authors do note the heterogeneity of their subjects with mental retardation, with about 13% performing within the normal range on these tasks.

Courbois (1996) tested two groups of adolescents with retardation on tasks involving the use of visual images: generating an image, maintaining it, inspecting it, and performing mental rotation, adapted from the research of cognitive psychologist Stephen Kosslyn. Subjects with significant evidence of brain damage performed more poorly than those with cultural familial retardation, and both groups performed more poorly than typically developing children approximately matched for MA, suggesting marked deficits in visual imagery.

In the most recent edition of Ellis' handbook, Dulaney and Ellis (199~ reported research confirming an association of "rigidity" with mental retardation. Ellis and colleagues (Ellis & Dulaney, 1991; Ellis, Woodley—Zanthos, Dulaney, & Palmer, 1989) made use of the Stroop task, in which the names of colors, such as red, green, and yellow, are printed in colors of ink other than the color described by the word. In the traditional version of this task, subjects are asked to name the colors. Their tendency to read the words, however, is so automatic that it slows down their color naming greatly compared to how quickly they are able to name such colors in the absence of any words. In Ellis' research, the Stroop procedure goes a step further: subjects are asked to practice color naming Stroop words for several days, until their suppression of reading becomes rather automatic. Now they are again asked to read the words, disregarding the ink colors. It is in this task that persons with mental retardation show "cognitive inertia" in the form of slow reading rates, relative to control subjects matched on chronological age.

In conclusion, Gestalt theory, once a major inspiration for mental retardation research, has gone into decline. Nevertheless, the findings of such research in the areas of perception and thinking, many of them solidly replicable, remain in the literature. The challenge now is to integrate these findings within a more contemporary theoretical framework. One is reminded of the historic example of the 18th century chemist Joseph Priestley. He explained the process of combustion by the presence of "phlogiston", a flammable principle, within the substance that caught fire. Within this framework he discovered what he called "dephlogisticated air," which was highly supportive of such combustion. The phlogiston theory is long since defunct, even though Priestley believed in it until his dying day. Now we follow the reconceptualization presented by rival chemist Lavoisier, who called this kind of air "oxygen". Lavoisier viewed combustion as the chemical combination of oxygen with the combustible substance. This was a better theory because it predicted the fact that after combustion, the material that was burned gained rather than lost weight. Therefore, the solid research findings inspired by Gestalt theory need to be reconceptualized.

7. HULL-SPENCE THEORY

One of the early chapters in the first Ellis handbook, by Gordon N. Cantor (1963), concerned the Hull-Spence theory and mental retardation. This chapter described Clark Hull's hypothetico-deductive method and certain key constructs within it, such as habit strength (H, related to the number of reinforced evocations of a response), drive (D, related to the number of hours of food deprivation or the intensity of an aversive stimulus), and incentive motivation (K, related to the weight or sweetness of the food reinforcement given). Cantor noted some of the ways in which Kenneth Spence's concepts differed from those of Hull (e.g., the use of equations multiplying

D and H rather than adding them) and went on to describe several experiments involving persons with retardation carried out within these general frameworks.

Hull (1943, 1952) was a major figure among the behaviorally oriented learning theorists. His work dominated American academic psychology in the 1940s, 1950s and 1960s. Much of Hull's research on learning was carried out with rats, but his theory attempted to generalize his principles to all organisms. Spence (1956, 1960) did research mainly on discrimination in animals and on eyelid conditioning in humans and was a bit more cautious in presuming the generality of his theorizing. Hull died in 1952 and Spence in 1967. Toward the end of their era of wide influence in psychology, the whole field of the behavioral study of learning experienced a trend toward smaller scale theories, often of a mathematically sophisticated variety.

One of these smaller scale theories within the Hull—Spence tradition, described in the first Ellis handbook, was that of David Zeaman and Betty J. House (1963). Their chapter dealt with the role of attention in the discrimination learning of persons with retardation. In their large and systematic research program, Zeaman and House typically used a two-choice discrimination task in which the choice of the correct object, e.g., a square, was reinforced by candy to be taken from the food well underneath the object. The choice of the other object, e.g., a circle, was not rewarded. The left-right position of these objects varied randomly from trial to trial. They plotted "backward" learning curves, including the final trial on which the person reached the learning criterion, then the trial before that, and so on. These curves showed that the slope of the subject's final approach to the criterion tended to be steep and rather constant. The curves of the slow and rapid learners thus differed mainly in the length of the period of "chance" or 50% responding preceding the criterion trials. Zeaman and House developed a mathematical theory hypothesizing that the subject's behavior consisted of two parts: (1) attending to a certain dimension of the stimulus, (e.g., its position or its form) and (2) choosing one object on that basis. Subjects with retardation were found to differ from ones without retardation primarily in this attentional phase of the task.

In 1973, Fisher and Zeaman described an attention-retention theory of the discrimination learning of persons with retardation. They incorporated elements from the Atkinson and Shiffrin (1969) theory of memory into their theory of discrimination learning; enabling it to handle additional phenomena, such as decremental effects of intertrial intervals, proactive and retroactive interference, release from proactive interference, and rehearsal. They provided abundant data to justify this innovation. At the same time, Marc W. Gold (1973) presented his research on vocational rehabilitation of persons with retardation. Gold noted that he had used the Zeaman and House (1963) theory in his task analysis in order to teach sheltered workshop clients to assemble 15—piece and 24—piece bicycle brakes. Anyone who has ever tried to take apart and reassemble the coaster brake of a bicycle will appreciate the magnitude of Gold's achievement.

In 1977, House responded to an attack on the lack of “ecological validity” on research—in mental retardation by stating that its goal was “to gain a scientific understanding of low intelligence as a subcategory of human intellectual functioning”. She thus chided the critics for doing a “disservice to the field in disparaging basic research” (p. 534). In 1979, Zeaman and House summarized 25 years of theory and research on their attention theory of discrimination learning in mental retardation. This chapter suggested breadth of attention as a possible new theoretical parameter. This refers to the number of “looks” or the number of different dimensions sampled at one time during learning. To those who had expressed surprise that House and Zeaman could spend so many years working on “simple” discriminative learning, the authors replied that “when we were younger, we thought psychology was easier than it is” (p. 117).

In the early 1960s, Hullian theory was no doubt the dominant one in mental retardation research. At that time, the work by Zeaman and House may have been the most influential mental retardation research program in the view of psychology at large (Ellis, 1985). Since Zeaman’s death in 1984, this kind of research, like that within the Hull-Spence tradition in general, seems to have faded. In the 1997 edition of Ellis’ handbook, not even the chapter devoted to attention bears much of an imprint of Zeaman and House’s approach. Indeed, most recently, Burack, Evans, Klaiman, and Iarocci (2001) attacked the notion of attention deficits as being inherent to mental retardation. They reasoned that this hypothesis was not well founded because Zeaman and House’s research compared the performance of persons with retardation to persons without retardation matched only on chronological age, not MA. So far no reply by proponents of attention deficits to this critique has appeared.

In our view, Zeaman and House’s findings and their elegant mathematical theories remain among the more solid bodies of research in mental retardation. At the least, their work informed psychologists concerning some of the processes underlying discrimination learning, including attention and memory. Unquestionably, their work also showed the developmental relevance of these processes, i.e., their relation to MA. A high priority for researchers interested in advancing this approach is to respond to the challenge of Zigler, Burack, and others to investigate whether these processes are also sensitive to IQ differences in individuals with and without mental retardation, matched for MA. Because the theories of Hull and Spence appear to have become outmoded, there is also a need to incorporate Zeaman and House’s findings into a more contemporary theory of discrimination learning.

8. PIAGET’S THEORY

Mary Woodward (1963, 1979) wrote chapters on the application of Piaget’s theory to mental retardation in the first and second editions of Ellis’ handbook. The chapters included brief résumés of Piaget’s theory and emphasized the differences

between the approach taken by Piaget and associates to assessment and those used by American Piagetian researchers. Piaget used a clinically oriented exploration of each child's thinking, whereas Americans insisted on somewhat rigid and standardized group methods. Woodward mentioned Barbel Inhelder's (1943/1968) dissertation, which confuted the relevance of Piagetian stages to mental retardation. According to Inhelder, children with retardation go through the same stages of mental development as do ones without retardation, but at a slower rate. This conclusion was later supported by a review of over 30 Piagetian comparative studies (Weisz & Zigler, 1979), although persons with retardation fail universally to reach the highest Piagetian stage, i.e., formal operations. Woodward (1963) mentioned the usefulness of Piagetian methods in the intellectual evaluation of individuals with severe and profound retardation whose performance was below the basal level of standard IQ tests. Others have found that scores on batteries of Piagetian tasks correlate highly with mental age and IQ scores. A longitudinal study of about 100 individuals with severe and profound retardation revealed that the sequence of their development of Piagetian tasks was markedly different from that of nonretarded controls (Silverstein, Pearson, Keller, & McLean, 1982).

After Piaget's death in 1980, his influence waned. A Jean Piaget society exists and meets regularly, attended by several researchers from around the world, and this approach continues to be pursued within developmental psychology. However, few Piagetian research articles have appeared in the mental retardation research literature in the past decade. The 1997 edition of the Ellis handbook did not include a Piagetian chapter.

9. VYGOTSKY AND LURIA'S APPROACH

Ellis did not find a psychologist to write a chapter from the standpoint of Lev S. Vygotsky or his student A. R. Luria for his first handbook and instead reprinted two articles of Luria's from the 1958 and 1959 *Journal of Mental Deficiency Research* (the predecessor of the *Journal of Intellectual Disability Research*) in chapter format (Luria, 1963). In the second of these reprinted articles, there was a section containing interesting anecdotes of the performance of "oligophrenic" (brain damaged, mentally retarded) children on a bulb-squeezing task developed by Ivanov Smolensky. These demonstrated the children's difficulty in inhibiting their responses and the lack of coordination between their verbal and motor responses.

Perhaps the most influential of Vygotsky's ideas has been his concept of a "zone of proximal development" (ZPD), the difference between the mental age of the child performing alone and the child's performance when assisted by an adult. The teacher diagnoses the depth of the ZPD and constructs a sequence of activities, gra-

dually diminishing the contributions of an adult and increasing the contributions of the child.

In Israel, Reuven Feuerstein elaborated on Vygotsky's ideas by developing an approach to the education of disadvantaged immigrant children through "mediated learning" or "instrumental enrichment". These young people, some of them functioning in the range of mental retardation, were exposed to extensive training on materials taken from intelligence tests. At least some research confirmed the efficacy of such training in facilitating the academic achievement of adolescents with mental retardation (Feuerstein, 1979).

Luria had a long career well after Vygotsky's death and became an eminent figure in neuropsychology (e.g., Luria, 1961, 1973). J. P. Das (1984) devised a theoretical approach to mental retardation based on some of Luria's ideas about brain functions, such as planning, attention, and simultaneous and successive information processing. Das ultimately devised an innovative method of cognitive evaluation based on these concepts. Its application to Down syndrome and aging is described elsewhere in this volume.

