

The Making of Developmental Psychology

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This chapter is an introduction to the ideas, people, and events that have guided scientific activity in developmental psychology over the past century. Its preparation has been facilitated by several recent publications on the history of developmental psychology. The views of the past held by active researchers are reflected in chapters of the edited volume, *A Century of Developmental Psychology* (Parke, Ornstein, Rieser, & Zahn-Waxler, 1994). The contributors are, with few exceptions, currently involved in contemporary research. Secondary commentaries can provide useful guides and interpretations, but there is no substitute for consulting original sources. To that end, a reprint series containing historically significant original articles and volumes has been prepared by Wozniak (e.g., 1993, 1997).

Other recent volumes include the contributions of professional historians and others who are not enmeshed in current empirical debates of the discipline (e.g., Broughton & Freeman-Moir, 1982; Elder, Modell, & Parke, 1993). In addition, the social relevance and the making of the discipline in American society have been told expertly by Sears (1975) and White (1995). Any single overview—including this one—can tell only part of the story.¹

Adopting the convention used in the previous *Handbook of Child Psychology*, 20 years must lapse before a contribution or event qualifies as historical. Two decades constitute approximately one generation in the life of our science; therefore, 1976 is the endpoint for material in this revised chapter. This rule makes the task manageable and sharpens the focus on the events of the past.

DEVELOPMENT AND HISTORY

It is mildly ironic that an area committed to the study of the origins and development of behavior and consciousness traditionally has shown little interest in its own origins and development. In the great handbooks of the field, the first five (Carmichael, 1946, 1954; Murchison, 1931, 1933; Mussen, 1970) did not include historical overviews; in the 1983 edition of this volume, this state of affairs was changed when two chapters on history were included (Borstelmann, 1983; Cairns, 1983). The earlier reluctance to look to our past, though regrettable, is understandable. If substantive progress is to be made in new empirical research, it will be won by those who look ahead rather than backward. There are also institutional and economic limits on scholarship where journal space is precious, and historical reviews and comments are afforded low priority. The upshot is that contemporaneous research articles tend to bypass the work and insights of earlier investigators. This neglect of the past has been correlated with a more general tendency to give short shrift to competing findings, concepts, and interpretations. Such shortcomings in scholarship, if unchecked, can undermine real progress in the discipline.

Historical accounts are neither static nor immutable. As new information about the nature of developmental phenomena becomes available, perspectives on earlier events may shift in emphasis and interpretation. Similarly, as new findings and issues emerge, prior relevance can be reevaluated and viewed in a fresh light. The rediscovery of J. M. Baldwin's contributions is a case in point. With the increased interest in integrative concepts of cognitive, moral, and social development, it was perhaps inevitable that researchers should rediscover the intellectual foundation for developmental studies provided by Baldwin. A direct line of influence has been drawn between the concepts of J. M. Baldwin and those of Jean Piaget, L. S. Vygotsky, H. Wallon, and L. Kohlberg (see Broughton & Freeman-Moir, 1982; Cairns, 1992; Valsiner & van der Veer, 1993). The construction of the intellectual history of a science is necessarily an ongoing enterprise.

One point of consensus is that developmental psychology has its own distinctive history, which is associated with but independent of the history of experimental or general psychology. The year 1979—one century after Wundt established a psychology laboratory at the University of Leipzig—was the centennial of scientific psychology (Hearst, 1979). The assignment involves a modest fiction, since even a casual reading of the literature of the day indicates that the enterprise of modern psychology was already well under way in 1879 in the laboratories of Helmholtz, Fechner, Weber, Lotze, James, and Galton (Littman, 1979).

Looking backward, it might seem inevitable that the study of behavioral development should have emerged as the focal problem for the new science of psychology. Several of the founders of the discipline approached the subject matter of psychology from a developmental perspective, and the genetic theme was influential in philosophical and biological thought in the late 19th century. Alfred Binet in France, William Preyer and William Stern in Germany, Herbert Spencer and George J. Romanes in England, and several American psychologists (from G. S. Hall and John Dewey to James Mark Baldwin and John B. Watson) agreed on the fundamental viewpoint of

development, if little else. What is the fundamental viewpoint? Watson, who is often depicted as an opponent of the developmental approach, indicated that developmental methods require the continuous observation and analysis “of the stream of activity beginning when the egg is fertilized and ever becoming more complex as age increases” (1926, p. 33). For Watson, the developmental approach was:

[the] fundamental point of view of the behaviorist—viz. that in order to understand man you have to understand the life history of his activities. It shows, too, most convincingly, that psychology is a natural science—a definite part of biology. (p. 34)

Nor was the kernel idea of development a new one for biological science or for psychology. It had guided the work and thinking of physiologist Karl von Baer (1828) and those who followed his early lead in the establishment of comparative embryology. It was also a basic theme in the earliest systematic statements of psychology (Reinert, 1979).

But not all of the founders of the new science subscribed to the developmental perspective or the assumption that psychology was a definite part of biology. Some of the most influential—including Wilhelm Wundt himself—had a different view. Noting the difficulties that one encounters in efforts to study young children in experimental settings, Wundt argued that “it is an error to hold, as is sometimes held, that the mental life of adults can never be fully understood except through the analysis of the child’s mind. The exact opposite is the true position to take” (1907, p. 336).

Even the father of child psychology in America, G. Stanley Hall, relegated developmental concerns to minor league status in the new psychology. In the inaugural lectures at Johns Hopkins, Hall (1885) followed his mentor Wundt in holding that psychology could be divided into three areas: (a) experimental psychology, (b) historical psychology, and (c) the study of instinct. The study of children and adolescents was assigned to historical psychology, which included as well the study of primitive people and folk beliefs. Instinct psychology dealt with those processes and behaviors that were considered innate, thus encompassing much of what is today called comparative and evolutionary psychology. Of the three divisions, Hall considered experimental psychology to be the “more central and reduced to far more exact methods.” These methods included the use of reaction time, psychophysical procedures, and introspection to examine the relations between sensation and perception. Historical and instinct psychology necessarily relied on observational and correlational methods, hence were seen as less likely to yield general and enduring principles. Hall’s divisions were consistent with the proposals of numerous writers—Auguste Comte, John Stuart Mills, Wilhelm Wundt—who called for a second psychology to address aspects of human mind and behavior that were based in the culture (Cahan & White, 1992; Wundt, 1916). In Hall’s account, the 2nd psychology was a second-class psychology.

The division between experimental and developmental psychology has proved to be remarkably durable—but that is getting ahead of the story. The main point is that developmental issues could have been nuclear concerns for the new science, but they were not. They have not even played a significant role in the history of experimental psychology (see Boring, 1929, 1950).

There is also consensus that the initiation of the scientific study of children represents the convergence of two forces, one social and the other scientific. The scientific background is the primary focus of this chapter, and our principal attention will be given to the intellectual and empirical foundations of the discipline.

But there were also social and political roots. Sears (1975) observed, in his classic chapter titled “Your Ancients Revisited,” that:

By the end of the [19th] century, there had developed a vaguely cohesive expertise within the professions of education and medicine, and the origins of social work as a helping profession were clearly visible. During the first two decades of the twentieth century, these professions began relevant research to improve their abilities, but their main influence on the future science was their rapidly expanding services for children in the schools, hospitals, clinics, and social agencies. This expansion continued after World War I, and it was in the next decade, the 1920s, that scientists from several non-professionally oriented (“pure science”) disciplines began to join the researchers from the child-oriented professions to create what we

now view as the scientific field of child development. But like the engineering sciences which evolved from physics and chemistry, child development is a product of social needs that had little to do with science qua science. . . . The field grew out of *relevance*. (p. 4, author's emphasis)

Whether it is viewed as a creation of social forces or as an inevitable outcome of open scientific inquiry, developmental psychology was established as a separate research discipline only within the past century. However, its scientific roots in biology extend back at least an additional 100 years. It was then that fundamental questions on the origin of life, species transmutation, and individual development began to generate empirical investigations.

BIOLOGICAL ROOTS: EMBRYOLOGY AND EVOLUTION

A strong case could be made that the early scientific roots of developmental psychology are to be found in embryology and evolutionary biology rather than in experimental psychophysics. Two core ideas in 19th-century biological thought directly shaped developmental psychology and require attention: (a) K. E. von Baer's developmental principle and (b) C. R. Darwin's evolutionary theory.

THE DEVELOPMENTAL PRINCIPLE

Karl Ernst von Baer (1792–1876) ranks as one of the great original biologists of the 19th century, alongside Curvier, Lamarck, and Darwin (Hamburger, 1970). Born in Estonia, of German ancestry, he did his pivotal work on anatomical development at Würzburg and Königsberg. The pioneer of comparative embryology, von Baer discovered the human ovum and the notochord (the gelatinous, cylindrical cord in the embryo of vertebrates around which, in higher forms, the backbone and skull develop). More relevant to this chapter, von Baer generalized beyond his empirical work in embryology and anatomy to enunciate general principles on the fundamental nature of ontogenetic change (Baer, 1828–1837). He proposed that development proceeds, in successive stages, from the more general to the more specific, from relatively homogeneous states to increasingly differentiated hierarchically organized structures.

Although von Baer himself considered his developmental proposals to be revolutionary, they initially received only modest attention. After a bout of extreme fatigue, disappointment, and disillusionment, von Baer moved to Russia in 1834 and became librarian of the Academy of Science in St. Petersburg. Later, he was appointed leader of a Russian Arctic expedition where he conducted geographical, botanical, and biological research relevant to evolution and development. At the end of his career, he returned to Estonia, the country of his birth, and served as President of the University of Tartu.

Von Baer's developmental principles may seem commonplace to modern students; his general axioms are mentioned in introductory chapters of texts on biological and cognitive development. But when the ideas were first proposed, they challenged the then-dominant explanations for how development proceeds. Two views vied for prominence throughout most of the 19th century: (a) preformism and (b) epigenesis (Gould, 1977). Preformism held that developmental transformations were illusions because the essential characteristics of the individual had already formed at the beginning of ontogenesis. Only the size and relations of the parts to each other changed, and their essential properties were preset and predetermined. Although preformism is dismissed nowadays as drawings of a miniaturized adult in the womb, the concept of a homunculus is not essential to the model (Gould, 1977).

What was basic to preformism was the idea that development could bring about changes in the shape and relationships among organs, but development fails to bring out new or novel properties. Hence, stability and predictability from embryogenesis and infancy to adulthood was expected, if one's measurement tools were adequate. Absurd? Perhaps, except that the proposals do not appear entirely unreasonable if one considers parallels in modern genetic theory, where genes endure unchanged even though the organisms that they create do not. Moreover, particular alleles are assumed to be associated with the ontogeny of specific structural and behavioral characteristics. At another level, modern developmental researchers often assume that the primary traits and dispositions—such as attachment and aggression—develop and become stabilized during the interchanges of infancy and early childhood. These dispositions and the internalized models thus generated may be transformed over development into age-appropriate expression, but not in underlying type.

The other major 19th-century approach to development was epigenetic. Novelties were brought about through progressive transformations in development. But what determines the course of the transformations and, ultimately, the nature of the finished product? The earlier vitalistic answer—*entelechy*, the Aristotelian vital force—was no longer acceptable to most 19th-century epigeneticists. Among other problems, the teleological answer looked to be an admission of ignorance. But without developmental regulation and direction, what would prevent growth from occurring willy-nilly into diverse and monstrous forms? The concept of epigenesis-as-developmental-transformations could not stand alone. It required additional assumptions to account for the sequential properties of development and its orderly nature (Bertalanffy, 1933; Gould, 1977).

This theoretical void was filled in 19th-century biology by the recapitulation concept prominent in *Naturphilosophie*, a significant philosophical movement in Germany. Recapitulation bound together the two main forms of organic creation, ontogeny (individual development) and phylogeny (species development), into a single framework. In embryonic development, organisms are assumed to pass through the adult forms of all species that had been ancestral to them during evolution. Organisms in embryogenesis experience a fast-forward replay of evolutionary history. With this predictable and orderly progression, novel features may be added only in the terminal or mature phases of development. This concept, labeled the “biogenetic law” by Ernst Haeckel (1866), was enormously influential in 19th century biology. The recapitulation hypothesis also provided the biological metaphor for G. S. Hall’s account of adolescence and S. Freud’s original formulations of repression and psychosexual stages (Sulloway, 1979, pp. 198–204, 258–264).

In opposition to prominent biologists of his day, von Baer argued that recapitulation was based on faulty observations and romanticism rather than logic. In his own research, he found that organisms of related species were indeed highly similar in anatomy during their early stages of embryonic growth. However, contrary to the expectations of the recapitulation interpretation, species-typical differences appeared early in the course of development, not only in its final stages. Moreover, the organization at successive stages seemed to uniquely fit the organism for its current circumstances. It was not merely the mechanical repetition of earlier ancestral forms, as implied by the recapitulation model (de Beer, 1958). To sharpen the epigenetic account, von Baer (1828) offered four laws by which development could be described:

1. The general features of a large group of animals appear earlier in the embryo than the special features.
2. Less general characteristics are developed from the more general, and so forth, until finally the most specialized appear.
3. Each embryo of a given species, instead of passing through the stages of other animals, departs more and more from them.
4. Fundamentally, therefore, the embryo of a higher animal is never like a lower animal, but only like its embryo.

Von Baer held that development was a continuing process of differentiation and organization; hence, novelties could arise at each stage, not merely the terminal one. When this embryological principle was later applied to structures, actions, thoughts, and social behaviors (e.g., Piaget, 1951; Werner, 1948), it produced far-reaching consequences. The conclusion proposed in 1828 was that developmental processes demand rigorous study in their own right; they cannot be derived from analogies to evolution.

Although von Baer was recognized as a leading embryologist, his generalizations on the nature of development were not immediately accepted. They were inconsistent with broadly held beliefs in biology, and von Baer’s rejection of the Darwinian account of evolution probably did not help matters. Despite compelling empirical and comparative evidence, for most of the 19th century von Baer’s developmental generalizations fared poorly in open competition with the recapitulation proposal.

Von Baer’s developmental ideas were not entirely ignored in his time, however. It was in Carpenter’s (1854) influential physiological textbook that Herbert Spencer discovered von Baer’s formulation of the developmental principle. Spencer (1886) wrote that von Baer’s work represented “one of the most remarkable indications of embryology.”

It was in 1852 that I became acquainted with von Baer's expression of this general principle. The universality of law had ever been with me as a postulate, carrying with it a correlative belief, tacit if now avowed, in unity of method throughout Nature. This statement that every plant and animal, originally homogeneous, becomes gradually heterogeneous, set up a process of coordination among accumulated thoughts that were previously unorganized, or but partially organized. (p. 337)

Spencer's work, in turn, inspired the genetic epistemology of James Mark Baldwin and his successors, including Jean Piaget. Von Baer's other line of influence on psychology appears in animal behavior and comparative psychology through the work of Z.-Y. Kuo, T. C. Schneirla, and L. Carmichael in the 20th century. The modern dynamic systems model, transactional theory, developmental psychobiology, and developmental science have von Baer's principle of development as a kernel concept (e.g., see chapters by Lerner; Thelen & Smith; Wapner & Demick, this Volume). Moreover, time and timing are central in von Baer's formulation, consistent with modern concepts of critical periods in embryogenesis and sensitive periods in behavior development, and with the concepts of neoteny and heterochrony in behavioral evolution (Cairns, 1976; de Beer, 1958; Gottlieb, 1992; Gould, 1977).

There have been some major revisions, of course. The developmental principle identified a key feature of epigenesis—homogeneity giving way to heterogeneity through progressive differentiation, then integration into reorganized structures—but it did not solve the problem of how development is directed. In his writing, he remained vaguely teleological, a position that seemed consistent with *Naturphilosophie* but out of line with his rigorous experimental work and careful theoretical analysis. Leaving the directionality issue open-ended invited continued application of the recapitulation proposition. The puzzle of directionality in embryological development took almost 100 years to solve (Bertalanffy, 1933).

EVOLUTION AND DEVELOPMENT

“To what extent and in what manner has the work of Charles Darwin influenced developmental psychology?” (Charlesworth, 1992, p. 5). In answering his question on Darwin's impact, Charlesworth concludes that the influence is much less direct and much weaker than has been traditionally accepted. He finds only few direct links to Darwinian propositions or to evolutionary theory in modern developmental psychology. This is regrettable because:

... Darwin's contribution and its current elaborations can enhance developmental research, whereas the latter can assist the former by putting its hypotheses to competent test. (p. 13)

It should be noted that Charlesworth's conclusion on the modest impact of evolutionary theory on developmental psychology is at variance with other judgments in the literature. For example, Kessen (1965) credited Darwin with dramatically changing our concept of children and childhood. This effect, according to Kessen (1965), was both direct (through Darwin's published observations of his infant son) and indirect (through the profound impact of evolutionary ideas on the developmental contributions of W. Preyer, J. M. Baldwin, G. S. Hall, and H. Taine). A similar conclusion is expressed by Wohlwill (1973), who tracks three lines of Darwinian influence on developmental thought through Baldwin, Preyer, and S. Freud.

The proposition regarding the impact of Darwin depends in large measure on how broadly or narrowly Darwin's influence is defined. As observed above, the study of individual development is rooted in embryology, not in evolution. In her overview of the history of embryology, Jane Oppenheimer (1959) observes that the methods and concepts of embryological science owe little to the concepts of evolutionary biology. Moreover, von Baer himself explicitly rejected the Darwinian construction of evolution.

The picture becomes blurred, however, with E. Haeckel's (1866) wedding of ontogenetic and evolutionary concepts in the recapitulation principle. Haeckel was an enormously influential advocate of Darwinian evolution in the second half of the 19th century, and his influence is strongly represented in Preyer (1888) and Hall (1904). Moreover, a direct line can be drawn from Darwinian commentaries on the evolution of the emotions and intelligence to the work of comparative psychologists G. J. Romanes (1889) and C. L. Morgan (1896), and from these pivotal figures in the late 19th century to the foundation of modern comparative work on psychobiological integration and concepts of learning. The importance of evolutionary themes is told by Sigmund Freud himself

(1957). It is also a core message in Sulloway's (1979) intellectual biography that was aptly titled, "Freud, Biologist of the Mind."

Those aspects of Darwin's evolutionary theory that have had only a modest influence on developmental psychology concern its strong implications for the heritability of behavior and the evolution of behavioral propensities. At least one modern model of sociobiology views ontogenetic variation as "developmental noise" (Wilson, 1975). This is because sociobiological emphasis is on (a) variations in structures of societies, not variations in individual life histories, and (b) the biological contributors to those variations in group structures, including the genetic determinants of aggressive behaviors, altruism, and cooperation. As in the logic of Wundt, immature expression of these phenomena in individuals is seen as ephemeral and individualistic; genetic and evolutionary forces may be viewed more clearly when they are aggregated across persons into societal structures (see Gottlieb, Wahlsten, & Lickliter, Ch. 5, this Volume).

In contrast, evolutionary concepts have had a major impact on research in comparative studies of development in animals from the mid-19th century to the present. In England, Douglas Spalding (1873) reported the remarkable effects of early experience in establishing filial preferences in newly hatched chicks. His experimental demonstrations seemed to confirm that phyletic and ontogenetic influences must operate in tandem, that the young animal was predisposed to form preferences during a period of high sensitivity shortly after hatching, and that the experiences that occurred then were especially effective in the rapid establishment of preferences.

George John Romanes, a young scientist who had the confidence of Darwin, was impressed by Spalding's demonstrations and, with him, emphasized the early formation and plasticity of behavior within the framework of its evolutionary foundation. More generally, Romanes's analysis of the stage-paced development of sexuality and cognition served as a basic text for the two most important theorists in developmental psychology, Sigmund Freud and James Mark Baldwin. *Mental Evolution in Man* (Romanes, 1889) was one of the most annotated books in Freud's library, and Sulloway (1979) suggests that it provided inspiration for Freud's later emphasis on the early appearance of infantile sexuality. In accord with recapitulation theory, Romanes had placed the onset of human sexuality at 7 weeks. J. M. Baldwin (1895), for his part, gives explicit credit to Romanes and Spencer as providing inspiration and direction to the work embodied in his *Mental Development in the Child and the Race*. It should also be observed that Romanes, whose aim was to clarify the evolution of the mind and consciousness, is also regarded as the father of comparative psychology (Gottlieb, 1979; Klopfer & Hailman, 1967).

Studies of behavioral development in nonhumans were also rapidly becoming a focal concern in North America. The Canadian physiologist, Wesley Mills, offered an especially clear statement of the need for developmental studies in a *Psychological Review* paper that appeared in 1899. In the article, Mills took E. L. Thorndike (1898) to task for his narrow view of how experimental analyses can contribute to understanding animal learning and intelligence.

For Mills, the notions of ecological validity and biological constraints on learning would not be unfamiliar ideas. What, then, would be the method that he could endorse as being likely to yield the secrets of social behavior and cognition? In a remarkable passage, Mills (1899) outlines a strategy that anticipates the importance of understanding development in context. He wrote:

Were it possible to observe an animal, say a dog, from the moment of its birth onward continuously for one year, noting the precise conditions and all that happens under these conditions, the observer being unnoticed by the creature studied, we should, I believe be in possession of one of the most valuable contributions it is possible to make to comparative psychology. This would imply not one, but several persons giving up their whole time, day and night, by turns, to such a task. As yet, but very imperfect approaches have been made to anything of the kind; nevertheless, such as they have been, they are the most valuable contribution thus made, in the opinion of the present writer, and the more of such we have the better.

If to such a study another were added, in which the effect of altering conditions from time to time with the special object of testing the results on an animal or animals similarly closely observed from birth onward, we should have another most valuable contribution to comparative psychology; but experiment on animals whose history is unknown must, in the nature of the case, be very much less valuable than in such an instance as that just proposed. (p. 273)

However convincing Mills's proposals may appear in retrospect, E. L. Thorndike completed the work, and experimental methods won the battle of the day and, for the most part, the war of the century. By the next generation, experimental studies of learning in animals and children were dominated by Thorndikian short-term, nondevelopmental experimental designs, at least in the United States. It should be noted, in Thorndike's defense, that the main point of his experimental laboratory work, first described in *Animal Intelligence* (1898, p. 1), was to clarify "the nature of the processes of association in the animal mind." It was, in effect, the study of animal consciousness and the role that representation plays in learning methods. Thorndike's statement of the "law of effect" proved to be enormously influential.

In summary, thoughtful investigators of development in nonhuman animals have been concerned with evolutionary and ontogenetic issues and how they are interrelated. The focus was reflected in the work of Romanes (1889), Morgan (1896), and Mills (1898) in the latter part of the 19th century, and in the work of Kuo (1930), Schneirla (1959), Tinbergen (1972), and Hinde (1966) in the mid-20th century. This dual concern, along with the research on animals and young humans that it has stimulated, has helped establish the conceptual and empirical foundations for a fresh developmental synthesis. Whether Darwinian thought has been influential for modern developmental psychology depends on which evolutionary ideas are evaluated and which aspects of developmental psychology are examined.

The Emergence of Developmental Psychology (1882–1912)

Developmental studies flourished *despite* the influence of traditional psychophysical laboratories rather than because of it. The study of behavioral and mental development was going full steam in the 1890s. By mid-decade, genetic or developmental psychology had its own scientific journals (*L'Année Psychologique*, 1894; *Pedagogical Seminary*, 1891, later to be renamed the *Journal of Genetic Psychology*), research institutes (Sorbonne, 1893; Clark University, 1890), influential textbooks (e.g., *The Mind of the Child*, 1882; *L'évolution intellectuelle et morale de l'enfant*, 1893; *Mental Development in the Child and the Race*, 1895), professional organizations (e.g., Child Study Section of the National Education Association, 1893; Société Libre pour l'Étude Psychologique de l'Enfant, 1899), and psychological clinic (University of Pennsylvania, 1896). As early as 1888, G. Stanley Hall was able to refer to the "nearly fourscore studies of young children printed by careful empirical and often thoroughly scientific observers" (Hall, 1888, p. xxiii). The field had advanced so far that it was christened with a name—Paidoskopie—to emphasize its newly won scientific independence (Compayré, 1893). Happily, the activity survived the name.

There is, however, no strong consensus on which year should serve as an anchor for developmental psychology's centennial. The problem is that the area is now sufficiently diverse so that one can point to several landmark dates, depending on which movement or which pioneer one wishes to commemorate. The founding of the child development research institute at Clark University and the establishment of the journal *Pedagogical Seminary*, by G. Stanley Hall, were clearly of signal importance for the area. But to celebrate Hall's contributions over those of Alfred Binet can hardly be justified. Binet, at almost the same time, was laying the foundations for modern experimental child psychology at the Sorbonne and establishing *L'Année Psychologique* as a prime source for developmental publications. Perhaps the dilemma may be eased by recognizing that these major advances were themselves beneficiaries of a zeitgeist that seems to have begun about 1880 and gained significant momentum with the publication of William Preyer's *The Mind of the Child* in 1882.²

The book has been called "the first work of modern psychology" (see Reinert, 1979), providing "the greatest stimulation for the development of modern ontogenetic psychology" (Munn, 1965).

Not everyone agrees with these high evaluations of Preyer's work or of its originality (see, for instance, - Bühler, 1930; Kessen, 1965; and below). Nonetheless, Preyer's book served as a powerful catalyst for the further study of development in psychology and in biology, and 1882 seems to be a reasonable date for us to begin this story of the development of modern developmental psychology. In addition to Hall and Binet, two other persons—James Mark Baldwin and Sigmund Freud—contributed much to the molding of the area. The nature and extent of their contributions will be the main focus of this section.

EMBRYOS AND INFANTS

When *The Mind of the Child* was published, William T. Preyer (1841–1897) intended it to be only the first installment of a more comprehensive study of the nature of development. He completed the project four years later, with publication of *The Special Physiology of the Embryo* (Preyer, 1885). That these two contributions were not translated together and studied as a unit is a pity, for, in Preyer's mind, the issues to which they were addressed were mutually dependent and complementary. Preyer assumed that the methods and concepts applicable to embryological study could be applied with advantage to behavioral study, and that investigations of the one would support and complement investigations of the other. Why then two books? As Preyer (1882) explains it:

I proposed to myself a number of years ago, the task of studying the child, both before birth and in the period immediately following, from the physiological point of view, with the object of arriving at an explanation of the origin of separate vital processes. It was soon apparent to me that a division of the work would be advantageous to its prosecution. For life in the embryo is so essentially different a thing from life beyond it, that a separation must make it easier both for the investigator to do his work and for the reader to follow the expositions of the results. I have, therefore, discussed by itself, life before birth, in the "Physiology of the Embryo." (p. ix)

Preyer completed work on both phases of the project, embryogenesis and postnatal development, in a significant number of species (including humans). It is almost true that his feat has yet to be matched by another single investigator.

What drew Preyer to the study of development in the first place? That question cannot be answered definitively, but we do know that he was trained in physiology in Germany and, with others of his generation, came under the spell of Ernst Haeckel's vision of the unity of science and the centrality of development in evolution and life. Preyer recognized that the scientific program of modern biology would be incomplete without a careful analysis of human development from conception through maturity, and that such a program would necessarily be interdisciplinary. As he put it, such prenatal and postnatal observations "are necessary, from the physiological, the psychological, the linguistic, and the pedagogic point of view, and nothing can supply their place" (1882, pp. 186–187). Beyond Preyer's appreciation that intellectual and scholarly breadth were required for the productive study of children, he established methodological standards for the enterprise. The procedures that he endorsed, and followed, belied the proposition that children, even immature and unborn ones, could not be studied objectively and with profit.

Preyer was not the first person to undertake detailed observations of his offspring for scientific purposes. A professor of Greek and philosophy at the University of Marburg, Dietrich Tiedemann (1748–1803), had earlier employed the method, and his 1787 monograph *Observations on the Development of Mental Capabilities in Children* (Murchison & Langer, 1927), seems to have been the first known published psychological diary of longitudinal development in children, according to Reinert (1979). In the hundred years between Tiedemann and Preyer, several studies appeared, some of which were sufficiently free of parental bias and distortion from other sources to be considered useful scientific contributions (Reinert, 1979, has an informative account of this work).

An article by Charles Darwin played an important role in stimulating further interest in the endeavor. In 1877, it appeared in the new psychological journal *Mind*, having been triggered by the appearance, two months earlier, of a translation of H. Taine's (1876) parallel observations in the immediately preceding issue. Darwin's article was based on 37-year-old notes he made during the first two years of one of his sons. Although inferior to the other reports in terms of systematicity of observation and depth of reporting, Darwin's contribution served to legitimize the method and promoted research with children.

The methodological standards that Preyer established for himself are admirable, even by today's criteria. He reports that he "adhered strictly, without exception," to the following rules:

1. Only direct observations were cited by the investigator, and they were compared for accuracy with observations made by others.

2. All observations were recorded immediately and in detail, regardless of whether they seemed uninteresting or “meaningless articulations.”
3. To the extent possible, observations were unobtrusive and “every artificial strain upon the child” was avoided.
4. “Every interruption of one’s observation for more than a day demands the substitution of another observer, and, after taking up the work again, a verification of what has been perceived and noted down in the interval.”
5. “Three times, at least, every day the same child is to be observed, and everything incidentally noticed is to be put upon paper, no less than that which is methodically ascertained with reference to definite questions” [*The Mind of the Child* (1882), Vol. 2, pp. 187–188].

In brief, most problems of observation and categorization were anticipated by Preyer, including those of reliability and observer agreement.

How Preyer chose to organize his findings is almost as interesting as his methods and findings. For Preyer, the mind of the child, like Gaul, can be divided into three parts: (a) Senses, (b) Will, and (c) Intellect. Because his knowledge about the comparative development of vision, hearing, taste, smell, touch, and temperature perception was surprisingly broad, many—but not all—of Preyer’s (1882) generalizations on the “Development of Senses” were on target. A few of his statements were demonstrably wrong. For instance, he wrote “the normal human being at birth hears nothing” (p. 96). Preyer arrived at an opposite (and correct) set of conclusions on the capabilities of various nonhuman species to hear at birth. In light of the care and precision of most of the observations, it’s puzzling that Preyer made such an elementary error. In retrospect, we may speculate that a primary flaw was theoretical rather than methodological. Preyer’s conclusions on neonatal incompetence were colored by his general assumption that human beings were less mature at birth than were species ancestral to them (i.e., neoteny). This was not the first time, nor the last, that strongly held hypotheses about the nature of children led to erroneous conclusions, despite disconfirming empirical evidence.

The “Development of Will” provided an informative and informed analysis of the onset of such patterns as sitting, grabbing, pointing, standing, and other motoric acts. But Preyer was looking for more than a behavioral inventory: He hoped to find out how the pattern arose. For instance, “deliberate” pointing seemed to arise from the early action of abortive “seizing” or “grabbing,” and only at about 9 months of age did “pointing” gain the capacity to signal to others the child’s wants and needs. Among other things, he concludes: “The first deliberate intention-movements occur only after the close of the first three months” (p. 332). Preyer thus found, in the study of the development of movement patterns, reflexes, and other actions, a possible clue to the systematic analysis of the onset of intentionality.

The third part of *The Mind of the Child*, “Development of Intellect,” includes the consideration of language comprehension and production as well as the development of social cognition, including the concept of the self. Preyer’s discussion proceeds, with uncommonly good sense, from a description of the onset of landmarks of language development to an attempt to determine when the notion of “ego,” or the self, develops. For Preyer, it occurs when the child can recognize “as belonging to him the parts of his body that he can feel and see” (p. 189). Whatever the other merits of that proposal, it permits Preyer to undertake a series of observations and mini-experiments on the matter. One section deals with the ability of children to respond to their reflections in a mirror; another, with the uses and misuses of personal pronouns by young children.

In addition to his study of infancy and early childhood, Preyer left another legacy to modern developmentalists, *The Special Physiology of the Embryo* (1885). To complete his analysis of the “origin of separate vital processes,” Preyer conducted experiments and made observations on the embryos of invertebrates, amphibia, birds, and various mammals. Some of these observations—on the prenatal development of sensory and motor functions—have only recently been confirmed and extended using modern techniques. In line with recent interpretations of early development, Preyer concluded that (a) integrated, spontaneous motor activity was antecedent to the development of responsiveness to sensory stimulation, and (b) motor activity may provide the substrate for later mental, emotional, and linguistic performance. Because of his pioneering studies, he is acknowledged to be the father of behavioral embryology (Gottlieb, 1973).

Preyer has sometimes been depicted as the prototypic methodologist—careful, precise, compulsive, and pedestrian. On this score, Karl Bühler (1930) writes that *The Mind of the Child* was “a remarkable book full of interesting and conscientious observations, but poor in original ideas” (p. 27) and that “Preyer himself was no pioneer in psychology” (p. 27). Others have echoed the exact words, along with the sentiment that his book was more like a developmental psychophysiology than a developmental psychology” (Reinert, 1979).³

Has Preyer’s empirical reputation outrun his theoretical contribution to developmental psychology? The answer depends in part on what aspects of theory one chooses to focus on. Preyer’s main concern in preparing both *Mind of the Child* and *Special Physiology* was the clarification of a basic issue of development: the relations between ontogeny and phylogeny of behavior, and how these two processes influenced each other. His categorization of the dates of onset was *not* an end in itself, to develop a behavioral timetable. Rather, his aim was to establish the lawful sequence of development of sensory and cognitive systems so that meaningful generalizations could be drawn between species and among systems in development.

Hence, for Preyer (1882) one key theoretical issue was how to reconcile competing claims of the “nativists” and the “empiricists” in the origin and perfection of the “vital processes” of behavior and thought. As far as human vision (or other sensory processes) was concerned, he concluded that “my observations show that . . . both parties are right” (Vol. 1, p. 35, my emphasis). In a discussion that constitutes an early model for the developmental landscape of C. H. Waddington (1971), he speculates that “The brain comes into the world provided with a great number of impressions upon it. Some of these are quite obscure, some few are distinct” (Vol. 2, p. 211). Through experience, some of the pathways are obliterated, and others are deepened.

Lest Preyer be written off as a naïve nativist, it should be added that his position was closer to the bidirectional approach of modern developmental psychobiology than to the innate ideas of Immanuel Kant. Drawing on studies of the comparative anatomy of the brain as well as cross-species comparisons of behavior, he concluded (1882) that there is feedback between experience and normal structural development in the brain. He offered a foresightful statement of the bidirectional structure–function hypothesis, reaching the conclusion that “*The brain grows through its own activity*” (Vol. 2, p. 98, my emphasis). How then does the individual contribute to his or her own development? Preyer’s answer was clearly speculative, but it followed the same line of reasoning that is reflected in the structure–function bidirectional proposals offered in the next century by developmental psychobiologists and modern neurobiologists. (See also chapters by Brandtstädter and by Gottlieb et al., in this Volume.)

The theoretical import of Preyer’s behavioral timetable comes into focus when viewed in the context of Haeckel’s biogenetic law. Its key assumption was that human maturation was *accelerated* with respect to ancestral species. That is, as noted earlier, in this concept humans are presumed to pass through the several stages of development more rapidly than the species from which they were derived, so that evolutionary “novelties” and distinctively human characteristics appear at maturity, not in infancy. To be tested, the view required precise information about the relative rates of maturation; hence the need for exactness in plotting the onset of particular behaviors. But Preyer was not a biogenetic apologist. He offered the compelling hypothesis that humans’ maturation rate was retarded relative to ancestral species, an idea that ran counter to the accepted version of recapitulation. In other words, human beings should enjoy a longer (not shorter) period of immaturity than their closest phyletic relatives. Accordingly, in most “vital processes” and behavior, there should be relatively greater plasticity in development and opportunities for learning for children than for nonhuman animals (Vol. 1, pp. 70–71). This is essentially an early statement of behavioral neoteny: that the relatively slower rate of maturation should be an advantage in making for an extended period of curiosity, flexibility, and adaptability in human beings (see also Fiske, 1883). Echoes of his theoretical interpretations can be found in modern studies of ontogenetic-phyletic relations (e.g., de Beer, 1958; Cairns, 1976; Mason, 1980) and the bidirectionality of structure–function relations (e.g., Gottlieb, 1976; Kuo, 1967).

Tracing the heritage that Preyer left for developmental study, we find that he set high standards for scientific observation of behavioral development. Though not unflawed, his observations were carefully recorded and sanely written. For those who followed him, Preyer embedded the study of children in the framework of biological science, and he demonstrated how interdisciplinary techniques could be employed. Beyond the methodological message, there was a theoretical one. Preyer was a man of his times, evolutionary in outlook and committed to the clarification of the relations between ontogeny and phylogeny, between nature and nurture.