A contemporary presentation of the Vygotsky-Luria position was provided by the Russian psychologist T. V. Akhutina (1997), a student of Luria. Akhutina said that the first point of development of executive function is seen in the child's emotional self-regulation. In other words, affect must precede cognition. Second is the development of the verbal regulation of behavior, mediated by the child's relationship with the adult. At the age of 6-7 years, the typically developing child masters inner speech and inner representation and begins to be able to plan and to control attention.

Nonetheless, the subsequent editions of Ellis' handbook do not contain any chapters written from Vygotsky's or Luria's points of view. Elsewhere, Peter L.C. Evans (1982) tried rather unsuccessfully to replicate and extend some of Luria and Ivanov-Smolensky's research on inhibitory processes in mental retardation.

10. SKINNE'S APPROACH

Before the 1960s, most psychological research in the field was on people with mild or borderline mental retardation, and very little was on moderate, severe, or profound mental retardation. Organizations such as the National Association for Retarded Children (now the Arc) and the Association for Persons with Severe and Profound Aandicaps (now called TASH) were exerting pressure to do something direct and practical about the state of the nation's citizens with developmental disabilities. Children with severe and profound mental retardation were generally regarded as uneducable and were customarily consigned to custodial care in state institutions. Parent and professional pressure resulted in funding for national research efforts in mental retarda-

tion. The NICHD provided funds for mental retardation research centers as well as educational research projects within this population.

Behavioral researchers within the tradition of B. F. Skinner, especially Bijou and his students Baer, Lovaas, Wolf, Risley, Wahler, and Etzel, at the Ranier School and the University of Washington; Spradlin at the J. F. Kennedy Center at Peabody College; Schiefelbusch at the Bureau of Child Research at the University of Kansas; and Sidman, Touchette, Stoddard, and later McIlvane at the E. K. Shriver Center in Boston, all began to put together research programs on teaching basic self-help, social skills, attention, discrimination learning, and language skills firmly based on operant principles of reinforcement theory. A behavioral technology evolved that included observing and recording behavioral events in laboratory analog and generalized natural settings. Single-subject experimental designs to support the internal validity of these techniques were developed. The field of applied behavior analysis emerged with the launching of its own journal and a statement of its principles (Baer, Wolf, & Risley, 1968). This paper was and still is a science citation classic. It unleashed an incredible amount of excitement and optimism perhaps too much about what could be accomplished with direct instruction and intervention with all people with mental retardation and developmental disabilities.

Young behavioral scientists in Kansas and at selected sites across the country established research projects that flew in the face of the prevailing fatalism about the abilities of persons with severe mental retardation. Armed with behavior analytic principles, they believed it was possible for persons with mental retardation to learn functional daily living skills. Early controlled laboratory experiments showed that they could learn selfdressing, grooming, toileting, eating skills, social skills, language and communication skills, work skills, and others. Many of these investigations dealt with problems commonly labeled "cognitive", but the problems were addressed in a behavior analytic framework as stimulus control.

Although much of the early work and demonstration took place in institutions, these behavioral researchers were early, frequently unsung, advocates of deinstitutionalization. Nearly all of this technology has now been adapted to community settings, not only for people with mental retardation and developmental disabilities, but also to inner city children living in poverty, to those with juvenile delinquency, and in the regular school system. In a sense, a technology for community integration was enabled by this work. Positive behavior supports, supported employment, early intervention in autism, prevention of school violence, selfdetermination, and empowerment are all current social policy movements that have some of their supportive roots in behavioral technology developed since the early 1980s. Behavior analysts may not have cured autism or mental retardation, but they have revolutionized our expectations and the way we think about the capabilities of people with mental retardation and developmental disabilities.

There was a time when the main clinical activity of psychologists working in mental retardation was administering intelligence tests. Their work in counseling and therapy with retarded persons and their families was not supported by research evidence. The development of applied behavior analysis, e.g., in the treatment of psychopathology, including aggression, self-injurious behavior (SIB), stereotypies, and autism, as well as self-help and communicative skills and in persons with retardation, spearheaded change. Many states in the United States now legally certify behavior analysts. The American Board of Professional Psychology has approved a diploma in "behavioral psychology", and the American Psychological Association (APA) has approved this field as a professional specialty. Whether or not research psychologists working in mental retardation take pleasure in this outcome, there is no doubt that they have contributed to it. The APA Division on Mental Retardation and Developmental Disabilities has often presented its highest honor, the Edgar A. Doll Award, to researchers in applied behavior analysis (Routh, 1999).

Despite these accomplishments, none of the Ellis handbooks included a chapter devoted specifically to Skinner's approach or to applied behavior analysis. Perhaps this was in part due to Skinner's well-known antipathy to cognitive psychology. He regarded cognitivism with the disdain that Darwinists reserve for creationism advocates.

11. MEMORY

Philosophical inquiry concerning memory goes back to Socrates, Plato, and Aristotle, and experimental psychology claimed it with Ebbinghaus' lifelong work (Ebbinghaus, 1885/1913). As early as 1887, Galton observed abbreviated memory spans in adults with severe mental retardation. In the first edition of his handbook, Ellis (1963b) reviewed the literature on memory in mental retardation and offered a "stimulus trace model" wherein the intensity or duration of the trace of a stimulus is diminished if the integrity of the person's central nervous system (CNS) is impaired, compared to the stimulus trace in an organism with an intact CNS. The diminished stimulus trace leads to an inadequate behavioral event. The term "stimulus trace" is similar to one in Clark Hull's theory, but Ellis did not necessarily link his concepts to Hull's work. Ellis's research on memory generally compared persons with retardation to others of the same chronological age.

Ellis's (1963b) model, among others, soon drew fire from Edward Zigler (1969) as a "difference" or "deficit" theory, which Zigler contrasted to his own "developmental" approach. In Zigler's view, individuals with mild mental retardation are neurologically intact, representing only the lower portion of the normal curve, and their mental development simply occurs at a slower rate than that of typically developing children. In contrast to Ellis, Zigler's preferred comparison is between retarded and

nonretarded individuals matched for MA, not CA. (This was the beginning of the “development versus deficit” controversy that used up many pages of scientific journals over the years). Another conceptual problem with the stimulus trace theory was its unitary nature, when memory had already been shown to constitute multiple processes.

Ellis (1970) then elaborated a more complex model of memory, an adaptation of the work of Waugh and Norman (1965), with three different types of memory: primary (sometimes called sensory memory), secondary (short-term), and tertiary (long-term) processes. An important feature of the model was rehearsal strategies, which were used to maintain items in secondary memory and to transfer them to tertiary memory. Ellis presented the results of 14 experiments, most of them with adolescent and adult retarded persons, compared to college students the same age. The task was one involving the probed recall of a series of nine digits. The subjects with and without retardation generally did not differ on the last items presented, showing the usual “recency” effect, interpreted within Ellis’s model as a manifestation of primary memory. The subjects without retardation also showed a marked “primacy” effect, which the ones with retardation did not, interpreted as being due to the use of rehearsal by the college students only. Such differences have often been replicated in the literature. As Detterman (1979) remarked in summarizing this literature, “there is overwhelming evidence in favor of a rehearsal deficit” (p. 7S2) in mental retardation.

In a widely cited study, Butterfield, Wambold, and Belmont (1973), using a serial learning task, successfully taught individuals with retardation to use a cumulative rehearsal strategy and were able to equalize their performance with that of participants without retardation. This and other studies like it clearly showed that the poor performance in Ellis’s secondary memory was probably an example of a remediable production deficit. The research problem then began to shift to one of developing procedures to maintain such a strategy and to generalize it to other tasks. Fully six chapters in the second edition of the Ellis handbook in 1979 were devoted to memory, mostly to this specific issue.

Ann L. Brown (1974) also discussed the topic of strategic behavior in the memory of persons with retardation. One of the procedures she used, the keeping-track task, produced clear primacy differences between subjects with retardation and typically developing ones. She found that these could be reduced by training the subjects with retardation to rehearse. Interestingly, when Brown used a visual recognition memory task, one not requiring active strategic behavior, persons with mental retardation showed essentially no deficit compared to control subjects the same age.

Patricia A. Shepherd and Joseph F. Fagan, III (1981) reported the successful development of procedures for assessing visual recognition memory in children with profound mental retardation. They adapted techniques originally developed by Robert Fantz showing the child two displays and noting the one the child preferred to look at. Using this approach, children who had neither speech nor the ability to walk

were able to indicate their preference for a face, color, or pattern they had not seen before. These preferences for novelty established their ability to remember the displays they had seen previously.

The Gatlinburg conference in 1988 took memory as its theme. Subsequently, Ellis and colleagues (Ellis, Woodley-Zanthos, & Dulaney, 1989; Katz & Ellis, 1991) reported in print that there were no differences due to age, IQ, or instruction (intentional or incidental) on memory for location. This finding is similar to that of Brown (1974), reported earlier, with a task involving no need for strategic effort. Both types of finding are in line with Hasher and Zacks' (1979) distinction between automatic and effortful processes. When processing is automatic, as in recognition memory or memory for location tasks, persons with retardation do as well as controls. In contrast, people with retardation performed more poorly than controls in effortful processing, as reflected in free recall among other tasks.

In their chapter on strategy use in the most recent Ellis handbook, Bray, Fletcher, and Tumer (1997) emphasized that persons with retardation actually have many competencies, some of them even involving spontaneous strategy use with concrete objects. Among the competencies, they mention spread of activation, which seems to be intact in individuals with mental retardation, according to semantic priming studies by Sperber, Ragain, and McCauley (1976). In this type of priming task, the presentation of a word such as "animal" has been shown to facilitate the subsequent reading of a related word such as "cow," whereas presentation of the word "plant" would have no such effect. Bray and colleagues did not, however, seem to be as enthusiastic about the hope of inducing strategy maintenance and transfer as the authors of the memory chapters in the 1979 edition of the handbook.

Now some of the physiological bases of memory are beginning to be made clear by studies of nonhuman organisms such as sea slugs, rabbits, and the like. We can no doubt expect to see sophisticated brain imaging studies of memory in individuals with mental retardation soon.

12. BEHAVIOR GENETICS

The author of the chapter on behavior genetics in the first edition of the Ellis handbook, I. I. Gottesman (1963), is known mainly for his research on the genetics of schizophrenia. Nevertheless, he provided a clearly written account of the genetics of mental retardation. To begin with, he mentioned the relatively recent discoveries of the genetic basis of Down syndrome (DS) as trisomy 21 (Lejeune, Turpin, & Gautier, 1959) and of a test for heterozygous carriers of phenylketonuria (PKU; Hsia, Driscoll, Troll, & Knox, 1956). Gottesman summarized relevant animal research on behavior genetics, family and twin studies of the inheritance of intelligence in humans, cytogenetics, and the polygenic theory of mental retardation. Of course, no field in

the biological sciences has shown greater progress in the 20th century than genetics, including T. H. Morgan's research concerning the chromosomes of the fruit fly, Watson and Crick's discovery of the role of DNA and RNA, and most recently the Human Genome Project. The challenge for psychologists is to study the implications of all this for behavior.