Surprisingly, he was perhaps as influential in embryology as in developmental psychology. Through his work, talented young men and women were recruited to experimental embryology (including Hans Spemann, who identified “critical periods” and “organizers” in embryological development). Perhaps most important, Preyer demonstrated, by his successful integration of experimental studies of human and nonhuman young, that the investigation of behavioral development could be as much a scientific enterprise as a social, humanistic movement. Happily, other colleagues in America and Europe understood the message.

MEMORY AND INTELLIGENCE

In a recent article on the scientific contributions of Alfred Binet (1857–1911), Siegler (1992) observes: “It is ironic that Binet’s contribution should be so strongly associated with reducing intelligence to a single number, the IQ score, when the recurring theme of his research was the remarkable diversity of intelligence” (p. 175). That is only one of the ironies in Binet’s work and life. Another is that he was arguably the greatest French psychologist of his day; yet he was unable to obtain a professorship in France. Moreover, the intelligence test that he developed with Simon, which was intended to provide guides on how “to learn to learn,” has been used over the past century as a basis for classifying children and adults into intellectual categories that are presumed to be constant over life.

Statements about historical priority and influence are delicate matters, but among non-French observers there is no serious debate over the claim that Alfred Binet was France’s first significant experimental psychologist.⁴ What makes his work of special importance for this chapter is that he was the premier early experimental child psychologist whose observations extended beyond the laboratory. The results have been far-reaching. Jenkins and Paterson (1961) observed, “Probably no psychological innovation has had more impact on the societies of the Western world than the development of the Binet–Simon scales” (p. 81). Given the influence of this procedure identified with Binet’s name, it is understandable, yet regrettable, that his other contributions to developmental psychology have gained so little attention. As it turns out, it took experimental child psychology some 70 years to catch up with some of Binet’s insights on cognition and the organization of memory.

Throughout his career, Binet was characterized by an independence of thought and action, starting with his introduction to psychology. It was his third choice in careers, after he had dropped out of law school and medical training (Wolf, 1973). In 1879/1880, Binet began independent reading in psychology at the Bibliothèque Nationale in Paris. Curiously, he selectively avoided experimental psychology (the Wundtian version) by reading little or no German, and he took no trips to Leipzig. Shortly after he began work in psychology, he published his first paper, a useful discussion of experiential contributions to the psychophysics of two-point tactile discrimination. For research training, Binet affiliated himself with the distinguished neurologist, Jean Martin Charcot, at the Salpêtrière (a noted Paris hospital). Over a period of seven years, Binet collaborated with Charcot and Charles Féré in studies of hypnotism and its expression in normal persons and in the patient population. Binet’s introduction to “experimental methods” thus was some distance removed from the then-acceptable laboratory procedures. His apprenticeship in research led to some spectacular controversies, with young Binet in the middle of the fray. The problem was that certain phenomena reported by the Salpêtrière group defied credibility—for example, that the effects of hypnotic suggestion migrate from one side of the body to the other by virtue of electromagnetic influences (a very large magnet was used in demonstrations). Attempts to replicate the phenomena elsewhere proved unrewarding. As it turned out, the research procedures followed by Binet and Féré were remarkably casual, and they gave scant attention to the possible suggestibility of their subjects or of themselves (see Siegler, 1992).

An absurd idea? In light of our present knowledge about the brain and hypnotism, it was a thoroughly naïve proposition. But this is the stuff out of which discoveries are made. Féré shortly afterward (1888) became the first investigator to discover that emotional changes were correlated with electrical changes in the human body. Naïve or not, he is credited with discovering the resistance method of measurement and developing the first statement of arousal theory (Thompson & Robinson, 1979, p. 444).

While he was at the Salpêtrière, Binet’s research skills were simultaneously being sharpened in the embryological laboratory of E. G. Balbiani. He became acquainted firsthand with the rigorous procedures of biological research and the then-current concepts of evolution, development, and genetics. This work culminated in 1894 with his being awarded a doctorate in natural science from the Sorbonne and his appointment as Director of the Laboratory of Physiological Psychology at the same institution. In that year, Binet also founded and edited *L’Année Psychologique*, coauthored two books (one dealing with the determinants of the extraordinary memory feats of chess

masters and calculators; the other, a critical treatment of the methods and approaches of experimental psychology), and published 15 articles. Among the articles were studies of the psychology of aesthetics, suggestibility, the nervous system of invertebrates, perception in children, and studies on the development of memory. Only one year's work? No, because some of the studies had been ongoing over the previous two to three years; yes, because his publication list was just as impressive in 1895 as in 1894. This pattern was maintained until his death in 1911, except that, later in his career, he also wrote and supervised plays that were produced in Paris and London (Wolf, 1973).

Prolificacy can be embarrassing if one hasn't much to write about. That seems not to have been a problem for Binet, due in large measure to his "very open, curious, and searching" mind. Binet was so described when, prior to completing his doctorate, he was named laureate by the Moral and Political Academy of the Institute of France (Wolf, 1973). Although he began his research training in the library, he soon became committed to the task of expanding the empirical foundations of the area in ways that seemed novel if not heretical. He early rejected the conventional methods of experimental psychology (as it had been practiced in Leipzig and Baltimore) as being narrow and misleading. On introspective experiments, he wrote, in his *Introduction to Experimental Psychology*:

Subjects go into a little room, respond by electrical signals, and leave without so much as a word to the experimenter. . . . With the three choices only—"equal," "greater," or "less"—they often seem to set up the results of the experiments in advance. Their aim is simplicity, but is only a factitious one, artificial, produced by the suppression of all troublesome complications. (Binet, Phillippe, Courtier, & Henri, 1894, pp. 28–30)

Nor was he impressed by the large-scale studies by G. S. Hall and his students, who used the questionnaire methodology. On the latter, Binet (1903) wrote:

The Americans, who love to do things big, often publish experiments made on hundreds or even thousands of persons. They believe that the conclusive value of a study is proportional to the number of observations. That is a myth. (p. 299)

These hardly were the sorts of comments that would endear him to his American and German colleagues, and Howard C. Warren, one of the more generous reviewers, reciprocated by "confessing to a feeling of disappointment when it is considered what even a short book like this might have been" (Warren, 1894).

What Binet had to offer psychology was a pragmatic, multimethod, multipopulation approach to the problems of behavior. Instead of relying merely on introspection and psychophysiological experimentation, Binet thoroughly dissected behavioral phenomena. To explore memory, for instance, he varied the nature of the stimuli (memory for figures and for linguistic material; memory for meaningful sentences vs. individual words), the subjects tested (chess masters and superior "calculators" who performed on the stage; normal children and retarded children), measures employed (free recall, recognition, physiological measures of blood pressure and electrical activity), type of design (large group samples, individual analysis over long-term periods), and statistics employed. Through it all, Binet selected designs, procedures, and subjects with a purpose, not merely because they were available. To investigate imagination and creativity, he studied gifted playwrights and explored new techniques (inkblots, word association, and case history information).

Such methodological catholicism is not without pitfalls. He was open not only to new discoveries but to new sources of error. In his day, he received high praise and devastating criticism for his work, and both seemed earned. The early studies were vulnerable: Binet was in the process of learning a trade for which there were, as yet, no masters. He came out on the short end of a devastating exchange on the "magnetic" nature of hypnotism (Siegler, 1992), and there was equally justified criticism by H. S. Jennings (1898/1899) on Binet's interpretations of his studies on the psychic life of the lower beasts. S. Franz (1898), a student of J. M. Cattell, took him to task for the quality of his statistical presentation in a series of studies on the relation between cognition and physical measures in children. Florence Mateer (1918) doubtless had Binet in mind when she commented that "the French write brilliantly and convincingly but their technique is apt to be at fault" (p. 24). Such errors—and the attitudes they fed—unfortunately masked the fundamental brilliance of Binet's work. Though shy in personal demeanor, Binet as a scientist was not a timid man; he was outspoken, and his criticism of naïve generalizations and wrongheaded conceptualizations placed him at odds with beliefs held by then-dominant leaders of the discipline. He published

what he believed, and seems to have judged the long-term gains to be worth the short-term costs to his career and influence.

Binet reported demonstrational studies of memory and perception that he had conducted with his two young daughters. The work was extended in succeeding years not only with his children (through adolescence) but with diverse subjects and areas of memory. Along with his collaborators, notably Victor Henri, the work was extended to persons who were extraordinarily talented or retarded. Because Binet operated on the working assumption that the study of normal processes was the key to understanding special talents or deficits, his laboratory also made a major investment in the analysis of memory in normal children, adolescents, and adults. Binet was highly sensitive to the need for convergent analyses that intersect on a common problem. He argued in 1903 that “our psychology is not yet so advanced” that we can limit our analyses to information obtained in the laboratory; rather, complex intellectual functions are best understood in studies of persons “whom we know intimately, to relatives and friends.”

Binet did not, however, disdain large-scale research designs; he simply believed that they were insufficient *in themselves* to tell the full story about the nature of memory processes. In collaboration with Henri, he conducted a remarkable series of studies on memory development that involved several hundred children.

In one of their analyses, Binet and Henri (1894) found that the children reconstructed material into chunks of information that were meaningful to them. It should be noted that this idea of active reorganization has now returned to occupy the attention of “modern” views of memory and recall (e.g., Paris, 1978). In the words of Binet and Henri, as translated by Thieman and Brewer (1978):

The children have a tendency to replace a word from the spoken text when the word appears in a rather lofty style, with another word with which they are better acquainted, and which they encounter more often in their own conversation. Their act of memory is accompanied by an act of translation. (p. 256)

How Binet and his colleagues chose to follow up this experimental work is instructive. Noting that other researchers might do things differently, Binet embarked on an intensive study of “superior functions” in relatives (namely, his two adolescent daughters) and friends. Binet did not give up on experimental designs so much as he extended their boundaries by conducting experiments on persons whose histories and characteristics were known intimately to him. For Binet, the key to unlocking the secrets of intelligence involved not only mapping its outline in large-scale studies but also making a detailed tracing of its internal features in individual analysis. This movement back and forth—from a focus on individuals to a focus on large samples, then back to individuals—was a distinctive and deliberate research strategy.

Attention to two or three children, rather than to a single individual or to large samples, inevitably leads one to a focus on the differences among them. So it was with Binet. He was not the first psychologist, of course, to be curious about differences among persons and their assessment and explanation. Francis Galton (1883) had earlier used sensory discrimination tests to assess differences in basic abilities. The rationale for such tests was stated succinctly by Galton (1883): “The only information that reaches us concerning outward events appears to pass through the avenue of our senses; and the more perceptive the senses are of difference, the larger is the field upon which our judgment and intelligence can act” (p. 27).

In other words, modest differences at the level of sensation would be directly reflected in “complex” cognitive functioning, or would be multiplied. A similar rationale (and research strategy) was recommended by the American psychologist, James McKeen Cattell, in an article entitled “Mental Tests and Measurement” (1890). Specifically, Cattell proposed that mental measurement should employ several tests of “basic” sensory and motor abilities, including assessments of color discrimination, reaction time, and other standard psychophysical procedures. Other experimental psychologists—including Joseph Jastrow at Wisconsin, Hugo Munsterberg at Freiberg, and J. A. Gilbert at Yale and Iowa (1894, 1897)—concurred.

Characteristically, Binet and Henri (1895) took an approach that was radically different from that of their American and German colleagues. It was, however, wholly consistent with the conclusions they had arrived at in their earlier studies of memory development; namely, it was absurd to focus on elementary units of memory as

opposed to a recall for ideas and meaning. Furthermore, from Binet's studies of individuals, it seemed clear that great differences could be observed among persons in terms of "higher" mental functions, including language skills, suggestibility, common-sense judgments, and imagination. Binet and Henri (1895) thus argued for a methodological strategy that was precisely opposite to that of Galton and Cattell:

The higher and more complex a process is, the more it varies in individuals; sensations vary from one individual to another, but less so than memory; memory of sensations varies less than memories of ideas, etc. The result is that if one wishes to study the differences between two individuals, it is necessary to begin with the most intellectual and complex processes, and it is only secondarily necessary to consider the simple and elementary processes_._._._ (Binet & Henri, 1895, p. 417).

Although "complex processes" are more difficult to measure than simple ones, less precision is required because individual differences in complex functions are much greater than in elementary ones. The more fundamental problem that Binet and Henri identified is that it is easier to separate the intellect into its parts than it is to put the elements together and create a functioning, competent whole. That is, the greatest challenges arise not in the initial assessment of sensory elements but in determining how they should be *combined* to predict intellectual performance. How should the components be appropriately weighted, and what is the nature of the process by which sensations are translated into cognitions? The solution that Binet and Henri offered was a wholly pragmatic one: Bypass the recombination problem and assess the complex functions directly. Given this simplifying solution, Binet and Henri outlined a programmatic approach to the assessment of individual differences that was completed 10 years later.

The child study movement in France directly contributed to the eventual development of workable mental tests. Soon after the formation of the *Société libre pour l'Étude psychologique de l'Enfant* (Society for the Psychological Study of the Child), Binet was invited to become a member and he shortly became a leading voice in its activities and publications. The *Société* not only prodded the Ministry of Public Instruction to think constructively about the needs of retarded children, but was also influential in having a commission appointed to set up special classes. Binet, as a leader of the *Société*, was appointed to the commission. It was not entirely coincidental, then, that he was invited to develop tests for identifying children who could benefit from special instruction, and the results of the work were reported in a series of articles in *L'Année Psychologique* in 1905 (Binet & Simon, 1905) and later extended (Binet 1908, 1911). Although the articles offered guidelines for assessment in each of three areas (medical, educational, psychological), their greatest attention was given to psychological tests. The 30 tests of the 1905 scale followed the outline offered by Binet and Henri (1895) some 10 years earlier, except some procedures—including the suggested use of inkblots to study imagination—were omitted and new techniques were borrowed from other investigators—among them, Ebbinghaus's incomplete sentence technique (1897) and Jacobs's (1887) "memory for digits" test.

Although most of the basic concepts of intelligence test construction were reflected in the initial scale (e.g., multiple tests arranged in order of difficulty, various areas of competence tested, age standardization, and external validation), the refinement of the scale so it could be used productively with normal children required extensive further revision. The task was begun by Binet (1908, 1911) and completed by American developmental psychologists, notably Goddard (1911) and Terman (1916). Despite the magnitude of their achievement, Binet and Simon (1905) were fully aware of the limitations of the technique as well as its promise. They wrote in conclusion:

We have wished simply to show that it is possible to determine in a precise and truly scientific way the mental level of an intelligence, to compare this level with a normal level, and consequently to determine by how many years a child is retarded. Despite the inevitable errors of a first work, which is of a groping character, we believe that we have demonstrated this possibility. (p. 336)

They had indeed.

Binet eschewed identification as a theorist, even declining initially to offer a definition of intelligence, "a problem of fearful complexity." He added, in 1908:

Some psychologists affirm that intelligence can be measured; others declare that it is impossible to measure intelligence. But there are still others, better informed, who ignore these theoretical discussions and apply themselves to the actual solving of the problem. (p. 163)

Despite his disinclination to define intelligence, Binet was not hesitant to take a strong stand on the nature of intellectual functioning and its determinants. The design of the tests themselves reflects the assumption that the aim was to diagnose different levels of functioning, not to assess the child's "faculty" for thought. Consistent with this functional view of cognitive processing, Binet argued that one of the test's primary virtues would be to identify children who needed to "learn to learn." For Binet, intellectual adaptation reflected dynamic, ever-changing processes that underwent constant modification and reorganization. Hence his focus on the ways that these processes become organized over time, and their "plasticity and extendibility" (1909, pp. 127–128). On this score, he proposed a program of "mental orthopedics" that should be followed to enhance cognitive functioning. In *Les Idées modernes sur les Enfants* (1909), Binet specifically deplores the notion that "the intelligence of the individual is a fixed quantity" and protests the idea as "brutal pessimism" (p. 126). Ironically, exactly the opposite assumption fueled the enthusiasm of most American translators for the test, along with the conviction that this "fixed quantity" is hereditarily determined, and a child's "true score" can be identified within limits of sampling error.

How can we summarize Binet's primary contributions to understanding development? Beyond his specific insights on psychological phenomena, three fundamental advances may be attributed to this remarkable scientist. The first concerns the insight that the assessment of individual differences in higher-order cognition requires a molar rather than a molecular strategy. In retrospect, the idea seems to make a good deal of sense, but it was embraced by American psychology only after the research of Binet and Simon made the conclusion inescapable. After all, it seems intuitively obvious that precise, microanalytic experimental methods *should* be superior to molar, complex ones in predicting everyday behavior. The idea dies slowly, and it is alive and well today in the study of social development. As with cognition, recent molecular analyses of social interactions appear to fare less well in prediction and classification than do molar assessments of the same phenomena. Exactly why molar techniques have an advantage continues to be a matter of debate, and Binet's analysis may still be the key.

A second contribution is related to the first. For Binet, the "two sciences of psychology," described later by Cronbach (1957), were both essential. Binet pioneered both experimental child psychology and the study of individual differences. His stance on the matter is embodied in the methodological credo: "To observe and experiment, to experiment and observe, this is the only method that can obtain for us a particle of truth" (Binet, 1904, translated by Wolf, 1973, p. 293). As Binet saw it, problems inevitably arise when the two basic methodologies are divorced. If questions are raised that cannot be settled by experimentation, then they should be dismissed "since they are not susceptible to the sole criterion of certainty" that modern psychology can accept.

One other, more general legacy requires comment. Beyond the other pioneers in the field, Binet was one of the first to provide convincing evidence for the proposition that a *science* of human development was possible. He understood the complexity of the problem, but he persevered in the attempt to help developmental psychology "become a science of great social utility" (Binet, 1908). Binet demonstrated that an empirical science of behavioral development in humans was within grasp, if the investigator maintained a profound respect for the information yielded from the dual methods of observation and experimentation.

THE NEW PSYCHOLOGY IN AMERICA

In leading the organization of the new science of psychology in America, G. Stanley Hall (1844–1924) had no peer. In his long career, he proved to be an effective and durable advocate, writer, and spokesman for psychology and for children in America. The story of Hall's career has been expertly told by Ross (1972) and White (1992), with the latter providing fresh insights on Hall's role in science and social policy. Born in Massachusetts, Hall was a minister, professor of philosophy, experimental psychologist, child psychologist, educational psychologist, university president, and leader of the child study movement. He was also a premier figure in American psychology: the first professor of psychology in America (at Johns Hopkins, 1883) and the first president of the American Psychological Association (1891). As is the case with truly effective teachers, Hall had great enthusiasm and tolerance for ideas, and he was a master at conveying his enthusiasm to others. He had a large vision for psychology and its destiny in creating better persons and a more perfect society.

But how did he fare as a scientist and a theorist in the light of history? In the previous edition of the *Handbook*, this chapter concluded that Hall had a large influence on the growth and organization of the new psychology in America, and that he provided a foundation for the scientific study of children and adolescents. It was concluded that Hall's own research contributions were modest and his theoretical proposals were flawed by being too tightly woven to the informed beliefs of his day and too loosely linked to empirical data. The grand vision of the science that he offered had only modest substance. After spending several years carefully sifting the evidence, Sheldon White (1992) has arrived at a radically different conclusion regarding Hall's contributions. He observes:

Recent writings usually picture Hall as a functionary and figurehead, condense his ideas into a few slogans, quote criticisms of his work by his often rivalrous peers, and effectively concede Hall his administrative trophies while ignoring most of what he had to say. (p. 33)

Some did listen to what Hall had to say, because, like Mark Hopkins, his mentor at Williams College, he was a masterful teacher (White, 1992). Lewis Terman, Arnold Gesell, and E. C. Sanford were strongly influenced by Hall in their graduate training at Clark University. John Dewey, James McKeen Cattell, and Joseph Jastrow took courses from Hall at Johns Hopkins. Others—including Earl Barnes, who initiated investigations of children at Leland Stanford Junior University in the 1890s—were attracted to Hall's method and perspectives through the child study movement (Goodwin, 1987; Zenderland, 1988). These scientists helped shape the face of 20th-century psychology in America.

Hall's introduction to developmental psychology occurred in 1880, when he returned to America from postdoctoral study in Europe with Wundt. He brought with him from Germany the "questionnaire method" to study "the contents of children's minds." The method was initially aimed at helping teachers learn what concepts children had available at the time that they entered school. The procedure involved asking children brief questions about their experiences and about the meaning of words—for example, "Have you ever seen a cow?" or "Where are your ribs?" The answers were scored right or wrong, and the percentage correct was used to describe groups of children, not individuals. Rural children were compared with city ones, boys with girls, Black children with White ones, and so on. The questionnaire method, at least in terms of the kind of questions asked, was a precursor of later general aptitude tests of general information and vocabulary. In Hall's core investigation, children just entering school in Boston were asked some 134 questions, such as those given above. Data collection was voluminous but haphazard; about half of the protocols from the 400 children tested had to be eliminated.

In commenting on this research, White (1992) writes:

The questionnaire work was methodologically weak, to be sure, but the methodological regulations psychology subsequently put into place have probably been excessively restrictive. Hall's questionnaires asked people to give narrative accounts of children's behaviors in everyday situations, and this kind of approach is becoming more popular nowadays. (p. 33)

The point is well taken. Educators were impressed by Hall's vision of how scientific research had the potential to revolutionize educational practices (Hall, 1883, 1891). Zenderland (1988) suggests that the main impact of the child study movement on psychology was to pave the way for the acceptance of clinical psychology.

Hall's opportunity to shape the direction of psychology in America came when he was offered the first professorship in psychology in the United States, at Johns Hopkins University in 1884. He had been selected over C. S. Peirce and G. S. Morris—no modest competition. Peirce is viewed by many to be the preeminent American philosopher, and Morris was a "brilliant lecturer" (White, 1992). Following the general model established by Wundt at Leipzig, Hall set up a teaching laboratory at Hopkins and recruited to it several young persons who were later to play a formative role in the development of the science. In the first laboratory course, the students included John Dewey, James McKeen Cattell, Joseph Jastrow, and E. H. Hartwell. With the support and encouragement of Johns Hopkins president D. Gilman, Hall also established the first psychological journal in the United States, the *American Journal of Psychology*. On the basis of his success at Hopkins, Hall was offered in 1889 the opportunity of shaping a university himself by serving as first president of Clark University. Hall remained at Clark until his death in 1924, and established there a tradition of developmental study that remains strong today.

In the spirit of *Naturphilosophie*, Hall applied the biogenetic law to all aspects of human development. For Hall, the implications for the education, rearing, and religious instruction of children were manifold. He warned about the hazards of “unnatural” and “artificial” constraints on learning and early development, and expressed disdain for parents and teachers who attempt to instruct children rather than permitting their natures to unfold. According to Hall’s view of recapitulation, behaviors, like morphological structures, follow an invariant course of development that has been determined by ancestral evolutionary progression. Interference with that natural process would be detrimental, and likely to bring about a stunting of growth or “developmental arrest.”

Hall’s biogenetic framework led him to a focus on the phenomena of adolescent development. In behavior, the fast-forward replay of ancestral psychological characteristics ended in adolescence, and the individual became free to superimpose distinctive and individual talents on the predetermined developmental sequence. Hence, it should be the stage of greatest plasticity and possibility for change. As Hall (1904) put it:

While adolescence is the great revealer of the past of the race, its earlier stages must be ever surer and safer and the later possibilities ever greater and more prolonged, for it, and not maturity as now defined, is the only point of departure for the super anthropoid that man is to become. (Vol. 2, p. 94)

Hall’s designation of adolescence as the time when the child begins a fresh set of tracks was optional. Other recapitulation theories propose that the adding on of unique features occurs in the early postnatal period, or even prenatally (see Gould, 1977, for an informed discussion of the matter). Convinced that the adolescent period was the nuclear one for the fulfillment of human potential, Hall (1904) prepared a two-volume compendium entitled *Adolescence: Its Psychology and Its Relations to Physiology, Anthropology, Sociology, Sex, Crime, Religion, and Education*. The book offered a broad sweep of citations from philosophical, physiological, anthropological, religious, and psychological sources. Where the data fell short, Hall offered speculative evolutionary and moralistic interpretations. The product was impressive in scope and uneven in logic and scientific rigor.

But it was often on target. Some of the insights and discussions appear remarkably modern in content if not in tone. On social cognition and developmental changes in attitudes, Hall (1904) wrote:

Children’s attitude toward punishment . . . tested by 2,536 children (ages 6–16) showed also a marked pubescent increase in the sense of the need of the remedial function of punishment as distinct from the view of it as vindictive, or getting even, common in earlier years. There is also a marked increase in discriminating the kinds and degrees of offenses; in taking account of mitigating circumstances, the inconvenience caused others, the involuntary nature of the offense and the purpose of the culprit. All this continues to increase up to sixteen. (Vol. 2, pp. 394–395)

Similarly, in a discussion of moral reasoning, Hall (1904) concluded: “Thus with puberty comes a change of view-point from judging actions by results to judging by motives” (Vol. 2, p. 394). The statement was also based on empirical data using a reformed version of the questionnaire method. In this context, Hall cites Schallenberger’s study (1894) on the development of moral judgments:

From one thousand boys and one thousand girls of each age from six to sixteen who answered the question as to what should be done to a girl with a new box of paints who beautified the parlor chairs with them with a wish to please her mother, the following conclusion was drawn. Most of the younger children would whip the girl, but from fourteen on the number declines very rapidly. Few of the young children suggest explaining why it was wrong, while at twelve, 181, and at sixteen, 751 would explain. The motive of the younger children in punishment is revenge; with the older ones that of preventing a repetition of the act comes in; and higher and later comes the purpose of reform. With age comes also a marked distinction between the act and its motive and a sense of the girl’s ignorance.⁵ (Vol. 2, pp. 393–394)

Adolescence thus is “the stage when life pivots from an autocentric to an heterocentric basis” (Vol. 2, p. 301).

So far, so good, except Hall had the misfortune of discovering the biogenetic law at about the time that the new generation of biologists was discarding it. If evolution and recapitulation ranked high on Hall’s psychological priorities, then morality and religion ran a close second. The linkages came about in ways that were not always

immediately obvious, but seemed to represent his faith in the psychic “continuity throughout the universe” (Vol. 2, p. 208).

How does one evaluate Hall’s contributions to developmental psychology? It is almost true to say that they were unique. Kessen (1965) provides a perceptive and succinct summary: “There have been diggers in the sand pile of child study since him, but in a sense, Hall has had no descendants—only heirs” (p. 151). More recently, White (1992) concluded that Hall made three significant contributions:

1. Hall provided a “first cooperative ‘normal science’ of child development” through his questionnaire program. The point is that the questionnaires, although limited as scientific instruments in the ways that Hall employed them, had great potential for describing children’s lives in natural context.
2. Hall viewed social participation as a catalyst for internal organization, and thereby provided a “social-biological” conception of childhood.
3. Hall was guided by the need “to arrive at a scientific synthesis on the one side and practical recommendations on the other.”

Related to the third point, one contribution should not be overlooked because it has potentially large implications for both developmental theory and intervention models. Hall focused on adolescence because he believed it was a period of great vulnerability and the time when novel actions and beliefs were established and consolidated, for good or for ill. In his view, infants and children were more or less buffered, a belief shared by his student Arnold Gesell (see below). Although Hall’s reasoning about recapitulation was clearly off base, his intuitions about developmental plasticity in adolescence were inventive and provocative.

Hall also expanded the boundaries of the academic discipline and stimulated fresh approaches to it. Of special importance was his pivotal role in the organization and support of the activities of the child study movement in America, including the Child Study Section of the National Education Association.

In his scientific role, Hall was more an importer and translator of scientific methods and theories than he was a creator of them. In addition to the questionnaire method and the biogenetic law, Hall helped bring to America Wundtian experimental procedures and Preyer’s volume on *The Mind of the Child* (Hall wrote the foreword to the American translation). He also helped change the face of American psychology when, in 1909, he arranged a meeting between Sigmund Freud and his lieutenants (C. G. Jung, A. A. Brill, E. Jones, and S. Ferenczi) and the most prominent psychologists in North America. This meeting was held to commemorate the 20th anniversary of the founding of Clark University, and it is generally viewed as a key event in the acceptance of psychoanalysis in North America at a time when Freud felt ostracized by the European scientific establishment. In the same year, Clark University presented an honorary degree to William Stern, another significant pioneer in the establishment of developmental psychology. Throughout his career, Hall remained open to new and fresh approaches, and he promoted efforts to make psychology more useful and relevant to society.

In sum, Hall was a remarkable teacher and catalyst for the field. Some of the most significant areas of developmental study—mental testing, child study, early education, adolescence, life-span psychology, evolutionary influences on development—were stimulated or anticipated by Hall. Because of shortcomings in the methods he employed and the theory he endorsed, few investigators stepped forward to claim Hall as a scientific mentor. His reach exceeded his grasp in the plan to apply the principles of the new science to society. Psychology’s principles were too modest, and society’s problems were too large. Perhaps we should use a fresh accounting to judge Hall’s contributions, one that takes into account the multiple facets of his influence on individuals, the discipline, and society. The audit would reveal that all of us who aspire to better the lot of children and adolescents can claim him as a mentor.

MAKING DEVELOPMENTAL THEORY

Nowadays, any account of the scientific study of cognitive and social development must take note of the singular contributions of James Mark Baldwin (1861–1932). His role as an intellectual leader of the emergent discipline is

now well established. Baldwin's *Mental Development in the Child and the Race* (1895) was one of the first attempts to construct a genetic epistemology within the framework of the "new psychology" (Broughton & Freeman-Moir, 1982; Cairns & Ornstein, 1979; Mueller, 1976). The companion volume, *Social and Ethical Interpretations of Mental Development* (Baldwin, 1897), was the first systematic effort by a psychologist to use developmental ideas to bridge the gap between the study of social institutions (i.e., sociology) and the study of individual functioning (i.e., psychology).

Recent scholarship has compared Baldwin's proposals with those of Jean Piaget. In this regard, Wozniak (1982, p. 42) writes:

Baldwin proposed a biosocial, genetic theory of intelligence, a theory of mind in the broadest sense, which was conceptually far ahead of his time. This theory contained within it, en germe, many of the most important concepts of the biological theory of intelligence and of the genetic epistemology which Piaget was to develop.

Other studies show direct lines of descent of key ideas and concepts expressed by Baldwin to those commonly associated with Piaget and Vygotsky (Broughton, 1981; Cahan, 1984; Valsiner & Van der Veer, 1988; Wozniak, 1982). But it would be a mistake to view Baldwin's thinking only through a Piagetian or Vygotskian lens. Baldwin's distinctive ideas on evolutionary epistemology, cross-generational transmission of developmental accommodations, the dynamics and social embeddedness of personality, and the dual genesis of cognition are sufficiently provocative to demand study in their own right.

Baldwin is less of a "shadowy figure" nowadays than he was just 14 years ago (Broughton & Freeman-Moir, 1982, p. 2). Baldwin was born in 1861 in Columbia, South Carolina, and died in 1934 in Paris. Following undergraduate training in philosophy and psychology, and a year of advanced study in Europe (including a semester in Leipzig with Wilhelm Wundt), Baldwin completed a doctorate at Princeton University in 1888. In the 4 years that he was on the faculty at the University of Toronto, he founded an experimental laboratory and began a research program on "infant psychology." The results of this work, which were published in the journal *Science* 100 years ago, dealt with the ontogeny of movement patterns, handedness, color vision, suggestibility, and research methodology (Baldwin, 1890, 1891, 1892, 1893). These findings provided the empirical basis for his first major work on mental development.

From the beginning, Baldwin was more a theoretical psychologist than an experimental one. He employed research findings to illustrate theoretical principles rather than to systematize empirical phenomena. Primary in Baldwin's thinking was the "conviction that no consistent view of mental development in the individual could possibly be reached without a doctrine of the race development⁶ of consciousness—that is, the great problem of the evolution of mind" (Baldwin, 1895, p. vii). In this conviction, he followed the theoretical lead of Herbert Spencer in philosophy and George John Romanes in biology, and the empirical lead of Wilhelm Preyer and Alfred Binet. After this intensive but brief involvement with the experimental investigation of infants, Baldwin returned to issues of psychological and evolutionary theory, historical commentary, editorial activities, and philosophical construction and systemization. The study of development was no longer an empirical activity for him, but questions of psychological genesis remained at the core of his theoretical and philosophical speculations.

He was a key figure in the organization of psychology as a science, the establishment of three of its basic journals (*Psychological Review*, *Psychological Bulletin*, and *Psychological Abstracts*), and the founding of two major departments of psychology (at the University of Toronto and Princeton University) and the reestablishment of a third (at Johns Hopkins University). He served as one of the first presidents of the American Psychological Association when he was only 36 years of age. He won the highest honors available to psychologists in his day, including the Gold Medal of the Royal Academy of Denmark and the first honorary Doctorate of Science degree awarded by Oxford University. It is now generally acknowledged by those who have reviewed the record that Baldwin stands alongside William James, John Dewey, and C. S. Peirce as one of the primary intellectual forces involved in the founding of American psychology as a science.

Metaphysics and Development

In an excellent analysis of the structure of Baldwin's thought, Wozniak (1982) writes, "Baldwin had deep intellectual roots in the 'mental philosophy' tradition which dominated American higher education during the nineteenth century" (p. 13). Yet he early gained a respect for the emerging biological and behavioral sciences, and the possibility that there might be a scientific explanation for the origin of knowledge and the perception of reality. At the outset of his career, Baldwin explicitly oriented his empirical and theoretical work toward a synthesis of metaphysics and psychological science (Wozniak, 1982, p. 14). In the early 1890s, he became convinced that genetic study must be the central theme for the synthesis of reason and reality.

Throughout the remainder of his career, "the great topic of development itself" (Baldwin, 1895, p. x) dominated his work and thinking. In his day, Baldwin expanded the application of genetic concepts in three emergent disciplines—psychology, evolutionary biology, and sociology—and in one established discipline—philosophy. Baldwin's own scientific life illustrates his view that cognitive development is not limited to childhood. As Wozniak (1982) observes:

Baldwin was himself subject of a series of intellectual transformations. So great, in fact, are the differences in conceptual structure and content among his major books...that one wonders if perhaps there might not have been three Baldwins at work: a mental philosopher (roughly to 1889), an evolutionary psychologist (approximately 1889–1903), and an evolutionary epistemologist (1903–1915). (p. 14)

Although Wozniak's characterization of the marked intellectual transitions in Baldwin's career seems accurate, Baldwin appears to have moved beyond scientific psychology even before the turn of the century, coincident with his work on the *Dictionary of Philosophy and Psychology*. Given the scope and complexity of Baldwin's work, any brief summary is likely to be misleading. Shortcomings in the following account may be corrected by consulting more complete analyses that have recently become available, including Wozniak (1982), on the intellectual origins of genetic epistemology; Mueller (1976) and Valsiner and Van der Veer (1988), on the relations between psychology and sociology; and Cahan (1984), on the comparison of the genetic psychologies of Baldwin and Piaget. In addition, various chapters in the previous edition of the *Handbook of Child Psychology* (1983) attempt to place Baldwin's contributions into contemporary and historical context (Cairns, 1983; Harter, 1983; Sameroff, 1983). Then there are the voluminous writings of Baldwin himself, including 21 books and more than 100 articles. Baldwin's own thoughtful summary of his life's work is perhaps the best place to begin (Baldwin, 1930).

Mental Development and Social Ontogeny

The two works of Baldwin that have proved most stimulating to modern developmental psychologists are *Mental Development in the Child and the Race* (Baldwin, 1895), and *Social and Ethical Interpretations of Mental Development* (Baldwin, 1897). The earlier book presented Baldwin's attempt to formulate a "genetic epistemology." In individual development, a key mechanism for bringing about growth in the "cognitive scheme" is the "circular reaction." This invention of Baldwin's is linked to concepts of learning that appeared later and explained how experience could become internalized into habit through recurrent self-stimulation or imitation. A consideration of ontogenesis challenged the then-dominant idea that consciousness was "a fixed substance, with fixed attributes" (Baldwin, 1895, p. 2). He writes with respect to the static conceptions of traditional approaches:

The genetic idea reverses all this. Instead of a fixed substance, we have the conception of a growing, developing activity. Functional psychology succeeds faculty psychology. Instead of beginning with the most elaborate exhibition of this growth and development, we shall find most instruction in the simplest activity that is at the same time the same activity. Development is a process of involution as well as of evolution, and the elements come to be hidden under the forms of complexity which they build up.... Now that this genetic conception has arrived, it is astonishing that it did not arrive sooner, and it is astonishing that the "new" psychology has hitherto made so little of it. (1895, p. 3)

In Baldwin's eyes, development proceeds from infancy to adulthood through stages, beginning with a reflexive or physiological stage, continuing through "sensorimotor" and "ideomotor" stages, and progressing to a

stage of symbolic transformations (Baldwin, 1895). Only in the most advanced stage do “syllogistic forms come to have an independent or a priori force, and pure thought emerges—thought, that is, which thinks of anything or nothing. The subject of thought has fallen out, leaving the shell of form” (Baldwin, 1930, p. 23). From its earliest formulation, Baldwin’s stage theory of mental development focused attention on process as much as on structure. Many of the terms that he employed—“accommodation,” “assimilation,” “imitation,” “circular reaction”—are commonplace in today’s textbooks, although it cannot be assumed that Piagetian meanings are necessarily the same as Baldwinian ones.