In 1967, Edward Zigler's article appeared in *Science* concerning the two-group approach to mental retardation. According to this view, it is mainly mild mental retardation that is familial, due in part of the influence of polygenes. Severe mental retardation is more likely to be due to chromosomal anomalies, major Mendelian gene effects including inborn errors of metabolism, and environmentally induced brain damage. As Zigler noted, the forerunners of his two-group approach included Lewis (1933) and Heinz Werner, with his concept of endogenous vs exogenous mental retardation (e.g., Wemer & Strauss, 1939).

Interestingly, no chapter on behavior genetics appeared in the 1979 edition of the Ellis handbook. With the exception of Arthur R. Jensen (e.g., 1970), many psychologists working in the area of mental retardation seemed to ignore genetics during the 1970s and 1980s. As Hodapp and Dykens (1994) stated, there seemed to be two cultures within behavioral research in mental retardation. Research published in biomedical journals tended to be syndrome oriented, while that in psychological journals conceptualized retardation mainly in terms of levels of severity. As Baumeister later noted, a genetics journal such as *Nature Genetics* has an impact factor of about 28 (the number of times each article is subsequently cited), whereas the *American Journal on Mental Retardation* (although the leading journal in special education and rehabilitation) has an impact factor a little above 1.

Down syndrome did receive somewhat more attention in the psychological literature than other types of genetically based mental retardation. Carr (1992) reported a longitudinal study of children with DS over their first 21 years of life. She documented clearly the fact that IQ levels decrease in DS during infancy and childhood. Adaptive skills also develop more slowly in children with DS than in children with other types of mental retardation. Zigman, Schupf, Zigman, and Silverman (1993) reported on aging and Alzheimer disease in DS. Malamud (1972) had published the results of autopsies of 1160 people with mental retardation. Of those with Down syndrome, 4 of 47 age 40 or under had pathological signs of Alzheimer disease (neurotic plaques and tangles in the hippocampus or cortex), whereas 49 of 49 age 41 or over had such signs. Standard criteria for dementia are difficult to apply to persons already affected by mental retardation. Nevertheless, Zigman and colleagues (1993) were able to demonstrate that many individuals with DS over age 40 do not yet manifest Alzheimer disease clinically. The reasons why this is so are not yet clear.

By 1996, there appeared to be a surge in interest in genetics among psychologists doing research in mental retardation. In that year, the Gatlinburg conference

had genetics as its theme. Geneticist John Opitz reported at the conference that there were now 705 established genetic causes of mental retardation. It is impossible for any printed textbook to keep up with these, and investigators and clinicians instead refer to the Online Mendelian Inheritance in Man (OMIM) website on the Internet. In the third edition of Ellis' handbook a chapter by Lee Anne Thompson (1997) on behavior genetics appeared. According to Thompson, family and twin studies continued to support the distinction between clinical and cultural-familial mental retardation. She noted research showing that polygenic influences seem to influence mental development even in persons with a chromosomal anomaly.

Other indicators of this interest are plentiful. Fisch (1997) reviewed longitudinal research on behavioral development in individuals with fragile X syndrome. Declines in IQ and adaptive behavior across childhood were typical. Dykens (1999) and Hodapp (1999) reviewed the direct and indirect behavioral effects, respectively, of various chromosomal anomalies. Indirect effects are those mediated by people's reactions to the individuals with these syndromes rather than being caused directly by genetic factors. In 2001, a special issue of the *American Journal on Mental Retardation* was devoted to behavioral phenotypes of genetic syndromes, including fragile X, Prader-Willi, Smith-Magenis, Down, and Williams. Because of the rarity of these syndromes, researchers often relied on questionnaires submitted to members of organized groups of parents of children with such a syndrome. As an example of such research, Dimitropoulos, Feurer, Butler, and Thompson (2001) found that children with Prader-Willi syndrome manifested more compulsions, skin picking, and tantrums than those with Down syndrome or typically developing children. As Dykens (2001) noted, it is currently thought that about a third of the persons with mental retardation, including many with mild delay, have genetic disorders. As she said, "most of these disorders have yet to receive even a single behavioral study" (p. 3). There is much work to be done here by psychological researchers.

13. LANGUAGE AND COMMUNICATION

The chapter on language and communication in the first Ellis handbook was written by Joseph E. Spradlin (1963). Its viewpoint was dominated by B. F. Skinner's (1957) book, *Verbal Behavior*. Spradlin first reviewed the existing measures of language, saying that "it seems quite likely that the science of language will proceed no more rapidly than the development of language measures" (p. 516). He mentioned the Templin-Darley Articulation Test, the Peabody Picture Vocabulary Test (Dunn, 1959), and the Illinois Test of Psycholinguistic Abilities (Kirk & McCaughy, 1961), all of which seem distinctly dated to our contemporary eyes. Noting that speech, language, and communication problems were highly prevalent among persons with retardation, Spradlin then reviewed a number of relatively inconclusive studies evaluating attempted

interventions. Finally, he stated: "Studies of the effect of reinforcement on speech and vocal behavior, though far from conclusive, indicate that vocal language may be subject to the same reinforcement principles as nonlanguage behavior. If this is true, then great strides might be made through the application of these principles to increase the frequency of language responses, to shape these responses, and to bring these responses under stimulus control" (p. 551).

It is worth noting that Spradlin's chapter made no mention of Noam Chomsky's (1957) book, *Syntactic Structures*, one that revolutionized linguistics and helped initiate the "cognitive revolution" in psychology. Nor did the chapter mention Chomsky's (1959) well-known scathing review of Skinner's book. Skinner, as a radical empiricist, believed that verbal behavior was shaped mainly by environmental events. Chomsky, an equally convinced rationalist, thought it impossible in principle that such a view could account for the development of language. Instead, according to Chomsky, there must be some innate "language acquisition device" making it possible for children to acquire such a complicated system as quickly as they do. The Chomsky-Skinner debate polarized the field and, as Warren and Yoder (1997) were later to comment, almost paralyzed research on language intervention in mental retardation for a time. It is interesting that a similar philosophical discussion provided some of the background of J. M. G. Itard's unsuccessful attempt to train Victor, the wild boy of Aveyron, to speak in the late 18th century. In that case, the philosophers in question were John Locke (the empiricist) and René Descartes (the rationalist).

An example of the 1960s response of behavioral psychologists to the "Chomsky challenge" is the study by Guess, Sailor, Rutherford, and Baer (1968) in which they began with a 10-year-old institutionalized girl with no language. Using operant methods and many hours of instruction, they taught her the productive use of the plural morpheme. As an ABA experimental demonstration, they showed that plurals could be reversed temporarily so that they were applied by the girl to singular objects, and singular words to plural objects.

It is also interesting to compare Spradlin's account of language measures with those outlined a number of years later by mainstream linguists Catherine E. Snow and Barbara A. Pan (1993). They advised that language be evaluated on the basis of transcripts of spontaneous speech in natural settings and as a componential structure rather than as a "single domain" of development. Specifically, according to these authors, language needs to be analyzed in terms of syntax, morphology, the lexicon, phonology, speech acts, participation in conversational turns, and as discourse. Thus, one might be able to conclude that a child with DS at least initially had good lexical, speech act, and conversational skills but was delayed significantly in terms of morphology, syntax, and discourse. Skinner's approach, in contrast to that of mainstream linguistics, seems to relate mostly to the pragmatics of language.

As might be expected, then, the study of language in persons with retardation and the development of language interventions went forward for some time through the efforts of behavioral psychologists, speech and language pathologists, and special educators without very much help from linguists. In the second edition of the Ellis handbook, Jones and Robson (1979) reviewed efforts at language training for persons with severe mental handicaps. They found the paper of Risley and Wolf (1967) on establishing functional speech in echolalic children to be the single most helpful one in the literature as a guide as to how to proceed. An encouraging number of controlled experimental studies were identified in the literature. Jones and Robson (1979) summarized the basic skills of language intervention in operant terms such as modeling, shaping, chaining, use of prompts, seeking generalization, use of time-out, and reinforcement, but in a way that was intrinsic to speech rather than arbitrary. Thus, the teacher does not reward the child only with food or social praise for saying "up", "book", or "cat", but instead picks the child up, provides a book, or chases down the cat, thus giving the child precise control over the environment. Essentially the same language intervention techniques could be alternatively described in terms of "questioning hierarchies" such as gaining the child's attention, directing it to salient features of the task, ignoring irrelevant responses, and so on.

In the chapter following that of Jones and Robson (1979), Fristoe and Lloyd (1979) discussed nonspeech communication. They noted that over 70% of children with mental retardation had speech problems, many having no functional speech at all. Because communication is important even when the individual is unable to speak, alternative approaches are needed and are increasingly available. These include signing, gestures, finger spelling, and visible symbol systems including Blissymbolics, rebus programs, and other pictographic approaches. Only recently has it been realized that sign languages such as American Sign Language (ASL) are languages in the full sense, with their own syntax, morphology, and so on (Klima & Bellugi, 1979). Some persons with mental retardation, and not only those who are hearing impaired, have been helped to acquire functional sign language. Many others have learned to use communication boards or other such devices.

In the most recent Ellis handbook, Warren and Yoder (1997) noted some progress in setting aside "radical nativist or behaviorist perspectives" in the study of language and language intervention in mental retardation. New and well-validated multidimensional assessment procedures have now been developed, such as the Wetherby and Prizant (1990) Communication and Symbolic Behavior Scales. The study of children with Williams syndrome, who have remarkably good language and communication in the context of general mental retardation, has challenged the idea of Piaget and others that language development depends on cognitive development. Language intervention studies in mental retardation are at last moving from work with adults in institutional settings to those with prelinguistic children in the home, with some stu-

dies such as that of Wilcox (1992) reporting rather strong “generalization of targeted skills and of general developmental gains” (Warren & Yoder, p. 388). The authors favor a continuum of optimally effective intervention procedures rather than any single method. They criticize existing approaches for insufficient attention to the generalization of intervention effects across persons, settings, materials, peers, and interaction style.

Warren and Yoder (1997) further noted the existence of some dubious practices in language and communication intervention. It has been the traditional practice of speech and language therapists to recommend intervention only when a child’s speech and language performance is lower than his or her overall cognitive abilities, denying help to those with “flat” language and cognitive profiles. There seems to be no theoretical or empirical justification for this practice, and they recommend that it be changed. Second, they take note of the facilitated communication controversy, in which abundant experimental evidence has now shown that the source of these “communications” supposedly typed by the individual with mental retardation or autism is the facilitator, not the child (e.g., Green, 1994). Wolfensberger (1994) has referred to facilitated communication as the “cold fusion” of the social sciences. More seriously, Herman H. Spitz (1997) proposed that the facilitators were engaging in “nonconscious movements”, much like those automatic writers, spirit mediums, or Ouija board users studied by psychologists *before* the turn of the 20th century (e.g., James, 1889).

14. PSYCHOPATHOLOGY

Sol L. Garfield (1963), who reviewed psychopathology for the first Ellis handbook, recognized that practically every type of abnormal behavior could occur in persons with retardation, but it was not entirely clear whether such problems were more prevalent in them than in the general population. Statements existed by many “authorities” on the issue, as well as a number of surveys, but Garfield appropriately criticized the methods used to reach such a conclusion. The diagnostic criteria used both for mental retardation and for psychopathology in the existing research were often vague or of questionable reliability. [It was only later that Reiss, Levitan, and Szyszko (1982) wrote that often clinicians did not diagnose emotional disorders because of the “primacy” of mental retardation—the bias of diagnostic overshadowing]. The surveys were generally confined to institutional populations and, thus, were of uncertain generalizability. The review accordingly concluded with many more questions than answers. Yet, it struck a hopeful note: “when we devote as much clinical and research efforts to understanding the retarded as we have to other groups, we can expect that our knowledge of this complex group will increase...” (p. 598).

According to historians of psychiatry, the early 1960s represented the high point of the influence of psychoanalysis, with many academic departments of psychology seeking psychoanalysts as chairmen (e.g., Shorter, 1997). Psychoanalysis was even then known for its relative lack of concern with diagnostic precision. Perhaps this accounts for some of Garfield's difficulty in finding survey research using precise definitions of categories of psychopathology. Although Freud had never been sanguine about the utility of psychoanalysis in treating individuals with retardation, many attempts at psychodynamically oriented psychotherapy with such persons went on during the post World War II era. Manny Sternlicht (1966) summarized some of the literature on such psychotherapeutic procedures, finding many outcomes he considered to be positive and hopeful. However, only a mere handful of these attempts at treatment were subjected to any kind of rigorous evaluation. If the person treated got better, this outcome was attributed by Sternlicht to the therapy.

Beginning in the 1960s, the research became more sophisticated. The Isle of Wight study, a classic of psychiatric epidemiology, was carried out in 1964 and 1965 (Rutter, Tizard, & Whitmore, 1970). Using standardized interview procedures with parents and children and standardized teacher questionnaires, this study of a cohort of all children 9-11 years old living on the island at last provided a more definitive answer concerning the overlap of mental retardation and psychopathology. Children with mental retardation were approximately five times as likely (20%) as age-matched controls (about 4%) to have behavioral and emotional problems. At about this same time, behavioral treatment procedures began to be applied in institutional settings, to the maladaptive behavior, mainly of persons with moderate and severe retardation (e.g., Spradlin & Girardeau, 1966).

By the 1960s, Gershon Berkson (1968; Berkson & Davenport, 1962) had begun his research career investigating the factors influencing one kind of aberrant behavior, abnormal stereotyped movements, in persons with retardation. Berkson studied stereotypies in animals as well (e.g., Berkson, Mason, & Saxon, 1963), as unlike mental retardation itself, this behavior lends itself to the identification of realistic animal models. Some stereotyped behaviors such as thumb sucking and body rocking are not uncommon in normal infants, yet in adults such behaviors are seen mostly in relatively severely retarded individuals and are observed often in institutional settings. They are also more common among the blind. Baumeister and Forehand (1973) found that certain conditions, such as environmental noise, food deprivation, and frustration, increase levels of stereotypy. Stereotyped behaviors are to some extent modifiable by operant factors such as contingent positive reinforcement or contingent aversive stimuli. Nevertheless, a survey by Berkson, McQuiston, Jacobson, Eyman, and Borthwick (1985) found that a large percentage of persons with mental retardation in institutions had stereotyped behaviors. Schultz and Berkson (1995) defined a con-

cept of “abnormal focused affections” in which the individual’s behavior is “focused on a highly specific object, nonobject, or physical location rather than...a particular motoric movement...” (p. 390). They demonstrated the association of these “affections” with stereotyped behaviors.

Ronald S. Lipman (1970) reviewed the use of psychotropic medications in institutions for persons with retardation. Phenothiazines such as chlorpromazine had just been introduced in France in the early 1950s and were widely used to treat patients with schizophrenia. By the time of Lipman’s review, these and other neuroleptics were used with over half of these institutionalized people. Robert Sprague and John S. Werry (1971) noted, however, that there was very little reasonable research concerning the efficacy of such medications for persons with retardation and mental illness or severe behavior disorders. The situation was made even worse by the publication by Steven Bruening of drug “studies” based on fabricated data, discovered and exposed by Sprague (1993).

Another important type of aberrant behavior seen especially among individuals with severe retardation is self-injurious behavior. This topic was reviewed by Baumeister and Rollings (1976). These behaviors include head banging; eye gouging; biting of extremities, lips, and tongue; scratching; and rectal “digging”. Like stereotypes, some minor forms of SIB, such as head banging, are not uncommon in infancy, but the severe forms of SIB are seen principally in severely retarded persons. As these reviewers noted, there are two medical conditions involving SIB: Lesch-Nyhan syndrome, a sex-linked metabolic disorder, and Cornelia deLange syndrome. Like stereotyped behavior, SIB is to some extent modifiable by operant factors such as differential reinforcement of other behaviors (DRO). It can be suppressed rapidly by punishment such as response-contingent electric shock (Tate & Baroff, 1966), although the use of such procedures was and continues to be controversial. Foxx and Azrin (1973) have also developed procedures for suppressing SIB, known as “overcorrection” and clearly including a punitive component.

Schroeder, Schroeder, Smith, and Dalldorf (1978) found a 10% prevalence of SIB in an institutional population. Those with SIB tended to be younger than others but had been institutionalized longer. They had more seizure disorders, more severe language handicaps, more visual impairment, more severe or profound mental retardation, and fulfilled more of the published criteria for autism than those without SIB. Over 90% of the SIB changed status over 3 years. Of those receiving behavior modification, 94% improved; of those receiving psychotropic drugs, 32% did so. Spontaneous improvement of SIB occurred in 21%.

In the second edition of the Ellis handbook, Stephen R. Schroeder, James A. Mulick, and Carolyn S. Schroeder (1979) wrote a chapter on the “management of severe behavior problems”. In doing this review, the authors sifted through about 500 experimental studies, most of them using single-subject methods. The authors dis-

carded about two-thirds of these because of inadequate research designs and reported on the rest. Schroeder et al. (1979) defined "severe" as "having consequences which are correlated with tissue damage requiring medical treatment or which result in exclusion from social and educational programs appropriate to one's adaptive level" (p. 342). The specific problems studied included aggression, self-injurious behavior, stereotypies, disruptive classroom behaviors, noncompliance, and other inappropriate behaviors, a formidable list but one obviously weighted to what have been called "externalizing" as opposed to "internalizing" behaviors such as anxiety, depression, social withdrawal, and the like.

Schroeder et al. (1979) reported that the bulk of the research on the management of severe behavior problems in mental retardation involved operant procedures, including positive reinforcement, the reinforcement of alternative behaviors such as DRO (reinforcement of other behaviors) or DRI (reinforcement of incompatible behaviors), the withdrawal of reinforcement (extinction or time-out), physical restraint (viewed as a form of time-out), avoidance conditioning, or overcorrection. Other procedures involved the manipulation of antecedents, such as establishing stimulus control. A pervasive issue involved the comparison of treatment procedures, either across individuals or using each of the procedures to be compared with a particular individual. In the former case, the heterogeneity of the persons treated could be a problem. Intraindividual comparisons, however, risked confounding treatment effects with the timing or sequence of the interventions. At this stage of behavioral research, Schroeder stated that it was not yet possible to relate treatment effects to taxonomic characteristics of those treated.

During the same year as the Schroeder et al. (1979) review, the *Journal of Autism and Childhood Schizophrenia*, edited by Eric Schopler, changed its name to the *Journal of Autism and Developmental Disabilities*. Considerable longitudinal research had been carried out since Leo Kanner first identified autism (Kanner, 1943; Kanner & Eisenberg, 1956). The editorial board of this journal, including British child psychiatrist Michael Rutter, concluded that autism was, in fact, a developmental disorder more akin to mental retardation than to schizophrenia. Many autistic children do not speak or are otherwise mentally retarded, and they do not typically grow up to have hallucinations or delusions as one would expect if they suffered from schizophrenia. Neither do they have more relatives with schizophrenia than anyone else in the population.

The treatment of another problem behavior-rumination was reviewed by Nirbhay N. Singh (1981). Rumination is a syndrome in which the individual, usually following a meal, self-induces vomiting and chews the vomitus as a cow or other "ruminant" animal might do. This is a serious condition, associated with malnutrition, that can be life-threatening. According to Singh, rumination was first noted in adults in 1618 but was not seen in children until 1907. Rumination is often first seen in infants between 3 weeks and 12 months of age but may persist for years, especially in persons with retardation.

In an unpublished survey of the total population of an institution in 1980, Singh and Dawson identified about 6% as ruminators. Many types of psychotherapy and behavioral treatment of rumination have been attempted, but controlled evaluations of most of these do not yet exist. The use of lemon juice put into the individual's mouth when rumination occurs has been shown to be an effective treatment in two well-done experiments, but caution must be exercised in its use because of potential medical complications such as irritation of the mouth, not to mention the possibility of aspiration.

One new behavioral approach to SIB was that of Edward G. Carr and V. M. Durand (1985), called functional communication training. If the function of SIB was found to be to escape a demanding educational activity, for example, the individual could be taught to signal through words or gestures the wish to terminate the activity. If the SIB functioned to attract attention, the person could be provided with more acceptable methods of requesting time from nearby adults. Such training would be expected to reduce the need for SIB. A "user's guide" was published for use in producing such positive changes (Carr, Levin, McConnachie, Carlson, Kemp, & Smith, 1994). In support of this general approach, one might cite the study by Bott, Farmer, and Rohde (1997), who analyzed data from community registers on 3662 persons with mental retardation who understood speech. Those with no expressive speech or poor speech had significantly more behavioral problems, including self-injury, than those with good speech.

Aman (1993) cited more than 250 studies involving psychopharmacology and SIB in mental retardation. Baumeister, Todd, and Sevin (1993) reviewed psychopharmacological studies in mental retardation with satisfactory experimental designs. The most commonly used drugs in such research were still neuroleptics. Clearly, the sophistication of this research was increasing. A worrisome concern was the continued appearance of a sometimes irreversible neurological syndrome known as tardive dyskinesia, involving involuntary movements of the lips and tongue, in individuals exposed to prolonged high doses of neuroleptics. Tardive dyskinesia was identified originally in the 1950s but was becoming of greater concern to physicians as the widespread use of neuroleptic medications continued. Robert L. Sprague and colleagues were responsible for developing a standardized measure of this disorder (Sprague, Kalachnik, Bruening, Davis, Ullmann, Cullari, Davidson, Ferguson, & Hoffner, 1984).

In the third edition of Ellis' handbook, Stephen R. Schroeder, Richard E. Tessel, Pippa S. Loupe, and Christopher J. Stodgell (1997) returned to a discussion of severe behavior problems. They reported that 80% of the research done in this area had been carried out since their last review 15 years previously (over 2000 research studies). An important innovation in the assessment of such behavior problems, functional analysis, was described as "experimental hypothesis testing in the natural environment, and experimental analyses in environments analogous to the natural environment, with systematic observation of behavior" (p. 440). A wellknown example

of this approach was that of Iwata, Dorsey, Slifer, Bauman, and Richman (1982) with SIB. The antecedents or consequences maintaining SIB in different individuals may be quite diverse, even with the same topography of the behavior. The downside of functional analysis of course is that it may be lengthy and expensive to conduct.