Social and Ethical Interpretations in Mental Development: A Study in Social Psychology (Baldwin, 1897) appeared only 2 years later. This book is the first work by an American psychologist on social-cognitive development in childhood; it is also the first volume in English that includes “social psychology” in its title (Mueller, 1976). In this work, the cognitive-stage model is extended to issues of social development, social organization, and the origins of the self. Baldwin felt that the essential issues of social psychology had been neglected because of the void that existed between the concepts of psychology and sociology:

And it is equally true, though it has never been adequately realized, that it is in genetic theory that social or collective psychology must find both its root and its ripe fruitage. We have no social psychology, because we have had no doctrine of the *socius*. We have had theories of the ego and the alter; but that they did not reveal the socius is just their condemnation. So the theorist of society and institutions has floundered in seas of metaphysics and biology, and no psychologist has brought him a life-preserver, nor even heard his cry for help. (1895, p. ix)

In social development, there is a “dialectic of personal growth” that progresses from an egocentric receptive stage to a subjective one and, eventually, to an empathic social stage. In Baldwin’s scheme:

The development of the child’s personality could not go on at all without the modification of his sense of himself by suggestions from others. So he himself, at every stage, is really in part some one else, even in his own thought of himself. (1897, p. 30)

Consistent with his emphasis on developmental processes of the self rather than static structures, personality is not fixed by early experience or by genes. Accordingly, “personality remains after all a progressive, developing, never-to-be-exhausted thing” (Baldwin, 1897, p. 338). Actions are fluid, dynamic, and responsive to the immediate setting. In Baldwin’s view:

[The child’s] wants are a function of the social situation as a whole. . . . His wants are not consistent. They are in every case the outcome of the social situation; and it is absurd to endeavor to express the entire body of his wants as a fixed quantity under such a term of description as “selfish,” or “generous,” or other, which has reference to one class only of the varied situations of his life. (1897, p. 31)

The self becomes progressively and inevitably accommodated to others and to the traditions of society. This “social heredity” is mediated through imitation and the operation of an internal circular reaction. From each relationship, there emerges a refined sense of oneself and of others. “The only thing that remains more or less stable is a growing sense of self which include both terms, the ego and the alter (Baldwin, 1897, p. 30).

Sociogenesis

One other primary developmental concern of Baldwin involves the relations between nature and nurture and the cross-generational transmission of modifications in individual development. In light of the metaphysical synthesis that guided Baldwin’s thinking, it was entirely fitting for him to argue that the nature–nurture dichotomy falsely “supposes that these two agencies are opposed forces” and that it fails to entertain the possibility that “most of man’s equipment is due to both causes working together” (Baldwin, 1895, p. 77). Evolutionary adaptations and developmental accommodations operate toward the same goals, although they are established over vastly different time intervals. Extending this analysis to the problem of how this synchrony is established and maintained, Baldwin wrote:

It is clear that we are led to relatively distinct questions: questions which are now familiar to us when put in the terms covered by the words, “phylogenesis” and “ontogenesis.” First, how has the development of organic life proceeded, showing constantly, as it does, forms of greater complexity and higher adaptation? This is the phylogenetic question. . . . But the second question, the ontogenetic question, is of equal importance: the question, How does the individual organism manage to adjust itself better and better to its environment? . . . This latter problem is the most urgent, difficult, and neglected question of the new genetic psychology. (1895, pp. 180–181)

Beginning in his first developmental volume (Baldwin, 1895) and continuing through *Development and Evolution* (Baldwin, 1902), Baldwin expanded on his view of the cross-generational transmission of behavior tendencies through “organic selection.” He proposed that “accommodations” that occur in the lifetime of the individual could be transmitted to the next generation in the form of “adaptations” of the species by means of the process that he labeled “organic selection” (Baldwin, 1895, p. 174). The essence of the idea was that ontogenetic accommodations can serve to direct the course of evolutionary change. How was it accomplished? On this matter, there remains debate on exactly what processes were implicated (e.g., Gottlieb, 1979, 1987; Piaget, 1978; Vonèche, 1982). Baldwin was clearly reaching for a developmental mechanism of directed selection that would supplement the Darwinian concept of natural selection, without invoking “the Lamarckian factor” (i.e., the inheritance of acquired characteristics). Over the years, Baldwin sharpened this concept (Baldwin, 1930). The proposal became known in biology as the “Baldwin effect” (Cairns, 1983; Gottlieb, 1979), despite Baldwin’s large debt to the crisp logic of C. L. Morgan (1896, 1902).

Toward a Critical Evaluation

Since the modernity of Baldwin’s theory has become acknowledged, it has seemed reasonable to evaluate its adequacy by modern standards. Certain shortcomings in coherence and expression appear in a cursory examination of his books; other problems demand the examination of the work of Baldwin’s contemporaries. Doubtless the most important measure of his theory has to do with its effects on subsequent investigators, including those in the present generation.

Perhaps because of his openness to novel conceptions, Baldwin sometimes evolved the meaning of basic concepts in the theoretical models that he proposed. The relativity of his ideas to time and context renders any static description of his theory misleading. It also confounds comparisons that may be made with his contemporaries and apparent intellectual heirs, including Piaget and Vygotsky.

Baldwin’s work illustrated another premise of his theoretical perspective—that an individual undergoes the “constant modification of his sense of himself by suggestions from others” (1897, p. 30). On this score, his early work in mental philosophy was heavily influenced by the metaphysical view of Scottish commonsense philosophy in general and the intuitionist realism of James McCosh, his mentor at Princeton (Mueller, 1976; Wozniak, 1982). During the second period, his research laboratory owed much to the prior work of Preyer, Binet, and Shinn. Similarly, his conceptions of “organic selection” seemed to have drawn much from the work of Morgan (1896) and Osborn (1896). In the work on genetic logic and precision of philosophical definition, Baldwin drew on contemporaries William James and C. S. Peirce in his conception of the task and its execution. Baldwin typically was generous in acknowledging these influences, and thereby highlighted his own distinctive insights and creativity.

Baldwin’s writing style and organization were uneven. On some issues, as is illustrated by some quotes in this chapter, he was incisive, powerful, and challenging. He could also, however, be obtuse. William James, one of the few American psychologists who remained friendly with Baldwin, gently remarked, “This article (like much of its author’s [Baldwin’s] writing) is in places deficit in perspicuity” (James, 1894, p. 210). Other critics were less generous. James Sully, an important British experimentalist and a contemporary of Baldwin, began and ended a review of *Mental Development in the Child and the Race* with the following comments:

This is a book which presents special difficulties to the reviewer. One looks on a biological work—for such Professor Baldwin’s work seems to be quite as much as a psychological one—for arrangement, structure, organic form: in the present case one is struck almost at first glance by the apparent absence of these attributes. And the first impression is by no means dispelled as one begins to read. . . .

To sum up my impression of Prof. Baldwin's book. It seems to me in many respects fresh and stimulating. On the other hand in what looks like an over-straining after originality apparent newness of conception often turns on closer examination to be but newness of phrasing. *When new ideas are put forward one misses for the most part an impartial and thorough-going confronting of theory with fact* (1896a, pp. 97, 102–103, my italics).

Uncertainty was not limited to this first volume. In comparing Baldwin's discussions of social development with those of C. H. Cooley (1902), Sewney (1945, p. 84) indicated that "Cooley presented his views in a language that is lucid and readable, and free of the confusing and jumbled terminology that fills the writings of Baldwin." In an unpublished journal located by Mueller (1976, p. 250), Cooley himself allowed the following comments on Baldwin's style and motivation:

A great fault with strenuous writers like Baldwin is that in their eagerness to produce they do not allow time enough for their imaginations to grow naturally and thoroughly into the mastery of a subject. They force it, and so impair its spontaneity, its sanity and humanness. What they write may be stimulating, consecutive, attractive for a time, but it is not food to live on. A style like this Goethe calls mannerism or "*das manierierte*." If you wish to produce anything of lasting value, you see to it that the subject matter, the truth, is the first interest of your mind, not your books, your essay, yourself as discoverer and communicator of truth. (quoted from Mueller, 1976, p. 250)

A modern reviewer, otherwise sympathetic to Baldwin, indicated that "there is much in Baldwin's work that is unfinished and confusing" (Broughton, 1981, p. 402). Examples of the unfinished business included theoretical discontinuities in Baldwin's social theory, and internal inconsistencies in the description of stages.

Baldwin's style may have been more than an inconvenience for readers. It permitted him to reform explanations and concepts so that one and the same term could take on fresh nuances or alternative meanings, depending on its context. Imprecision in presentation thereby promotes projection in interpretation. Perhaps this explains the considerable dispute as to what exactly was meant by Baldwin in his use of such terms as *organic selection*, *imitation*, and *genetic method*.

Baldwin tended to incorporate new ideas into his own developmental view, and he did not always appear to be sensitive to possible contradictions between the new and the old. Baldwin seems to have benefited greatly from Josiah Royce and William James in his concepts of the social self (Valsiner & Van der Veer, 1988). He also introduced some of the ideas of Osborn (1896) and Morgan (1896) in his revision of the concept of "organic selection." It was, however, a process of assimilation, not imitation. Most of the ideas were transformed when they became incorporated into a genetic framework. This long-term pattern of intellectual reformulation and reconstruction may account for why Baldwin invented new terms for old ideas and was particularly sensitive to the issue of intellectual priority and ownership. In his eyes, the concepts were new inventions. Priority and recognition were especially important for Baldwin, and this concern may help explain his haste to publish.

To illustrate, consider the concept of *organic selection*. The aim of the concept was clear from the beginning: to link the accommodations that occur in the life history of the individual to the adaptations that occur in the life history of the species. But the identification of the precise mechanisms has proved to be something of a projective test. This is due in part to the assimilation by Baldwin of the terms and logical argument outlined by C. Lloyd Morgan (1896). In a brief but brilliant essay on this matter, reprinted as an appendix in Baldwin's volume on *Development and Evolution*, Morgan (1902) refers to the collaboration of individual modification in development and adaptive variation in phylogenesis as *coincident variations*. The concept of coincident variation was incorporated into Baldwin's account of organic selection, but it was unclear when he accepted the important corollary that there were no direct connections between specific individual experiences in ontogeny and specific variations in phylogeny. Eventually, Baldwin did clarify the concept (Baldwin, 1930).

All this is to say that the contributions of Baldwin did not arise independently of the rich intellectual context in which he lived and drew inspiration. But he also inspired his colleagues. Consistent with his model of - social-cognitive development, the influences were bidirectional. There is now ample evidence that a large number of investigators in four disciplines were challenged by Baldwin's proposals and conceptions on development. In his commitment to the concept of development and its systematic application, Baldwin was more persuasive,

thoughtful, and persistent than any of his peers, including G. Stanley Hall. He envisioned a new *genetic science* (Baldwin, 1930).

Lawrence Kohlberg deserves credit—more than any other psychologist of the present generation—for having brought the attention of American psychologists to the theoretical contributions of Baldwin. Before Kohlberg's (1969) classic article on social cognition, there was scant recognition among modern developmental psychologists of the extent to which Baldwinian insights have persisted in the discipline. Kohlberg himself studied Baldwin's work independently in graduate school to establish a theoretical framework for his investigation of ethical and moral development. It is therefore fitting that the primary book on Baldwin's theory should be edited by two of Kohlberg's former students (Broughton & Freeman-Moir, 1982) and that Kohlberg's chapter in that volume contained some of its most noteworthy passages. His essay provides a succinct answer to the question: What are the real differences between Baldwin's and Piaget's theories? Kohlberg (1982) writes:

In the end, the fundamental distinction between Baldwin's moral psychology and Piaget's is that Piaget's psychology has no self. Piaget starts with an ego knowing objects, but knowing them first egocentrically. Development is a progressive movement toward objectivity. In contrast, for Baldwin all experience is experience of a self, not just of a bodily and cognitive ego. This means first that central to the self is not cognition but will. Second, it means that from the start experience is *social* and reflective. The child's sense of self is a sense of will and capacity in the relation of self to others. The individual is fundamentally a potentially moral being, not because of social authority and rules (as Durkheim and Piaget thought) but because his ends, his will, his self is that of a shared social self. (pp. 311–312)

It is also an integrative self. Baldwin (1897) himself indicated: "In spite of the large place which I assign to Imitation in the social life, I should prefer to have my theory known as the 'Self' or the 'Self Thought' theory of social organization" (p. xviii).

Baldwin's theoretical work anticipated much of Piaget's theory of cognitive and moral development. Piaget's use of Baldwin's distinctive terms—from circular reaction and cognitive scheme to accommodation, assimilation, and sensorimotor—point to a direct line of intellectual descent. More importantly, as Cahan (1984, p. 128) has observed, "the goals, genetic approach, and epistemological assumptions underlying Piaget's inquiry into cognitive development found explicit statement around the turn of the century in Baldwin's work." The mediational linkages from Baldwin are readily identified. From 1912 to his death in 1934, Baldwin's primary residence was in Paris. His work was well regarded in French intellectual circles in general, and by Pierre Janet in particular. As Piaget wrote to Mueller (1976, p. 244):

Unfortunately I did not know Baldwin personally, but his works had a great influence on me. Furthermore, Pierre Janet, whose courses I took in Paris, cited him constantly and had been equally very influenced by him. _ _ _ _

There is also a written record in the pattern of Piaget's citations of Baldwin. Curiously, these references appeared in works that were published very early (1926) or very late (1978) in Piaget's career.

It would be a mistake to infer that Piaget's theory was simply a revision of Baldwin's original. As Broughton (1981) and Cahan (1984) have observed, the differences are as great as the similarities. In addition to the insightful distinction made by Kohlberg, there is a large difference in the scientific styles of the two investigators that, in turn, gave rise to marked differences in the content of their approaches. Baldwin used the methods and analyses of experimental psychology to illustrate developmental theory. He learned early that the methods of experimental psychology were inadequate to evaluate the developmental theory that he was constructing. Given this dilemma, he chose to abandon the scientific issues and address the philosophical ones.

Piaget, on the other hand, was trained in biology rather than philosophy. As an empirical scientist, he employed observations to understand phenomena rather than merely demonstrate principles. Piaget was challenged to invent methods appropriate to the empirical issues he sought to comprehend. The clinical method of direct observation and the creation of developmentally appropriate tasks provided him with the tools for revising, extending, and evaluating his proposals. They also permitted others to assess the replicability of the phenomena and determine the adequacy of the theory. More important, the objective tracking of phenomena over time permitted

Piaget and those who followed his lead to arrive at insights that were not self-evident to experimentalists or armchair observers. The insights, in turn, contributed to the vitality of Piaget's developmental model.

Despite the shortcomings in Baldwin's theoretical system and empirical work, his proposals have nonetheless exercised a large direct and indirect influence on developmental theorists in the 20th century. As Valsiner and Van der Veer (1988) document, there are direct connections between Baldwin's (1897) concepts of the development of the self in social context and George H. Mead's (1934) symbolic interactionism, on the one hand, and L. S. Vygotsky's (1962) propositions on the social-contextual origins of personality, on the other. Baldwin's work was the common denominator, since neither Mead nor Vygotsky referred to the other directly. The Valsiner and Van der Veer (1988) analysis is consistent with independent evidence that (a) Baldwin's work had a significant influence on C. H. Cooley as well as Mead, in formulations of symbolic interactionism; and (b) Baldwin's influence on Vygotsky was mediated primarily through Janet's writings. Valsiner and Van der Veer (1988) point out that the assimilation of Baldwin's influence was selective. On the one hand, Cooley (1902) and Mead (1934) tended to discard the developmental features of Baldwin's self theory. On the other hand, Vygotsky (1962) preserved both the ontogenetic focus and the social dynamics of Baldwin's system.

In addressing the issue of what lasting significance Baldwin's developmental concepts may have for the science, we first must ask why they vanished from psychology in the first place. The primary explanation was that Baldwin's theoretical formulations were out of line with the ideas and empirical trends that were to dominate the new American psychology of the early 20th century. The new psychology was to be dominated by models that either denied the importance of cognition or diminished the importance of development beyond infancy. Moreover, his developmental concepts of the mind and of social processes required research methods that were simply not available to the discipline. The further Baldwin went beyond the study of infancy, the more speculative and removed from data he became. But the fulfillment of his aim—the building of a science of development—demanded a continuing tension between a drive for system and a drive for evidence. As Quine (1981, p. 31) has observed:

If either of these drives were unchecked by the other, it would issue in something unworthy of the name of scientific theory: in the one case a mere record of observations, and in the other a myth without foundation.

Baldwin lacked the cadre of colleagues and students to help him translate his developmental ideas into an empirical science. Without adequate methodologies, he became increasingly removed from the validation and correction of his ideas, and, like William James before him, became increasingly drawn to philosophy and away from the empirical - issues of developmental psychology.

There were other factors that various writers have felt were important in limiting his influence: (a) his writing style failed to inspire confidence in the validity of his ideas; (b) he failed to produce students who might have continued his work (i.e., in the 5 years that he was at Johns Hopkins, no students completed the doctoral program in psychology); and (c) his severe embarrassment in a personal scandal that became public led to abrupt termination from his academic position at Johns Hopkins in 1909. After that incident, he spent little time in the United States, and his name seems to have been virtually blacklisted by the next generation of psychologists. Each of these events may have contributed to the regression and submersion of Baldwin's concepts in American psychology. Ironically, Baldwin's forced move to Paris may have facilitated the acceptance of his concepts. European psychologists tended to be more receptive to developmental concepts and methods than their American counterparts.

Beyond these contributing factors, the unfinished business in Baldwin's agenda was to create methods, techniques, and analyses that are appropriate for developmental study. Piaget and Vygotsky, who helped establish those methods and revised their concepts in the light of their results, had an enormous impact on modern developmental thinking. Recent methodological critiques have suggested that the systematic study of developmental processes requires not only different statistics, but also different research designs and different ways to organize empirical observations (Cairns, 1986; Valsiner, 1986; Wohlwill, 1973). Furthermore, it was explicit in Baldwin's proposals that the task of disentangling development-in-context was necessarily an interdisciplinary activity that extends beyond the traditional boundaries of psychology. Sully (1896a) was probably correct when he observed that Baldwin's *Mental Development in the Child and the Race* was as relevant to biology as it was to psychology. And Mueller (1976) was likely accurate when he noted that Baldwin's *Social and Ethical Interpretation of Mental Development* was as relevant to sociology as to psychology.

The broader point is that Baldwin may have failed in his larger goal even if he had written more precisely, recruited more students, and died of old age in Baltimore rather than Paris. He would have failed because he had envisioned a science different from any that could be accommodated by the new psychology. It appears that many of the obstacles that precluded the adoption of developmental concepts into the psychology of the 1890s remain in place in the 1990s.

What might we conclude about James Mark Baldwin? Beyond whatever shortcomings may have existed in his writing and teaching, and beyond whatever honors he coveted and disappointments he endured, he ultimately succeeded in reaching the part of the goal that was within his grasp. He had insight and vision to describe developmental ideas that continue to inspire and challenge after 100 years.

DEVELOPMENTAL PSYCHOPATHOLOGY

Sigmund Freud (1856–1939) stood in curious relationship to the founding of developmental psychology. Unlike the other investigators covered in this section, Freud published no empirical research on behavioral development per se: He observed few children in a clinical setting, and none in a traditional experimental design. Yet psychoanalysis has emerged as one of the more important influences—if not the most important—for developmental psychology in the 20th century. Further, the early acceptance of psychoanalysis in the United States and elsewhere was due in part to the enthusiasm of G. Stanley Hall. As Freud himself described the emergence of the psychoanalytic movement:

In 1909 Freud and Jung were invited to the United States by G. Stanley Hall to deliver a series of lectures on psychoanalysis at Clark University, Worcester, Mass. From that time forward interest in Europe grew rapidly; it showed itself, however, in a forcible rejection of the new teachings, characterized by an emotional colouring which sometimes bordered upon the unscientific. (1926/1973, vol. 18, p. 720)

Hall recognized a novel developmental idea when he saw one. His promotion of psychoanalysis occurred at a time when it was suffering rejection in Europe and obscurity in North America. Freud's (1910) lectures at Clark, published in Hall's *American Journal of Psychology*, remain one of the most lucid and succinct presentations of psychoanalysis by its founder.

Born in Moravia and raised in Vienna, Freud as a student showed the catholicity of interests that was to appear in his mature work. Though anatomy and physiology were his primary areas of concentration, he was greatly impressed by the work of Darwin and Haeckel, on the one hand, and by the ideas of British associationist John Stuart Mill, on the other. After completing medical studies, Freud engaged in neurobiological research for several years, initiating, among other things, a phyletic/ontogenetic analysis of the fetal brain and the mapping of sensory neural tracts. Freud's early physiological publications were well received, and he achieved international recognition as a highly promising researcher and methodologist.

The mid-1880s constituted a turning point in his career when he decided to practice neurology, in part for economic considerations, according to Jones (1953). To further his training in this specialty, Freud won a fellowship to study in Paris with the renowned neurologist, J. M. Charcot. From 13 October 1885 until 28 February 1886, Freud thus worked in the facilities at the Salpêtrière and, presumably, shared some of the same interests as Alfred Binet. Apparently both young men were attracted by Charcot's demonstrations of the interrelations between physical symptoms and the mind, including the use of hypnotism in the remission of hysteric symptoms and in probing the "unconscious" mind. Binet, characteristically, was the first of the two to publish on issues of sexual perversions and their origins. In a remarkable yet almost forgotten paper entitled "*Le fétichisme dans l'amour*," Binet (1887) described the ease with which sexual attractions and impulses could be associated with neutral objects, and the "abnormal" could be brought about by normal mechanisms of associative learning. In this paper in an early volume of the *Revue Philosophique*, Binet anticipated three of the major themes identified with psychoanalysis; namely, (a) the continuity between mechanisms that regulate normal and abnormal behaviors and emotions, (b) the significance of sexuality in psychopathology, and (c) the essential lawfulness of human behavior.

Returning to Vienna, Freud began his neurological practice, leading to a collaboration with Josef Breuer in the writing of *Studies in Hysteria* (1895/1936). When Freud substituted free association and dream analysis for hypnotism in reaching the unconscious, psychoanalysis was invented.

Might Binet's concepts of unconscious have contributed to the psychoanalytic movement? In a remarkable passage in Breuer and Freud (1895/1936), we find:

The continuation of the hysterical symptoms which originated in the hypnoid state, during the normal state, agrees perfectly with our experiences concerning post-hypnotic suggestions. But this also implies that complexes of ideas incapable of consciousness co-exist with groups of ideas, which function consciously; that is to say, there is a *splitting of the psyche*. . . . It seems certain that this too can originate without hypnoidism from an abundance of rejected ideas which were repressed, but not suppressed from consciousness. *In this or that way here develops a sphere of psychic existence, which is now ideationally impoverished and rudimentary, and now more or less equal to the waking thoughts, for the cognition of which we are indebted above all to Binet and Janet.* (Breuer & Freud, 1936, p. 188, my emphasis)

One reason that the Binet-Janet-Freud linkage has been heretofore overlooked may be that A. A. Brill failed to include this section in his earlier English translation of *Studies in Hysteria* (i.e., before 1936). A mere oversight? Perhaps, but Sulloway (1979) proposes a less benign interpretation of selective recall and biased citations in psychoanalysis. He asks, "Why is the history of intellectual revolution so often the history of conscious and unconscious attempts by the participants to obscure the true nature and roots of their own revolutionary activity?" (p. 6). His answer is that there "generally exists a powerful underlying tension between the forward-looking orientation of the would-be discoverer and the backward-looking orientation of the historian" (p. 7). Innovation, novelty, and discovery are the stuff out of which new scientific movements are created. There is strong temptation to ignore or denigrate research and researchers who threaten the illusions of novelty or validity—despite a commitment of the scientist to balanced and thorough scholarship. Although psychoanalysis illustrates this temptation, it hardly constitutes a unique case in the past of developmental psychology.

As Freud (1926/1973) has pointed out, psychoanalysis "in the course of time came to have two meanings: (1) a particular method of treating nervous disorders and (2) the science of unconscious mental processes, which has also been appropriately described as 'depth psychology' " (p. 720). Psychoanalysis, the theory, involves strong assumptions about the development and evolution of personality that psychoanalysis, the method and therapy, does not. Why, then, did psychoanalysis-as-theory emerge as a developmental one?

One answer would be that it was demanded by the data. The roles of, say, infant sexuality and the primacy of early experiences would be seen as having been revealed by the use of psychoanalysis-as-method. A second possibility, not incompatible with the first, is that Freud may have been intellectually prepared to focus on the formative nature of ontogenetic events by virtue of his research training and experience in neurobiology. Recall that Freud had, in his physiological work, undertaken analyses of embryogenesis. Finally, broader intellectual-scientific forces appear to have been at work. As Gould (1977) and others have noted, parallels to the then-contemporary evolutionary developmental assumptions seem to be liberally represented throughout psychoanalytic thought. That Freud should draw on biological approaches in the formulation of his theory of personality and psychopathology seems entirely reasonable, in light of his scientific training in the area.

Contrary to the view that Freud employed physics as the basic model for psychoanalysis, the theory seems more analogous to the biological thought of the day than to either "physical" or even "medical" models. Hence, certain psychoanalytic propositions appear to be immediately parallel to Darwinian-Haeckelian proposals on development and evolution. These include: (a) the never-ceasing intrapsychic struggle and competition among instincts for survival and expression; (b) the psychoanalytic focus on two immanent motivational forces that figure importantly in evolution—instincts that bring about reproduction (sexual, libido), and instincts that bring about selection and destruction (aggression, Thanatos); (c) the assumed preestablished progression of the stages of ontogenesis that parallel the stages of phylogenesis, hence the appearance of sexual expression in human infancy; and (d) the notion of developmental arrest or fixation, an idea introduced into recapitulation theory to account for fetal teratology, whereby "monsters" would be produced if the ancestral stages of phyletic evolution were not permitted to be sequentially produced in individual development.

Later, in *Moses and Monotheism* (1939), Freud makes his debt to the biogenetic law explicit. As we have already seen, the primary American psychological recapitulationist, G. Stanley Hall, recognized the fundamental harmony of his ideas on development and evolution with those of psychoanalysis.

The methodological legacy of psychoanalysis requires comment. Freud's main endeavor in life, according to Freud himself, was "to infer or to guess how the mental apparatus is constructed and what forces interplay and counteract it" (Jones, 1953, vol. 1, p. 45).

The inferences on development and infantile experiences were colored, in large measure, by statements and reconstructed memories of his adult neurotic patients. It was a narrow data base, hardly adequate to construct a theory of normal development. But Freud had an advantage that most other theorists of his day (and these days) did not have: he, like Binet, was permitted the opportunity to study complex processes in "persons whom we know intimately." Psychoanalysis thus evolved from the exhaustive observation of single individuals over a long-term period, including Freud's own self analysis. Theory construction and its evaluation thus proceeded on an idiographic basis, following a research strategy not unlike the method he found effective in his earlier physiological studies.

If the contributions of investigators who employed the idiographic method are any indication—Preyer, Binet, Baldwin, Lewin, Piaget—then the procedure seems not wholly without merits. But there are pitfalls. While Binet argued that it was necessary to work back and forth—verifying and testing one's hypotheses at both levels of analysis—Freud eventually expressed a disdain for systematic experimental work, and the validity of the results it produced. For instance, in response to what seemed to be the experimental demonstration of repression in the laboratory, Freud observed: "I cannot put much value on these confirmations because the wealth of reliable observations on which these assertions rest makes them independent of experimental verification" (cited in Shakow & Rapaport, 1964, p. 129). Freud had earlier held that the rejection of psychoanalytic teachings had been for "emotional" and "unscientific" reasons. Here the suggestion appears to be that they should be accepted on the same grounds. In time, the validity of psychoanalytic assertions came to be evaluated by dogma, not by data. That's a pity on two counts. First, the history of developmental research indicates that Freud was correct in holding that idiographic methods are no less "scientific" than are nomothetic ones, though the more enduring advances have occurred when the two methods have been coupled. Second, the scientific status of the entire area was compromised when it became permissible to denigrate the value of a conclusive empirical observation or experiment if it happened to be in conflict with a kernel hypothesis.

In any case, psychoanalysis has thrived for 100 years—in science and society. Its direct impact upon the health and social sciences and literature cannot be overestimated. As a scientific orientation, the breadth of its roots in the evolutionary-developmental thought of Darwin and Haeckel, on the one hand, and the psychological associationism of J. S. Mills and British empiricism, on the other, made it especially susceptible to hybridization. For example, psychoanalysis-as-theory was as readily married to the hypothetico-deductive behavioral model of C. Hull as it was to the ethological theory of K. Lorenz and N. Tinbergen. Both syntheses—social learning theory and attachment theory—have proved to be exceedingly influential in developmental research, a matter which we revisit.

One kernel assumption that has made psychoanalysis particularly attractive to developmentalists has been its focus on the very early years as formative and determinative. The events of infancy and early childhood are presumed to provide the foundation for adult personality and psychopathology. This broad assumption demands research on infancy and early childhood and on the events that occur in the familial relationships. Ironically, the assumption also implies that the events that occur later in ontogeny—during childhood and adolescence and early adulthood—are necessarily less plastic and malleable, hence less critical for understanding personality and psychopathology. Psychoanalysis is a developmental theory, up to a point. Hence, childhood is seen as the "latency" period, and adolescence is viewed as a period of activating the propensities and conflicts of the earliest years. The goal of much research in this tradition has been to demonstrate that there are strong continuities from infancy and the preschool period throughout childhood, adolescence, and early adulthood.

There is a formal similarity between psychoanalysis and most of its descendant theories—including Object Relations Theory and Attachment Theory—in that the principal dynamic processes of development are restricted to the earliest years. Once these personality dispositions and structures become established and fixed, other nondevelopmental processes come into play. Under very special circumstances, such as psychoanalytic therapy, later interventions are possible. As Fenichel (1945) observes, the transference relationship in psychoanalysis is seen as a reconstructive psychiatric intervention where the fixations and conflicts of infancy and childhood are relived and repaired.

The broader point is that psychoanalysis and its descendant models implicate developmental processes—reciprocal interaction, bidirectionality, behavioral plasticity, biobehavioral organization—only up to a critical point in ontogeny. In the usual case, this point is infancy or very early childhood. These developmental processes, then, become less active and less relevant, and the personality structures and dispositions that they produced govern the nature and quality of the individual's adaptations throughout the life course.

OTHER TRENDS IN SCIENCE AND SOCIETY

Child Clinics

Psychoanalysis clearly played the leading role in setting the agenda for future studies of developmental psychopathology, but other, nearly forgotten forces were operating to link psychology and society. One notable event, particularly relevant to child study, was the opening of the first psychological clinic in the United States. It was founded in 1896 at the University of Pennsylvania under the direction of Lightner Witmer, a former student of Wundt and Cattell.

The aim of Witmer's work was to assist in the diagnosis and treatment of children with school problems, and to apply the principles of the newly established science to everyday concerns. What were those principles? In Witmer's view, the study of children required a multidisciplinary approach, and from the beginning he brought together different professions, including social workers, physicians, and practicing psychologists. In the absence of a treatment model, he created one. Although the clinic was essentially a local Philadelphia operation, it grew and prospered under Witmer's leadership, and a journal, the *Psychological Clinic*, was founded to describe its activities. The concept of an applied psychology, as well as a clinical psychology, caught on, and one of the students from Witmer's group at Pennsylvania, Morris Viteles, led the way in the establishment of industrial psychology in America (Viteles, 1932).

Developmental Theory

From 1900 forward, when theoretical activity in developmental psychology was on the wane in the United States, it began to thrive in Europe. Following the impetus provided by Preyer, developmental work in German-speaking countries expanded, with the young William L. Stern (1871–1938) playing a leading role. Stern was instrumental in extending the theoretical and institutional foundations of the new science in Germany from the turn of the century through the early 1930s (Kreppner, 1992). In 1909, he was sufficiently prominent in the discipline that he was awarded an honorary degree from Clark University.

Kreppner (1992) has recently argued that Stern should be viewed as the peer of Preyer, Binet, Freud, Hall, and Baldwin as a pioneer in developmental psychology. Remembered in American psychology mostly for his proposal that the mental ages could be converted into an intellectual quotient (Petersen, 1925; Stern, 1911, 1914)—a transformation that was designed to equate intelligence scores across chronological ages—little systematic recognition has been given to his fundamental role in establishing three areas of psychology as scientific disciplines: (a) differential psychology, (b) personality psychology, and (c) developmental psychology. Stern's influence is seen in the ideas on development that he generated, in the institutions he created, and in the students whom he influenced, including Heinz Werner and Martha Muchow.

Although he completed his dissertation with Hermann Ebbinghaus, Stern saw early that the study of human development required a unified perspective (Kreppner, 1992). In this regard, Binet and Henri (1895) had earlier confronted the dualism between elementarism and holism in understanding children's cognitive functioning and problem solving. In the same spirit:

[Stern criticized] the view that psychological elements are carriers of psychological forces... a person's actions are defined not by single elements but by the entire structure of environment, person, and person–environment interaction. Thus, a wholistic view was one of the fundamental bases from which Stern constructed his person-oriented theoretical framework. (Kreppner, 1994, p. 317)

Consistent with the dialectic philosophy, Stern described the tug-of-war between personal dispositions and environmental constraints in development. This brings up the issue of how plastic or malleable are actions in ontogeny. The individual is a complex unit that is not entirely determined by the forces within or the forces without. In this regard, Stern wrote:

This is the fact of personal plasticity or malleability, a domain of intentional education or unintentional influences of the milieu. This domain is narrower than many empiricists might be aware of. For the person is not only a passive recipient of the environmental forces impinging on him, but he is also reacting to these forces. The way he shapes and keeps a kind of plasticity is not only a symptom of the conflict between activity and passivity, it is also a tool for overcoming it: It is a mirror which is a weapon at the same time. (W. Stern, 1918, pp. 50–51, quoted from Kreppner, 1994, p. 318)

But it should be recalled that a dialectical systems perspective is not necessarily a developmental perspective. Stern's dual interest in development and individual differences presents a dilemma. The inclusion of developmental change in any discussion of characteristics of the self—traits and types—adds fresh complications. The theoretical task is to resolve the tension between changing, adaptable features that promote fresh adaptations, and enduring, permanent features that provide for predictable individual differences. On this score, the proposal of the IQ ratio held age constant and focused on individual differences; it represented the differential assessment, nondevelopmental side of Stern's thinking. His students represented both features of Stern's thought, from the nondevelopmental representations of topographical theory (Lewin, 1935) to the thoroughly developmental concepts of mental development and symbolic transformation in Werner (1940).

His influence extended even beyond the boundaries of recent retrospectives. Through the work of Gordon Allport, Stern's ideas became prominently represented in the classic volume *Personality* (Allport, 1937). Stern's strong influence is seen in Allport's concepts of the holistic nature of personality organization and functioning, and idiographic and nomothetic models. In the study of individual differences, Stern literally wrote the book, authoring one of the first systematic texts on differential psychology (1911), a volume that is still admirable in its precision and clarity.

After establishing and directing the Psychological Institute at Hamburg University, Stern was expelled from Germany in 1933 by the Nazi regime. He came to the United States in 1934, was appointed in the Department of Psychology at Duke University, and died in Durham, North Carolina, in 1938. As in the case of J. M. Baldwin, his ideas have survived, but his name recognition temporarily lapsed.

Child Study

In France, developmental work progressed in brilliant leaps in education and became bogged down in the universities. Binet himself was rejected in his three attempts to secure an academic appointment as chairs became open at the Sorbonne and the Collège de France. He died without having been named to a professorship in France, despite his preeminent role in the establishment of psychology as an empirical science. Binet's founding of a laboratory for the experimental study of educational problems inspired E. Claparède's establishment of the J. J. Rousseau Institute in Geneva.

In England, James Sully (1896b) and William Drummond (1907) produced influential textbooks on psychology and on development, although there was relatively little novel research being conducted on children (but see McDougall, 1906–1908). In this regard, Mateer (1918) observed that “on the whole English contributions to child study, in so far as it deals with the child of preschool age, have been imitative rather than original and very scanty in number” (p. 28). Additionally, the contributions of G. Stanley Hall were being brought back to Europe whence they had originated. The British Child Study Association, in England, and the Society for the Psychological Study of the Child, in France, were two of the more influential groups modeled after Hall's American association. Comparable developments were occurring in Italy, Russia, Denmark, and Portugal, but these events were relatively remote from the mainstream of ongoing developmental work and thinking. They soon were to become less remote with the importation by Mateer (1918) of classical conditioning methods for studying learning in infants and children.