Aside from functional analysis, several psychometric screening devices for evaluating psychopathology in retarded persons have been developed relatively recently, including the Aberrant Behavior Checklist, the Psychopathology Instrument for Mentally Retarded Adults (PIMRA), and the Reiss Screen for Maladaptive Behavior.

Meanwhile, the American Psychiatric Association developed its *Diagnostic and Statistical Manual for Mental Disorders* (DSMN; APA, 1994). Validating its diagnostic schemes in relation to mental retardation represents an important area for future research, as Schroeder et alii (1997) have remarked. Meanwhile, both behavioral and psychopharmacological approaches to the treatment of behavior problems in mental retardation had advanced significantly in the previous 15 years, according to this review. On the other side of the Atlantic a new set of assessment procedures has been developed in the past decade for psychopathology in mental retardation, the Psychiatric Assessment Schedule for Adults with Developmental Disability (PAS-ADD) (Costello, Moss, Prosser, & Hatton, 1997). These procedures, developed and validated in relation to the International Classification of Diseases (ICD-10), include a semistructured interview, a checklist for use by direct care staff and families, and a separate schedule that can be used by staff without a special professional background.

Psychopathology was the theme of the Gatlinburg conference in 1992 and again in 2001. During the 1992 meeting, one invited speaker after another got up and said, in effect, "I don't know much about mental retardation, but let me tell you about aggression" or attention deficit hyperactivity disorder (ADHD), or whatever the assigned topic was. In the 2001 conference, in contrast, the speakers were expected to integrate the two areas, as indeed is now standard practice. Meanwhile, many researchers have been working to try to test with retarded persons hypotheses developed in the mainstream study of psychopathology. For example, paralleling the work of Kenneth Dodge with typically developing children, Pert, Jahoda, and Squire (1999) found that aggressive adults with mental retardation were more likely than nonaggressive ones to infer hostile intent of peers in ambiguous situations.

In a rare study of this kind, J. M. O'Dwyer (1997) compared a sample of 50 persons with intellectual disability and schizophrenia with another group the same size with intellectual disability alone, matched for age, sex, degree of intellectual disability, and presence of epilepsy. Of those with schizophrenia, 45 had histories of complications of pregnancy and birth versus 37 of those with intellectual disability alone, a statistically significant difference. With regard to an important treatment issue, after a thorough review of the relevant literature, Duggan and Brylewski (1999) cono-

cluded that there was no evidence from random clinical trials to guide the use of antipsychotic medication for persons with intellectual disability and schizophrenia.

In conclusion, the study of psychopathology in mental retardation has moved from a state of ignorance regarding the relationship of these two types of disorders to the realization that they overlap substantially. Interventions, both behavioral and pharmacological, have been developed and studied rigorously. Diagnostic criteria have been refined greatly. It would now be especially useful if the professional barriers between workers in the field of mental retardation and those in psychiatry could be relaxed. An unfortunate side effect of the separation of NIMH and NICHD in 1963 seems to have been the neglect of mental retardation by psychiatry in the United States. There are some exceptions to this neglectful trend, such as the many contributions of psychiatrist George Tarjan.

15. PERSONALITY AND MOTIVATION

In the first Ellis handbook, Rue L. Cromwell (1963) wrote a chapter devoted to personality and motivational processes in mental retardation, focusing on concepts such as generalized expectancy, locus of control, tendencies toward approach and avoidance, and the like. The theoretical framework he adopted was Julian Rotter's (1954) social learning theory. Rotter's principal formula predicted the potential for behavior in a particular situation on the basis of the person's expectancy of reinforcement and the value of that reinforcement. The ideas underlying Cromwell's chapter seemed to be that people with retardation, because of their life experiences, tend to have lower generalized expectancies, an external locus of control, and distinctive ways of approaching or avoiding others. He reviewed various studies but these had somewhat inconsistent results, requiring frequent ad hoc adjustment of the theoretical premises. The chapter concluded with the statement of nine theoretical postulates, plus related corollaries and theorems, most of which have not figured in subsequent research. Nevertheless, Cromwell introduced a set of research issues that have preoccupied the field ever since.

Another catalyst was Edward Zigler's (1996) programmatic research on the personality structure of retarded persons. Originally trying to extend Jacob Kounin's work on rigidity, Zigler (Green & Zigler, 1962; Zigler, 1963; Zigler & Williams, 1963) discovered instead a motivational phenomenon. Persons with retardation who have experienced social deprivation within their families and later in impersonal institutions are often eager for any kind of contact with another person. Because of this, they will spend lengthy periods at somewhat boring experimental tasks such as "marble in the hole" in order to receive the repeated social reinforcement involved. This effect is not unique to retardation but can be seen in other individuals subjected to similar experiences of social deprivation. The marble-dropping task used in these experiments

has two parts; in some of his research, Zigler (Zigler, Hodgden, & Stevenson, 1958) found that institutionalized persons spend longer on the second part, which proved to be a replicable effect. Zigler explained it on the basis of a seemingly contradictory principle of "wariness". The institutionalized person, having had many unfortunate experiences with adults, is at first wary about approaching them. When they do not prove to be punitive, the individual tries to stay in the socially reinforcing situation as long as possible.

Like Cromwell, Zigler hypothesized that persons with retardation, having experienced much failure, might be willing to settle for a lower degree of success than typically developing children. Stevenson and Zigler (1958) used a simple three-choice position task with knobs the child could push to obtain marbles. Only one of the knobs was reinforced, either 33, 66, or 100% of the time. Typically developing children tended to engage in "probability matching" on this task (as do nonretarded adults) and chose the reinforced knob about the same percentage of the time as it was reinforced. The children with retardation, instead of assuming that a higher percentage of reward must somehow be possible, tended to "maximize", choosing the reinforced knob most of the time, even in the 33% reinforcement condition.

Another phenomenon studied by Zigler and associates (e.g., Tumure & Zigler, 1964) was "outer directedness" in retarded people. According to this hypothesis, the retarded child, as a result of failure experiences, comes to distrust his or her ability to solve problems. The child, thus, becomes, much more influenced by any environmental stimuli that happen to be present (e.g., the behavior of a nearby peer) suggesting how a problem might be solved. As in most of Zigler's research, comparisons were made to nonretarded children of the same MA.

Not surprisingly, Zigler and a colleague (Balla & Zigler, 1979) were asked to write the main chapter in the personality-motivation area for the second edition of the Ellis handbook. In this chapter, Zigler reiterated and elaborated his previous statements about social devaluation, wariness, expectations regarding success and failure, and outer directedness. He then reviewed the areas of self-concept and ability, where research had been somewhat less definitive, and closed with a section on the effects of institutions. Among other findings, he noted the work of (Clarke & Clarke, 1953, 1954) and others on IQ increases in retarded persons with histories of severe deprivation, even following institutionalization. In one important study, Zigler, Butterfield, and Capobianco (1970) followed the same individuals they had seen before after 10 years of institutionalization. The effects of preinstitutional social deprivation on response to social reinforcement were still present after all this time.

Haywood and Switzky (1986) reviewed their own program of research, begun around 1963, on personality and motivation in persons with retardation. This research is complementary to that of Zigler and colleagues in many ways. Its focus is on intrinsic vs. extrinsic motivation, concepts derived from Herzberg's theory of work mo-

tivation (Herzberg, Mausner, & Synderman, 1959). Herzberg found that when asked about their positive job satisfactions, workers in business and industry mentioned "intinsic" factors such as the pure satisfaction in doing a task, the opportunity to learn new things, opportunities to exercise creativity, and so on. When asked about their dissatisfactions, these workers mentioned "extinsic" factors, such as low pay, hazardous or uncomfortable work conditions, and lack of security. Herzberg developed a "choice motivator scale" to measure such factors. In one of the first studies of this kind, Haywood and Weaver (1967; cf. also Haywood, 1971) used the original Herzberg scale to choose mentally retarded persons who were quite extinsically motivated versus a group that was less so (it was difficult to find a purely intinsically motivated group). Participants were assigned randomly to one of four groups for a hole-punching task. One was given task-incentive instructions ("if you punch a lot of holes I'll let you do another task that you might find interesting"), another a penny per trial, a third group a dime per trial, and a fourth group no reward. As predicted, the more intrinsically motivated group responded best to the task-incentive conditions, whereas the extinsically motivated group performed best for 10 cents per trial. Haywood and Switzky (1986) presented many other studies with parallel findings.

Haywood developed a multiple choice version of the choice motivator scale and then, finding that it was still too difficult for many retarded subjects, came up with a "picture motivation scale", which he then validated. In Haywood's (1971) early research, mildly retarded children showed the fewest intrinsic responses on this scale (22%), followed by lower class (45%) and middle class (66%) nonretarded children, respectively.

In 1988, Shulamith and Hans Kreitler discussed the application of their cognitive approach, developed in research with normal children, adolescents, and adults and schizophrenics, to motivation in retarded individuals. They criticized the research of others in this area, including Zigler and Haywood, for doing studies mainly of groups and neglecting individual differences in motivation. They developed cognitive orientation questionnaires concerning beliefs about the goals of the subjects ("I want to go out"), beliefs about the self ("I am lazy"), beliefs about norms and rules ("it is detestable to dress sloppily"), and general beliefs ("if you fail once, you fail always"). They then used these questionnaires with familial retarded persons from special education schools in Israel to predict rigidity in card sorting, response to tangible versus intangible rewards, and changes following success and failure. In multiple regression analyses, the questionnaires accounted for an average of about 53% of the variance in the criterion tasks, an impressive outcome. Unfortunately, the Kreitlers' research has so far not been well integrated with the findings of others in this area.

In the third edition of Ellis' handbook, Hodapp and Zigler (1997) reviewed recent developments in their research on personality and motivational factors. They did complain a bit about what they considered the ambivalence of most behavioral

researchers in mental retardation about the personality and motivational domain. It is true that this topic has never been a theme of a Gatlinburg conference. Hodapp and Zigler (1997) briefly presented and updated research concerning social reinforcement effects in relation to institutionalization and preinstitutional social deprivation. They did the same for studies of wariness, lowered expectancy of success, outer directedness, effectance motivation, and self-concept. They now indicate a willingness to see their theory applied to a wider population, and not just to those with cultural-familial retardation.

Switzky (1997) discussed new developments in his research with Haywood and their associates on personality and motivation. He related their findings to those of many other investigators outside the area of mental retardation. These included Susan Harter's research on effectance motivation, Albert Bandura's research on self-efficacy, and Deci's work on the role of autonomy in people's negative reactions to overt rewards. Within a more traditional area of mental retardation research, Switzky reported that Borkowski, Day, Saenz, Dietmeyer, Estrada, and Groteluschen (1992) are now open to the view that intrinsic motivation can facilitate children's generalization of cognitive strategies. Finally, Switzky is guest editing a volume of the *International Review of Mental Retardation* that will focus on personality and motivation. When it is published it will provide an excellent summary and contemporary treatment on this topic, building on the firm foundation established by Zigler, Haywood, and others.