From 1890 onward, North America joined Europe as a primary center for the scientific study of children. Millicent Shinn's "Notes on the Development of a Child" appeared in 1893 and led to a renewed interest in individual studies. At the time, her replication and extension of Preyer's method was considered to be a "masterpiece" (Mateer, 1918).

Development and Education

The work of Binet, Hall, and Stern has underscored the intimate linkage between basic developmental research and educational practice. These investigators became psychologists, however, and they focused on developmental phenomena in their research and their writings on education. It was a different course with John Dewey. Cahan (1994) notes in her review of Dewey's contributions to the science,

Education was Dewey's most enduring, comprehensive, and synthetic philosophical problem and the one for which he became best known. His interest in education "fused with and brought together what might otherwise have been separate interests—that in psychology and that in social institutions and social life." (Cahan, 1994, p. 146)

Influenced by the neo-Hegelianism of George S. Morris and W. T. Harris, on the one hand, and the pragmatism of C. S. Peirce and William James, on the other, Dewey evolved a distinctive view of education that focused on the social circumstances of the child. The dialectic between the child and the environments in which he or she lived and adapted was key to understanding the nature of development. In this framework, schools became the natural settings for the study of development.

Dewey held that the experiences of children in school could prepare them to develop those intellectual and moral virtues that would establish a better society (Dewey, 1916). How is this to be achieved? According to Dewey, the subject matter of education should not be imposed by the agenda of the adult but should be drawn from the child's immediate environment and from the child's current interests. The task then would be to begin with the child's needs and concerns, not the teacher's.

Sound familiar? These ideas were in the air in the early decades of the 20th century. The Baldwin–Piaget concepts of accommodation and assimilation were first cousins to the idea that there is a "constant reorganizing and restructuring of experience" (Dewey, 1916, p. 82). So are the views of Stern that "the way [the child] shapes and keeps a kind of plasticity is not only a symptom of the conflict between activity and passivity, it is also a tool for overcoming it." Vygotsky's "zone of proximal development" captures a similar concept. These interwoven ideas owe much to Hegelian idealism and the emergent, developmental assumptions with which it has been associated.

At the level of theory, Dewey created a framework for conceptualizing development and education rather than providing a tightly knit model to guide teaching practices. There are ambiguities, however, in how the transition is made from theory to practice. For example, the idea of a "restructuring of experience" does not provide prescriptive rules on how challenging the task must be, or how much assistance and drill the child should be given.

In a review of Dewey's work and thought, Cahan (1994) emphasized that Dewey considered education to be an opportunity for society to reformulate itself, and that "the school is cast as a lever for social change" (Cahan, 1994, p. 163). This central theme was expressed early by Dewey (1899) in a lecture at the University of Chicago:

The obvious fact is that our social life has undergone a thorough and radical change. If our education is to have any meaning for life, it must pass through an equally complete transformation. . . . The introduction of active occupations, of nature study, of elementary science, of art, of history; the relegation of the merely symbolic and formal to a secondary position; the change in the moral atmosphere, in the relation of pupils to teachers—of discipline; the introduction of more active, expressive, and self-directing factors—all these are not mere accidents, they are necessities of the larger social evolution. . . . To do this means to make each one of our schools an embryonic community life, active with types of occupations that reflect the life of the larger society, and permeated throughout with the spirit of art, history, and science. When the school introduces and trains each child of society into membership within such a little community, saturating him with the spirit of service, and providing him with instruments of effective self-direction, we shall have the deepest and best guarantee of a larger society which is worthy, lovely, and harmonious. (pp. 43–44)

Hence, educational theory “becomes political theory, and the education is inevitably cast into the struggle for social reform” (Cremin, 1964, p. 118). In Dewey’s framework, there is an explicit fusion among the science of human development, educational applications, social reform, and morality. Viewed in historical perspective, Dewey’s work and vision may be seen as yet another legacy of his former teacher at Johns Hopkins, G. Stanley Hall.

THEMES OF THE FOUNDATIONAL PERIOD

The emergence of modern developmental psychology in the late 19th and early 20th centuries was hardly a coherent, systematic enterprise. For instance, Dewey’s broad philosophical view of development and the embryological concepts of von Baer and evolutionary constructs of Darwin seemed to live in different lands. Considered as a whole, developmental work and theory were diverse, vigorous, contentious, fresh, and, in many instances, brilliant. Despite the lack of unanimity in method and theory, certain themes seemed to capture the attention and guide the work of these early developmental investigators. Seven themes of general significance were:

1. The ontogeny of consciousness and intelligence.
2. Intentionality and the correspondence between thought and action.
3. The relations between evolution and development.
4. The nature–nurture debate.
5. The effects of early experience and when development ceases.
6. Moral development.
7. How the science may contribute to the society.

Knowledge and Consciousness

“Theory of the mind” concepts are hardly new for developmentalists. Indeed, for both comparative and developmental investigators, the origins of consciousness and the development of knowledge were the major empirical concerns in the formative period of the science. The main business of comparative psychology, in the view of Romanes (1884), was to investigate the continuity of consciousness and intelligence from animals to man. To establish the linkage, it was necessary to undertake studies of animal consciousness and of animals’ apparent “intelligent” adaptations to the varied circumstances of life. Why continuity? For Romanes, continuity would demonstrate that human beings were on the same continuum as animals in the evolutionary scheme. Using information brought to him from varied and informal sources, Romanes collected anecdotes on how various beasts (dogs, chickens, spiders, cats) demonstrated high levels of intelligence in their adaptations, and transmitted this knowledge to descendants through Larmarckian mechanisms of hereditary transmission.

Here C. Lloyd Morgan entered the scene. Recall that Morgan’s major contribution to developmental and evolutionary thought was his elegant refutation of the concept of hereditary transmission of acquired characteristics,

a variation of which Baldwin labeled “organic selection” (Klopfer & Hailman, 1967; Morgan, 1896, 1902). The logic of his argument against Lamarckianism extended beyond psychology and beyond behavior.

Morgan was also instrumental in helping establish some limits on the projection of higher-order cognitive processes to lower organisms. Initially a skeptic about interpreting the mental status of nonhuman animals, he formulated a canon (or criterion) by which such attributions may be permissible. Now known as *Morgan’s Canon*, it reads “In no case may we interpret an action as the outcome of the exercise of a higher psychical faculty, if it can be interpreted as the outcome of the exercise of one which stands lower in the psychological scale” (Morgan, 1894, p. 53). In its assumption that the “psychic facility” of nonhuman animals can be qualitatively different from those of human beings, Morgan’s criterion helped put a break on the more blatant forms of 19th century anthropomorphism (see also Schneirla, 1966). As a byproduct, it invited a shift from a focus on animal consciousness to a focus on animal behavior, including analyses of the roles of biophysical and chemical processes within the organism and physical and social forces without.

The shift was nontrivial. By 1906, H. S. Jennings entitled his magnificent study of the activities of paramecia as “The *Behavior* of Lower Organisms.” Earlier, Binet’s work on infusoria and other lower beasts was labeled, “The *Psychic Life* of Micro-Organisms” (my emphases). Through Jennings and J. Loeb, the shift in focus paved the way for J. B. Watson’s behaviorism (1914) and, ironically, the denial of consciousness. In the article, “How Lloyd Morgan’s Canon Backfired,” Costall (1993) proposes that “C. L. Morgan argued that the behavior of animals and humans could only be treated in intentionalist terms; his Canon was an attempt to stem anthropocentrism but has been consistently misunderstood” (p. 13; see also Wozniak, 1993). Whatever might have been Morgan’s own intentions, he played a pivot role in extending accounts of behavioral development in animals and children beyond mentalism and anthropomorphism. This was a critical step if developmental research was to be promoted from the second class status that it had been assigned by Wundt (1907) and Hall (1885).

Questions on the origin of knowledge were also central for early developmentalists. Not only were child psychologists concerned with “the content of children’s minds” (Hall, 1891), but with how the content got into the mind. Preyer gave primary attention to the establishment of the senses, language, and cognition, and Binet and Baldwin early focused on experimental studies of childhood perception, discrimination, and memory. Baldwin’s (1895, 1915) developmental theory on the origins of knowledge arose in part from an admixture of the speculations of the post-Kantian and the evolutionary views of Herbert Spencer and G. J. Romanes on stages in consciousness and cognition.

At its root, however, were observations of infants that provided empirical substance to the ideas of reflexive, sensorimotor, and ideomotor adaptations. Baldwin’s mature theory of “genetic epistemology” was, essentially, a theory of the mind. It was based for the most part on intuition and the framework that had been established by predecessors in philosophy and biology. It seems no mere coincidence that the dominant concern with cognition and intelligence gave rise to the most robust empirical tests and the most reliable experimental methods of the period.

The Relations between Thoughts and Actions

Although the problem of consciousness was the major theme, questions of the linkages between thoughts and actions lagged not far behind. At what point in ontogeny do “willful” acts arise, and what is the relationship among consciousness and intention and action at any stage of development? These related questions were explored by virtually all early developmental investigators, but, again, with different emphases and different conclusions. Binet and Freud, in part because of their experience with hypnotism and their exposure to the work of Charcot, were concerned with the role of unconscious processes in the direction and control of behavior, both normal and pathological. Binet’s (1892) studies of alterations of personality dealt with the effects of unconscious forces, and Breuer and Freud (1895) made motivation and unconscious control the central theme of psychoanalytic theory. On this score, one of the more interesting observations from this period is the discovery of the linkage between Binet’s and Freud’s views of unconscious processes. Similarly, Baldwin (1897) considered how conscious acts, with practice and time, become unconscious, and how awareness and intentionality develop in step with cognitive development. Nonetheless, the study of “intentionality” posed formidable methodological problems that were not solved (although Preyer launched an early assault on the problem in his studies of infants).

Ontogeny and Phylogeny

How may development be defined: in terms of the ontogeny of individuals, or the ontogeny of the species? Developmental psychology was born in the wake of the biological revolution created by the formulation and widespread adoption of the Wallace–Darwin theory of species origins. The challenge to produce a similarly powerful theory of individual genesis was felt by biologists and psychologists alike. The initially popular candidates for such a general developmental theory were unfortunately limited.

Doubtless the most influential early developmental theory was the “biogenetic law.” Virtually all early important developmental writers were recapitulationists of one sort or another. Adoption of the recapitulation perspective did not, however, preclude consideration of alternative or supplementary views. On this score, the delayed maturation hypothesis of Preyer and the Baldwin–Morgan–Osborne proposal on organic selection represented efforts to solve the puzzle of how development could contribute to evolution as well as the reverse.

The “biogenetic law” collapsed shortly after the turn of the century, when the cornerstone assumption of recapitulation was discredited in biology (Gould, 1977). Embryological studies indicated that morphological steps in development could not be simply accounted for in terms of ancestral analogs. Even in embryogenesis, morphology was adaptive to the special conditions that prevailed and, as von Baer had earlier argued, development was appropriately described in terms of early differentiation of structures in ways that became increasingly distinctive for the species. The idea that evolutionary modifications and developmental adaptations are mutually supportive has been repeatedly offered, from the proposals of Morgan and Baldwin to those of modern ethology and developmental psychobiology. To be sure, the recapitulation doctrine was wrongheaded, but the issues to which it was addressed remain fundamental for the science.

Nature and Nurture

A related but separable matter concerns the extent to which an individual’s behavior and propensities reflect the operation of experiences as opposed to an inborn, heritable potential. The “nature–nurture” problem, as labeled by Galton (1871), continues to tantalize developmental theorists. Positions on this matter were as diverse then as they are now. Virtually all writers of this early period paid at least lip service to the proposal that it was not an “either–or” proposition but a question of how the two influences were fused in the course of development.

A variety of methods were employed for the study of “natural” influence on behavior. Preyer, for instance, assumed that the actions that develop in the absence of training must reflect the operation of innate factors in the infancy of an individual child. Galton, in a nomothetic approach, placed emphasis on the information to be obtained from pedigree studies, familial and twin comparisons, and selective breeding in animals. Along with Karl Pearson, he developed new statistical tools for the evaluation of covariation and correlation, and these fit neatly with the metric scale of intelligence. They also invited the partitioning of variance into heritable and environmental sources, a technique that also provided the foundation for modern quantitative behavioral genetics and a century of controversy.

When Does Development End?

All early developmentalists, by definition, assumed that experience played a role in the establishment and maintenance of basic systems of behavior, emotion, and cognition. There were radical differences among them regarding *when* they considered experience to be relevant, since timing made all of the difference in the world (see Elder, Ch. 16, this Volume). For G. Stanley Hall, individual experience played a major role in adolescence; early experience was virtually irrelevant because evolutionary forces laid the course for development up through adolescence. For Freud, it was just the opposite: infancy was key; he assumed very early development to be basic in laying the foundations for adult behavior. Beyond infancy and early childhood, the person resisted enduring changes (except under psychoanalytic treatment). For Preyer, it was embryogenesis. And for Baldwin, personality development was a continuing, never-to-be-exhausted process over the life course, so turning points could occur throughout ontogeny.

When the details of timing and plasticity of development were left unspecified, investigators could talk past each and share a happy illusion that they referred to the same issues and outcomes. A basic premise of psychoanalytic theory is the strong hierarchical assumption that very early experiences are foundational for the thoughts, actions, and relations that follow. Psychoanalytically oriented writers could be radical developmentalists, but only for one phase of the life course. Once the personality structures, motives, and “working models” become established, focus was given to the processes of maintenance, not those of establishment and change. On the other hand, investigators in a Baldwinian life-course perspective could look to events that occurred over ontogeny.

In the absence of longitudinal information on the behavioral adaptations of human beings, there was no adequate basis for selecting or rejecting these theoretical assumptions about the timing and functions of early experience. Although Mills (1898) called for systematic longitudinal study, it took a half-century before this method was systematically explored, and still another 90 years before it became a method of choice.

Morality and the Perfectibility of Humans

The concern with intentionality and willfulness can be viewed as part of a broader question of ethics: How can science help understand how human perfectibility may be achieved and imperfections avoided? This core issue was clearly pervasive in the moral psychologies of Tetens and Carus, and it was also a matter of no little import for Spencer, Hall, Baldwin, and several others of the era. A goal shared by many of them was to formulate a developmental science, which, in its highest application, would supplement—or supplant—religion.

By 1900, the key empirical finding—that stages existed in the “development of moral judgments”—had been established, in that older children gave greater weight to the motivation and intentions of a transgressor than did younger children. Similarly, striking age-developmental differences were obtained in the level of abstraction of the “moral judgments,” and in the extent to which older children as opposed to younger (12–16 years vs. 6–10 years) took the point of view of the offender. These generalizations were drawn from voluminous questionnaire studies, based on the responses of thousands of children at each age level (e.g., Hall, 1904; Schallenger, 1894). The methodology, but not the conclusions, was severely criticized at home and abroad. On matters of moral conduct, J. M. Baldwin’s proposals adumbrated both Hartshorne and May on the specificity of moral conduct, and the proposals of Kohlberg on the development of the self and moral reasoning.

Social Applications

The application to the needs of society presented both opportunities and problems. To promote the application of “scientific” principles to rearing and educating children, child study movements arose in America, and similar efforts were initiated on the continent and in England. The problem was that scientific principles were in short supply. On this point, William James noted, in *Talks with Teachers* (1900), that “all the useful facts from that discipline could be held in the palm of one hand.” Not everyone, including Binet and Hall, agreed with James. Then, as now, the temptation was great to go beyond commonsense beliefs in writing about children.

The ideas and claims of some early developmentalists had political ramifications as well. One of the outcomes was the establishment and rapid growth of the eugenics movement, with Francis Galton as its intellectual leader and the protection of superior genes as its goal in England. One byproduct of “Social Darwinism” was the importance attached to the newly devised metric scale of intelligence and the belief that it would permit rapid identification of innate, stable differences in talent. A movement in Germany, promoted by Haeckel (1901), carried a message of biological ethnic superiority and led to dark political goals.

There was also a very bright side to the application of developmental principles and ideas (see Sears, 1975). Persons concerned with the science tended to act as child advocates, lending their prestige to the passage of child labor laws, the revision of elementary and secondary school curricula, and the promulgation of child-centered rearing and control practices. The discipline may not have directly benefited from these efforts, but the welfare of children did. Then there was the enormous impact that John Dewey’s concepts of human development had on teaching and schooling practices. The field moved ahead to consolidate its claim to be an empirical science as well as a progressive social movement.

In summary, the modern study of behavioral development had an auspicious beginning as a vigorous, multidisciplinary undertaking that was pregnant with new ideas, fresh approaches, and novel developmental methods. To the founders, the resolution of the basic problems of development seemed within grasp. Perhaps they were, but that early promise was not to be fulfilled, at least not for another half-century.

THE MIDDLE PERIOD (1913–1946): INSTITUTIONALIZATION AND EXPANSION

One-third of the 20th century, from 1913 to 1946, encompassed two world wars, an economic depression of unprecedented depth and duration, the rise to world power of two new political-economic systems, and unspeakable horrors of mass destruction and genocide. These events affected the course of all intellectual and scientific work undertaken during the period, and developmental psychology was no exception.

Paradoxically, some of the events that had tragic worldwide consequences served to enrich and broaden the discipline. World War I brought attention to the advantages and potential of psychological assessment, particularly intelligence testing. It also sent the primary American developmental theorist, James Mark Baldwin, to France, where he enjoyed greater influence than he had had in his own country. World War II contributed toward the establishment of psychology as a profession as well as a science. The American prosperity enjoyed in the 1920s was directly translated into liberal support for the discipline by private foundations and state funds. Likewise, the depression of the 1930s and early 1940s effected a massive withdrawal of funds and, concomitantly, a drop in the level of research activity on developmental problems.

Nazi persecution in the 1930s brought to America a cadre of brilliant theorists from Europe. Some, including Kurt Lewin, Fritz Heider, and Heinz Werner, gained an opportunity to change the direction of modern social psychology and to keep alive the developmental concept. For others, including Karl Bühler and William Stern, the exodus was a tragedy wherein their talents and achievements were virtually unappreciated and ignored. And what directions might the study of social development have taken if Charlotte Bühler had been permitted to remain safe and free at her Institute in Vienna rather than becoming an adjunct faculty member in Los Angeles?

Beyond societal and political influences, there was much to be accomplished within the area. There was an immediate need to extend the methodological boundaries of the discipline in order to permit systematic investigation of the several issues claimed by its investigators and theorists. Hence, the formulation of ways to translate ideas into research operations remained a first task. Virtually all substantive issues required attention, from social, cognitive, and sensorimotor analyses to the study of language, moral development, and psychobiological changes. In the 1920s, with the widespread granting of funds that were specifically assigned to support studies of children, there was an explosive increase in empirical research.

In the establishment of its empirical foundations, the enterprise of child and developmental psychology became segregated into separate subareas, topics, and theories. No single model, not even behaviorism, was broad enough to encompass and provide direction for the activities of researchers. The fragmentation stimulated efforts to put the field back together again through the publication of handbooks (which served to summarize the diverse investigations) and the founding of development-centered journals and scientific societies. But in the absence of a compelling and coherent general theory of development, the subareas of developmental investigation and thought evolved along separate trajectories. The story of the main events and ideas of this period is perhaps best told by recounting the progress made in the several areas of inquiry—from mental testing and moral development to language and thought and developmental psychobiology. That will be the strategy adopted in this section, beginning with some comments on the institutionalization of American developmental psychology and ending with a brief review of some major theoretical ideas of this period.

INSTITUTIONS AND DEVELOPMENT

The child study movement led by G. Stanley Hall in the 1880s and 1890s bore fruit some 20 years later. Child study associations had been established in one form or another in all regions of the country. Collectively, they formed a potent movement for child advocacy. In 1906, an Iowa housewife and mother, Cora Bussey Hillis, proposed that a research station be established for the study and improvement of child rearing (Sears, 1975). Her argument was simple but compelling: If research could improve corn and hogs, why could it not improve the rearing of children?

The campaign to establish a Child Welfare Research Station at the University of Iowa was eventually successful. The Iowa unit was established in 1917 and its research–laboratory school opened in 1921.

The Iowa facility—along with a comparable research unit that opened shortly afterward at the Merrill-Palmer Institute in Detroit—became the model for child development institutes that were to spring up across the United States and Canada in the 1920s and 1930s. Because one of the main functions of the institutes was dissemination of information about children, various publications were established, ranging from university monograph series (at Iowa, Columbia, Minnesota, Toronto, and Berkeley) and journals (*Child Development*, *Child Development Monographs*) to handbooks (Murchison, 1931, 1933) and magazines (*Child Study*, *Parents Magazine*). Most of the institutes also awarded advanced degrees, thereby helping to create a new professional workforce. The graduates found placements in university teaching and research positions, as well as in a wide range of applied settings. An interdisciplinary organization, the Society for Research in Child Development, was established in 1930 to provide a forum and a framework for scientific contributors to the discipline (Frank, 1935).

The story of this “golden age” for the study of children in America has been told expertly by two of its participants (Sears, 1975; Senn, 1975), so only an overview is required here. New funds from diverse private and governmental sources were made available to researchers in child development. Among the more notable contributors were the individual sponsors of the Fels and Merrill-Palmer child study institutes, along with various special-mission projects (i.e., Terman’s study of gifted children, by the Commonwealth Fund; the study of the effects of motion pictures on children, by the Payne Foundation; the causes of morality, by the Institute for Religious and Social Education).

But in terms of sheer impact on the field, the Laura Spelman Rockefeller Memorial (LSRM) must be acknowledged as having the greatest influence. Through LSRM funds, major centers for research were established at three universities (California, Columbia, Minnesota). Substantial support was awarded to the existing institutes at Yale and Iowa, and smaller-scale research centers were created at the University of Michigan and in Washington, D.C. Studies of personality and child development at Vassar, Sarah Lawrence, and Teachers College (Columbia) also shared in the Rockefeller support. And that’s not all. Under the general direction of Lawrence Frank, the Rockefeller funds provided support for individual research projects (including C. Bühler’s pioneering investigations) and made possible the establishment of the national Child Study Association (see *Child Study*, Vols. 1–3). Such liberal support for child study provided stimulation for ongoing work at Stanford, Harvard, Toronto, and Cornell. All in all, the effect was to confirm Binet’s observation that Americans like to do things big.

To summarize in detail the specific activities and accomplishments of these institutes from 1920 to 1940 is beyond the scope of this review. At midstream, Goodenough (1930b) provided an informative coverage of the work and accomplishments during a period of great activity. Each institute soon evolved its own “personality” in terms of methods employed and problems addressed. The issues that the institutes tackled should illustrate the point.

1. Mental testing. Virtually all of the institutes were committed, at some level, to clarifying the problems of intelligence assessment and how individual differences in test performance came about. By the late 1930s, studies at Iowa on the effects of enrichment on intelligence test performance had appeared, and longitudinal work on the stability and change of IQ had begun at Fels and Berkeley. Anderson (1939) at Minnesota offered a provocative theory of the continuity of intellectual functions, based on the extent to which early tests assessed functions that overlapped with those assessed in later tests. The faculty at Stanford, headed by Lewis Terman and Quinn McNemar, strongly contested any strong claims on the malleability of intelligence (Minton, 1984).

2. Longitudinal study. Most thoughtful developmental psychologists recognized the need for gaining adequate information about behavior and development over a significant portion of the life span. But the lack of resources inhibited such long-term, large-scale investigations of behavior and cognition. Here is where the institutes were invaluable. Two of the institutes—Berkeley and Fels—launched systematic longitudinal investigations. The work complemented the already initiated study by Terman at Stanford.

3. Behavioral and emotional development. The study of children’s fears and how they arise was undertaken at Columbia, Johns Hopkins, Minnesota, California, and Washington University (St. Louis). This work, essentially an extension of the projects launched by Watson and his collaborators at Johns Hopkins (see below), dealt with the

problems of how emotions arise in ontogeny and how fears are learned and unlearned (Jersild, Markey, & Jersild, 1933; M. Jones, 1931).

4. *Growth and physical maturation.* The early work of the Iowa group was concerned with the study of children's physical development, including the care and feeding of children (Baldwin & Stecher, 1924). Similarly, Arnold Gesell's institute at Yale led the way in establishing graphs of normal development for use in identifying instances of aberrant behavior or developmental disorders (see below). The Fels Institute early established a tradition for clarifying the relations between physical and behavioral development, leading to, among other things, significant advances in assessment and diagnosis of psychosomatic relations.

5. *Research methods.* John Anderson and Florence Goodenough at Minnesota, Dorothy S. Thomas at Columbia, and H. McM. Bott at Toronto recognized the need for more adequate observational research methods (see Anderson, 1931; Bott, 1934; Goodenough, 1929; Thomas, 1929). But the methodological work was not limited to observational techniques. Goodenough (1930a) continued to explore alternative and flexible methods for personality and intellectual assessment (including her Draw-a-Person test), and these workers led the way in ensuring that high levels of statistical sophistication would be employed in research design and analysis. Dorothy McCarthy at Minnesota and Jean Piaget at the J. J. Rousseau Institute began their influential studies of the origins of children's language and thought (see below).

This is a mere sampling of the major concerns and issues. Without detracting from the intellectual and scientific quality of the work completed, it should be noted that few major theorists were associated with the newly founded institutes. There were some notable exceptions to this generalization, including Jean Piaget at the Rousseau Institute and, in the 1940s, Kurt Lewin and Robert Sears at Iowa. For the most part, the institutes were devoted to the pragmatic problem that Mrs. Hollis had identified, "How can we improve the way that children are reared?" The area soon learned that it had neither methods nor theories adequate to the task. The institutes focused on devising more adequate methods, leaving the primary theoretical work to others.

MENTAL TESTING

In the eyes of many developmentalists in the 1920s and 1930s, the major obstacle to establishing a credible science of child psychology was not theoretical so much as it was methodological. Given Binet's insights on and career-long devotion to the matter, it seems altogether fitting that he, along with his collaborators, engineered the most significant methodological advance of the first half-century of the science. Whatever may be the flaws and shortcomings of the Binet-Simon method of intellectual assessment, it provided the tool that was required for the precise study of children's development, and for the translation of cognitive events into quantifiable units. The test opened the door for comparisons of significant psychological dimensions across ontogeny, and for the analysis of individual differences among persons. It also provided a reliable method for addressing the major themes that had been identified in the first era of the field, including the problems of nature-nurture, early experience, continuity of consciousness, and the predictability of behavior and cognition.

Goodard (1911) deserves credit for having been the first to bring the Binet-Simon scale to America, but Lewis M. Terman and his colleagues at Stanford University were key in extending the use of intelligence tests in America and worldwide through their revision of the Binet-Simon scales. The Stanford-Binet individually-administered tests helped establish clinical psychology as a separate profession in clinics, schools, the military, and industry, fulfilling one of Binet's visions (Petersen, 1925).

Like other students of G. S. Hall who gravitated toward educational psychology, Terman's initial academic appointment at Stanford was in the School of Education. Formerly a school principal, Terman had a long-standing interest in the problems of individual differences in the classroom. He selected as his dissertation project the comparison of seven bright and seven dull boys on various measures (Terman, 1906). He had been acquainted with Binet's work since his research for his undergraduate thesis at Indiana University, and, given his background and the Barnes-associated tradition at Stanford for large-scale study, it seemed entirely in character that Terman should attempt an extensive standardization of the Binet-Simon scales (on some 1,000 California schoolchildren; Terman, 1916). Among other improvements to the scale, Terman adopted a suggestion by William Stern that any child's performance could be expressed in terms of an Intelligence Quotient (IQ). In his commitment to observation and

standardization, Terman proved to be a worthy successor to Binet. The Americanized version of the test was an almost immediate success. The method was widely adopted and the essential idea was used to construct group tests to meet the needs of the military (in screening recruits for World War I) and the schools to sort out highly gifted or retarded children (Goodenough, 1954).

This is not the place to attempt a comprehensive account of the testing movement; useful histories of mental testing, through 1925, can be found in Peterson (1925) and Young (1924), and more recent accounts can be found in Goodenough (1954), Tuddenham (1962), and Carroll and Horn (1981). Three comments on mental testing and its relation to developmental psychology are in order, however.

First, the method paved the way for systematic comparisons across time, across persons, and across conditions. This was a necessary step toward the conduct of longitudinal studies of human behavior. It also provided the tool for comparing persons of different backgrounds, races, and environmental experiences, thereby permitting the researcher to address anew the problems of heredity and environmental influence. The study of the effects of early experience on IQ was explored by Sherman and Key (1932), by Wheeler (1942), and by the Iowa group led by Skeels and Wellman (Skeels, 1966; Skeels, Upgraff, Wellman, & Williams, 1938). In addition, the procedure was applied in ways not anticipated by its innovators. For instance, Kamin (1974) reported the tests were used as a screening device for immigrants to the United States—a practice that was hardly appropriate, given the diverse backgrounds of the persons being tested and the conditions of assessment. The device proved to be an exceedingly powerful tool for categorization and for differentiation of cognitive abilities.

The second comment concerns the relation of the testing movement to the rest of psychology, especially the rest of developmental psychology. Interest in the use of the procedure as a research device initially rode a wave of enthusiasm, followed by a period of neglect. When experimental studies of how performance on intelligence tests could be modified were conducted in the 1930s, it became clear that increments of one or more standard deviations (e.g., 10 to 20 IQ points) were not uncommon and could be brought about in a relatively brief period (4 to 16 weeks) (see Jones, 1954, for a review of this work). In addition, Sherman and Key (1932) demonstrated that a negative correlation was obtained between IQ and age among children living in culturally deprived Appalachia. Such findings raised questions about the environmental contributions to IQ scores, and much debate about the nature and meaning of the findings followed (see McNemar, 1940; Minton, 1984). A parallel controversy arose over the interpretation of twin data, and the implications of findings from the tests of monozygotics, dizygotics, and other types of siblings for the inheritance of intelligence. The issues subsided, without clear resolution, in the late 1930s, then came to the forefront again some 30 years later.

Third, the method of intelligence testing did not give rise to a coherent theory of the development of intelligence. The theoretical debates centered mostly around matters of test structure and statistical analysis (e.g., whether a single factor could account for the variance or whether two or multiple factors were required) and whether the results of the experimental tests were being properly interpreted. There was a significant gap between the emerging theories of cognition (following the model of Baldwin and Piaget) and the methods of assessment being employed. Neither Piaget nor Baldwin are mentioned in Goodenough's (1954) comprehensive chapter on "mental growth." The gap was not unprecedented: A parallel problem could be found between the methods of social interactional assessment and the theories of personality and social learning patterns (see below). But the test procedures proved their worth in education and in the marketplace, even though they could not be readily integrated into the existing body of psychological theory. Hence, the testing movement evolved and prospered outside the mainstream of developmental psychology (Dahlstrom, 1985).

LONGITUDINAL STUDIES

According to Wesley Mills (1899), the discipline needed (a) longitudinal studies of individual organisms from birth to maturity, and (b) systematic experimental manipulations of the long-term conditions for development. Without that information, one could scarcely hope to achieve a firm grasp of the processes of development, whether nonhuman or human. Because the major hypotheses about development were concerned at their root with these processes, one would have thought that longitudinal studies would have been given the highest priority in the new discipline. They were not. Perhaps the practical difficulties in mounting life-span projects in humans seemed too formidable, or the investment and risks seemed too great. For whatever reasons, the information available about longitudinal development by the end of the first period of the area's history was either sketchy (e.g., Binet's study of

his two daughters) or subjective and retrospective (e.g., psychoanalytic interviews). But, on this fragmentary information, the most influential psychoanalytic and behavioristic theories of cognitive and personality development were formulated, and few data were available to assess their implications or correct their shortcomings.

One of the obstacles for longitudinal study—the need for measurement—seemed to be solved by the development of a reliable device for the metric assessment of cognitive abilities. That advance was sufficient for Lewis M. Terman, who perfected the instrument and pioneered the first large-scale longitudinal study of behavioral/cognitive characteristics in 1921. He selected 952 boys and girls in California, from 2 to 14 years of age, who achieved a test score of 140 IQ or above. This group comprised the brightest children (in terms of test performance) who could be found in a population of about a quarter-million (Terman, 1925). His initial aim seems to have been the planning of educational procedures for gifted children. As it turned out, the sample provided the core group for follow-up studies that continued through most of the 20th century. At several stages in childhood and early adulthood, these “gifted” children-cum-adults were reassessed, with the behavioral net widened to include personality characteristics, life accomplishments, and social adaptations. Later, their spouses and children were included in the study, and each group of subjects was followed through the 60th year of life (Sears, 1975). Despite shortcomings in the original design (e.g., absence of a matched nongifted control or comparison group), the data provide a rich yield of development through the life span. Overall, the work constitutes one of the major achievements of the science in its first century, incorporating the efforts of three of its most influential figures (Binet, Terman, & Sears).

Another factor that had inhibited longitudinal studies was the need for research institutes that would survive as long as their subjects. That problem was solved in the 1920s by formation of the several child research institutes across the United States. Soon afterward, longitudinal projects were initiated at Berkeley, Fels Institute, Minnesota, and Harvard. Initially, smaller short-term projects were undertaken to investigate particular issues. Mary Shirley (1931, 1933a, 1933b), for instance, completed a two-year-long investigation of the motor, emotional, and social development of infants. In contrast to the cross-sectional studies of Gesell, her longitudinal work permitted her to identify particular sequences in growth and change.

Experimental intervention studies of the sort that Mills (1899) had called for in animals were undertaken with children. Myrtle McGraw's (1935) work with Jimmy and Johnny, twins who were given different training experiences, is one of the better instances of the use of what Gesell called the “co-twin” control procedure. By providing “enrichment” experiences prior to the normal onset of basic motor functions, McGraw was able to demonstrate that experiences can facilitate the appearance and consolidation of climbing and other movement patterns. The “enriched” twin continued to show a modest advantage over the control twin, even though age and associated growth greatly diminished the apparent gains (see Bergenn, Dalton, & Lipsitt, 1994, for a more detailed account of McGraw and her contributions). Along with these well-known works, a large number of lesser-known investigations were addressed to the same issues, using short-term longitudinal interventions to influence intelligence test performance (e.g., Hilgard, 1933), and motor skills (e.g., Jersild, 1932).

These studies of longitudinal development were limited to children, at least in the initial stages. What about development beyond childhood? Since the early investigations of Quetelet, there had been few attempts to address directly the problems of developmental change during maturity. The exceptions are noteworthy because they provide part of the foundation for contemporary emphasis on the study of development over the entire life span of human experience. One of the first texts on aging was produced by G. Stanley Hall (1922), shortly before his death. Later in the same decade, Hollingsworth (1927) published a text on development over the whole life span, and some 12 years later, Pressey, Janney, and Kuhlen (1939) extended the coverage.

The database for these extensions to developmental issues over the life span was meager, at best. Surprisingly little research on behavioral development in adolescence was stimulated; perhaps Hall's major work gave the appearance that all of the important questions were already answered. One of the more interesting studies of this age group was reported by Bühler (1931), who analyzed the diaries of some 100 adolescents. In describing this work, Bühler writes:

Intimate friendship is by all authors, considered as a characteristic of adolescence, not of childhood. The same is true of that love or devotion which one calls *hero-worship*. This is also considered as a very characteristic feature of puberty. Charlotte Bühler studied, on the basis of adolescents' diaries, the distribution and types of hero-worship during puberty. Her collection of about one hundred authentic diaries contains contributions from different countries, different milieus, and different age groups. There are German, Austrian, American, Czech, Swedish, and Hungarian diaries in this collection. Statistics show that the average age at which girls begin to write diaries is thirteen years and eight months, while the average age for boys is fourteen years and eleven months. In all of the girls' diaries either a "crush" or a flirtation plays a role, sometimes both. The period of the "crush" is from thirteen years and nine months to seventeen years. The boys' diaries show a larger variety of types of friendship. In the place of the "crush," a devoted admiration for a leader or for a girl, or often for an older woman, plays a role. (Bühler, 1931, p. 408)

Diaries provided an innovative substitute for prospective longitudinal data, providing an account of the adolescent's most intimate thoughts, concerns, hopes, and wishes. But it also had certain hazards, with the problems of selection paramount (e.g., who keeps a diary, what is selectively omitted or recorded). Because of its inherently private nature, the method has few safeguards against fraud. On this score, Sigmund Freud wrote a laudatory introduction to the published version of a diary that, upon critical examination, proved to be a fake. It is a modest irony that the young Cyril Burt (1920/1921) exposed the fraud. Some 50 years later, Kamin (1974) and others raised questions about biases and the accuracy of data in Burt's own work on twins reared apart. Despite the pitfalls, diaries continued to provide a potentially rich source of information about the beliefs, attitudes, and conflicts of adolescents.

Given the amount of time, effort, and funding required for these longitudinal studies, what could be said about their payoffs by midcentury? Were they worth the investment? The early returns indicated that the highest levels of predictability were obtained when the assessment procedures had previously established reliability and utility (i.e., intelligence and physiological measures). In social and personality characteristics, however, individual differences appeared to be demonstrably less stable over time. Because the longitudinal work was, for the most part, atheoretical, except for an implicit belief in the long-term stability of human characteristics, the early findings posed serious problems for interpretation. Were the methods and measures at fault, or was the theoretical framework itself to blame? It took research another half-century to answer this question.

BEHAVIORISM AND LEARNING

At about the time that World War I began in Europe, American psychology underwent an internal upheaval. John B. Watson (1878–1957) called behaviorism a "purely American production" (1914, p. ix). Its essential message—that the study of humans, animals, and children required the objective methods of natural science—was of fundamental importance, but it was hardly novel. Others close to Watson, including his mentors in behavioral biology (Jacques Loeb and H. S. Jennings) and his colleagues in psychology (e.g., K. Dunlap), had expressed similar ideas. But none had presented the argument with the persuasiveness and flair that Watson did in person and in print. As Watson put it:

Psychology as the behaviorist views it is a purely objective experimental branch of natural science. Its theoretical goal is the prediction and control of behavior. Introspection forms no essential part of its methods, nor is the scientific value of its data dependent upon the readiness with which they lend themselves to interpretation in terms of consciousness. The behaviorist attempts to get a unitary scheme of animal response. He recognizes no dividing line between man and brute. The behavior of man, with all of its refinement and complexity, forms only a part of his total field of investigation. (1914, p. 1)

For Watson, there was an essential unity in animal and human psychology. The methodological differences that trifurcated the discipline for Hall and divided it for Wundt were not valid; the study of children, animals, and adult human beings could be reduced to the same behavioral, noncognitive techniques. Moreover, Watson called for a pragmatic psychology, one that could be applied in society and useful in everyday affairs. Watson liberalized psychology by holding, in effect, that the science could apply itself to any problem of life and behavior.

Watson was originally trained in comparative psychology and heavily influenced by biologist Jacques Loeb, who was “concerned with explaining animal behavior in terms of physiol-chemical influences and without the use of anthropomorphic, psychic, or mentalistic terms” (Jensen, 1962, p. x). His explanatory concept of “tropism” was borrowed from studies of plants, where stimulus-directed movement occurs, say, toward sunlight. At the same time, another behavioral biologist, H. S. Jennings, agreed with Loeb on the need for objective analysis, but he also emphasized the “complexity and variability of behavior in lower organisms and the importance of internal factors as determinants of behavior” (Jensen, 1962, p. x). How Loeb—Watson’s mentor at Chicago, and Jennings—Watson’s senior colleague at Johns Hopkins—outlined many of the essential ideas of behaviorism is a fascinating story that has been brilliantly documented by D. D. Jensen (1962; see also Pauly, 1981).

Watson’s contributions to development evolved through two stages: empirical and theoretical. Consider first his methodological and research contributions to developmental study. Consistent with his vision, Watson set about to demonstrate the relevance of purely behavioral procedures to the study of human behavior. He began his work with newborn infants and the analysis of the conditioning of emotional reactions (Watson & Morgan, 1917; Watson & Rayner, 1920). Watson was well prepared for the task; by mid-career, he had been recognized as one of America’s leading researchers in comparative and physiological psychology (Buckley, 1979; Horowitz, 1992).

Why did Watson choose to work with infants? Given the methodological outline of behaviorism, would it not have been as appropriate to begin with adolescents or adults? Watson provided the answer himself in his “lifechart” of human activities, where he asserted that “to understand man,” one must begin with the history of human behavior (1926). He saw personality as being shaped by learning experiences from birth onward. Innate reflexes and inherent emotions provided the substrate, and conditioning and learning mechanisms permitted the elaboration of emotions and behavior in development. Personality thus was the outcome of a hierarchical structure, and discrete learning experiences provided the essential building blocks. The conditioning of early emotions—love, fear, or rage—provided the foundation for all that followed. In his stress on emotions and early experience, Watson seems to have been influenced directly by Freud (as Watson suggested in 1936, in his autobiographical statement), as well as by other views of personality current in the day (including McDougall’s, 1926, theory of sentiments). In any case, the study of emotional development in infancy became the focus for Watson’s experimental and observational work from 1916 to 1920. Because of his work, Watson (along with E. L. Thorndike) was credited in an early *Handbook of Child Psychology* as having initiated experimental child psychology (Anderson, 1931, p. 3). Binet was overlooked again.

The infant work was conducted in the laboratories and newborn nursery at Johns Hopkins Hospital from 1916 through 1920; it was interrupted by Watson’s service in World War I and terminated by his being fired from Hopkins in 1920. The series involved controlled observation of stimuli that elicit emotional reactions in infants (Watson & Morgan, 1917), a systematic attempt to catalogue the behavior responses present at birth and shortly afterward (Watson, 1926), and the experimental conditioning and manipulation of fear reactions (Watson & Rayner, 1920).

Although Watson’s conditioning studies were only demonstrational and would hardly deserve publication on their methodological merit, they proved to be enormously influential. Following the lead of the more extensive and careful work of Florence Mateer (1918) and of the Russian investigator N. Krasnogorski, who first reported in 1909 the conditioning of salivation in children (see Krasnogorski, 1925; Munn, 1954; Valsiner, 1988). Watson boldly attacked the problem of the conditioning of emotions in infancy in the “case of Albert.” What was impressive about this work was the finding that fear was conditioned and, once established, resisted extinction and readily generalized. As M. C. Jones (1931) pointed out, “conditioned emotional responses” differ from earlier demonstrations of reflexive conditioning in that there was one obvious discrepancy: “Whereas the conditioned reflex is extremely unstable, emotional responses are often acquired as the result of one traumatic experience and are pertinacious even in the absence of reinforcement” (p. 87). According to Watson, “guts can learn” (1928), and they seemed to have excellent memories. He wrote, “This proof of the conditioned origin of a fear response puts us on a natural science grounds in our study of emotional behavior. It yields an explanatory principle which will account for the enormous complexity in the emotional behavior of adults” (1928, p. 202). Conditioned emotional responses, whether in the form of the “CER” of B. F. Skinner and W. K. Estes (1944), the “two-factor theory of anxiety” of Solomon and Wynne (1953), or the “learned helplessness” concept of Maier, Seligman, and Solomon (1969), have continued to play a significant if enigmatic role in neobehavioral accounts of personality and development.

Although Watson himself completed no further scientific investigations, his experimental studies with infants were taken up by students and colleagues through the 1920s and early 1930s (see M. C. Jones, 1931). Mary Cover Jones (1924) explored the problem of the extinction of emotional reactions, demonstrating how experimentally produced fears could be “undone.” H. E. Jones (1930) clarified the short-term stability of the response (not great after 2 months). Later, experimental psychologists investigated the possibility of neonatal (e.g., Marquis, 1931; Wickens & Wickens, 1940) and fetal (Spelt, 1938) conditioning, along with extensive studies of early motor learning. Watson’s work also stimulated the development of observational methods to assess children’s behaviors, on the one hand, and the establishment of the family of behavioristic theories of learning, on the other (e.g., Guthrie, 1935; Hull, 1943; Skinner, 1938; Tolman, 1932).

This brings us to Watson’s theory of psychological development, which grew both more extreme and more expansive the further he became removed from data in time and space. As Watson’s ideas on child development became elaborated, it seemed clear that he considered all emotions—not merely fear and rage—to be obstacles for adaptive behavior and a happy life. Among other things, he campaigned, in his influential best-seller, *Psychological Care of Infant and Child* (1928), against too much mother love. The child, he said, would become “honeycombed” with affection and, eventually, would be a social “invalid” wholly dependent on the attention and responses of others. Love, like fear, can make one sick to the stomach.

Despite such rhetoric, Watson’s books carried a deadly serious message for the 1920s and 1930s. Science could lead to improved and efficient ways to rear children, and if mothers and children could be liberated from each other early in the child’s life, the potential of both would be enhanced. This “modern” view of child rearing was predictably controversial, attracting both converts and devastating criticism. Along with his emotionally cool view of personality, Watson became increasingly extreme in his environmentalism. Although he was developmental in his approach, Watson downplayed the role of psychobiological factors in personality after birth, considering learning to be the key mechanism for the pacing and stabilizing of behavior development from birth to maturity. Biology was important, of course, but only as it established potential for learning. In the absence of evidence on the long-term effects of early experience or longitudinal studies of human development, Watson was skating on extremely thin ice. To his credit, he said so (1926, p. 10). But Watson was in no position to obtain corrective or confirming data; except for occasional part-time teaching at the New School, in New York, and a lecture series at Clark University, he had dropped out of academia and out of scientific research in 1920.

Watson nonetheless became a symbol for a scientific approach to child rearing during the 1920s and 1930s through his popular magazine articles (e.g., in *Harper’s* and *Atlantic Monthly*). His views extended into education, pediatrics, psychiatry, and child study, where the stress on the acquisition of habits and avoidance of emotions became translated into prescriptions for behavioristic child rearing. A cursory review of these materials reveals virtually no empirical citations, except for references to the demonstrational studies that Watson conducted or loosely supervised. It should be noted, however, that Watson’s advice for mothers to adopt a psychologically antiseptic approach toward their children had not been original with him. In physician Emmet Holt’s *The Care and Feeding of Children*, a best-seller since its first edition in 1894, the same guidance had been given on the evils of kissing children (“Tuberculosis, diphtheria, syphilis, and many other grave diseases may be communicated in this way”; Holt, 1916, p. 174) or playing with babies (“They are made nervous and irritable”; Holt, 1916, p. 171). Watson didn’t offer fresh guidance so much as new reasons. In the book promotion in 1928, Watson was described as “America’s greatest child psychologist” (Buckley, 1989, Fig. 15).

What might have happened if Watson had remained involved in empirical research? We can only guess that his statements would have been more closely tied to facts rather than speculations, and that his views about child rearing would have become less idiosyncratic and less extreme (see Buckley, 1989). But, as we have indicated elsewhere, certain problems remained at the heart of his system (Cairns & Ornstein, 1979). Beyond the behavioristic model of an emotionless and mindless child, perhaps the most salient weakness in Watson’s view was the assumption that development was a mechanistic process that could be reduced to fundamental units of learning. Seemingly all behavior was learned, from birth onward, and the earliest experiences were the most basic. This was a peculiar and unnecessary position for a behaviorist to take. Although Watson early claimed psychology was “a definite part of biology,” his view of development was nonbiological and nonorganismic. Learning is an essential process in development, but it is not the only process.

Experimental studies of learning in children did not begin and end with Watson. Another influential line of research followed the lead of E. L. Thorndike in studies of verbal learning and in the analysis of the “law of effect” and different reward and punishment contingencies (see Peterson, 1931, for a review of relevant studies). The work followed not only the laboratory analogues used by Thorndike (following Binet & Henri, 1895, and Ebbinghaus, 1897), but also within-classroom manipulations of the efficacy of different kinds of reward–punishment feedback (e.g., Hurlock, 1924). The studies of learning and memory were, for the most part, divorced from conditioning research in infants and animals, studies of mental testing, and investigations of language and thought. Areas of inquiry that might be seen as potentially fitting together to form a developmental view of cognition instead evolved separately, each toward its own distinctive methodology, concepts, and discipline affiliation. It would be another 50 years before serious attempts were made to bring them back together (see Carroll & Horn, 1981; Ornstein, 1978).

MATURATION AND GROWTH

While Watson served as the spokesman for behaviorism and environmentalism in child development, Arnold Gesell (1880–1961) was gaining stature as an advocate of the role of growth and maturation in behavior. Trained at Clark University in the early 1900s, Gesell absorbed G. S. Hall’s vision of the significance of child study, the importance of biological controls in behavior, and the practical implications of child research, particularly for education. After earning his PhD degree, Gesell worked initially in schools and curriculum (as did most of the Clark graduates in developmental psychology in that period). He returned to complete an MD degree at Yale, then founded a child study laboratory in 1911, which permitted him to extend the tradition of W. Preyer and M. Shinn. Gesell (1931, 1933) early demonstrated himself to be an innovative and careful methodologist. He was one of the first to make extensive use of motion pictures in behavioral analysis and to explore the advantages of using twins as controls in experimental studies (i.e., one twin is subjected to the experimental manipulation, the other serves as a maturational control).

In 1928, Gesell published *Infancy and Human Growth*, a remarkable report on several years of study of the characteristics of infancy. According to Gesell, one of his aims was to provide “objective expression to the course, the pattern, and the rate of mental growth in normal and exceptional children” (p. viii). The other aim was theoretical, and the last section of the book takes on “the broad problem of heredity in relation to early mental growth and personality formation_._._and the significance of human infancy” (p. ix).

Gesell (1928) was characteristically thorough in dealing with both problems, and his normative tables and descriptions of how *Baby Two* (2 months old) differs from *Baby Three* and *Baby Nine* ring true to the contemporary reader. On basic characteristics of physical, motor, and perceptual development, children showed reasonably constant growth and age-differentiation. If the infants selected did not, as in a couple of instances, they may be substituted for by more “representative” ones. All in all, the business of establishing appropriate norms was seen as an essential part of his medical practice and the practical issues of diagnosis. As Gesell later described it:

[The clinical practice] has always been conducted in close correlation with a systematic study of normal child development. One interest has reinforced the other. Observations of normal behavior threw light on maldevelopment; and the deviations of development in turn helped to expose what lay beneath a deceptive layer of “obviousness” in normal infancy. (Gesell & Amatruda, 1941, p. v)

Gesell and his associates established definitive norms for growth and behavioral change in the first five years of life, in a series of exhaustive and detailed reports (e.g., Gesell & Amatruda, 1941; Gesell & Thompson, 1934, 1938).

Few psychologists nowadays regard Gesell as a theorist. That is a pity, for his contributions might have provided a useful stabilizing influence during a period that became only nominally committed to “developmental” study. “Growth” was a key concept for Gesell. But what did he mean by growth? Horticultural terms have long been popular in describing children (a classic example being Froebel’s coining of “kindergarten”). But Gesell was too astute to become trapped in a botanical analogue; he recognized human behavioral and mental growth as having distinctive properties of its own. He wrote:

Mental growth is a constant process of transformation, of reconstruction. The past is not retained with the same completeness as in the tree. The past is sloughed as well as projected, it is displaced and even transmuted to a degree which the anatomy of the tree does not suggest. There are stages, and phases, and a perpetuating knitting together of what happens and happened. Mental growth is a process of constant incorporation, revision, reorganization, and progressive hierarchical inhibition. The reorganization is so pervading that the past almost loses its identity. (1928, p. 22)

What does this lead to? For Gesell, it led to a new perspective on the relations between heredity and environment. Similar to what Preyer had written some 50 years before, Gesell concluded:

The supreme genetic law appears to be this: All present growth hinges on past growth. Growth is not a simple function neatly determined by X units of inheritance plus Y units of environment, but is a historical complex which reflects at every stage the past which it incorporates. In other words we are led astray by an artificial dualism of heredity and environment, if it blinds us to the fact that growth is a continuous self conditioning process, rather than a drama controlled, *ex machina*, by two forces. (1928, p. 357)

These are not the only similarities to the interpretations offered by earlier students of infant development. Recall Preyer's analysis of infancy, and the functions of the extended immaturity of children for the plasticity of behavior. The concept of neoteny was elegantly restated by Gesell, along with a fresh idea on the social responsiveness that is unique to humans:

The preeminence of human infancy lies in the prolongation and deepening of plasticity. There is specific maturation of behavior patterns as in subhuman creatures; but this proceeds less rigidly and the total behavior complex is suspended in a state of greater formativeness. This increased modifiability is extremely sensitive to the social milieu and is constantly transforming the context of adaptive behavior. In the impersonal aspects of adaptive behavior of the nonlanguage type (general practical intelligence) there is a high degree of early correspondence between man and other primates. This correspondence may prove to be so consistent in some of its elements as to suggest evolutionary and even recapitulatory explanations. But transcending, pervading, and dynamically altering that strand of similarity is a generalized conditionability and a responsiveness to other personalities, to which man is special heir. This pre-eminent sociality exists even through the prelanguage period, long before the child has framed a single word. Herein lies his humanity. (1928, p. 354)

As a rule, Gesell stood close to his data. When he ventured away, he was drawn irresistibly back to the facts that had been meticulously collected and to his belief in the curative effects of maturation. He felt strongly that the understanding of the properties of growth qua growth would be the key to unlocking the central dilemmas of psychology. The same year that Watson offered his polemic on the role of early stimulation in child rearing, Gesell offered the counterposition on the invulnerability of the infant to experience. He wrote:

All things considered, the inevitableness and surety of maturation are the most impressive characteristics of early development. It is the hereditary ballast which conserves and stabilizes the growth of each individual infant. It is indigenous in its impulsion; but we may well be grateful for this degree of determinism. If it did not exist the infant would be a victim of a flaccid malleability which is sometimes romantically ascribed to him. His mind, his spirit, his personality would fall a ready prey to disease, to starvation, to malnutrition, and worst of all to misguided management. As it is, the inborn tendency toward optimum development is so inveterate that he benefits liberally from what is good in our practice, and suffers less than he logically should from our unenlightenment. Only if we give respect to this inner core of inheritance can we respect the important individual differences which distinguish infants as well as men. (1928, p. 378)

The infant is more robust than he appears, in that he is buffered by psychobiological fail-safe systems and driven by an "inborn tendency toward optimum development." The message is a general one, issued by one who observed the remarkable commonalities in infant growth as it progresses, inevitably, from the stage of the neonate to the first year and beyond.

Does this inborn inertia apply to all features of infant growth—to mental development as well as personality and social development? On this matter, Gesell drew a distinction between the mechanisms that control

cognitive and social growth. In the latter instance—social growth—the essential determinants were the social matrix present in the “web of life” and the “conditioned system of adaptation to the whole human family.” Sound Watsonian? Not really, for Gesell is closer to the transactional views of James Mark Baldwin than to the unidirectional ones of behaviorism and its emphasis on the parental shaping of children. Gesell wrote:

All children are thus, through correlation, adapted to their parents and to each other. Even the maladjustments between parent and child are adaptations in a psychobiological sense and can only be comprehended if we view them as lawfully conditioned modes of adaptation. Growth is again the key concept. For better or for worse, children and their elders must grow up with each other, which means in interrelation one to the other. The roots of the growth of the infant’s personality reach into other human beings. (1928, p. 375)

In effect, maturational changes demand interactional ones, and the nature of the resolution reached between the child and others at each stage is the stuff out of which personality is built. Gesell offers here the outline for a psychobiological theory of social development.

Where did the theory go? Not very far in Gesell’s work, for it remained in a bare outline form, with scant data to back it up. Like Baldwin before him, Gesell did not have the methods (or perhaps the desire) to continue to explore the dynamic message implicit in this psychobiological view of social interactions. That is doubly unfortunate, for his views on social development were at least as reasonable and no more speculative than those of Watson. If enunciated more fully, they may have provided explicit guides for his next-door colleagues in the Institute of Human Relations when they set about to fabricate the first version of social learning theory. Some 40 years later, the essential model was explicated by Bell (1968) and Bell and Harper (1977), using surprisingly similar models and metaphors.

In speaking of Gesell’s legacy, Thelen and Adolph (1992) comment on some of the paradoxes in Gesell’s work:

His devotion to maturation as the final cause was unwavering, yet he acted as though the environment mattered, and his work contains threads of real process. He believed in the individuality of the child but chose the dictates of the genes over the whims of the environment. He wanted to liberate and reassure parents but may only have added to the arsenal of parental guilt. (p. 379).

In retrospect, Gesell’s views may seem paradoxical only because we fail to respect the distinctions that he made. A key distinction is that social interactions of children are more likely than motor and sensory structures to be impacted by experience; hence, there is a “generalized conditionability and a responsiveness to other personalities, to which man is special heir.” Gesell did not assume the primacy of early experience; rather, the infant is buffered because “the inborn tendency toward optimum development is so inveterate that he benefits liberally from what is good in our practice, and suffers less than he logically should from our unenlightenment.” This is a powerful message, consistent with the earlier pronouncement from Hall on adolescence. At the least, it indicates that investigators should look beyond infancy for the formative effects of experience, particularly the effects in “responsiveness to other personalities.”

Gesell was a pioneering investigator who understood the totality of the organism. He also understood that experiential factors must be considered in any systematic developmental account. Although he appreciated the multiple ways that environmental events could influence behavior, he declined to assign them priority in accounting for the development of basic motor, sensory, and emotional systems.

Other investigators recognized the role of age-related biological changes in the development of behavior, and their relations to the occurrence of basic changes in emotional, cognitive, and social patterns. For example, M. C. Jones (1931), in discussing the development of emotions, remarks that a wariness or fear of unfamiliar persons tends to emerge in the second half of the first year of life (from 20 weeks to 40 weeks; see Bayley, 1932, and Washburn, 1929). Jones notes that this phenomenon appears in the absence of any apparent pairing of the stranger with some external noxious stimulus; hence, it would not fit very well with the Watsonian view of the conditioned elaboration of fear or of love. Other developmental mechanisms must be at work.

Why, then, the relative popularity of experimental demonstrations of fear and its conditioning and extinction, as opposed to careful longitudinal studies of the development of the phenomena subsumed by fear? Jones's (1931) answer was insightful and doubtless correct: "Because training and practice are more readily subject to laboratory proof, we have at times minimized the importance of the less accessible intraorganismic factors" (p. 78).

The availability of funding and staffing for the major child development institutes permitted the support of significant studies of maturation and growth at Teachers College (Columbia), Berkeley, Iowa, Minnesota, and Fels Institute. Among the more notable studies was that of Mary Shirley at the University of Minnesota. To extend Gesell's cross-sectional observations, Shirley conducted a longitudinal investigation of motor, emotional, and personality development over the first two years of life with 25 infants, and published the results in a comprehensive three-volume work (Shirley, 1931, 1933a, 1933b). Similarly, the Shermans at Washington University (St. Louis), McGraw (1935) at Teachers College, and K. M. B. Bridges at Montreal completed useful studies of growth-related changes in infants and young children.

SOCIAL AND PERSONALITY DEVELOPMENT

In a review of studies of social behavior in children, Charlotte Bühler (1931) gave an American, Will S. Monroe, credit for having completed the first studies of "the social consciousness of children." Monroe's work, published in German (1899), reported a number of questionnaire studies dealing with various aspects of social development. For instance, children were asked what sort of "chum" they preferred, what kinds of moral qualities they found in friends, and what their attitudes were about punishment, responsibility, and discipline. Monroe's work was not, however, the first published set of studies on these matters. Earl Barnes of Stanford (who had been Monroe's teacher) had earlier edited a two-volume work (*Studies in Education*; 1896–1897, 1902–1903) that had covered the same ground, reporting a reasonably comprehensive set of questionnaire studies of social disposition. Margaret Schallenberger (1894), for instance, had been at Stanford and was a student of Barnes at the time she completed the report discussed above on age-related changes in the social judgments of children. In the 1890s, questionnaires were being circulated to teachers throughout the country, through the various state child study associations (in Illinois, South Carolina, Massachusetts), and literally thousands of children were being asked brief questions about their social attitudes, morals, and friendships. G. Stanley Hall from time to time would include questionnaires in the *Pedagogical Seminary*, and would ask readers to submit the results to him.

Because of the shortcomings in the method, ranging from haphazard sampling procedures to problems in nonstandard administration and scoring of questions, the questionnaire studies were hardly models of scientific research. Nonetheless, certain age-related phenomena were sufficiently robust to appear despite the methodological slippage. Hence the earlier cited conclusion by Schallenberger about the reliance of young children on concrete forms of punishment, with reasoning and empathy playing roles of increasing importance in early adolescence. These findings were given wide circulation in Hall's *Adolescence*, and provided the empirical substrate for some of the more useful sections of that work. In time, the criticisms took effect, and after about 10 to 15 years of questionnaire studies, the method was no longer a procedure of choice. As Bühler notes, "little was done in the decade after Monroe made this first start in the direction of developmental social psychology," and, she concludes, the studies failed because of "the lack of a systematic point of view" (1931, p. 392).

Following a hiatus in work on social development, another method was introduced for studying the social behavior of infants and children in the mid-1920s. It was essentially an extension of the "objective" or "behavioral" procedures that had been used in the investigation of individual infants and young animals. Almost simultaneously, reports of behavioral studies appeared in child study institutes in Vienna, New York (Columbia), Minnesota, and Toronto. Somewhat earlier, Jean Piaget had recorded the naturalistic verbal exchanges among young children (Piaget, 1926). Five of the first eight *Child Development Monographs* from Teachers College (Columbia) were concerned with the methods and outcomes obtained by the behavioral assessments of social patterns (Arrington, 1932; Barker, 1930; Beaver, 1930; Loomis, 1931; Thomas, 1929). Dorothy S. Thomas, who co-authored with sociologist W. I. Thomas *The Child in America* (1928), seems to have spearheaded this attempt to apply "the methodological scheme of *experimental sociology* to children." In addition to the work of Thomas and her colleagues, insightful methodological papers on the procedure were published by Goodenough (1929, 1930a) at Minnesota and Bott (1934) at Toronto. Charlotte Bühler (1927) should herself be credited with having pioneered the controlled experimental observations of infants, and she seems to have been the first investigator to

have completed an “experimental study of children’s social attitudes in the first and second year of life” (Bühler, 1931).

Observational studies from 1927 to 1937 generated almost as much enthusiasm as earlier questionnaire studies. They were based on the assumption that the stream of behavior could be classified into particular behavior units, and that these units could be submitted to the statistical analyses previously developed for the treatment of experimental and test data. Careful attention was given to the basic issues of observation, including observer agreement, code reliability, stability of measures, various facets of validity and generality, and statistical evaluation. The issues attacked by the method ranged from the mere descriptive and demographic—including size and sex composition of groups as a function of age (Parten, 1933) and nature of play activities (Challman, 1932)—to studies of the natural occurrence of aggression (e.g., Goodenough, 1931) and reciprocal patterns of interchange (Bott, 1934). By 1931, Bühler was able to cite some 173 articles, many of which dealt directly with the observation of children’s social behavior patterns. In the following 5 to 10 years, an equal number of studies was reported, some of which are now recognized as having laid the foundation for work taken up again in the 1970s (e.g., Murphy, 1937). In terms of method, the reports were on a par with the current generation of observational analyses of social interchanges.

What theoretical ideas were associated with these behavioral methods and to what extent was there a “systematic” point of view? There was, as it turns out, as little theoretical guidance for this work as for the earlier questionnaire studies. The work was behavioral, but it was not concerned with developmental processes, either learning or psychobiological. J. M. Baldwin had virtually been forgotten (save for some exceptions, e.g., Piaget, 1926). Given D. S. Thomas’s (1929) aims and background, it is mildly surprising that the procedures at Columbia were not more intimately linked to the sociological models of Cooley, Mead, and Baldwin. Perhaps that conceptual extension was part of the general scheme, but it failed to materialize in the work completed at Teachers College or at the other child institutes. As it turned out, the research focused on the immediate determinants of the actions and interactions of children, but scant information was gained about their relationship to how interactions are learned or modified, or what they mean for longer term personality development.

If there were any theoretical underpinnings for the research on interactions and social development, the model seems to have been drawn either from a belief in the importance of growth and maturation, or from a commitment to the enduring nature of personality types, as determined by genetic, constitutional, or early experience factors. In this regard, Bühler (1931) classified infants into three types, depending on their reactions to social stimulation. “These types were called the socially blind, the socially dependent, and the socially independent behavior” (1931, p. 411). Socially blind children don’t pay much attention to the actions and reactions of other persons; instead they take toys, play, and move about without regard for the other child. The socially dependent child, on the other hand, is “deeply impressed by other’s presence and activities; . . . he observes the effect of his behavior on the other and carefully watches the other’s reactions.” The socially independent child “is one who—though aware of the other’s presence and responsive to his behavior—yet does not seem dependent on him, is neither intimidated nor inspired” (1931, p. 411). Bühler sees these dispositions as being independent of home and rearing conditions; hence, they are “primary” dispositions. Retests of the children (who were 6 to 18 months of age) suggested to Bühler that these types were relatively stable, but she adds the caveat that, “it remains to be seen, of course, whether these pioneer observations will be confirmed by other authors” (1931, p. 411).

In retrospect, the interactional studies were estranged from the issues being debated by the dominant theories of the day—psychoanalytic, learning, cognitive—and few seemed willing to attempt to bridge the theoretical or empirical gaps. As it turned out, the data did find a useful service in the practical areas of nursery school management and the training of young teachers. Because the findings were either ignored or deemed irrelevant by those concerned with major psychological theories of development, the method and its concerns passed from the scene, temporarily.

MORAL DEVELOPMENT

The perfectibility of humans and the establishment of a higher moral order had been a continuing concern for developmentalists. Although questionnaires on children’s beliefs and attitudes toward transgressions and punishments were useful, they had obvious shortcomings as scientific instruments. In the 1920s and 1930s, work on these issues continued, but with a self-conscious appreciation of the limits of the techniques that were available.

Nonetheless, there were substantive issues to be addressed and real-life problems to be solved, and it seemed entirely reasonable to expect that the investigators of moral development would be ingenious enough to meet the challenge (see V. Jones, 1933). Out of this need arose three major advances in the study of moral development: (a) the use of short-term experimental manipulations in the assessment of honesty and prosocial behaviors; (b) the employment of observations of naturally occurring rule-making and moral judgments; and (c) the refinement of attitudinal questionnaires that might be employed in the assessment of particular experiences.

The demonstration of the utility of short-term experimental procedures with school-age children has an unusual background, at least in comparing what the sponsors had hoped to learn and what they actually got. Hugh Hartshorne was a professor in the School of Religion at the University of Southern California, and Mark May was a psychologist at Syracuse University when they were recruited to Columbia University by the Institute of Social and Religious Research to conduct a multiyear project on how Sunday schools, churches, and religious youth groups could better do their job. E. L. Thorndike was a guiding force in the initiation and interpretation of this research. If physical science could solve problems for the society, why could not behavioral science help solve some of the moral and ethical issues that had arisen?

The project was an ambitious one: to analyze the effects of various institutions of the society on moral behaviors, and to determine how the institutions could improve their performance. At the outset, Hartshorne and May recognized that they must solve the problem of the assessment of moral and ethical behaviors. Following a critique of then-available questionnaire and rating procedures, Hartshorne and May concluded that a fresh approach to the study of values and character was required. They wrote: "Although recognizing the importance of attitude and motive for both social welfare and individual character, as ordinarily understood, we realized that in any objective approach to ethical conduct we must begin with the *facts of conduct*" (1929, Vol. 3, pp. 361–362). Accordingly, the investigators developed a battery of tests and experimental settings designed to yield information about honesty, helpfulness and cooperation, inhibition, and persistence. The best known measures are the brief experimental assessments of deceit (permitting the misuse of answer sheets, peeping, and other forms of cheating, all of which were monitored in sly ways by the experimenter). They also devised various sociometric techniques, including a "Guess Who" procedure to assess peer reputation. The results of this work and the authors' interpretation on the relative specificity of moral conduct have been widely discussed. For our purposes, it is sufficient to note that this was one of the first studies to be conducted of short-term experimental manipulations of social behavior in school-age children. In addition, the authors offered a courageous theoretical statement on how ethical conduct is acquired (via Thorndikian learning principles). It was not exactly what the sponsoring agency had expected, or wanted. The Executive Secretary of the sponsoring Institute of Social and Religious Research wrote apologetically in the foreword:

To lay minds this volume, at first glance, may seem overloaded with matter that has little to do with moral and religious education—a medley of tests and statistics and a paucity of clear directions as to building character. Such readers might profitably reflect that these preliminary processes are inevitable if character education is ever to emerge from guesswork into a science. Medical and surgical science had to follow a similar road to advance from magic and quackery. (Hartshorne & May, 1929, Vol. 2, p. v)

Hartshorne and May had concluded that traditional religious and moral instruction have little, if any, relationship to the results of experimental tests of honesty and service to others.

With questionnaire procedures generally in disfavor by the 1920s, the essential problem of how to quantify attitudes remained. L. L. Thurstone, a pioneering quantitative psychologist at the University of Chicago, was recruited by the Payne Foundation to determine the effects that moviegoing had on the social attitudes and prejudices of children. The assignment provided Thurstone the opportunity to develop a new technology for the assessment of moral/ethnic attitudes. In a series of studies, Thurstone and his colleague, R. C. Peterson (Peterson & Thurstone, 1933), introduced new methodologies for gauging the effects of specific motion pictures on attitudes toward national/ethnic groups. They used a pre- and posttest design, coupled with a 5-month follow-up test (post-posttest). Although these studies seem to be little known to contemporary writers, Thurstone himself (1952) considered them to be highly influential for his development of an attitude assessment methodology. Moreover, the work provided a wholly convincing demonstration of the strong effects that certain films had in decreasing, or increasing, racial and religious prejudice. In some cases (such as the inflammatory *Birth of a Nation*), the

unfavorable racial attitudes induced by viewing the film were detected 5 months later. This study was an admirable forerunner to the research of the 1960s and 1970s concerned with the effects of television (see also, Jones, 1933).

A major advance was pioneered by Jean Piaget in his assessments of moral reasoning (Piaget, 1932/1973). Piaget's clinical method—observing the actions of individual children and carefully recording their responses—permitted him to identify changes in the children's employment of rules and their origins. Although the procedure shared the self-report properties of questionnaires, his observations and direct inquiries permitted a more precise identification of the standards being invoked idiosyncratically by the children. Again, the impact of Piaget's reports seems to reflect in large measure the theoretical significance of his interpretations.

THE DEVELOPMENT OF LANGUAGE AND COGNITION

From 1924 onward, the problem of how language and thought develop attracted the attention of the brightest talents of the discipline. Some of them—including Jean Piaget and L. S. Vygotsky—were concerned with language as a vehicle for understanding how thought patterns develop in the child. Others focused on language as a phenomenon in itself, with attention given to the “amazingly rapid acquisition of an extremely complex system of symbolic habits by young children” (McCarthy, 1954).