16. INTELLIGENCE

In the first edition of the Ellis handbook, no chapter was devoted to the topic of intelligence. This concept is obviously central to the field of mental retardation. It may be that in the 1960s, Ellis reasoned that this area had already received enough attention. Along with "social maturity", it was practically the only topic studied before the era of more abundant government support for the psychological theory of, and research on, mental retardation. The Gatlinburg conference has had speakers or themes on intelligence, early intervention, and epidemiology several times from 1973 onward.

Ever since intelligence tests were introduced by Alfred Binet early in the 20th century, they have been widely used in the diagnosis of mental retardation, generally with the rationale that they measured "g" or general ability as originally conceptualized by Charles Spearman in 1904. In examining a correlation matrix of a group of children's marks in school in various subjects in his initial research, Spearman noticed that the matrix showed "positive manifold". In other words, children who had high marks in one subject tended to have them in other subjects as well. The fact that school marks in different subjects are correlated seems to justify combining them, as is commonly done, into a single aggregate, the grade point average. Of course, in an

intelligence test, the items represent performances on somewhat arbitrary cognitive tasks presented by the examiner rather than school marks. Another part of Spearman's concept is the "indifference of the index". In other words, it does not matter what items are combined to form an IQ score, so long as the items represent some variety and are cognitively rather than sensory or motor based. Spearman conceptualized "g" metaphorically as the mental energy underlying a person's overall intellectual performance. Thus, if the mind is viewed as a factory with various machines representing the different abilities, "g" might be represented as the electricity that causes them all to operate.

That is not to say that all psychologists agreed with concepts such as "g" or intelligence. In the initial chapter of the very first volume of the *International Review of Mental Retardation*, Sidney W. Bijou (1966) presented "a functional analysis of retarded development". As a follower of Skinner, Bijou preferred simply to speak of "developmental retardation" not as a symptom of defective intelligence or any such hypothetical trait. An individual with retardation, he said, "is one who has a limited repertory of behavior shaped by events that constitute his history" (p. 2). Bijou did admit that an individual might be physically impaired and thus unable to perform certain responses, or biologically impaired in sensory functions. Bijou explained developmental retardation on the basis of the following factors: (1) reinforcements that are infrequent or in small amounts, (2) reinforcements that are withheld or presented on a noncontingent basis, (3) opportunities restricted by social or economic factors, (4) the use of contingent aversive stimulation, or (5) the reinforcement of aversive behavior. Bijou and Baer (1961, 1965) had previously presented their developmental theory and some supporting evidence for it.

Spearman's "g" concept was soon challenged by multiple factor theorists such as J. P. Guilford (1959), who developed for heuristic purposes a threedimensional "structure of intellect" matrix of 120 separate abilities, and Arthur Jensen (1970), who conceptualized what he called level I ("associative") and level II ("cognitive") abilities as separate factors. Jensen mentioned the digit span task as a measure of level I and progressive matrices as a level II measure. Jensen used these level concepts to try to account for socioeconomic and ethnic differences in intellectual and academic functioning. In a rather unpopular view, for example, he argued that many lower SES and minority individuals were normal in level I but impaired in level II abilities.

The actual intelligence tests used in the diagnosis of mental retardation in various countries of the world, according to A. B. Silverstein's (1970) review, were just what any experienced clinician might expect: various editions of the Stanford-Binet, the Wechsler Intelligence Scale for Children, and the Wechsler Adult Intelligence Scale, all of which allow the calculation of an overall IQ score as an estimate of "g". It might be noted that the 4th edition of the Stanford-Binet was quite a different test than its predecessors, being revised to conform to modern factor analytic research.

In a semilongitudinal analysis of traditional Stanford-Binet scores of 1159 residents of an institution for persons with retardation, Fisher and Zeaman (1970) made use of about 4700 tests and retests across the life span. They found that the resulting curves could be best represented by three mathematical parameters: (1) a logarithmic growth term in childhood and adolescence, (2) a gradual linear decline during adulthood, and (3) a factor describing the overall level of the curve for individuals in different severity categories of retardation. Howard Gardner (1983) tried to argue that there are a number of relatively independent “intelligences” rather than one general ability. These include musical, bodily-kinesthetic, personal and social, linguistic, logical-mathematical, and spatial intelligences. Gardner disregards psychometric data and relies on what he calls “subjective” factor analysis based on data from the performance of high-level geniuses who are often outstanding in only one of the just-described fields (Beethoven, Martha Graham, etc.). He also relies on neuropsychological data showing the possibility of impaired function in one of these narrow areas with the preservation of other skills. Some researchers have thought Gardner’s concepts to be applicable to the “savant,” defined by Hill (1978) as “a mentally retarded person demonstrating one or more skills above the level expected of nonretarded individuals” (p. 281). These skills include calendar calculating (giving the day of the week for any date named), memory for obscure or trivial facts, such as telephone numbers, musical ability, artistic ability, prime number identification, and mechanical dexterity. Ted Nettelbeck and Robyn Young (1999) argued otherwise, however, stating that Gardner’s term “intelligences” is inappropriate here because “most savants do not function independently because they do not develop the life skills and common sense required to do so” (p. 142). Neil O’Connor and Beate Hermelin in the United Kingdom were the first to do formal experiments analyzing savant skills. They published 30 articles in this area. It had been supposed previously that some of these skills were based merely on rote memory, but O’Connor and Hermelin’s work demonstrated that “savant skills are frequently based on the application of rules whereby an extensive body of expert knowledge is organized” (Nettelbeck & Young, p. 145).

In addition to their use in defining mental retardation, IQ scores have also been used as dependent measures in various attempts at early intervention. For example, beginning in the early 1970s, Craig Ramey and colleagues (e.g., Ramey & Haskins, 1981) initiated a controlled study called the Abcedarian project intended to demonstrate the impact of an intensive educational experience in early childhood for maintaining or improving IQ scores. The subjects were infants from demographically high-risk backgrounds who were medically healthy. All received free medical care. The experimental group was in an enriched day care program for 40 hours per week, whereas the controls stayed home. By 18 months of age, group differences in favor of the day care group began to appear on the Bayley Scales of Infant Development. So far, the differences have continued to maintain themselves at follow-up. The

Abcedarian project and others like it have not gone without criticism. Herman Spitz (1986) reviewed all attempts to raise IQ scores permanently and found them wanting. One question concerning such research is how long lasting after intervention are the early gains children make while being given extra intellectual stimulation after the intervention ends. For example, do they last into adulthood? Another question is whether the IQ increases translate into improved academic performance and other real-life domains.

An additional research purpose served by measures of intelligence is the identification of mental retardation in epidemiological studies. These have proved to be essential in medical research and could be so for psychological studies as well. Tom Fryers (1993) stated, however, that it was practically impossible to review epidemiological studies of mild mental retardation across jurisdictions, even within developed countries, because the definitions used are so varied. For the time being, it seemed to him that the only solution was to use the definition of IQs less than 50 as the effective definition of mental retardation, because when a person's IQ is under 50, measures of social competence can pretty much be assumed to be impaired without separate measurement. Epidemiological comparisons across different eras are somewhat confounded by the "Flynn effect" (Flynn, 1978, 1984) of systematically rising raw scores on intelligence tests over the last several decades in developed countries, presumably due to increasing educational levels in the population. More recently, Keith G. Scott and colleagues developed an epidemiological method for linking birth records to school records 12 to 15 years later in a state with relatively standardized policies for special education placement. Chapman, Scott, and Mason (2002) thus were able to study a cohort of 267,277 children born in Florida and later attending school there. Low maternal education was the largest risk factor for both educable and trainable mental retardation, with relative risks of 10.9 and 3.2, respectively. Among mothers with low educational levels (less than high school), the youngest ones were at most risk having children later placed in classes for educable mentally retarded children, whereas the oldest mothers were at greatest risk for having a child in classes for trainable mentally retarded.

In conclusion, at the end of the century, the concept of "g" and the intelligence tests used to measure it seemed to have survived most of the criticisms of them and are still widely used to define mental retardation and as classification and outcome variables in widely varying domains of behavioral research.

17. ADAPTIVE SKILLS AND SOCIAL COMPETENCE

After intelligence tests came into common use, one could easily find some individuals with IQ scores in the 50-70 range who were performing acceptably in society, so that some additional assessment method was needed to identify those who

were also socially incompetent (and thus mentally retarded from a clinical standpoint). Edgar A. Doll (1935) developed the Vineland Social Maturity Scale to serve this purpose. The Vineland was based on informal interviews with persons who knew the individual well. The heterogeneous set of skills evaluated included activities of daily living and communication, as well as functional academics, domestic activities, and employment. The items were summed into a social age score and a social quotient somewhat analogous to IQ. In the official American Association of Mental Deficiency (AAMD) definition in effect at the time of the Fust Ellis handbook, it was stated that “mental retardation refers to subaverage general intellectual functioning which originates in the developmental period and is associated with impaired adaptive behavior” (Heber, 1961, p. 3). Thus, the definition implicitly endorsed the joint use of an IQ test and a social maturity measure in diagnosis. However, such social maturity measures have been part of the definition of mental retardation mainly in the United States and not, for example, in the United Kingdom.

In the second edition of the Ellis handbook, Meyers, Nihira, and Zetlin (1979) reviewed the measurement of adaptive behavior. The revised AAMD definitions of mental retardation (Grossman, 1973, 1977) continued to endorse the use of both general intellectual functioning and impaired adaptive behavior in the diagnosis of mental retardation. Adaptive behavior was defined as “the effectiveness or degree with which an individual meets the standards of personal independence and social responsibility expected for age and cultural group” (Grossman, 1977, p. 11). There was, however, great dissatisfaction with existing measures of adaptive behavior, over 100 of which were then extant. The association itself had undertaken the development and standardization of a new measure, the AAMD Adaptive Behavior Scale (ABS; Nihira, Foster, Shellhaas, & Leland, 1974): one criticism of the Vineland scale was that it produced a unitary score when its items demonstrably did not intercorrelate with each other to form a single factor. Accordingly, the ABS part I defined 10 separate behavioral domains: independent functioning, physical development, economic activity, language development, number and time, domestic activity, vocational ability, self-direction, responsibility, and socialization. The ABS also included part II, which consisted of ratings of 14 facets of maladaptive behavior. The behavioral domains of each part were developed on the basis of empirical, factor-analytic research. The two most common dimensions found in studying the part I domains were described as “autonomy” and “responsibility.” Meyers et al. (1979) concluded their review with the expectation that “the marketplace should settle down eventually with the continued utilization of only a few of the better scales. We do not expect any one to dominate” (p. 477).