The comprehensive review articles by Dorothy McCarthy that span this period provide an excellent overview of the era (McCarthy, 1931, 1933, 1946, 1954). At one time or another, virtually all major developmental investigators have been drawn to the study of language development, and so were some nondevelopmentalists as well. The intimate relationship that exists between language and thought was brought brilliantly to the attention of psychologists by Jean Piaget in a small book that he published to report the results of his new functional approach to the study of language development. Piaget's study of language breathed fresh life into one of the oldest questions of the area: How do thought, logic, and consciousness develop? Language was a mirror to the mind, for Piaget; it was to be used to reflect the nature and structure of the mental schemas that gave rise to verbal expressions. In this work, Piaget seems to have been explicitly guided by J. M. Baldwin's view that the young child proceeds in his thought to progressively discriminate himself from nonself. The major empirical marker for this shift in thinking was movement from egocentric speech to socialized speech. Piaget wrote:

“Egocentric” functions are the more immature functions, and tend to dominate the verbal productions of children 3–7 years of age, and, to a lesser extent, children 7–12 years. In this form of speech, a child does not bother to know to whom he is speaking nor whether he is being listened to. He talks either for himself or for the pleasure of associating anyone who happens to be there with the activity of the moment. This talk is ego-centric, partly because the child speaks only about himself, but chiefly because he does not attempt to place himself at the point of view of his hearer. Anyone who happens to be there will serve as an audience. (1932/1952, p. 9)

Socialized speech, where the child “really exchanges his thoughts with others, either by telling his hearer something that will interest him and influence his actions, or by an actual interchange of ideas by argument or even by collaboration in pursuit of a common aim” (p. 9–10), does not emerge until about age 7 or 8, and the process is not complete until 11 or 12 years of age. Later in the same volume, Piaget linked egocentrism to the child's tendency to personalize thought:

[Without the ability to “objectify” one's thinking,] the mind tends to project intentions into everything, or connect every thing together by means of relations not based on observation...the more the ego is made the centre of interests, the less will the mind be able to depersonalize its thought, and to get rid of the idea that in all things are intentions either favourable or hostile (animism, artificialism, etc.)....Ego-centrism is therefore obedient to the self's good pleasure and not to the dictates of impersonal logic. It is also an indirect obstacle, because only the habits of discussion and social life will lead to the logical point of view, and ego-centrism is precisely what renders these habits impossible. (1932/_1952, pp. 237–238)

In other words, Piaget shares with both Baldwin and Freud the assumption that the child's concept of reality and logic develops from contact with the external world, emerging from an amorphous sense of the self. It is not insignificant that, in the foreword to *The Language and Thought of the Child* (1932/1952), Piaget stated:

I have also been deeply impressed by the social psychology of M. C. Blondel and Professor J. M. Baldwin. It will likewise be apparent how much I owe to psychoanalysis, which in my opinion has revolutionized the psychology of primitive thought. (pp. xx–xxi)

The method employed by Piaget and the concepts he embraced stimulated almost immediate worldwide attention and controversy. In McCarthy's thorough reviews of the empirical data that bore on this question (including her own), she (1931, 1933, 1946, 1954) traced the evolution of a huge literature on the matter. Strict interpretation of Piaget's categories suggested that, over a wide variety of populations and settings in which young children were observed, seldom did the proportion of egocentric remarks exceed 6% to 8%. Moreover, the negative evidence came not merely from studies of children in the United States; an equally convincing set of disconfirming investigations emerged from studies of Chinese (Kuo, 1937), Russians (Vygotsky & Luria, 1929), and Germans (Bühler, 1931). After identifying what was meant by the concept of egocentric as opposed to socialized speech, C. Bühler wrote:

It is agreed, however, among other authors—e.g., William Stern and David and Rosa Katz—that this result is due to the special conditions of life in the “Maison des Petits” in Geneva, where Piaget's work was done. The Katzes (1927) emphasize, in opposition to Piaget, that even the special relationship of the child to each of the different members of the household is distinctly reflected in the respective conversations. This is surely true of all the dialogues they published. (Bühler, 1931, p. 400)

This was a key point for Bühler, who had just spent several years of her life demonstrating the quality and nature of the social patterns of children in infancy and early childhood. She had conclusively shown the truly “social” nature of their behaviors. Note that Bühler attributes the discrepant findings to the contextual–relational specificity of Piaget's initial observations. Piaget seemed to accept that explanation, at least for the time being. In the foreword to the second edition of *The Language and Thought of the Child* (1932), he wrote:

[Our] original enquiries dealt only with the language of children among themselves as observed in the very special scholastic conditions of Maison des Petits de L'Institut Rousseau. Now, Mlle. M. Muchow, M. D. Katz, Messrs. Galli and Maso, and M. A. Lora [Luria], after studying from the same point of view children with different scholastic environments in Germany, Spain, and Russia, and especially after studying children's conversations in their families, have reached results which, on certain points, differ considerably from ours. Thus, while the little pupils show in their conversations coefficients of ego-centricism more or less analogous to those we have observed, M. Katz's children, talking among themselves or with their parents, behave quite differently. (pp. xxiii–xxiv).

Another explanation, favored by McCarthy (1933, 1954), is that the problem resided in the ambiguity of the classification system employed by Piaget. For whatever reason, there were notably few confirmations of Piaget's assertion that young children were predominantly egocentric in their speech. The controversy extended into the 1970s (see, e.g., Garvey & Hogan, 1973; Mueller, 1972), along with replications of the earlier disconfirmation of Piaget's report.

The issue was significant for the area because it had implications for the understanding of virtually all psychological aspects of development, whether cognitive, linguistic, social, or moral. Beyond the issue of whether egocentric speech was 6% or 40% or 60%, there was agreement that this form of communication tended to decrease as a function of the child's age. Why? Piaget's answer, which seemed compatible with the earlier formulations of Baldwin and Freud, was that egocentric communication directly reflected young children's “personalized” mode of thinking, and that as children became more objective in their views of themselves and of reality, the transition to socialized speech occurred. Egocentric speech became dysfunctional and was discarded. A counterproposal by the Russian psychologist L. S. Vygotsky (1939) constituted a serious challenge to the Piagetian interpretation. The key to Vygotsky's proposal is that, at maturity, two speech systems exist: inner speech and socialized speech. For Vygotsky (1939):

The relation of thought to word is first of all not a thing, but a process; it is a proceeding from thought to word and, conversely, from word to thought. . . . every thought moves, grows and develops, each fulfills a function and solves a given problem. This flow of thought occurs as an inner movement through a series of planes. The first step in the analysis of the relationship between thoughts and words is the investigation of the different phases and planes through which the thought passes before it is embodied in words. (p. 33)

Herein lies the need for a developmental investigation of speech functions, for it may provide us with an answer as to how thought and speech are interrelated. This investigation:

reveals, in the first place, two different planes in speech. There is an inner, meaningful semantic aspect of speech and there is the external, acoustic, phonic aspect. These two aspects although forming a true unity, have their own particular laws of movement. . . . A number of facts in the development of children's speech reveal the existence of independent movement in the phonic and the semantic aspects of speech. (1939, p. 33)

How does Vygotsky interpret the role of egocentric speech and how does his interpretation differ from Piaget's? Although egocentric speech has no apparent function of its own in Piaget's formulation—it merely reflects the child's egocentric thinking and is thereby doomed to disappear with the child's cognitive growth—it assumes great functional importance for Vygotsky. Egocentric speech constitutes, in effect, a developmental way station “a stage which precedes the development of inner speech” (1939, p. 38). It is a form of speech that aids in the young child's thought processes but, rather than waning in childhood and becoming dysfunctional, egocentric speech undergoes an evolution with “inner speech” and thought as its end product. Vygotsky (1939) wrote:

To consider the dropping of the coefficient of egocentric speech to zero as a symptom of decline of this speech would be like saying that the child stops to count at the moment when he ceases to use his fingers and starts to do the calculations in his mind. In reality, behind the symptoms of dissolution lies a progressive development. . . . the formation of a new speech form. (p. 40)

Vygotsky then took a significant step forward in the analysis of both speech functions and their relation to thought, by conducting some ingenious experiments on the nature of egocentric speech. He went beyond naturalistic observations to manipulate theoretically relevant dimensions. He determined, for instance, that the incidence of egocentric speech decreased sharply when children were placed in the company of others who could not possibly - understand them—deaf and dumb children, or children speaking a foreign language. Vygotsky reports that the coefficient of egocentric speech “sank rapidly, reaching zero in the majority of cases and in the rest diminished eight times on the average.” While these findings seem “paradoxical” for Piaget's view, they were consistent with the idea that “the true source of egocentric speech is the lack of differentiation of speech for oneself from speech for others; it can function only in connection with social speech” (1939, p. 41).

To summarize the rest of Vygotsky's argument and experimental work would take us beyond the limits of this overview (see McCarthy, 1954). The story did not end in the 1930s; many of the same concerns and proposals were to reappear in the 1960s and 1970s. Unfortunately, the brilliant Vygotsky—who was born the same year as Piaget—died in 1934 at the age of 38. His developmental views were brought forward to contemporary psychology by his colleague and collaborator, A. R. Luria.

The functional analysis of language development, while most intriguing on theoretical grounds, constituted only a portion of the total research effort devoted to language. Researchers focused, in addition, on developmental stages in language expression (e.g., prelinguistic utterances, phonetic development, the growth of vocabulary, changes in syntactic complexity as a function of age) and individual differences in language development and how they arise (through experience, schooling, early exposure, and so on). The literature on these matters was such that, by the end of this period, no child development text could be prepared without a significant section given to the report and summary of these findings. The mass of data seemed to outrun the ability of theorists to organize it in terms of meaningful models.

DEVELOPMENTAL PSYCHOBIOLOGY AND ETHOLOGY

The Gesellian emphasis on growth and maturation was part of a broader attempt within developmental psychology and developmental biology to unlock the secrets of ontogeny (see McGraw, 1946). On this count, the understanding of the mechanisms of genetic transfer was significantly advanced by (a) the rediscovery of the work of Mendel, and (b) the revolutionary discoveries of the loci of units of chromosomal transmission. But these events raised a significant question for developmentalists. If all somatic cells have the same genetic code, how does differentiation occur in development and why do cells at maturity have distinctly different functions and properties? Where is the “master plan” for development, and how can particular cells be induced to perform their unique and special services for the organism?

Among the embryologists who addressed these issues, Hans Spemann (1938) provided a provocative suggestion following his discoveries that cellular tissues could be successfully transplanted from one area of presumptive growth to another. If the transplantation occurs at the appropriate time in development, tissues from the presumptive area of the neural plate of amphibia could be successfully transplanted to areas where limbs would arise. The tissue would then develop in accord with its surroundings, so that the tissue would take on the characteristics of skin or muscle, not of the brain. On the basis of these experiments, Spemann proposed that extranuclear or contextual forces served to “organize” the development of cellular materials in the course of ontogeny. Once organization occurred, during the period that was critical for the development of its form and function, then the effects would be irreversible or highly resistant to change (see Waddington, 1939).

Such demonstrations provided the substantive empirical examples for the formulation of a view on development that has come to be known as “organismic” theory or “system” theory of biological development (Bertalanffy, 1933). In its initial form, organismic theory was concerned with the question: What directs development? The answer, simply stated, is: The organism. Development is directed by the constraints inherent in the relationship among elements of the living system as they act on themselves and on each other. These elements can be cells, clusters of cells, or entire subsystems, such as those formed by hormonal processes. The kernel idea is that the several features of the organism, including its behavior, depend on the whole reciprocating system of which they form parts. The mutual regulation among components permits, among other things, possible feedback to the original source and self-regulation.

Organismic theory was compatible with the Darwinian perspective of evolution as a dynamic, adaptive process. Development is equally dynamic. It required only a modest conceptual leap to consider behavior as being an essential component of the organismic system, and its development could be understood only in terms of other biological and social features of the system. Hence the “system” in which the organism developed was not merely under the skin. Organization could be broadened to include feedback from other organisms and from the social network in which development occurred. Two developmental-comparative psychologists, T. C. Schneirla and Zing-Yang Kuo, led the way, in the early 1930s, for the application of the organismic perspective to the problems of behavioral ontogeny.

The problem that Schneirla tackled was how to unravel the complex social structure of army ants, who despite their lack of gray matter, were highly coordinated in virtually all phases of their adaptation. Wilson (1975) considers the species as a prototypic “truly social” one. How is the high level of social organization accomplished? Schneirla (1933) attacked the problem by undertaking a series of comprehensive field investigations in Panama and laboratory studies in his facilities at the American Museum of Natural History. He tested the assumption that colony organization does not arise from some single internal source; rather, the complex social system arises as an outcome of the interdependence of developmental events in the brood, workers, queen, and the contextual environmental constraints.

Schneirla identified the pattern of empirical relationships that provided elegant support for his developmental analysis of social organization. He discovered, for instance, that a primary trigger for migration and foraging raids in the colony was the heightened activity produced by the developing larvae. When the larvae emerged from the quiescent phase of development, their activity stimulated the rest of the colony to action, keying both foraging raids and migration. When the activity of the larval brood diminished as a consequence of growth-related changes, the raids ceased and the nomadic phase ended. The surplus food that then became available in the colony (due to decreased needs of the young) fattened the queen and served to trigger a new ovulatory cycle, thus

recreating the conditions for reproduction. Looking backward on this work, Schneirla (1957) concluded: "The cyclic pattern thus is self-rearoused in a feedback fashion, the product of a reciprocal relationship between queen and colony functions, not of a timing mechanism endogenous to the queen."

Z.-Y. Kuo, a Chinese psychologist who completed his doctoral training with E. C. Tolman at Berkeley before returning to work in China, came to similar conclusions at about the same time. Kuo was originally motivated by J. B. Watson's claims about the malleability of behavior, given the control over the conditions of development. He went beyond Watson and collected relevant data. In a series of provocative studies, where he produced unique environments for the young animals to grow up in, Kuo demonstrated that key features of social patterns could be changed, and novel ones created. Cats, for instance, could be made to "love" rats, not kill them, if the kittens were raised together with rodents from infancy onward (Kuo, 1930, 1967). Beyond behavioral plasticity, Kuo addressed the fundamental problem of behavioral origins, and when and how novel behavior patterns arise in the course of - ontogeny.

In his study of the origin of "instinctive" behaviors, such as pecking, vocalization, and movement patterns in birds, Kuo assumed that these characteristics arose in development because of necessary feedback relationships among central nervous system, physiological, and behavioral functions. Pushing the organismic proposal on the self-stimulative role of behavior to its limits, Kuo offered the proposal that the behavior of the embryo itself provided feedback that would help to direct its subsequent development. Preyer (1888) had earlier suggested the possibility of such feedback effects in development, but there were scant data relevant to the proposal.

The story of how Kuo explored these ideas can be found in a series of papers that he published during the 1930s, and a summary appears in his later volume on behavioral development (e.g., Kuo, 1930, 1939, 1967). He first had to solve the problem of how to keep embryos alive while viewing their development (he invented a way to produce a "window" by removing the external shell but keeping the embryo and the membranes surrounding it intact). Kuo was then able to plot, from the onset of development to hatching, the movement patterns in the egg, including the initial stages of heart activity, breathing, limb movement, and pecking. On the basis of these observations, he concluded that the activity of the organism itself was influential in determining the direction of development, including leg coordination and pecking. The initial report of these observations met initial skepticism (e.g., Carmichael, 1933), and for good reason. Some of Kuo's speculations have not been upheld because he did not give sufficient weight to the effects of spontaneous central nervous system innervation in producing cycles of activity and inactivity (Oppenheim, 1973). But his more general assumption that feedback functions can contribute to embryonic development has in some instances been strikingly confirmed. For example, inhibition of leg movement in the chick embryo has been found to be associated with ossification of the joints and difficulty in posthatching mobility (Drachman & Coulombre, 1962). Moreover, self-produced vocal calls by the embryo facilitate the development of posthatching species-typical preferences (Gottlieb, 1976).

As powerful as were Schneirla's and Kuo's demonstrations of the utility of a developmental approach to behavior, they had little immediate effect on child psychology (although Kuo's work was discussed at length by Carmichael, 1933, in the revised *Handbook of Child Psychology*, and Schneirla was a reviewer for the same volume). Not until the next generation was their essential message heard and understood in both comparative and developmental psychology.

Another psychobiological researcher had greater immediate success and visibility. Leonard Carmichael carried the psychological tradition of William Preyer into the 1930s. His *Handbook* chapters (Carmichael, 1933, 1946) provided a scholarly reminder of the unsolved problems of the relations between biological development and behavioral establishment. Carmichael also brought to the attention of child psychologists the impressive body of literature concerned with the analysis of early biological-behavioral development. The chapter by Myrtle McGraw (1946) provided an excellent critical overview of the basic issues of developmental psychobiology.

In Europe, the study of the "biology of behavior," or ethology, experienced a rebirth in Konrad Lorenz's article, "*Der Kumpan in der Umwelt des Vogels*" (1935; translated and published in English in 1937). In this paper, Lorenz reasserted the contribution of evolutionary forces in the determination of behavior, and reminded biologists and psychologists of the importance of early experience and its possible irreversibility. Building on the foundation laid at the turn of the 20th century by an American, C. O. Whitman, and a German, O. Heinroth, Lorenz offered a convincing argument for studying instinct and the evolutionary basis of behavior. Taking American behaviorists

head on, Lorenz argued that the effects of experiences in the “critical period” could not be accounted for in then-available principles of learning and association. Specifically, he distinguished the phenomenon of imprinting (the establishment of filial preferences and species identification in precocial birds) from “association learning” on four counts. Imprinting (a) occurred only during an early critical period, (b) was irreversible in later development, (c) was supraorganismic in its effects (not limited to the imprinted object but to the species of which the object was a member), and (d) took place prior to the developmental appearance of the response that was “conditioned” (e.g., sexual preferences were influenced, even though they were not present in infancy). Virtually no immediate notice was taken of ethological work by developmental psychologists; the gulf between disciplines, combined with World War II, delayed the introduction of these ideas into the mainstream of psychological and developmental thought.

THEORETICAL TRENDS OF THE MIDDLE PERIOD

What theoretical activity took place over this third of the 20th century? A great deal, for each of the major developmental models established in the previous period underwent revision, modification, and extension. Behaviorism was liberalized and enlivened by a marriage with psychoanalysis. Psychoanalysis itself was split into three recognizable subdivisions: (a) classical psychoanalysis (Munroe, 1955), (b) postpsychoanalytic theory, and (c) neopsychoanalytic theory. Similarly, the Baldwinian approach to cognitive and social development was partitioned and extended: (a) in the theory of mental development now associated with Jean Piaget, (b) in the symbolic interactionism movement in sociology, anthropology, and psychiatry, and (c) in Vygotsky’s expansion of the proposal that “each child is part someone else, even in his own thought of himself.”

Although Piaget and Vygotsky have been the most prominent representatives of the Baldwinian developmental tradition in America, Henri Wallon (1879–1962) became almost as prominent in Eastern Europe, Africa, South America, and, foremost, in France. But then, and now, he has received virtually no recognition from the English-speaking world. His student, René Zazzo (1984, p. 9) observes: “As a direct descendant of J. M. Baldwin and a precursor of the theoreticians of attachment, Wallon viewed the other person as basic and primary” (see also Wallon, 1984b). In brief, Wallon argued for a more integrative, more interactive, and more social view of the developing organism than did his contemporary and competitor, Jean Piaget (see Birns, pp. 59–65; Piaget, 1984; Wallon, 1984a).

Nor was behavioral Darwinism overlooked. The foundations for modern ethology had been laid by Whitman in America and Heinroth in Europe, and extended in the 1930s and 1940s by Lorenz and Tinbergen. The “organismic” approach affected theories in biology and psychology. Most immediately related to developmental concerns were the developmental psychobiological theory of Schneirla and Kuo and the cognitive-organismic principles of Stern, Lewin, and Werner. At first blush, it seemed as if Baldwin’s vision that “every man have his theory” had been fulfilled.

Except for some intrafamilial squabbles, there were few direct confrontations or face-offs among the major theories—not so much out of mutual respect as because of selective inattention. As A. Baldwin (1967, 1980) has observed, developmental theories tended to talk past each other rather than at each other; they had different aims, were concerned with different issues, employed different methods, and were challenged by different findings. In due course, as the interests and concerns of the discipline shifted, each of the general orientations was to experience its day in the sun.

A few comments are in order on three major theoretical systems of the period that have not yet been singled out for attention: social learning theory, psychoanalysis and its derivatives, and Lewinian “field theory.”

Social Neobehaviorism

The family of theories called “social learning” descended from a wedding of the general behavioral models of the 1930s and psychoanalytic ideas of personality. During the heyday of general behavioral systems, four models of learning emerged as especially influential: (a) the behavior system of Clark Hull (1943), (b) the contiguity learning model of E. R. Guthrie (1935), (c) the purposive behaviorism of E. C. Tolman (1932), and (d) the operant learning theory of B. F. Skinner (1938, 1953). Despite their differences in language and in basic assumptions about the nature of learning, the models shared the belief that the principles of learning were universal, transcending differences in species, age, and circumstances.

Beyond a faith in the universality of the basic principles of behavior, there was a need to specify the implications of these theories for distinctly human problems, including the acquisition of personality patterns and social dispositions. J. B. Watson led the way early in offering bold speculations about the learning and unlearning of fears and loves. The challenge to the writers of the 1930s was to provide a more systematic, and yet equally convincing, case for the learning of significant human behaviors. To this end, a group of able young scientists at Yale University set about to put the study of personality processes on a solid empirical and behavioral basis (Maher & Maher, 1979). This group attempted to link certain concepts of psychoanalysis with assumptions drawn from the general behavioral theory of Clark Hull. The upshot was a remarkably influential set of concepts that was to dominate theoretical formulations in child psychology for the next several decades.

The first major collaborative effort was directed at the analysis of the controls of aggressive patterns, as viewed from a psychoanalytic-behavioral perspective. The product of this collaboration, a slim volume entitled *Frustration and Aggression*, appeared on the eve of World War II and gained immediate attention and influence (Dollard, Miller, Doob, Mowrer, & Sears, with others, 1939). Although the basic hypothesis that “aggression is always a consequence of frustration” (p. 27) was soon amended by the authors themselves (see Miller, Sears, Mowrer, Doob, & Dollard, 1941), the idea behind the work was enthusiastically endorsed. The associationistic assumptions of psychoanalysis were neatly melded with the stimulus–drive assumptions of Hullian theory.

The direct application of concepts of learning and imitation to children was soon made by Miller and Dollard (1941) in their book *Social Learning and Imitation*. This was not the first such extension; the Sears study of infant frustration (cited in Dollard, Miller, Doob, Mowrer, & Sears, 1939), and Mowrer’s study of enuresis (1938) had already shown that social learning principles could be readily applied to problems of child development. After World War II, the full impact of the social learning perspective was to be felt by child psychology.

Psychoanalysis

By the 1930s, the enterprise of psychoanalysis had undergone multiple divisions and had exercised a significant impact on the study of behavioral development. The most obvious influence was direct, through the teachings of Sigmund Freud himself and those who remained faithful to the orthodox theory. But equally powerful influences were indirect, mediated through the theories of those who—like J. B. Watson, J. Piaget, and R. R. Sears—had been impressed by particular features of psychoanalytic theory. In between were the so-called “post-Freudians” (those who extended psychoanalytic theory within the constraints established by Freud himself) and “neo-Freudians” (those psychoanalysts who revolted by challenging certain inviolable assumptions, such as the emphasis on infantile sexuality and the primacy of early experience). These various themes have been expertly traced in discussions of psychoanalytic theory (e.g., Hall & Lindzey, 1957; Munroe, 1955). For our present purposes, some comments on the relation between psychoanalysis and the study of behavioral development are in order.

By the late 1930s, psychoanalysis appeared to many child psychologists to be the answer to their search for a unifying theory of development. One of the more influential writers on the matter was Freud’s daughter, Anna Freud. Her view on the adequacy of the theory for understanding personality development—indeed, all features of development—was unambiguous and uncompromising. In the chapter that she prepared for the first edition of *A Handbook of Child Psychology*, Anna Freud (1931) wrote:

Psychoanalysis does not permit itself to be ranged with other conceptions: it refuses to be put on an equal basis with them. The universal validity which psychoanalysis postulates for its theories makes impossible its limitation to any special sphere such as the conception of the neurotic child or even the sexual development of the child. Psychoanalysis goes beyond these boundaries, within which it might even have been granted the right of judgment, and encroaches upon domains which, as demonstrated by the table of contents of this book, other specialists consider their own. (p. 561)

Psychoanalysis would settle for nothing less than the whole pie of developmental psychology, and it came close to getting it in one form or another through the rest of the 20th century.

It seemed inevitable that empirically minded American psychologists would attempt to put some of the key propositions of the theory to experimental test—indeed, the enterprise attracted some of the best young scientists in

psychology. What did they find? In summing up the then-available results of the experimental assessments of fixation, regression, projection, and other psychoanalytic mechanisms, Sears (1944) wrote:

One is driven to the conclusion that experimental psychology has not yet made a major contribution to these problems. . . . It seems doubtful whether the sheer testing of psychoanalytical theory is an appropriate task for experimental psychology. Instead of trying to ride on the tail of a kite that was never meant to carry such a load, experimentalists would probably be wise to get all the hunches, intuitions, and experience possible from psychoanalysis and then, for themselves, start the laborious task of constructing a systematic psychology of personality, but a system based on behavioral rather than experiential data. (p. 329)

All this is to say that the experimental testing of psychoanalytic proposals was not a profitable enterprise. Sears was to follow his own advice, as we shall see, and would pave the way for the modern generations of social learning theory.

Despite the equivocal returns on the scientific analysis of the theory, its influence gained, not faded, during the 1930s and 1940s. Virtually every major theoretical system concerned with human behavior—save those that dealt with purely physiological, motor, or sensory phenomena—was accommodated to psychoanalytic theory. Behaviorism (whether “radical” Watsonianism or conventional Hullian theory) and Piagetian cognitive theory alike were significantly influenced in that era, just as ethology and social learning theory were influenced in the present one. The immediate effects on child-rearing practices were as great, if not greater, than the earlier ones associated with Holt and Watson. With the publication of the first edition of Benjamin Spock’s (1946) best-selling manual on infant care, the American public was encouraged to adopt practices not inconsistent with psychoanalytic training. The rapid growth of professional clinical psychology—World War II had demanded specialists in diagnosis and therapy—also underscored the need for a theory of assessment and treatment. The major tools available for the task included projective tests (typically based on psychoanalytic assumptions) and methods of psychotherapy (derived, directly or indirectly, from the psychoanalytic interview). Psychology as a profession and a science became increasingly indebted to psychoanalytic theory and practice.

But psychoanalysts themselves proved to be an intellectually heterogeneous lot, and the theory could hardly be viewed as a static, unchanging view of personality. Among the more prominent heretics were Carl Jung, Alfred Adler, Karen Horney, Eric Fromm, and Harry Stack Sullivan. They shared in common an emphasis on the interpersonal implications of dynamic theory, as these were expressed in the family system and in interpersonal exchanges of later childhood and maturity. With this focus on “object relations,” there was a concomitant de-emphasis on the importance of infantile sexuality and the reversibility of very early experiences (see Munroe, 1955). Horney (1937) and Sullivan led the way in the neo-Freudian theory of interpersonal relations. In 1940, in a lengthy article in *Psychiatry*, Sullivan outlined a rapprochement between theories of symbolic interaction that had become associated with sociology and anthropology and a neoanalytic interpersonal theory of psychopathology. Sullivan’s position was that the “self-dynamism” arises from “the recurrent interpersonal situations of life.” Ideas about the self-dynamism (which is not an entity but a process) are derived from the interpersonal settings of life and depend, in large measure, on the “consensual validation” of the views of “significant others” with whom one interacts. Because of the continuing impact of the social system on one’s behavior and one’s thought of oneself, the development of personality is a continuing, ongoing process. Sullivan’s views had a significant impact on subsequent sociological (Cottrell, 1942, 1969), psychiatric (Bateson, Jackson, Hayley, & Weakland, 1956; Jackson, 1968), and psychological models of social interaction.

Field Theory and Ecological Psychology

When Kurt Lewin immigrated to the United States in the early 1930s, he had already established himself as a distinguished child psychologist in Germany. American readers were first introduced to his powerful theory of “behavior and development as a function of the total situation” in two articles that appeared in English in 1931. In his classic theoretical paper, “Conflict between Aristotelian and Galileian Modes of Thought in Psychology” (1931a), Lewin offered an elegant defense for studying individual children in the actual, concrete, total situation of which they are a part. He argued that the dynamics of behavior—the study of the forces that exercise momentary control over the direction and form of actions—cannot be clarified by the use of standard statistical methods. Averages that are obtained by combining the results of large numbers of children in a “standard” environment are bound to obscure the precise dynamic controls of behavior, not clarify them. “An inference from the average to the

concrete particular case is...impossible. The concepts of the average child and of the average situation are abstractions that have no utility whatever for the investigation of dynamics” (Lewin, 1931b, p. 95). Lewin provided a rationale for the conclusion that had been arrived at intuitively by some of his most insightful predecessors (Preyer, Binet, Freud, and Piaget). The conclusion stood in sharp contrast to that arrived at by Galton and most American psychologists.

Lewin’s ideas about method were consistent with his theoretical position on the contextual relativity of psychological experience and action. A key element in Lewin’s theorizing was his emphasis on the *psychological* environment as opposed to the physical or objectively determined concrete environment. Lewin observed, “All these things and events are defined for the child partly by their ‘appearance’ but above all by their ‘functional possibilities’ (the *Wirkwelt* in v. Uexküll’s sense)” (Lewin, 1931b, p. 100). In endorsing animal behaviorist J. von Uexküll’s emphasis on the individual’s reconstructed inner space (the *Umwelt* and the *Innenwelt*) as opposed to the objective mechanical forces of the external world (see Loeb, 1964), he captured an idea whose implications have yet to be fully realized. Lewin formulated his psychological field theory in keeping with the gestalt and system theoretic approaches. Although behavior is seen as a function of both the person and the environment, these two major variables “are mutually dependent upon each other. In other words, to understand or to predict behavior, the person and his environment have to be considered as *one* constellation of interdependent factors. We call the totality of these factors the life space (*LSp*) of that individual” (Lewin, 1954, p. 919). Lewin’s theory was basically a model of action, to account for the directionality of behavior in terms of the forces present in a given psychological environment. But the effective forces belong neither to the person nor to the field alone; actions can be understood only in the totality of forces as they are merged to determine behavior.

In his work in the United States in the 1930s and 1940s, Lewin extended this theoretical model to diverse social and developmental phenomena, including the analysis of conflict, social influence, level of aspiration, and goal setting, as well as the effects of autocratic and democratic environments. Beyond their influence on specific research programs, Lewin’s principles of behavior and development became incorporated into the discipline without being identified with his particular school of thought. For instance, his “field theory” demanded attention to the context in which behavior occurred and, particularly, the individual’s personal response to that setting. The “environment” was not merely the physical and social context, but the child’s perception of that setting. So one and the same “objective” environment may be perceived differently, according to the needs of the child and the forces that operate on him or her; conversely, seemingly identical responses may reflect the operation of quite different psychological forces. There is a contextual relativity to both stimuli and responses, and neither should be divorced from the social/environmental matrix in which each is embedded.

This overview does not permit an account of Lewin’s developmental and social theory (excellent summaries may be found in Baldwin, 1967, and Estes, 1954). It should be noted that Lewin and the Lewinians pioneered in the study of conflict resolution (Lewin, 1935), level of aspiration (Lewin, Dembo, Festinger, & Sears, 1944), small group processes (Lewin, Lippitt, & White, 1939), and the effects of interruption and frustration (Barker, Dembo, & Lewin, 1941). One of Lewin’s post-doctoral students, Roger Barker, carried the essential concepts of ecological psychology to the next generation (Barker, 1963, 1964, 1968; Barker & Wright, 1951). Urie Bronfenbrenner (1979) has been enormously influential in extending the essential ideas (Bronfenbrenner, 1979, 1993, 1995). Furthermore, other students inspired by Lewin virtually sculpted the face of modern social psychology. There was also an immediate and direct connection to developmental psychology. Marian Radke Yarrow, an eminent developmental psychologist, was Lewin’s protégé at MIT, where she taught the graduate seminar on Lewinian theory to H. Kelley, J. Thibaut, and M. Deutsch, among others.

What did Lewinian theory not cover? Criticisms of field theory note that relatively little attention is given to the processes of enduring change—namely, those of learning. Although Lewin clearly acknowledges that “somatic” changes in the child can have a significant influence on the psychological environment, field theory gives only modest attention to how such developmental changes may be integrated with modifications in psychological forces. Hence, the model is exceedingly convincing as a descriptive model, but how it may be critically tested, modified, and falsified is less clear. Lewin’s emphasis woke psychology from its behavioristic slumbers by pointing out that the context-free objective “stimulus” may be an illusion. The implications for methodology and theory, especially in the study of social development and social psychology, were enormous.

COMMENTS ON THE MIDDLE PERIOD

It seems ironic that the most notable development in child psychology during this period was brought about initially by social and economic forces instead of scientific advances. Child research institutes were founded throughout the United States, and, once established, they became enormously influential in the science and remained so throughout the better part of the 20th century. Behind the foundations and the governmental–university agencies that provided the actual financial support for the institutes, there was a broad nationwide coalition of concerned teachers and parents who pressed for more attention, scientific and otherwise, to the needs of children. This was the same social/political “movement” that had been given early form and direction by G. Stanley Hall in the 1880s and 1890s. But the establishment of study centers did not a science make, and investigators were immediately challenged to develop more adequate procedures in virtually every sector of child research. Each area of study—intelligence, honesty, emotionality, language, thinking, perception, growth, predictability—presented its own problems of methodology and analysis, and each had to be solved in its own terms. The upshot was an inevitable fragmentation of developmental study.

What were the empirical advances in the period? To attempt to answer that question would be tantamount to compressing the information contained in the three compendia edited by C. Murchison (1931, 1933) and L. Carmichael (1946). Beyond the demonstration that almost all aspects of child behavior and cognition could be profitably studied by empirical procedures—something that had been promised but not demonstrated in the earlier period—we find substantive findings that perplexed the researchers themselves and seemed to defy integration with earlier concepts of the child. These phenomena included the specificity of honesty, the rapid conditionability of fear in infants, the egocentrism of children, the physical normality (or superiority) of bright children, and the modest predictability of behavior over time and space. Spectacular controversies were ignited by studies of early experience that purported to show that children’s basic intellectual adaptations could be influenced by especially beneficial or neglectful early experiences. Perhaps more important for the science than controversy were the less dramatic yet critical advances in describing the “normal” (i.e., species-typical) course of sensorimotor, cognitive, and behavioral development.

Theoretical activity in this period proceeded at two “levels,” specific and general. The empirical advances—methodological and substantive—produced information that demanded attention and integration. Hartshorne and May (1928) offered their “specificity” proposal on altruism and honesty; C. Bühler (1931), her account of three social “types” in infancy; F. Goodenough (1931), her explanation for the development of anger and quarrels; J. Anderson (1939), his hypothesis on the “overlap” in successive tests of infant competence; and so on. These data-based hypotheses constituted a necessary step between empirical studies of child behavior and the overarching theoretical conceptions that had stimulated the research in the first place.

On the second level, various attempts were made to establish a general integrative theory of development in order to fill the void left by the collapse of the recapitulation hypothesis. For every general developmental theory that vied for hegemony in the 1920s and 1930s, a straight line may be drawn backward to antecedent models of the 1880s and 1890s. The cognitive-developmental proposals of J. Piaget, L. S. Vygotsky, H. Wallon, and H. Werner were immediately linked to the concepts of J. M. Baldwin; the developmental psychobiology of Z.-Y. Kuo, T. C. Schneirla, and L. von Bertalanffy followed the prior conceptual advances in animal behavior and experimental embryology; the maturational model of A. Gesell constituted in several respects an extension of the developmental views of W. Preyer; the scientific basis for Watsonian behaviorism was established by the prior work of Morgan, Loeb, and Jennings, among others; and the several versions of psychoanalysis each retained some central elements of the parent theory.

Despite obvious differences among the above models, they shared a family similarity in that they were, in a basic sense, developmental. Differences among them arose on assumptions about how developmental processes might be most adequately described and how behavioral phenomena might be most appropriately conceptualized. These assumptions, in turn, reflected which behavioral or cognitive phenomena were addressed by the theory, and in which species. Although psychoanalysis gained a clear edge in popular recognition and clinical applications, organismic models became quietly influential in the research of psychobiological and cognitive investigators. But none of the models achieved clear dominance, and the science could not claim as its own a unifying theory of behavioral development that might complement or extend the theory of biological evolution. Indeed, advances in

identifying the contextual events that determined actions and learning raised questions on whether a general theory of behavioral development was possible.

THE MODERN ERA

Following a general depression in research activity during World War II, work on behavioral development began an upward slope in the postwar period and has only recently shown signs of leveling. A new “golden age” began for the discipline and it has surpassed those of the two previous eras (1895–1905 and 1925–1935). New techniques and approaches were introduced in rapid succession, stimulated in part by advances in electronic recording, coding, and computer analysis. The effective “life span” of research methods—from new projective procedures to questionnaires on authoritarianism or brief experimental procedures for studying learning—appeared to have been shortened from about 15 to about 10 years. Promising ideas—on test anxiety, social reinforcement satiation, impulsivity, and modeling—entered rapidly, dominated the area briefly, then faded away, often without a decent postmortem or obituary.

In large measure, the quickened pace of research activity and analysis could be attributed to great increases in federal support for empirical research and the opening of new teaching and research positions. A new institute established by the National Institutes of Health (NIH) was devoted to research on child health and human development, and other institutes accepted a developmental orientation to understanding problem behaviors (e.g., National Institute of Mental Health, National Institute of Drug Abuse). In addition, the U. S. Congress funded an unprecedented national program to provide poor and disadvantaged children with a “Head Start” prior to school entry. Two psychologists, Urie Bronfenbrenner and Edward Zigler, were instrumental in initiating the program and directing it through its early years. Other developmental psychologists were involved in the creation of television programs to enhance education and learning (e.g., *Sesame Street*). This period has been one of expansion, invention, and criticism, with new innovations and discoveries in virtually all areas of developmental research and application.

One of the more visible early theoretical trends in this period was the rise, domination, and passing of general learning theories. Until their grip began to fail in the early 1960s, behavioral models of learning were hegemonous in American psychology, and developmental psychology was no exception. To enter the theoretical mainstream, research in the several areas of child study, from language acquisition and cognitive learning to social behavior and child rearing, had to be couched in learning terms. Behaviors did not develop, they were acquired. Despite their austere and parsimonious construction, learning models appeared to be remarkably adaptable for developmental psychologists—but not adaptive enough. By the mid-1960s, the area began to rediscover the dynamic developmental models on which the field had been established. They appeared in quite different forms in studies of language and cognition, in investigations of basic motor and perceptual processes, and in longitudinal studies of social and personality development. The area also rediscovered the basic psychoanalytic assumption that the first relationships were critical for understanding psychopathology and the core features of personality.

Many of the ideas and problems that had been pursued over the first half of the 20th century came again to the forefront, from the study of growth patterns in motor and sensory development, in cognitive changes in thought and language, and in the effects of interactions on social and personality development.

This section of developmental history overlaps with contemporary events, including those covered in other chapters of this edition of the *Handbook*. The closer one comes to current trends, the more difficult it is to disentangle ephemeral interests from enduring changes. Hence we will leave for a final section of this chapter our perception of about the last 20 years of developmental science (the final decade of the 20th century and much of the first decade of the present century). Here, however, on more secure historical ground I discuss some of the shifts that have occurred in developmental science up through the 1980s that helped shape the contemporary trends within the field. I focus on three domains: (a) social learning theory, (b) attachment theory, and (c) cognitive development.

SOCIAL LEARNING: RISE, DECLINE, AND REINVENTION

Contrary to general impressions, there is no single “social learning theory”; there are several. The plurality came about initially because there was only modest consensus on which principles of learning were universal. Over the past half-century, a number of social learning theories have evolved from the basic frameworks established by

Skinner and the neo-Hullian theorists, each with its distinctive emphasis and adherents. It has been a complex and often misunderstood endeavor, and we comment here only on some of the historical highlights.

Rise

Robert R. Sears can be recognized as the person whose influence was pervasive in the introduction of the psycho-analytic learning synthesis to the study of children. One of the original members of the Yale group that created neo-Hullian social learning theory (Dollard et al., 1939; Miller et al., 1941), Sears was a pivotal influence for students and colleagues at the Iowa Child Welfare Research Station, Harvard University, and Stanford University. With his colleagues at these institutions, many of whom went on to develop influential revisions of social learning (including E. E. Maccoby, J. Whiting, V. Nowlis, J. Gewirtz, Richard Walters, A. Bandura, and Sears's wife, Pauline Snedden Sears), Sears was instrumental in bringing about major changes in the scope and concerns of developmental psychology.

In the first major publication to come from this group (Sears, Whiting, Nowlis, & Sears, 1953), "aggression" and "dependency" were seen as motives that were learned early in the life history of the child. How were they learned? The answer was not an easy one, at least not for Hullians, because the theory of conditioned drives had not been elaborated by Clark Hull (1951) and had been only vaguely outlined by Freud. Drawing from both of these views, Sears and his colleagues argued that these key social motives were acquired as a universal consequence of the early familial experiences of the child. Moreover, variations in the strength of the drives and in their expression were produced by differences in the quality of the parent-child relationship, as indexed by the rewards, punishments, and frustrations that occurred in the mother-child interaction. This social learning theory was extended to account for the development of gender role-typing (through internalization of parental values and self-reinforcement) and conscience (through nurturance and the withdrawal of love by the mother).

The semistructured interview technique was extensively employed to investigate parental attitudes, beliefs, and child-rearing practices. Large-scale studies were conducted by Sears and his colleagues in Iowa, Massachusetts, and California (Palo Alto). One aim was to replicate key findings at each of the three sites by using a common research technique. Employing lengthy in-depth interviews with parents as a primary research technique, these studies attempted to relate child-rearing practices with assessment of children's social behavior and personality patterns. The assessments of children capitalized on advances that had been made in observational methodology, and revised or developed child-appropriate "projective test" measures. Instead of using inkblots or semistructured pictures, the investigators used dolls and dollhouses to permit the preschool child to reconstruct the nuclear family (Bach, 1946). The interview and observational procedures provided the model for a wide range of cross-cultural and cross-age studies (e.g., Whiting & Whiting, 1975).

One of the great strengths of social learning theory and its practitioners was their openness to data, whether supportive or disconfirmatory. Hence, the original statement underwent revisions, both modest (e.g., Sears, Maccoby, & Levin, 1957; Sears, Rau, & Alpert, 1965) and major (e.g., Bandura & Walters, 1959; Whiting & Whiting, 1975), in attempts to extend it and correct its shortcomings.

Decline

What were the shortcomings? Some were identified by the investigators themselves in three large-scale studies of child rearing conducted in Iowa, Massachusetts, and California. When the results of the 20-year research effort were compiled and analyzed, the outcomes provided only modest support for the theory that had inspired the work. The problem was that there were few reliable correlates between variations in child-rearing practices and the children's social behavior and personality patterns.

Eleanor Maccoby, a key participant in this work, indicated that the problem lay as much in the theory as in the method. Looking backward after 35 years, Maccoby (1994) wrote:

[F]ew connections were found between parental child-rearing practices (as reported by parents in detailed interviews) and independent assessments of children's personality characteristics—so few, indeed, that virtually nothing was published relating the two sets of data. The major yield of the study was a book on

child-rearing practices as seen from the perspective of mothers [Sears, Maccoby, & Levin, 1957]. This book was mainly descriptive and included only very limited tests of the theories that led to the study. Sears and colleagues later conducted a study with preschoolers focused specifically on the role of identification with the same-sex parent in producing progress toward social maturity. They used a much expanded range of assessment techniques, including observations of parent–child interaction. The hypothesis that identification with parents was a primary mechanism mediating children’s acquisition of a cluster of well-socialized attributes was, once again, not supported (see especially R. R. Sears, Rau, & Alpert, 1965, Table 40, p. 246). (p. 594)

Not all of the outcomes were negative, nor were all unreliable. But the overall pattern of the findings provided scant support for the ideas that had inspired the work in the first place. What was to blame—the theory or the methods employed to test it? The methods could be criticized, and so could the theory.

In an incisive and courageous evaluation published at the height of the social learning era, Marian Radke Yarrow and her colleagues wrote:

Childrearing research is a curious combination of loose methodology that is tightly interwoven with provocative hypotheses of developmental processes and relationships. The compelling legend of maternal influences on child behavior that has evolved does not have its roots in solid data, and its precise verification remains in many respects a subject for future research. The findings from the preceding analyses of data make it difficult to continue to be complacent about methodology, and difficult to continue to regard replication as a luxury. The child’s day-to-day experiences contribute significantly to his behavior and development and are in many respects the essence of developmental theory. An exact understanding is important to science and society. In attempting to build on this knowledge, each researcher is a methodologist and as such has a responsibility for excellence. (Yarrow, Campbell, & Burton, 1968, p. 152)

Two noteworthy contributions by Sears and his colleagues require mention. In a presidential address to the American Psychological Association, Sears (1951) brought renewed attention to the theoretical concept of social interaction and the bidirectionality of familial relations. Although the research methods employed by the Sears group made it difficult to study interactional phenomena directly, these concepts figured importantly in the conceptions that were offered in each of Sears’s major subsequent publications. They provided the impetus for renewed attention to the issues that had been initially raised by James Mark Baldwin, and were then represented in the work of psychiatrist H. S. Sullivan (1940, 1953) and sociologist Leonard Cottrell (1942).

The second contribution was the reintegration of child development research into the mainstream of psychology, a position that it had not held for most of the previous half-century. By linking the study of children to the then-current theoretical systems of psychology, the door was opened for a fresh generation of psychologists to enter the field. The gains were not without cost, however, in that much of the earlier developmental work was set aside or ignored by the new group. Traditional developmental studies, as embodied in the chapters of successive editions of the Carmichael *Manual*, were seen as irrelevant for the basic issues of social learning and social control. Instead of descriptions of developmental change, this generation of developmentalists was concerned with explanations of change in terms of the “new” concepts of social interchange, imitation, dyadic analysis, dependency, aggression, and conscience. Overlooked in the social learning revolution was the fact that each of these concepts had been familiar to the founding generation, and the phenomena to which the concepts refer had been extensively researched in the next generation.

Coming back to the evolution of social learning theories, we find that, in the early 1960s, the movement was split into two major divisions, each of which was in intellectual debt to the parental movement and to the reinforcement concepts of B. F. Skinner (1953). J. Gewirtz, S. Bijou, and D. Baer (Bijou & Baer, 1961; Gewirtz, 1961) followed Skinner’s lead in applying the ideas and concepts of operant conditioning to analyses of behavior modification in normal and retarded children. But there were problems in negotiating the theoretical transition from pigeons to children. Just as the concept of “conditioned” or “learned motivation” had presented difficulties for the initial social learning theories, the notion of “conditioned” or “social reinforcement” proved to be an enigmatic concept for the operant revision (see Gewirtz & Baer, 1958; Parton & Ross, 1965).

Reinvention

The resurgence of social learning theory was led by Albert Bandura and Richard Walters (1963), who shifted the substantive and explanatory basis of the model. They argued that the wedding of learning concepts to psychoanalysis tended to short-change both models. Social learning should exploit learning mechanisms, including cognitive processes that govern imitation and reinforcement. In their work, “modeling” was seen as a primary mechanism for the acquisition of novel actions and, as such, a key to understanding socialization and transgenerational transmission. They had, in effect, reinstituted the construct of “imitation” to the nuclear role that it had played in J. M. Baldwin’s formulation.

The next modification in social learning theory came shortly afterward, when Albert Bandura revitalized the theory and established it on a foundation of distinctively human, cognitive processes. The need for further revision arose when it became clear that the short-term studies of imitation and social learning of children were open to alternative, cognitive interpretations. For instance, examination of the determinants and outcomes of modeling (i.e., imitation) in children indicated that children did not behave in a fashion that was analogous to observation learning in animals. A similar phenomenon was observed in the effects of social reinforcement (i.e., verbal reward) with children. Marked variations in reinforcer effectiveness could be induced simply by instructions or other - cognitive manipulations, leading to the interpretation that “social reinforcement” in children may more appropriately be viewed in terms of information transmission processes than primary reinforcement processes (see Paris & Cairns, 1972; Stevenson, 1965). Other “information” interpretations of punishment, dependency, and conscience appeared (e.g., Walters & Parke, 1964). A similar revision was made in the interpretation of imitation and modeling, for parallel reasons (Bandura, 1969). Patterson (1979) extended observational methods in inventive ways, hence paved the way for precise assessments of social learning hypotheses.

Along with Rotter (1954) and Mischel (1973), Bandura shifted the focus of social learning from preoccupation with psychoanalytic conflicts and anxieties to the positive, productive features of children. With the concepts of self-efficacy and self-regulation, he affirmed the distinctive qualities of human adaptation, and he shifted the focus of the orientation from human problems to human potential. But these are not opposed foci in Bandura’s revision of social learning theory. On this score, Grusec (1994) observes:

Bandura’s interest in self-efficacy arose from his studies of the role of participant modeling in the treatment of phobic disorders. A striking feature of the outcomes of these studies was the extent to which individuals’ perceptions of their own feeling of effectiveness determined how easily changes in behavior and fear arousal were achieved and maintained. According to self-efficacy theory, people develop domain-specific beliefs about their own abilities and characteristics that guide their behavior by determining what they try to achieve and how much effort they put into their performance in that particular situation or domain. (p. 488)

In a century-long cycle, social cognition–learning reformulations came to embrace not only J. M. Baldwin’s concept of imitation but also his concept of the self as a central organizing theme.

Some characteristics of behaviorist models have remained virtually unchanged in the several generations of social learning theories. Social learning researchers have maintained a curious stance toward the concept of development. From Watson onward, learning theories have been developmental in the sense that they have shared the “fundamental point” that humans’ activities should be studied historically. Social learning views have been slow to consider processes of age-related shifts in development (Cairns, 1979; Grusec, 1994). The implicit assumption has persisted that the incremental changes in cognition and learning are sufficient to account for the major phenomena of social development, including their establishment, maintenance, and change.

ATTACHMENT: DISCOVERY AND LOSS

With the rediscovery of imitation and modeling, students of social learning found fresh and robust phenomena to analyze, and a new generation of social learning models was born. So it was with mother–infant attachment. The systematic investigation of mother–infant attachment in studies of animal behavior, and subsequently in studies of humans, breathed new life into the psychoanalytic framework. According to an early definition by Ainsworth

(1972), attachment refers to “an affectional tie or bond that one individual (person or animal) forms between himself and another specific individual” (p. 100).

The prototypic attachment is that which develops between mothers and infants. That a strong tie develops early in life is certainly no new revelation. However, the systematic study of attachment behavior in animals and humans began only in the post-World War II era. Scott (1962, 1963), and Harlow (1958) opened the door for the systematic study of this early affectional relationship with their now classic studies of the young puppy and infant rhesus monkey. At about the same time, Bowlby (1958) and his former postdoctoral associates (Ainsworth, 1963; Schaffer & Emerson, 1964) offered influential statements on attachment in human infants.

The Phenomena of Attachment

Harry F. Harlow (1958) announced in his American Psychological Association presidential address the results of some dramatic findings on the importance of somatosensory contact in the formation of the bond of the infant monkey to inanimate “surrogate” mothers. According to the initial interpretation of these findings, tactile stimulation—or “contact comfort”—was a more powerful determinant than hunger in the infant’s formation of a social attachment. Subsequent work by Harlow and others led to significant modifications in the initial interpretations—on the necessary and sufficient conditions for the development of mammalian attachments (e.g., Cairns, 1966); on the stability and plasticity of effects induced by early social experience (e.g., Mason & Kinney, 1974; Suomi & Harlow, 1972). Nonetheless, the image of “motherless monkeys” had a catalytic effect in stimulating studies of mother–infant relations and, more generally, investigations of the development of social interactions.

Given the critical role assigned to early experiences in most developmental theories, it is curious that so little systematic work had been conducted on mother–infant attachment before the modern era. It is especially surprising because the intense relationship established between infants and mothers is perhaps the most easily detected and robust social phenomenon observed across mammals. At about the time when infants begin to locomote independently, they become extremely distressed when removed involuntarily or separated from their mothers (or mother-surrogates). Reunion tends to produce an immediate cessation of distress (e.g., the young quit crying, screaming, or bleating). Infants in this age range also express heightened weariness or fear when confronted with strange persons and strange places—or even familiar persons in strange places. These phenomena can be demonstrated in virtually all mammalian species; human babies show intermediate levels of intensity.

The multiple dimensions of early-formed bonds were investigated in experimental and observational work with birds (i.e., imprinting) and mammals (i.e., attachment). By the mid-1960s, a comprehensive picture could be drawn of the conditions for the emergence and maintenance of, and for change in attachment relationships (Harlow, 1958; Rosenblatt & Lehrman, 1963; Scott, 1963). The findings permitted four empirical generalizations about the nature of mammalian attachment (Cairns, 1966):

1. At birth and in the immediate postnatal period, there is an elegant synchrony between the actions and physiological states of the mother and of the infant. Moreover, the actions of the infant serve to maintain the mother in a maternal condition and sculpt her physiology so that it supports the contemporaneous needs of the infant. A parallel feedback loop serves similar functions for the infant, and a reciprocal relationship becomes established between the actions and states of the infant and those of the mother (Rosenblatt & Lehrman, 1963). Biological needs and social actions become mutually supportive (Hofer, 1994). In effect, the actions and biological conditions of the infant and mother rapidly become organized around each other.

2. Proximity and mutual mother–infant engagement promote the establishment of a social attachment that persists in the absence of the psychobiological conditions that originally promoted the interaction. In most mammalian species, the bond is intense, and involuntary separation triggers disorganization, distress, and disruption in both the infant and the mother. The distress is so extreme that it can be assessed by a host of behavioral and biological assessments.

3. Intense social attachment can be established under diverse conditions (e.g., the absence of milk, the absence of contact comfort, and, paradoxically, the presence of intense punishment). The influence of these conditions depends, in large measure, on the contexts of reciprocal exchange. Moreover, attachment can develop in

older as well as younger animals (maternal attachment is but one of the special conditions). Experimental studies have indicated that social attachment strength increases with interaction, time spent, and exclusivity of relationship.

4. Maturation changes trigger modifications in the nature and the quality of attachment; maturation of the young is synchronized with maternal behavioral and physiological changes that are consistent with the mother's preparation for the next generation of offspring. New attachments are formed typically within minutes and hours rather than weeks and months, possibly to balance the tension between conservation and survival (Cairns & Werboff, 1967; Mason & Kinney, 1974). In this regard, the adaptation had to be rapid in order for the vulnerable infant to live.

Attachment Theory

Studies of infant–mother attachment came in the wake of these systematic investigations, and they stimulated enormous scientific and public interest (Maccoby & Masters, 1970). Psychoanalyst John Bowlby began a series of seminars on these issues at the Tavistock Clinic in London in the 1950s, and expanded the series in the 1960s (Foss, 1961, 1965; see Bretherton & Waters, 1985). Two key research programs reported in these discussions were: (a) the observations of Schafer and Emerson (1964) on the age of onset of attachment and (b) Ainsworth's (1963) observational report of infant–mother attachment in Uganda. Schafer and Emerson (1964) discovered that human infants begin to exhibit discriminative attachment at about 8 to 9 lunar months after birth, and that these attachments were formed with respect to a wide range of persons who were intimately involved in the infants' caretaking.

John Bowlby first became known for his contributions to object relations theory and, specifically, the significance of early mother–infant bonds (i.e., Bowlby, 1946, 1952). Beginning in the early 1950s, he began informal interdisciplinary seminars that involved, along with others, the eminent ethologist Robert Hinde. One outcome of these discussions was a paper published in the *International Journal of Psychoanalysis* where Bowlby integrated concepts from object relations theory with evolutionary assumptions. He thereby generated a framework of attachment that fused psychoanalysis and ethology (Bowlby, 1958). In an important set of volumes, Bowlby described the implications of his “attachment theory” for understanding maternal–child anxiety, separation, and loss (1969, 1973).

In Bowlby's view of attachment, priority is given to the events that occur during the child's early years in the establishment of a relatively stable attachment system. Mother–infant separation is likely to produce enduring negative consequences. The nature of the attachment that is formed in early development gives rise to an internal representational model formed by the child. Moreover, the processes that give rise to an attachment involve intense mutual regulation and mutual organization between the mother and infant. Bowlby (1952) wrote:

If growth is to proceed smoothly, the tissues must be exposed to the influence of the appropriate organizer at critical periods. In the same way, if mental development is to proceed smoothly, it would appear to be necessary for the undifferentiated psyche to be exposed during certain critical periods to the influence of the psychic organizer—the mother. (p. 53)

Unlike ethological/animal behavior work, Bowlby's object relations/attachment theory has a distinctive focus on individual differences. In addition, its goal, like object relations theory, is to provide a comprehensive account of psychopathology. Like ethological assumptions, it emphasizes the formative effects of early experiences.

Any discussion of modern “Attachment Theory” must include Mary D. S. Ainsworth, Bowlby's long-term collaborator. Ainsworth conducted a pair of influential observational studies on mother–infant relations in Uganda (Ainsworth, 1967) and Baltimore (Ainsworth, Blehar, Waters, & Wall, 1978). One of the procedures to emerge from the later study was a controlled observation procedure labeled the “Strange Situation” (Ainsworth et al., 1978).⁷ This assessment involved a series of very brief separations (i.e., 1 to 3 minutes), with special attention given to the quality of the reunions. The coding of a reunion provided a classification procedure by which children were diagnosed as securely attached (Type B) or insecurely attached (Types A and C), along with various subtypes (Ainsworth et al., 1978). A primary attraction of Attachment Theory is its presumption that these types are linked to the quality of later relationships and to psychopathology.

An extended discussion of Attachment Theory and its strengths and shortcomings is beyond the limits of this chapter and would catapult the account into the contemporary period. For the current state of affairs on this enormously influential theory, the modern developmental version of neopsychoanalysis, see Bretherton and Waters (1985) and Goldberg, Muir, and Kerr (1995).

COGNITIVE RE-EMERGENCE

This era also saw the re-emergence of cognitive-developmental questions as a central focus for thinking and research. Stimulated by a national re-examination of the educational process (e.g., Bruner, 1960), in part because of influential volumes on Piaget (Flavell, 1963; Hunt, 1961) and Vygotsky (Cole, 1978), and in part because of the fading vigor of social learning approaches, the problem of how mental development occurs became a dominant concern for developmental researchers. It is a re-emergence—rather than a revolution—because the issues of mind, consciousness, and mental development were central to the discipline at its founding.

Virtually all aspects of the field were touched by the fresh emphasis. Investigations of language development, thinking, sensation, and information processing in children flourished as they had in no earlier era. Even hard-core behavioristic models proved to be vulnerable to cognitive modifications, with the new directions on “mediational mechanisms” being provided by T. and H. Kendler (Kendler & Kendler, 1962) and M. Kuenne (1946). Information-processing approaches were challenged to build bridges to cognitive developmental studies and interpretations. Given the thrust of the movement, it seemed inevitable that the barriers between social development and cognitive development should be transcended, and that it should become once again permissible to refer to concepts of others and of one self (see Harter, 1983, 1998, 2006; Lewis & Brooks-Gunn, 1979). The recent history of this movement and the statement of the rapprochement among experimental–cognitive concepts, social cognition, and cognitive–developmental concepts are covered in other chapters of this *Handbook* (see, for example, chapters by Baltes et al.; Fischer & Bidell; and Overton in this volume, and Kuhn, 2006).

HISTORICAL THEMES AND CONTEMPORARY ADVANCES

Now, more than one hundred years after it began, developmental research and theory continue to be diverse, vigorous, contentious, fresh, and in many instances, brilliant. In concluding this chapter, we recall the themes that were identified in the beginning, in order to both take stock of the last two decades of developmental science and to describe the progress made and the pitfalls encountered in more than a century of scientific work (see also Cairns, 2000; Cairns, Cairns, Rodkin & Xie, 1998).

Knowledge and Consciousness

Understanding the mind and how it develops and functions remains a major concern for developmentalists. Because of advances in technology, investigators who study the relations between brain processes and cognitive activity have achieved spectacular advances in identifying pathways and plasticity over time. And there is now compelling evidence to support Preyer’s speculation that “the brain grows through its own activity.” Yet, plenty of controversies remain, and certain basic issues continue to be controversial (e.g., is there an area in the brain devoted to language?) despite impressive advances in understanding and methodology. At least some of the matters that remain unresolved have less to do with how the brain is studied than with how our constructs of the mind are formulated and our measures are organized (Morrison & Ornstein, 1996; see the chapters by Gottlieb et al.; Magnusson & Stattin; Overton; and Valsiner, this Volume).

Thoughts and Actions

The self and its distinctive processes (e.g., self-concepts, self-efficacy, self-regulation) continue to be central for modern researchers. What was attributed to the “Will” in the 1890s is attributed to the self and its processes (motives, values, dispositions) in the 1990s. What has changed, however, are methods, measures, and the findings that they yield. The multilevel, multimeasure methodological procedures of the late 20th century have exposed some myths. One’s own self-attributions are not necessarily the same as descriptions of the self by others, and the differences are systematically linked to the domains assessed, the contexts of assessment, and the meaning of the measures. The story of how the discrepancies between the self and others is now being addressed belongs, however,

to today, not to the past. The current state of information on these matters is addressed elsewhere in this volume (see chapters by Baltes et al.; Brandstädter; and Rathunde & Csikszentmihalyi, this volume).

Ontogeny and Phylogeny

How may development be best defined: in terms of the ontogeny of individuals, the ontogeny of the species, or the ontogeny of both? This was one of the first issues in the systematic development of the science, and it has been one of the last to be reassessed in the present era. But it is now being addressed as a matter of how cross-generational transfer occurs, and how there may be turning points across generations as well as across ontogeny. According to a recent collaborative statement, “Developmental investigation focuses attention to the ontogenies of both embryos and ancestors, and to the process by which pathways may be repeated or redirected across successive generations” (Carolina Consortium on Human Development, 1996, p. 1). Intergenerational investigations may become a primary methodology of the future as they become feasible and practical (see, for example, Bronfenbrenner & Morris, this volume; Cairns, Cairns, Xie, Leung, & Hearne, 1998; Elder & Shanahan, this volume).

Nature and Nurture

After a century of controversy, the nature–nurture debate was still being contested both in public and in the laboratory (e.g., Herrnstein & Murray, 1994; Lehrman, 1953, 1970). Recall that J. M. Baldwin resolved the matter by observing that “most of man’s equipment is due to both causes working together,” and Preyer arrived at the same conclusion.

Today, the split conceptions of nature and nurture, and of the reductionist formulations associated with either a nature (e.g., sociobiology or behavior genetics) or a nurture (e.g., Behaviorism or functional analysis approaches) have passed from the main stream of theoretical and scientific interest (e.g., see Gottlieb, et al., this volume; Overton, this volume) and – through the lens of various versions of developmental systems theories (e.g., see Fischer & Bidell, this volume; Lerner, this volume; Magnusson & Stattin, this volume; Thelen & Smith, this volume) -- scientific attention has focused on models and methods that now promise to begin to address the question of how “both causes work together” at the level of biology, interactions, and social networks.

When Does Development End?

Virtually all researchers in this discipline are developmentalists—including arch-maturationist Arnold Gesell. The naïve idea of strict preformism and unidirectional causation has been a strawman since the beginning of the science. But there remain radical differences among investigators in *when* they believe experiences to be extremely relevant, and when they consider them to be irrelevant. Early speculations on this issue were handicapped by a paucity of systematic normative and experimental information. In the absence of longitudinal information on the behavioral adaptations of human beings, there was no adequate basis for selecting or rejecting these theoretical assumptions about the timing and functions of early experience. Neurobehavioral, cognitive, and social developmental research in the modern era has begun to clarify the role of time and timing across several domains. This information is reviewed, for example, by Baltes et al. (this volume), Brandstädter, (this volume), Elder and Shanahan (this volume), Overton, (this volume), and Valsiner (this volume).

Morality and the Perfectibility of Humans

Values and moral development continue to be important for the discipline, although the work has been handicapped by serious methodological challenges. With a few important exceptions, the conceptual framework for understanding the development of personal values was given less attention than in the earlier eras. The importance of this domain has emerged in the last 20 years, as instantiated by interest in moral and spiritual development (see Oser, et al., this volume), positive youth development (see Benson, et al., this volume), and the use of strength-based models of human development to conceptualize and study the development of diverse children and adolescents (see Spencer, this volume).

Given this burgeoning theoretical and empirical work, it seems likely that this domain will come to the forefront in the next era, given its centrality in understanding the human condition. Indeed, the current concern with

the self and with self-organization in the social context prepares the way for an integrated view of morality, positive human development, and the capacities for healthy functioning present in all people. As Kohlberg insightfully observed, “An individual is fundamentally a potentially moral being, not because of social authority and rules (as Durkheim and Piaget thought) but because his ends, his will, his self is that of a shared social self” (Kohlberg, 1982, pp. 311–312).

Social Applications

Applications continue to present large opportunities and large problems. Sears (1975) concluded that the discipline was created to be relevant. In this regard, White (1996) wrote:

Child study of some sort has to be part and parcel of any social design for children. Though developmental psychology is not, in the traditional sense, a policy science it has nevertheless a significant role to play in the organization and management of systems of governance directed towards children and families. (p. 413)

As research has become increasingly more tied to specific social concerns and social needs, some have feared that the science would be compromised. That has not occurred. To the contrary, carefully evaluated social applications have help created a more robust, verifiable, and relevant science (Lerner, this volume). Indeed the burgeoning of interest in applied developmental science that has occurred in the past 20 years and, certainly, since the last edition of this Handbook (e.g., see Farmer & Farmer, 2001; Fisher & Lerner, 2005; Gest, Mahoney, & Cairns, 1999; Lerner, Jacobs, & Wertlieb, 2003; and the several volumes of the journals, Applied Developmental Science and the Journal of Applied Developmental Psychology) has derived at least in part from the use of developmental systems theories to discuss the plasticity of human development and thus the potential of applying developmental science to promote positive human development.

One other byproduct of social applications should be mentioned. The rapid growth of the discipline has created some unanticipated hazards for developmental study, not the least of which is the intense competition for publication space and research support. In one unfortunate outcome, closely knit research groups have formed tight theoretical and/or empirical coalitions that promote inclusion and practice exclusion. Under these conditions, dominant methodologies and ideas tend to monopolize resources while ignoring or distorting competing concepts and disconfirming evidence. Although these efforts tend to self-correct in the long term, they may create fragmentation and misunderstanding in the short term. In this regard, efforts to achieve effective applications often act as catalysts to bring ideas and findings to common ground and common standards.

TOWARD AN INTERDISCIPLINARY SCIENCE

In June 1994, a Nobel Foundation symposium comprised of noted biologists and psychologists called for an integrated, unified framework for the study of development (Magnusson, 1996). No single source or single investigator can be credited, since it has become an interdisciplinary, international movement. In the history of the discipline, this is a singular event. Over the past 100 plus years, the insights and emphases of developmental investigators in Europe—from Binet and Stern to Lewin and Bühler—have often been on a different frequency than those in North America, and the reverse held as well. When exceptions occurred—early, with Baldwin, Piaget, Vygotsky, and Freud; and later, with Magnusson, Bronfenbrenner, Bandura, Bruner, and Bowlby—the entire discipline was revitalized.

The contemporary press toward better integrated models of development arose from multiple sources. These include social development and social ecology (e.g., Bronfenbrenner, 1995, 2005; Ford & Lerner, 1992), developmental psychobiology and ethology (Bateson, 1991; Garcia Coll, Bearer, & Lerner; Gottlieb, 1992; Hinde, 1970; Hood, Greenberg, & Tobach, 1995), the dynamic systems approach (Lerner, 2002; Smith & Thelen, 1993; Thelen & Smith, 1994), developmental psychopathology (e.g., Hay & Angold, 1993; Cicchetti & Cohen, 1994), cognitive development (Baltes & Baltes, 1990; van der Veer & Valsiner, 1991), and developmental science (Cairns, Elder, & Costello, 1996; Magnusson, 1996). Due in part to methodological advances in the study of development, basic perceptual and movement patterns gained fresh life and new direction. It appears that studies of social development, emotion, and cognition may be the greatest beneficiaries of the current drive toward a more integrated developmental framework.

Given the advances in theory—advances which were not possible until empirical data became available to sort out the developmental concepts—the field now seems on the threshold of becoming a true interdisciplinary science. The longitudinal studies initiated in the 1960s and 1970s in Stockholm by David Magnusson, in Finland by Lea Pulkkinen, and in England by Michael Rutter and David Farrington provided models for U.S. researchers across the last decades of the 20th century. Longitudinal research on children and adolescents has triggered a new revolution in methodology (e.g., see Duncan, Magnuson, & Ludwig, 2004; Laub & Sampson, 2004; McArdle & Nesselroade, 2003; Mishler, 2004; Molenaar, 2004; Nesselroade & Ram, 2004; Singer & Willett, 2003; Skrondal & Rabe-Hesketh, 2004; von Eye, 1990; von Eye, Bergman, 2003; von Eye & Gutierrez Pena, 2004; Willett, 2004). Important findings have been generated (e.g., Phelps, Furstenberg, & Colby, 2002; Young, Savola, & Phelps, 1991). This work has helped the field regain the vitality enjoyed in early eras. The multilevel information is now being organized around individuals in the natural contexts of their lives. When wedded to concerns of origins and plasticity, this information becomes “the essence of developmental theory” (Yarrow et al., 1968).

Footnotes

¹Professor Robert Cairns died on November 10, 1999. This chapter is based on the chapter written by Professor Cairns for the 5th edition of the Handbook of Child Psychology (1998) and was amended by Beverley D. Cairns and Richard M. Lerner. As was true for the 1998 version of the chapter, the present version owes much to two earlier chapters that Professor Cairns wrote on the history of developmental psychology (Cairns, 1983; Cairns & Ornstein, 1979) and to several people who contributed to the preparation of the earlier works: Beverley D. Cairns, Peter A. Ornstein, Robert R. Sears, William Kessen, Ronald W. Oppenheim, Alice Smuts, Lloyd Borstlemann, Robert Wozniak, Philip R. Rodkin, and the staff of the Center for Developmental Science.

²There is some ambiguity about the actual publication date of *The Mind of the Child*. In the preface to the second edition, Preyer tells us that “the first edition of this book appeared in October, 1881” (p. xvi). That seems straightforward enough, but the publication date of the original German work was 1882. The discrepancy apparently arose because of the lag between the time when the author signed off the Preface (in Jena, October 6, 1881) and the time the finished book was actually published. Similar ambiguity surrounds the traditional assignment of 1879 as the founding of Wundt’s laboratory; it was an ongoing enterprise at the time, and William James claimed priority anyway.

³Did cultural stereotypes play a role in the evaluation of *The Mind of the Child*? For instance, Compayré (1893) called the book a “monument of German assiduousness.” Mateer (1918) remarked (in the context of comparing Frenchman Pérez’s “logical, brilliant style” with that of Preyer) that: “The French write brilliantly and convincingly but their technique is apt to be at fault. They seem to hit intuitively upon right premises and conclusions, although their data may be unconvincing or scanty. The German work is more stolid, more convincing in its facts but less inspiring in application” (pp. 24–24).

⁴But not France’s first child psychologist. Pérez (1878) published his *The First Three Years of the Child* several years before Preyer’s *The Mind of the Child* (1882). The two authors covered the same ground, but, as Reinert (1979) indicates, Pérez was generally considered to be the more imaginative and Preyer the more methodical.

⁵Twenty-two thousand subjects? Not really. Schallenger’s (1894) article in the *Pedagogical Seminary* actually reported the responses of 3,434 girls and boys who were 6 to 16 years of age. The misinterpretation arose because Schallenger transformed their responses to proportional scores, then multiplied by 1,000 to permit comparisons between age-sex groups. Nonetheless, a sample of 3,434 boys and girls is impressive in any era, especially before the invention of computers, electric calculators, and mechanical pencils.

⁶*Race development* is one of the unconventional expressions employed by Baldwin. Race in this context refers to variations across the human species. In effect, cross-cultural studies of the development of cognition are required to complement studies of individual development in humans.

⁷The “Strange Situation” seems to have been modeled after the assessments of attachment employed with nonhuman mammals (see Scott, 1963).

REFERENCES

- Ainsworth, M. D. S. (1963). The development of infant-mother interaction among the Ganda. In B. M. Foss (Ed.), *Determinants of infant behavior* (Vol. 2, pp. 67–104). New York: Wiley.
- Ainsworth, M. D. S. (1967). *Infancy in Uganda: Infant care and the growth of love*. Baltimore: Johns Hopkins University Press.
- Ainsworth, M. D. S. (1972). Attachment and dependency: A comparison. In J. L. Gewirtz (Ed.), *Attachment and dependency*. New York: Wiley.
- Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the Strange Situation*. Hillsdale, NJ: Erlbaum.
- Allport, G. W. (1937). *Personality: A psychological interpretation*. New York: Holt.
- Anderson, J. E. (1931). The methods of child psychology. In C. Murchison (Ed.), *A handbook of child psychology* (pp. 1–27). Worcester, MA: Clark University Press.
- Anderson, J. E. (1939). The limitations of infant and preschool test in the measurement of intelligence. *Journal of Psychology*, 8, 351–379.
- Arrington, R. E. (1932). *Interrelations in the behavior of young children* (Child Development Monographs No. 8). New York: Teachers College, Columbia University Press.
- Bach, G. R. (1946). Father fantasies and father-typing in father-separated children. *Child Development*, 17, 63–80.
- Baer, K. E. von. (1828–1837). *Über Entwicklungsgeschichte der Thiere: Beobachtung und Reflexion* (2 vols.). Königsberg: Bornträger.
- Baldwin, A. (1980). *Theories of child development*. New York: Wiley. (Original work published 1967)
- Baldwin, B. T., & Stecher, L. I. (1924). *The psychology of the preschool child*. New York: Appleton.
- Baldwin, J. M. (1890). Origin of right- or left-handedness. *Science*, 16, 302–303.
- Baldwin, J. M. (1891). Suggestion in infancy. *Science*, 17, 113–117.
- Baldwin, J. M. (1892a). Infants' movements. *Science*, 19, 15–16.
- Baldwin, J. M. (1892b). Origin of volition in childhood. *Science*, 20, 286–287.
- Baldwin, J. M. (1893). Distance and color perception by infants. *Science*, 21, 231–232.
- Baldwin, J. M. (1895). *Mental development in the child and the race: Methods and processes*. New York: Macmillan.
- Baldwin, J. M. (1902). *Development and evolution*. New York: Macmillan.
- Baldwin, J. M. (1906). *Social and ethical interpretations in mental development: A study in social psychology*. New York: Macmillan. (Original work published 1897)
- Baldwin, J. M. (1915). *Genetic theory of reality, being the outcome of genetic logic, as issuing in the aesthetic theory of reality called pancalism*. New York: Putnam.
- Baldwin, J. M. (1930). [Autobiography]. *A History of Psychology in Autobiography*, 1, 1–30.
- Baltes, P. B. (1979). Life-span developmental psychology: Some converging observations on history and theory. In P. B. Baltes & O. G. Brim, Jr. (Eds.), *Life-span development and behavior* (Vol. 2, pp. 255–279). New York: Academic Press.
- Baltes, P. B., & Baltes, M. M. (Eds.). (1990). *Successful aging: Perspectives from the behavioral sciences*. New York: Cambridge University Press.
- Baltes, P. B., Lindenberger, U., & Staudinger, U. M. (1998). Life-span theory in developmental psychology. In W. Damon (Series Ed.) & R. M. Lerner (Volume Ed.), *Handbook of child psychology: Vol. 1 Theoretical models of human development* (5th ed., pp. 1029–1144). New York: Wiley.
- Baltes, P. B., Reese, H. W., & Nesselroade, J. R. (1977). *Life-span developmental psychology: Introduction to research methods*. Monterey, CA: Brooks/Cole.
- Bandura, A. (1969). *Principles of behavior modification*. New York: Holt, Rinehart and Winston.
- Bandura, A., & Walters, R. H. (1959). *Adolescent aggression*. New York: Ronald Press.
- Bandura, A., & Walters, R. H. (1963). *Social learning and personality development*. New York: Holt, Rinehart and Winston.
- Barker, M. (1930). *A technique for studying the social-material activities of young children* (Child Development Monographs No. 3). New York: Columbia University Press.
- Barker, R. G. (1964). *Big school, small school: High school size and student behavior*. Stanford, CA: Stanford University Press.
- Barker, R. G. (1968). *Ecological psychology: Concepts and methods for studying the environment of human behavior*. Stanford, CA: Stanford University Press.
- Barker, R. G. (Ed.). (1963). *The stream of behavior: Explorations of its structure and content*. New York: Appleton--Century-Crofts.