A chapter in the second edition of the Ellis handbook by Stephen Greenspan (1979) was a more ambitious attempt to define a dimension of “social intelligence” (SI). Previous theorists, including E. L. Thorndike and J. P. Guilford, had hypothesized

the existence of a trait of social intelligence by different names, but neither of them had been able to make a convincing case for its existence. Greenspan (1979) was quick to admit that he had not yet done so either. For heuristic purposes, he presented a three-level hierarchical model of "social intelligence." The second level included concepts such as social sensitivity, social insight, and social communication, and each of these included two or three subconcepts. Greenspan (1979) then reviewed the research literature related to each of the seven subcomponents of the model. He concluded hopefully that "relatively little research on SI has been done by MR researchers, although this condition of neglect appears to be changing at a rapid rate" (p. 520). At this point, the field indeed seemed ready to accept such a concept, but solid evidence for it was still lacking.

Jane L. Mathias (1990) presented what seems to be the first solid empirical evidence for the validity of a Greenspan-like concept of social intelligence. Mathias reported that she and Ted Nettelbeck had studied 75 mildly and moderately retarded persons with a battery of measures, including the seven variables in the Greenspan SI model, plus measures of IQ and adaptive behavior. They extracted three factors from the matrix of scores that partially supported Greenspan's model. A factor they named "practical-interpersonal competence" combined a general measure of adaptive behavior with five of the seven social intelligence variables: role taking, social comprehension, psychological insight, moral judgment, and social problem solving. However, an attempt to provide initial evidence of the criterion validity of this factor against teacher ratings and a self-report measure was not successful. Mathias and Nettelbeck's positive findings, if substantiated, could turn out to be important.

Nettelbeck and Wilson (2001) focused on a narrower aspect of social competence: the susceptibility of retarded persons to becoming the victims of criminal acts, including robbery, physical assault, and sexual assault. Some of Nettelbeck's specific research, reviewed in the chapter, compared persons with mental retardation who had or had not been criminal victims. They found the victims to be less socially competent and more likely to precipitate such offenses by their angry or aggressive ways of responding in various situations.

Other contributors to SI research were McGrew, Bruininks, and Johnson (1996), who carried out a confirmatory factor analysis on data from 323 students with mild, moderate, and severe mental retardation. Factors were identified that tended to confirm Greenspan's model of social intelligence but not the adaptive skills concept of the new AAMR definition (Luckasson et al., 1992) nor the Mathias (1990) concept of practical-interpersonal competence. The factors included conceptual intelligence (measures from the Woodcock-Johnson test), practical intelligence (adaptive behavior measures from a Bruininks inventory), emotional competence (maladaptive behavior measures from the same inventory), and social intelligence (social skills ratings by special education teachers). This research supported Greenspan and Granfield's (1992)

suggestion that mental retardation be defined as “a condition marked by deficits in three broad areas of intelligence: social, practical, and conceptual” (p. 450).

Stephen Greenspan and Peter F. Love (1997) wrote a chapter in the third edition of Ellis' handbook on “Social intelligence and developmental disorder: Mental retardation, learning disabilities, and autism”. The authors noted the research cited earlier partially confirming Greenspan's (1979) previous conceptualization of social intelligence. They also reviewed the research of Tanis Bryan (1982) on the poor social skills of learning disabled children, many of whom are demonstrably at risk for peer rejection or neglect. Some professionals have even advocated that low social skills as such be included in the legal definition of learning disabilities. As Greenspan and Love state, social impairment is even more central to the definition of autism. Asperger syndrome, or high-functioning autism, is almost purely a case of poor social relationships, in the absence of general cognitive dysfunction. Specific research reviewed by Greenspan and Love in their chapter included Simon Baron-Cohen's work on the autistic person's shortcomings in the area of “theory of mind” (Baron-Cohen, Leslie, & Frith, 1985).

Thus research on social competence continues to struggle in a sort of transitional stage. A theoretically oriented approach like that of Greenspan may well be the most productive way to proceed in this research area in the long run. For the time being, however, the definition of adaptive skills for practical purposes will continue to be rather ad hoc (e.g., one of the new commercially available assessment devices based on the 1992 or a subsequent AAMR definition of mental retardation).

18. FAMILIES

The first two Ellis handbooks did not have any chapters on families, although the third one did. *The International Review* volumes make no mention of family research until the middle 1980s. In its early days, the Gatlinburg conference tended to focus only on cognitive psychology and applied behavior analysis. It was more than two decades after the conference began, in 1989, when it first took families as its theme. In that same year the *American Journal on Mental Retardation* published a special issue on families. This was also the Gatlinburg theme in 1997. Thus, it was only during the 1980s and 1990s that the topic of mental retardation and the family finally became popular. A sizable group of psychologists are now doing research in this area.

Why did family research by psychologists in mental retardation emerge when it did? One hypothesis has to do with the “feminization” of psychology, including the psychology of mental retardation. After all, within the traditional family, care of children, including children with disabilities, falls more upon the mother than on the father. Of the 21 chapters of the first edition of the Ellis handbook, 3 had female authors or coauthors. Of the 19 chapters of the second edition, 7 had female authors

or coauthors. Of the 16 chapters of the third edition, 9 (more than half) had female authors or coauthors, including the first chapter on family research.

Another possible historical explanation connects the interest in family research with the rise of the deinstitutionalization movement. Families are certainly a “normal” alternative to institutional care. The philosophy of normalization emerged from Scandinavian countries and quickly influenced North America (e.g., Nirje, 1970; Wolfensberger, 1972). Since its peak in 1967, the census of persons with retardation in institutions in the United States has dropped steadily, and many states have now closed their institutions entirely. Popular exposés of the horrors of life in large, impersonal institutions (e.g., Blatt, 1966; Rivera, 1972), as well as human rights litigation in the 1970s, such as the Wyatt vs Stickney and Pennhurst cases, sped this process along. As Landesman (1986) remarked, investigators became interested in families and homes for children with mental retardation and moved away from their previous focus on out-of-home placement. Fujiura and Braddock (1992) stated that at least 85% of persons with mental retardation now lived at home with their families. As Baker, Blacher, Kopp, and Kraemer (1997) noted, between 1965 and 1989, the estimated number of children with mental retardation in institutions dropped 10-fold. The keynote of services in mental retardation at the end of the century had come to include family preservation, family support, and empowerment.

Another factor related to the development of family research in mental retardation was the emergence of a general field of family psychology. The Division of Family Psychology of the APA was founded in 1984. The *Journal of Family Psychology* began publication in 1987 and became an official APA journal in 1991. As Philpot (1997) explained, family psychology grew out of the family therapy movement. This began in the 1950s and was an amalgamation of many disciplines, such as social work, sex therapy, marital counseling, anthropology, sociology, and social psychiatry.

Before the 1980s, most family research in mental retardation emphasized pathology and burden. Bernard Farber (1959), frequently viewed as the father of family researchers, studied the influence of having a child with retardation on marital integration. He and other investigators of this era (Birenbaum, 1970, 1971; Olshansky, 1966) generally wrote of negative outcomes when a family was rearing a child with mental retardation. Concepts such as “arrested family life cycle”, “chronic sorrow”, and “courtesy stigma” were introduced and widely accepted. Although the theme of stress and distress, pathology, and dysfunction dominated much of the early research on families rearing children with mental retardation, an emphasis on coping and adaptation became more apparent in the 1980s and 1990s. For example, Kazuo Nihira, Iris Tan Mink, and C. Edward Meyers (1984) got family research in mental retardation by psychologists off to a good start by applying various standard family assessment procedures. Nihira, Mink, and Meyers (1981) found that the Moral-Religious Emphasis subscale of Moos’ Family Environment Scale correlated significantly with

the IQ of moderately retarded children, and the control subscale was significantly correlated with the children's misbehavior at school. Bradley, Caldwell, and Elardo (1977) had found their Home Observation for Measurement of Environment (HOME) scale to be significantly related to children's IQs at age 3 but in a way that was almost completely redundant with social class. Nihira et al. (1981) also found the HOME to predict school achievement in children with moderate retardation.

Minnes (1988) wrote a comprehensive review of relevant research using the double ABCX model of McCubbin and Patterson (1983). In this model, the stressor event (A) places demands on existing resources (B) and is appraised (C) by the family, leading to a crisis (X). Additional stresses (A) then pile up, calling on the same or additional resources (B), and are appraised (C). Coping occurs, leading to favorable or unfavorable adaptation. This emphasis on adaptation characterized the work of psychologists interested in family environments (Nihira, Mink, & Meyers, 1981, 1983); in aging and families (Seltzer & Krauss, 1989); and in families who choose to rear children with developmental disabilities by adopting them (Glidden, 1989, 2000). In each instance of these long-term research programs, conclusions described details of family and parent characteristics that related to either better or poorer adaptation.

Other family-oriented research focused on factors that were risky for the development of mental retardation. For example, Borkowski, Whitman, Passino, Rellinger, Sommer, Keogh, and Weed (1992), in a research project on adolescent parenting, proposed a model that included "the use of drugs, alcohol, and tobacco; poor nutrition; low birth weight; inadequate postnatal stimulation; low maternal intellectual ability; lack of knowledge about child development; unstable social supports; ill defined personal goals; and tendencies toward personal instability" (p. 160). Conceptually, developmental delays resulting from these factors could be due to direct genetic influences, poor home environments, and the interaction of these as seen in poor parenting skills. Indeed, in a recent and thorough review of research on parents with mental retardation, Holburn, Perkins, and Vietze (2001), writing in the *International Review of Research in Mental Retardation*, concluded that "without extensive supports, parents with developmental disabilities are not very good caregivers for their children" (p. 202). Feldman and Walton-Allen (1997) compared 27 school-age children whose mothers had mild mental retardation and 25 children in similarly economically poor families whose mothers were not retarded. Not one of the children with retarded mothers was without problems, including low IQ. The boys had poor academic achievement and behavior problems as well.

In a different sort of family research Jack Finney and colleagues using a novel family-oriented intervention (Finney, Miller, & Adler, 1993) reported a study relevant to the prevention of cytomegalovirus (CMV) infection in 11 mothers of children less than 18 months of age. CMV infections are not uncommon; many people who have them do not even feel ill. However CMV infection during pregnancy can cause

devastating effects to the fetus, including subsequent mental retardation. A common source of infection is young children in day care. They tend to drool and to put things in their mouths, readily transmitting the virus to each other. Then when the child goes home, it may transmit the virus to the mother. Finney's study first measured the extent to which the mothers engaged in risky behaviors such as kissing the young child on the lips and protective behaviors such as carefully washing their hands after diapering the child. After an educational intervention, the behaviors were assessed again, and it was found that risky behaviors decreased and the protective behaviors increased significantly. Finney's work is a good example of the value of combining medical with psychological knowledge in planning research.

Thus, by the time the third edition of Ellis' handbook was published, Zolinda Stoneman (1997) had a sizable body of research to review in her chapter on "mental retardation and family adaptation". This review focused first on the issue of heightened stress in the families of persons with retardation, featuring the double ABCX model. Next she discussed social support, noting Suelzle and Keenan's (1981) finding that the need for social support was highest during the child's preschool years and again in young adulthood of persons with retardation. Also noteworthy was Grant's (1986) discovery of a reversal in the families of some aged parents, where the adult with mental retardation was caring for the parent rather than the other way around. During the same year as Stoneman's chapter was written, Floyd and Costigan (1997) reviewed studies of families with a child with retardation that used direct observation. They noted that the best documented finding in such research was the greater directiveness of both mothers and fathers in interaction with their children with retardation. Stoneman concluded that family research was not as mature as other areas in the psychological study of mental retardation but that it was on a rapidly expanding course.

19. DEINSTITUTIONALIZATION

None of the three Ellis handbooks had a chapter on deinstitutionalization, and Gershon Berkson in reviewing the third edition said that he found this a "rather startling" omission (Berkson, 1998, p. 96). Nor was deinstitutionalization ever a theme of a Gatlinburg conference. Despite Ellis' reluctance to focus on it, it is thus appropriate to review these areas.

Many years earlier, Walter E. Fernald, the medical superintendent of the Waverly institution in Massachusetts, had published a study of patients with retardation who had been discharged for a period of 25 years (Fernald, 1919). He was surprised to find that most of them fared quite well on their own. In the 1950s, Jack Tizard and Neil O'Connor in the United Kingdom came out epidemiological studies in 12 institutions, suggesting that many of the individuals with milder levels of retardation did

not need to be there. Tizard and O'Connor (1956) found that with special training, many of these people could return to the community and find employment. They summarized these findings in their book, *The Social Problem of Mental Deficiency* (Clarke, 1998). In the United States, however, psychological researchers were slower to adopt such themes.

Groundbreaking work by anthropologist Robert Edgerton (1967, 1993; Edgerton & Bercovici, 1976) followed former residents of Pacific State Hospital in California longitudinally to assess their coping with life back in the community. Usually they found someone such as a spouse or landlady labeled by Edgerton as a “benefactor”—to help them with circumstances they found too difficult to handle. They did not accept the label of mental retardation and devised ingenious ways to pull over themselves a “cloak of competence”, such as keeping an old junk car near their house to make it less obvious that they could not read and thus had no driver’s license. Another might be to carry around a paperback book. These ex-patients learned to manage their verbal deficit by speaking in public as little as possible. Not trusting their memories, they usually carried little bits of paper with their address and phone number written on them. Using such strategies, they were generally able to live in a large city even though they were not able to read, write, or make change.

Ellis (1976) finally noted that there was an emphasis in the field on deinstitutionalization in the preface of Volume 8 of his *International Review of Research in Mental Retardation* series. However, it was another 2 years later before Scheerenberger’s (1978) chapter on “public residential services” appeared in the series, following by 11 years the beginning of the downturn in, the census of public institutions in the United States. As of June 1976, when Scheerenberger did his survey, there were 239 public residential facilities, mostly (more than 70%) occupied by persons with severe or profound retardation.

In 1984, as if to make up for lost time, almost the entire volume of the *International Review of Research in Mental Retardation* (now coedited by Ellis and Norman W. Bray) was devoted to deinstitutionalization. Willer and Intagliata (1984) noted that even though institutional populations were declining, the number of persons with retardation in out-of-home placements was rising steadily. People were simply being put into group homes rather than institutions. Latib, Conroy, and Hess (1984) studied parents’ reactions to the court-ordered closure of the Pennhurst Center, an institution in Pennsylvania. There was an initial backlash of resistance to the closure among some, but this often changed to a positive attitude once deinstitutionalization had actually occurred. As one respondent said: “I can’t believe I filled out the form. I was very much against the move and now I’m happy about it all” (p. 90).

Landesman and Butterfield (1987) found that the proportion of articles in the *American Journal of Mental Deficiency* and other such journals concerned with deinstitutionalization and community placement doubled over the decade 1975-1985.

Many new books on these topics also appeared during this time. There was a struggle for a scientific definition of outcomes by which to evaluate these changes, e.g., the concept of quality of life (e.g., Parmenter, 1992). Reviewing 87 studies over the period of 1970-1993, Hughes, Hwang, Kim, Eisenman and Killian (1995) found that over 1000 different empirical quality of life measures had been employed, suggesting a continued lack of consensus on this issue.

One factor driving deinstitutionalization may have been simply the relative costs of providing services in different settings. After controlling for other factors, such as level of adaptive behavior, Campbell and Heal (1995) found that at least in South Dakota, state-owned institutions were more costly than community services; within community services, agencies of intermediate size were the least costly. As Stancliffe and Hayden (1998) suggested in a study of the neighboring state of Minnesota, as institutions are downsized, fixed costs, such as staff salaries and underutilized physical facilities, tend to inflate *per-person expenditures*. In the era before the *present* one, state institutions kept their costs down partly by using inmates with more mild retardation to take care of those with more *severe* retardation, in effect a system of peonage. This was no longer permitted after deinstitutionalization began.

In addition to traditional institutions, nursing homes are *generally* considered to provide rather *restrictive* environments. Heller, Miller, and Factor (1998) studied 249 residents of nursing homes with mental retardation over a 3-year period. At follow-up, 50 of them had moved to community-based facilities. After controlling for other factors, Heller et al. (1998) showed that the residents who moved had *better* health and greater *levels* of community integration than those who stayed behind, and those living in smaller facilities had better adaptive behavior as well.

Family homes and institutions differ remarkably *even* in their architectural details, as shown by a *series* of investigations by Travis I. Thompson and *colleagues*. Thompson, Robinson, Dietrich, Farris, and Sinclair (1996a,b) showed slides of the interiors of 20 community residences for *people* with mental retardation to various groups, including architects, group home administrators, *people* with mental retardation, adults with *relatives* with retardation, and college students. The investigators found that all of *these* groups could agree remarkably well on which structures were homelike and which *were* institutional. A lengthy list of relevant building characteristics were identified and factor analyzed. In a companion paper, Thompson et alii (1996) showed that the adaptive and maladaptive behavior of residents of *these* same buildings was predictable from such ratings of homelikeness. Egli, Roper, Feurer, and Thompson (1999) extended this concept to cover the *homelikeness* of acoustic characteristics of residences for adults with mental retardation. The least homelike of 18 such residences *were* found to have longer sound reverberation times in their living and dining rooms (*measured* by recording the pop of a balloon) *because* of insufficient sound absorption by the furnishings.

One important *correlate* of community living seems to be personal control. Stancliffe, Abery, and Smith (2000) *measured* this construct using the Minnesota Opportunities and Exercise of Self-Determination Scale. After controlling for *differences* in adaptive and challenging behaviors, they found that individuals living semi-independently (in apartments) had more personal control than those living in group homes; within group facilities, those living in smaller units had more control than those living in larger ones.

In summary, Fernald, a physician; Tizard and O'Connor, psychologists outside the United States; and Edgerton, a pioneering anthropologist, *were* the first to carry out meaningful *research* on deinstitutionalization. Research psychologists in the United States waited for about a decade after parents' groups, lawyers, and other advocates had strongly begun the movement of persons with mental retardation back into the community. This belated research began simply by documenting the changes already well under way, recording the economic costs involved, and observing how individuals with retardation and their families were reacting to the new environments. The effort to develop a consensus on quality of life has so far been unsuccessful; but there is nevertheless little question that persons with mental retardation and their families prefer the new, more normalized existence toward which the field is striving. Some innovative research has been done by Thompson and colleagues on what characterizes a home versus an institution.

20. GENERAL DISCUSSION

The years since 1945 have been described as a golden age of psychological theory and research in mental retardation. If this is true, what have been some of the most important discoveries? One obvious success story has been the partnership of the fields of mental retardation and applied behavior analysis. The procedures of operant conditioning may have the virtue that they do not impose heavy requirements on the cognitive ability of the individual. Perhaps it is for precisely this reason that they have proved to be so useful even for persons with severe and profound mental retardation. Behavior analysis is also characterized by its seamless combination of basic science and applied issues. Most of this work is done in field settings, taking the behaviors and the environments as they come. As this chapter has shown, behavior analytic methods have been demonstrably effective in teaching self-help skills, in improving people's ability to communicate, and in managing psychopathology. Behavior analysis is no panacea, but in many instances it is the most effective intervention available. B. F. Skinner once won a research award from the Kennedy Foundation, and in retrospect he seems to have well deserved it.

A second success story is that of behavior genetics. The 20th century is sometimes described as the century of genetics, including the rediscovery of Mendel's

research and concepts, the development of biometric statistical methods, Morgan's research on chromosomes, Lejeune's discovery of trisomy 21, the Watson-Crick model of DNA, and, most recently, the human genome project. A recent tally of articles in the *American Journal on Mental Retardation* since 1998 showed that 25 articles, or about three full issues, had been published in the area of behavioral phenotypes of genetic or chromosomal syndromes. This is a burgeoning area that will keep behavioral researchers busy for many years to come. A third positive development is simply the broadening of the psychological research agenda in mental retardation. Topics such as family issues and deinstitutionalization were not even visible on the horizon at the time of Ellis' first handbook in 1963, and now they are among the most frequent areas of focus for behavioral researchers, as can be seen in grants funded, scientific presentations, and published articles.

But let us return to a thorny issue. Much psychological research in mental retardation has been based on prevailing theories in the field. Experience has shown that as decades pass, some psychological theories become obsolescent. What is a researcher to do under these circumstances? As a caricature of this situation, Keith E. Stanovich (1985) described a process that has been repeated all too often in the history of the experimental psychology of mental retardation:

A theory (model, process, task, etc.) gains popularity in experimental psychology. In time, the theory is taken up by developmental psychologists and becomes widely disseminated in their literature. After further delay, the theory is then applied to the performance of mentally retarded individuals. Of course, the irony is that at just about the time the theory is being most rigorously applied in research on mental retardation, it will have been superseded in the experimental psychology literature by a different theory (p. 182).

As judged by the literature in the last decade in mental retardation research, the "superseded" theories would most likely include Gestalt theory, HullSpence theory, and Piaget's theory. As our "phlogiston" example earlier in this chapter indicated, we think that under these circumstances, all is not lost. To focus once more on Gestalt theory, the phenomenon of transposed melodies identified by Ehrenfels is easily demonstrable to this day and will have to be included in any future theory of auditory perception. The same certainly goes for phi phenomenon or apparent motion in vision as studied by Wertheimer. In the same general category could be placed Spitz's findings of the difficulty of games requiring foresight for persons with mental retardation (compared to MA-matched controls), Fox and Oross' random dot kinetograms, or Ellis' cognitive inertia seen in Stroop test performance. These phenomena must be encompassed by any adequate theory of perception and thought in mental retardation.

In closing, we recognize the many efforts of Norman R. Ellis in facilitating the development of psychological research and theory in mental retardation. He steadfastly pursued his own preferred area of memory research in mental retardation through

a long career, publishing a number of noteworthy findings. In addition, through his handbooks, review series, and founding of the Gatlinburg conference, he served as a sort of midwife to this research. In his time, Socrates did the same thing for philosophy. There is no more honored calling.

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Donald K. Routh. Department of Psychology. University of Miami. Coral Gables, Florida.

Stephen R. Schroeder. Life Span Institute. University of Kansas. Lawrence, Kansas.