- Barker, R. G., Dembo, T., & Lewin, K. (1941). Frustration and regression: An experiment with young children. *University of Iowa Studies in Child Welfare*, 18(No. 1).
- Barnes, E. (1896–1897, 1902–1903). *Studies in education* (2 vols.). Philadelphia: Author.
- Bateson, G., Jackson, D. D., Hayley, J., & Weakland, J. H. (1956). Toward a theory of schizophrenia. *Behavioral Science*, 1, 251–264.
- Bateson, P. P. G. (Ed.). (1991). *The development and integration of behavior: Essays in honor of Robert Hinde*. New York: Cambridge University Press.
- Bayley, N. (1932). A study of crying of infants during mental and physical tests. *Journal of Genetic Psychology*, 40, 306–329.
- Beaver, A. P. (1930). *The initiation of social contacts by preschool children* (Child Development Monographs No. 7). New York: Columbia University Press.
- Bell, R. Q. (1968). A reinterpretation of the direction of effects in studies of socialization. *Psychological Review*, 75, 81–95.
- Bell, R. Q., & Harper, L. V. (1977). *Child effects on adults*. Hillsdale, NJ: Erlbaum.
- Bergenn, V. W., Dalton, T. C., & Lipsitt, L. P. (1994). Myrtle B. McGraw: A growth scientist. In R. D. Parke, P. A. Ornstein, J. J. Rieser, & C. Zahn-Waxler (Eds.), *A century of developmental psychology* (pp. 389–423). Washington, DC: American Psychological Association.
- Bertalanffy, L., von (1933). *Modern theories of development: An introduction to theoretical biology* (J. H. Woodger, Trans.). London: Oxford University Press.
- Bijou, S. W., & Baer, D. M. (1961). *Child development*. New York: Appleton-Century-Crofts.
- Binet, A. (1887). Le Fétichisme dans l'amour. *Revue Philosophique*, 24, 143–167, 252–274.
- Binet, A. (1892). *Les Altérations de la personnalité*. Paris: Félix Alcan. (Translated into English in 1896)
- Binet, A. (1903). *L'étude expérimentale de l'intelligence*. Paris: Schleicher.
- Binet, A. (1908). Le développement de l'intelligence chez enfants. *L'Année Psychologique*, 14, 1–94.
- Binet, A. (1911). Nouvelles recherches sur la mesure du niveau intellectuel chez les enfants d'école. *L'Année Psychologique*, 17, 145–201.
- Binet, A. (1973). Nos commission de travail. In T. H. Wolfe (Ed.), *Alfred Binet*. Chicago: University of Chicago Press. (Original work published 1904)
- Binet, A. (1978). *Les idées modernes sur les enfants*. Paris: Flammarion. (Original work published 1909)
- Binet, A., & Henri, V. (1894). La mémoire des phrases (mémoire des idées). *L'Année Psychologique*, 1, 24–59.
- Binet, A., & Henri, V. (1895). La psychologie individuelle. *L'Année Psychologique*, 2, 411–465.
- Binet, A., & Simon, T. (1905). Méthodes nouvelles pour le diagnostic du niveau intellectuel des anormaux. *L'Année Psychologique*, 11, 191–244.
- Binet, A., Philippe, J., Courtier, J., & Henri, V. (1894). *Introduction à la psychologie expérimentale*. Paris: Alcan.
- Birns, B. (1984). Piaget and Wallon: Two giants of unequal visibility. In G. Voyat (Ed.), *The world of Henri Wallon* (pp. 59–65). New York: Jason Aronson.
- Boring, E. G. (1950). *A history of experimental psychology*. New York: Century. (Original work published 1929)
- Borstleiman, L. J. (1983). Children before psychology: Ideas about children from antiquity to the late 1800s. In P. H. Mussen (Series Ed.) & W. Kessen (Vol. Ed.), *Handbook of child psychology* (4th ed., pp. 1–80). New York: Wiley.
- Bott, H. McM. (1934). *Personality development in young children*. Toronto: University of Toronto Press.
- Bowlby, J. (1946). *Forty-four juvenile thieves: Their characters and home backgrounds*. London: Bailliere, Tindall & Cox.
- Bowlby, J. (1952). *Maternal care and mental health* (2nd ed.). Geneva: World Health Organization.
- Bowlby, J. (1958). The nature of the child's tie to his mother. *International Journal of Psycho-Analysis*, 39, 350–373.
- Bowlby, J. (1969). *Attachment and loss: Vol. 1. Attachment*. New York: Basic Books.
- Bowlby, J. (1973). *Attachment and loss: Vol. 2. Separation: Anxiety and anger*. New York: Basic Books.
- Bretherton, I., & Waters, E. (1985). *Growing points of attachment: Theory and research*. Chicago: University of Chicago Press.
- Breuer, J., & Freud, S. (1936). *Studies in hysteria* (A. A. Brill, Trans.). New York: Nervous and Mental Disease. (Original work published 1895)
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.
- Bronfenbrenner, U. (1993). The ecology of cognitive development: Research models and fugitive findings. In R. H. Wozniak & K. W. Fischer (Eds.), *Development in context: Acting and thinking in specific environments* (pp. 3–44). Hillsdale, NJ: Erlbaum.

- Bronfenbrenner, U. (1995). Developmental ecology through space and time: A future perspective. In P. Moen, G. H. Elder, Jr., & K. Lüscher (Eds.), *Examining lives in context: Perspectives on the ecology of human development* (pp. 619–647). Washington, DC: American Psychological Association.
- Bronfenbrenner, U. (2005). *Making human beings human*. Thousand Oaks, CA: Sage Publications.
- Broughton, J. M. (1981). The genetic psychology of James Mark Baldwin. *American Psychologist*, 36, 396–407.
- Broughton, J. M., & Freeman-Moir, D. J. (1982). *The cognitive developmental psychology of James Mark Baldwin: Current theory and research in genetic epistemology*. Norwood, NJ: ALEX.
- Bruce, D. (1986). Lashley's shift from bacteriology to neuropsychology, 1910–1917, and the influence of Jennings, Watson, and Franz. *Journal of the History of the Behavioral Sciences*, 22, 27–44.
- Bruner, J. (1960). *The process of education*. Cambridge, MA: Harvard University Press.
- Buckley, K. W. (1989). *Mechanical man: John Broadus Watson and the beginnings of behaviorism*. New York: Guilford Press.
- Bühler, C. (1927). Die ersten sozialen Verhaltensweisen des Kindes. In *Soziologische und psychologische Studien über das erste Lebensjahr*. Jena: Fischer.
- Bühler, C. (1929). Personality types based on experiments with children. *Proceedings and Papers of the 9th International Congress of Psychology*, 100–112.
- Bühler, C. (1931). The social behavior of the child. In C. Murchison (Ed.), *A handbook of child psychology* (pp. 374–416). Worcester, MA: Clark University Press.
- Bühler, C. (1933). The social behavior of children. In C. Murchison (Ed.), *A handbook of child psychology* (2nd ed., pp. 392–431). Worcester, MA: Clark University Press.
- Bühler, K. (1930). *The mental development of the child: A summary of modern psychology theory*. New York: Harcourt Brace.
- Burt, C. (1920–1921). A young girl's diary. *British Journal of Psychology: Medical Section*, 1, 353–357.
- Cahan, E. D. (1984). The genetic psychologies of James Mark Baldwin and Jean Piaget. *Developmental Psychology*, 20, 128–135.
- Cahan, E. D. (1994). John Dewey and human development. In R. D. Parke, P. A. Ornstein, J. J. Rieser, & C. Zahn-Waxler (Eds.), *A century of developmental psychology* (pp. 145–167). Washington, DC: American Psychological Association.
- Cahan, E. D., & White, S. H. (1992). Proposals for a second psychology. *American Psychologist*, 47, 224–235.
- Cairns, R. B. (1966). Attachment behavior of mammals. *Psychological Review*, 73, 409–426.
- Cairns, R. B. (1976). The ontogeny and phylogeny of social behavior. In M. E. Hahn & E. C. Simmel (Eds.), *Evolution and communicative behavior* (pp. 115–139). New York: Academic Press.
- Cairns, R. B. (1979). *Social development: The origins and plasticity of social interchanges*. San Francisco: Freeman.
- Cairns, R. B. (1983a). The emergence of developmental psychology. In P. H. Mussen (Series Ed.) & W. Kessen (Vol. Ed.), *Handbook of child psychology: Vol. 1. History, theory, and methods* (4th ed., pp. 41–102). New York: Wiley.
- Cairns, R. B. (1983b). The genesis of genetic epistemology. *Journal of the History of the Behavioral Sciences*, 19, 260–263.
- Cairns, R. B. (1986). Phenomena lost: Issues in the study of development. In J. Valsiner (Ed.), *The individual subject and scientific psychology* (pp. 97–112). New York: Plenum Press.
- Cairns, R. B. (1992). The making of a developmental science: The contributions and intellectual heritage of James Mark Baldwin. *Developmental Psychology*, 28, 17–24.
- Cairns, R. B. (2000). Developmental Science: Three audacious implications. In L. R. Bergman & R. B. Cairns (Eds.), *Developmental science and the holistic approach* (pp. 49–62). Mahwah, NJ: Erlbaum.
- Cairns, R. B., & Ornstein, P. A. (1979). Developmental psychology. In E. S. Hearst (Ed.), *The first century of experimental psychology* (pp. 459–510). Hillsdale, NJ: Erlbaum.
- Cairns, R. B., & Werboff, J. (1967). Behavior development in the dog: An interspecific analysis. *Science*, 158, 1070–1072.
- Cairns, R. B., Cairns, B. D., Rodkin, P., & Xie, H. (1998). New directions in developmental research: Models and methods. In R. Jessor (Ed.), *New perspectives on adolescent risk behavior* (pp. 13–40). New York, NY: Cambridge University Press.
- Cairns, R. B., Cairns, B. D., Xie, H., Leung, M.-C., & Hearne, S. (1998). Paths across generations: Academic competence and aggressive behaviors in young mothers and their children. *Developmental Psychology*, 34, 1162–1174.
- Carmichael, L. (1933). Origin and prenatal growth of behavior. In C. Murchison (Ed.), *A handbook of child psychology* (2nd ed., pp. 31–159). Worcester, MA: Clark University Press.
- Carmichael, L. (Ed.). (1946). *Manual of child psychology*. New York: Wiley.

- Carolina Consortium on Human Development. (1996). A collaborative statement. In R. B. Cairns, G. H. Elder, & E. J. Costello (Eds.), *Developmental science* (pp. 1–7). New York: Cambridge University Press.
- Carpenter, W. B. (1854). *Principles of comparative physiology* (4th ed.). Philadelphia: Blanchard and Lea.
- Carroll, J. B., & Horn, J. L. (1981). On the scientific basis of ability testing. *American Psychologist*, 36, 1012–1020.
- Cattell, J. (1890). Mental tests and measurements. *Mind*, 15, 373–381.
- Challman, R. C. (1932). Factors influencing friendships among preschool children. *Child Development*, 3, 146–158.
- Charlesworth, W. R. (1992). Charles Darwin and developmental psychology: Past and present. *Developmental Psychology*, 28, 5–16.
- Cicchetti, D., & Cohen, D. J. (Eds.). (1995). *Developmental psychopathology*. New York: Wiley.
- Claparède, E. (1930). [Autobiography]. In C. Murchison (Ed.), *A history of psychology in autobiography* (Vol. 1, pp. 63–96). Worcester, MA: Clark University Press.
- Cole, M. (Ed.). (1978). *Mind in society: The development of higher psychological processes*. Cambridge: Harvard University Press.
- Compayré, G. (1893). *L'évolution intellectuelle et morale de l'enfant*. Paris: Hachette.
- Cooley, C. H. (1902). *Human nature and the social order*. New York: Free Press.
- Costall, A. (1993). How Lloyd Morgan's canon backfired. *Journal of the History of the Behavioral Sciences*, 29, 113–122.
- Costello, E. J., & Angold, A. (1996). Developmental psychopathology. In R. B. Cairns, G. H. Elder, Jr., & E. J. Costello (Eds.), *Developmental science* (pp. 168–189). New York: Cambridge University Press.
- Cottrell, L. S., Jr. (1942). The analysis of situational fields in social psychology. *American Sociological Review*, 7, 370–382.
- Cottrell, L. S., Jr. (1969). Interpersonal interaction and the development of the self. In D. A. Goslin (Ed.), *Handbook of socialization theory and research* (pp. 543–579). Chicago: Rand McNally.
- Cremin, L. A. (1964). *The transformation of the school: Progressivism in American education, 1876–1957*. New York: Vintage Books.
- Cronbach, L. J. (1957). The two disciplines of scientific psychology. *American Psychologist*, 12, 671–784.
- Dahlstrom, W. G. (1985). The development of psychological testing. In G. A. Kimble & K. Schlesinger (Eds.), *Topics in the history of psychology* (Vol. 2, pp. 63–113). New York: Wiley.
- Darwin, C. (1877). Biographical sketch of an infant. *Mind*, 2, 285–294.
- de Beer, G. (1958). *Embryos and ancestors* (3rd ed.). London: Oxford University Press.
- Dewey, J. (1899). *The school and society*. Chicago: University of Chicago Press.
- Dewey, J. (1916). *Democracy and education: An introduction to the philosophy of education*. New York: Macmillan.
- Dollard, J., Miller, N. E., Doob, L. W., Mowrer, O. H., & Sears, R. R. (with Ford, C. S., Hovland, C. I., & Sollenberger, R. T.). (1939). *Frustration and aggression*. New Haven, CT: Yale University Press.
- Drachman, D. B., & Coulombre, A. J. (1962). Experimental clubfoot and arthrogryposis multiplex congenita. *Lancet*, 283, 523–526.
- Drummond, W. B. (1907). *An introduction to child study*. London: Arnold.
- Duncan, G. J., Magnusson, K. A., & Ludwig, J. (2004). The endogeneity problem in developmental studies. *Research in Human Development* 1(1&2), 59–80.
- Ebbinghaus, H. (1897). Über eine neue Methode zur Prüfung geistiger Fähigkeiten und ihre Anwendung bei Schulkindern. *Zeitschrift für angewandte psychologie*, 13, 401–459.
- Elder, G. H., Jr., Modell, J., & Parke, R. D. (Eds.). (1993). *Children in time and place: Developmental and historical insights*. New York: Cambridge University Press.
- Estes, W. K. (1944). *An experimental study of punishment* (Psychological Monographs, 57, 3). Evanston, IL: American Psychological Association.
- Estes, W. K. (1954). Kurt Lewin. In W. Estes, S. Koch, K. MacCorquodale, P. Meehl, C. Mueller, Jr., W. Schoenfeld, & W. Verplanck (Eds.), *Modern learning theory* (pp. 317–344). New York: Appleton-Century-Crofts.
- Farmer, T. W., & Farmer, E. M. Z. (2001). Developmental science, systems of care, and prevention of emotional and behavioral problems in youth. *American Journal of Orthopsychiatry*, 71, 171–181.
- Fenichel, O. (1945). *The psychoanalytic theory of neurosis*. New York: Norton.
- Féré, C. (1888). Note sur les modifications de la résistance électrique sous l'influence des excitations sensorielles et des émotions. *Comptes Rendus de la Société de Biologie*, 40, 217–219.
- Fischer, K. W., & Bidell, T. R. (1998). Dynamic development of psychological structures in action and thought. In W. Damon (Series Ed.) & R. M. Lerner (Volume Ed.), *Handbook of child psychology: Vol. 1 Theoretical models of human development* (5th ed., pp. 467–561), New York: Wiley.

- Fisher C. B., & Lerner, R. M. (2005). *Encyclopedia of Applied Developmental Science*. Thousand Oaks, CA: Sage Publications.
- Fiske, J. (1883). *Excursions of an evolutionist*. Boston: Houghton Mifflin.
- Flavell, J. H. (1963). *The developmental psychology of Jean Piaget*. Princeton, NJ: Van Nostrand.
- Ford, D. H., & Lerner, R. M. (1992). *Developmental systems theory: An integrative approach*. Newbury Park, CA: Sage.
- Foss, B. M. (Ed.). (1961). *Determinants of infant behavior*. New York: Wiley.
- Foss, B. M. (Ed.). (1965). *Determinants of infant behavior: II*. New York: Wiley.
- Frank, L. (1935). The problem of child development. *Child Development*, 6, 7–18.
- Franz, S. I. (1898). [Review of the book *L'Année Psychologique* Vol. 4]. *Psychological Review*, 5, 665.
- Freud, A. (1931). Psychoanalysis of the child. In C. Murchison (Ed.), *A hand-book of child psychology* (pp. 555–567). Worcester, MA: Clark University Press.
- Freud, S. (1910). The origin and development of psychoanalysis. *American Journal of Psychology*, 21, 181–218.
- Freud, S. (1926/1973). Psychoanalysis: Fundamentals. In *Encyclopedia Britannica* (Vol. 18). Chicago: Encyclopedia Britannica.
- Freud, S. (1939). *Moses and monotheism*. New York: Random House.
- Freud, S. (1957). *A general selection from the works of Sigmund Freud*. New York: Liveright.
- Galton, F. (1871). *Hereditary genius: An inquiry into its laws and consequences*. New York: Appleton.
- Galton, F. (1883). *Inquiries into human faculty and its development*. London: Macmillan.
- Garcia Coll, C., Bearer, E., & Lerner, R.M. (Eds.). (2004). *Nature and nurture: The complex interplay of genetic and environmental influences on human behavior and development*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Garvey, C., & Hogan, R. (1973). Social speech and social interaction: Egocentrism revisited. *Child Development*, 44, 562–568.
- Gesell, A. (1928). *Infancy and human growth*. New York: Macmillan.
- Gesell, A. (1931). The developmental psychology of twins. In C. Murchison (Ed.), *A handbook of child psychology* (pp. 209–235). Worcester, MA: Clark University Press.
- Gesell, A. (1933). Maturation and the patterning of behavior. In C. Murchison (Ed.), *A handbook of child psychology* (2nd ed., pp. 158–203). Worcester, MA: Clark University Press.
- Gesell, A., & Amatruda, C. S. (1941). *Developmental diagnosis: Normal and abnormal child development*. New York: Hoeber.
- Gesell, A., & Thompson, H. (1938). *The psychology of early growth*. New York: Macmillan.
- Gesell, A., & Thompson, H. (with Amatruda, C. S.). (1934). *Infant behavior: Its genesis and growth*. New York: McGraw-Hill.
- Gest, S. D., Mahoney, J. L., & Cairns, R. B. (1999). A developmental approach to prevention research: Configural antecedents of early parenthood. *American Journal of Community Psychology*, 27, 543–565.
- Gewirtz, J. L. (1961). A learning analysis of the effects of normal stimulation, privation, and deprivation on the acquisition of social motivation and attachment. In B. M. Foss (Ed.), *Determinants of infant behavior*. New York: Wiley.
- Gewirtz, J. L., & Baer, D. (1958). The effect of brief social deprivation on behaviors for a social reinforcer. *Journal of Abnormal and Social Psychology*, 56, 49–56.
- Gilbert, J. A. (1894). Researches on the mental and physical development of school children. *Studies of the Yale Psychology Laboratories*, 2, 40–100.
- Gilbert, J. A. (1897). Researches upon school children and college students. *University of Iowa Studies: Studies in Psychology*, 1, 1–39.
- Goddard, H. H. (1911). Two thousand normal children measured by the Binet measuring scale of intelligence. *Pedagogical Seminary*, 18, 232–259.
- Goldberg, S., Muir, R., & Kerr, J. (Eds.). (1995). *Attachment theory: Social, developmental, and clinical perspectives*. Hillsdale, NJ: Analytic Press.
- Goodenough, F. L. (1929). The emotional behavior of young children during mental tests. *Journal of Juvenile Research*, 13, 204–219.
- Goodenough, F. L. (1930a). Interrelationships in the behavior of young children. *Child Development*, 1, 29–47.
- Goodenough, F. L. (1930b). Work of child development research centers: A survey. *Child Study*, 4, 292–302.
- Goodenough, F. L. (1931). *Anger in young children*. Minneapolis: University of Minnesota Press.
- Goodenough, F. L. (1954). The measurement of mental growth in childhood. In L. Carmichael (Ed.), *Manual of child psychology* (2nd ed., pp. 459–491). New York: Wiley.

- Goodwin, C. J. (1987). In Hall's shadow: Edmund Clark Sanford, 1859–1924. *Journal of the History of the Behavioral Sciences*, 23, 153–168.
- Gottlieb, G. (1973). Dedication to W. Preyer, 1841–1897. In G. Gottlieb (Ed.), *Behavioral embryology* (pp. xv–xix). New York: Academic Press.
- Gottlieb, G. (1976). The roles of experience in the development of behavior and the nervous system. In G. Gottlieb (Ed.), *Neural and behavioral specificity* (pp. 3–48). New York: Academic Press.
- Gottlieb, G. (1979). Comparative psychology and ethology. In E. Hearst (Ed.), *The first century of experimental psychology* (pp. 147–173). Hillsdale, NJ: Erlbaum.
- Gottlieb, G. (1987). The developmental basis for evolutionary change. *Journal of Comparative Psychology*, 101, 262–272.
- Gottlieb, G. (1992). *Individual development and evolution: The genesis of novel behavior*. New York: Oxford University Press.
- Gould, S. J. (1977). *Ontogeny and phylogeny*. Cambridge, MA: Harvard University Press.
- Grusec, J. E. (1994). Social learning theory and developmental psychology: The legacies of Robert R. Sears and Albert Bandura. In R. D. Parke, P. A. Ornstein, J. J. Rieser, & C. Zahn-Waxler (Eds.), *A century of developmental psychology* (pp. 473–497). Washington, DC: American Psychological Association.
- Guthrie, E. R. (1935). *The psychology of learning*. New York: Harper.
- Haeckel, E. (1866). *Generelle Morphologie der Organismen* (2 vols.). Berlin: Georg Reimer.
- Haeckel, E. (1901). *The riddle of the universe at the close of the nineteenth century*. London: Watts.
- Hall, C. S., & Lindzey, G. (1957). *Theories of personality*. New York: Wiley.
- Hall, G. S. (1883). The contents of children's minds. *Princeton Review*, 2, 249–272.
- Hall, G. S. (1885). The new psychology. *Andover Review*, 3, 120–135, 239–248.
- Hall, G. S. (1888–1889). Foreword. In W. Preyer (Ed.), *The mind of the child* (Vol. 1). New York: Appleton.
- Hall, G. S. (1891). The contents of children's minds on entering school. *Pedagogical Seminary*, 1, 139–173.
- Hall, G. S. (1904). *Adolescence: Its psychology and its relations to physiology, anthropology, sociology, sex, crime, religion, and education* (2 vols.). New York: Appleton.
- Hall, G. S. (1922). *Senescence, the last half of life*. New York: Appleton.
- Hamburger, V. (1970). Von Baer: Man of many talents. *Quarterly Review of Biology*, 45, 173–176.
- Harlow, H. F. (1958). The nature of love. *American Psychologist*, 13, 673–685.
- Harlow, H. F., & Zimmerman, R. R. (1959). Affectional responses in the infant monkey. *Science*, 130, 421–432.
- Harter, S. (1983). Developmental perspectives on the self-system. In P. H. Mussen (Series Ed.) & M. Hetherington (Vol. Ed.), *Handbook of child psychology* (4th ed.) (Vol. 4, pp. 275–386). New York: Wiley.
- Harter, S. (1998). The development of self-representations. In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.) *Handbook of child psychology: Vol. 3 Social, emotional, and personality development* (5th ed., pp. 553–617). New York: Wiley.
- Harter, S. (2006). The Self. In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.) *Handbook of child psychology: Vol. 3 Social, emotional, and personality development* (6th ed.). Hoboken, NJ: Wiley.
- Hartshorne, H., & May, M. S. (1928–1930). *Studies in the nature of character* (3 vols.). New York: Macmillan.
- Hay, D. F., & Angold, A. (1993). Introduction: Precursors and causes in development and pathogenesis. In D. F. Hay & A. Angold (Eds.), *Precursors and causes in development and psychopathology* (pp. 1–22). Chichester, England: Wiley.
- Hearst, E. (Ed.). (1979). *The first century of experimental psychology*. Hillsdale, NJ: Erlbaum.
- Herrnstein, R. J., & Murray, C. (1994). *The bell curve: Intelligence and class structure in American life*. New York: Free Press.
- Hilgard, J. (1933). The effect of early and delayed practice on memory and motor performances studied by the method of co-twin control. *Genetic Psychology Monographs*, 14, 493–567.
- Hinde, R. A. (1966). *Animal behavior*. New York: McGraw-Hill.
- Hinde, R. A. (1970). *Animal behavior: A synthesis of ethology and comparative psychology* (2nd ed.). New York: McGraw-Hill.
- Hofer, M. A. (1994). Hidden regulators in attachment, separation, and loss. *Monographs of the Society for Research in Child Development*, 59(2/3, Serial No. 240).
- Hollingworth, H. L. (1927). *Mental growth and decline: A survey of developmental psychology*. New York: Appleton.
- Holt, L. E. (1916). *The care and feeding of children: A catechism for the use of mothers and children's nurses* (8th ed., Rev.). New York: Appleton. (Original work published 1894)
- Hood, K. E., Greenberg, G., & Tobach, E. (Eds.). (1995). *Behavioral development: Concepts of approach/withdrawal and integrative levels*. New York: Garland.

- Horney, K. (1937). *The neurotic personality of our time*. New York: Norton.
- Horowitz, F. D. (1992). John B. Watson's legacy: Learning and environment. *Developmental Psychology*, 28, 360–367.
- Hull, C. L. (1943). *Principles of behavior*. New York: Appleton-Century-Crofts.
- Hull, C. L. (1951). *Essentials of behavior*. New Haven, CT: Yale University Press.
- Hunt, J. McV. (1961). *Intelligence and experience*. New York: Ronald Press.
- Hurlock, E. B. (1924). The value of praise and reproof as incentives for children. *Archives of Psychology*, 11(71).
- Jackson, D. D. (Ed.). (1968). *Communication, family, and marriage*. Palo Alto, CA: Science & Behavior Books.
- Jacobs, J. (1887). Experiments on "prehension." *Mind*, 12, 75–79.
- James, W. (1890). *The principles of psychology* (Vol. 1). New York: Macmillan.
- James, W. (1894). Review of "internal speech and song." *Psychological Review*, 1, 209–210.
- James, W. (1900). *Talks to teachers on psychology: And to students on some of life's ideals*. New York: Holt.
- Jenkins, J. J., & Paterson, D. G. (Eds.). (1961). *Studies in individual differences: The search for intelligence*. New York: Appleton-Century-Crofts.
- Jennings, H. S. (1898–1899). The psychology of a protozoan. *American Journal of Psychology*, 10, 503–515.
- Jennings, H. S. (1906). *Behavior of the lower organisms*. New York: Macmillan.
- Jensen, D. D. (1962). Foreword to the reprinted edition. In H. S. Jennings, *Behavior of the lower organisms* (pp. ix–xvii). Bloomington: Indiana University Press.
- Jersild, A. T. (1932). *Training and growth in the development of children: A study of the relative influence of learning and maturation* (Child Development Monographs No. 10). New York: Teachers College, Columbia University Press.
- Jersild, A. T., Markey, F. V., & Jersild, C. L. (1933). *Children's fears, dreams, wishes, daydreams, likes, dislikes, pleasant and unpleasant memories: A study by the interview method of 400 children aged 5 to 12* (Child Development Monographs No. 12). New York: Teachers College, Columbia University Press.
- Jones, E. (1953). *The life and work of Sigmund Freud* (Vol. 1). New York: Basic Books.
- Jones, H. E. (1930). The galvanic skin reflex in infancy. *Child Development*, 1, 106–110.
- Jones, H. E. (1954). The environment and mental development. In L. Carmichael (Ed.), *Manual of child psychology* (2nd ed.). New York: Wiley.
- Jones, M. C. (1924). A laboratory study of fear: The case of Peter. *Pedagogical Seminary*, 31, 308–315.
- Jones, M. C. (1931). The conditioning of children's emotions. In C. Murchison (Ed.), *A handbook of child psychology* (pp. 71–93). Worcester, MA: Clark University Press.
- Jones, V. (1933). Children's morals. In C. Murchison (Ed.), *A handbook of child psychology* (2nd ed., pp. 486–533). Worcester, MA: Clark University Press.
- Kagan, J., & Moss, H. A. (1962). *Birth to maturity, a study in psychological development*. New York: Wiley.
- Kamin, L. J. (1974). *The science and politics of IQ*. Hillsdale, NJ: Erlbaum.
- Katz, D., & Katz, R. (1927). *Gespräche mit Kindern: Untersuchungen zur Sozialpsychologie und Pädagogik*. Berlin: Springer.
- Kendler, H. H., & Kendler, T. S. (1962). Vertical and horizontal processes in problem solving. *Psychological Review*, 69, 1–16.
- Kessen, W. (1965). *The child*. New York: Wiley.
- Klopfer, P. H., & Hailman, J. P. (1967). *An introduction to animal behavior: Ethology's first century*. Englewood Cliffs, NJ: Prentice-Hall.
- Kohlberg, L. (1969). Stage and sequence: The cognitive-developmental approach to socialization. In D. A. Goslin (Ed.), *Handbook of socialization theory and research* (pp. 347–480). Chicago: Rand McNally.
- Kohlberg, L. (1982). Moral development. In J. M. Broughton & D. J. Freeman-Moir (Eds.), *The cognitive developmental psychology of James Mark Baldwin: Current theory and research in genetic epistemology* (pp. 277–325). Norwood, NJ: ALEX.
- Krasnogorski, N. I. (1925). The conditioned reflex and children's neuroses. *American Journal of Diseases in Children*, 30, 753–768.
- Kreppner, K. (1992). William L. Stern, 1871–1938: A neglected founder of developmental psychology. *Developmental Psychology*, 28, 539–547.
- Kreppner, K. (1994). William L. Stern: A neglected founder of developmental psychology. In R. D. Parke, P. A. Ornstein, J. J. Rieser, & C. Zahn-Waxler (Eds.), *A century of developmental psychology* (pp. 311–331). Washington, DC: American Psychological Association.
- Kuenne, M. R. (1946). Experimental investigation of the relation of language to transposition behavior in young children. *Journal of Experimental Psychology*, 36, 471–490.

- Kuhn, D. & Franklin, S. (2006). The second decade: What develops (and how)? In W. Damon & R. M. Lerner (Series Eds. & D. Kuhn & R. Siegler (Vol Eds.)) *Handbook of child psychology: Vol. 2 Cognition, Perception, and Language* (6th ed.). Hoboken, NJ: Wiley.
- Kuo, H. H. (1937). A study of the language development of Chinese children. *Chinese Journal of Psychology*, 1, 334–364.
- Kuo, Z.-Y. (1930). The genesis of the cat's response to the rat. *Journal of Comparative Psychology*, 11, 1–35.
- Kuo, Z.-Y. (1939). Studies in the physiology of the embryonic nervous system: IV. Development of acetylcholine in the chick embryo. *Journal of Neurophysiology*, 2, 488–493.
- Kuo, Z.-Y. (1967). *The dynamics of behavioral development: An epigenetic view*. New York: Random House.
- Laub, J.H., & Sampson, R. J. (2004) "Strategies for Bridging the Quantitative and Qualitative Divide: Studying Crime Over the Life Course" *Research in Human Development*, 1, 1&2, 81-99
- Lehrman, D. S. (1953). A critique of Konrad Lorenz's theory of instinctive behavior. *Quarterly Review of Biology*, 28, 337–363.
- Lehrman, D. S. (1970). Semantic and conceptual issues in the nature–nurture problem. In L. R. Aronson, D. S. Lehrman, E. Tobach, & J. S. Rosenblatt (Eds.), *Development and evolution of behavior: Essays in memory of T. C. Schneirla* (pp. 17–52). San Francisco: Freeman.
- Lerner, R. M., Jacobs, F., & Wertlieb, D. (Eds.). (2003). *Applying developmental science for youth and families: Historical and theoretical foundations*. Volume 1 of *Handbook of applied developmental science: Promoting positive child, adolescent, and family development through research, policies, and programs*. Editors: Richard M. Lerner, Francine Jacobs, and Donald Wertlieb. Thousand Oaks, CA: Sage Publications.
- Lewin, K. (1931a). Conflict between Aristotelian and Galileian modes of thought in psychology. *Journal of General Psychology*, 5, 141–177.
- Lewin, K. (1931b). Environmental forces in child behavior and development. In C. Murchison (Ed.), *A handbook of child psychology* (2nd ed., pp. 590–625). Worcester, MA: Clark University Press.
- Lewin, K. (1935). *A dynamic theory of personality*. New York: McGraw-Hill.
- Lewin, K. (1954). Behavior and development as a function of the total situation. In L. Carmichael (Ed.), *Manual of child psychology* (2nd ed.). New York: Wiley.
- Lewin, K., Dembo, T., Festinger, L., & Sears, P. (1944). Level of aspiration. In J. McV. Hunt (Ed.), *Handbook of personality and the behavior disorders* (Vol. 1, pp. 333–378). New York: Ronald Press.
- Lewin, K., Lippitt, R., & White, R. (1939). Patterns of aggressive behavior in experimentally created “social climates.” *Journal of Social Psychology*, 10, 271–299.
- Lewis, M., & Brooks-Gunn, J. (1979). *Social cognition and the acquisition of self*. New York: Plenum Press.
- Littman, R. A. (1979). Social and intellectual origins of experimental psychology. In E. Hearst (Ed.), *The first century of experimental psychology* (pp. 39–85). Hillsdale, NJ: Erlbaum.
- Loeb, J. (1964). *The mechanistic conception of life*. Cambridge, MA: Harvard University Press. (Original work published 1912)
- Loomis, A. M. (1931). *A technique for observing the social behavior of nursery school children* (Child Development Monographs No. 5). New York: Teachers College, Columbia University Press.
- Lorenz, K. Z. (1935). Der Kumpan in der Umwelt der Vögel. *Journal of Ornithology*, 83, 137–213.
- Lorenz, K. Z. (1937). The companion in the bird's world. *Auk*, 54, 245–273.
- Maccoby, E. E. (1994). The role of parents in the socialization of children: An historical overview. In R. D. Parke, P. A. Ornstein, J. J. Rieser, & C. Zahn-Waxler (Eds.), *A century of developmental psychology* (pp. 589–615). Washington, DC: American Psychological Association.
- Maccoby, E. E., & Masters, J. C. (1970). Attachment and dependency. In P. H. Mussen (Ed.), *Carmichael's manual of child psychology* (3rd ed.) (Vol. 2, pp. 73–157). New York: Wiley.
- Magnusson, D. (1988). *Individual development in paths through life: Vol. 1. A longitudinal study*. Hillsdale, NJ: Erlbaum.
- Magnusson, D. (1995). Individual development: A holistic integrated model. In P. Moen, G. H. Elder, Jr., & K. Luscher (Eds.), *Examining lives in context: Perspectives on the ecology of human development* (pp. 19–60). Washington, DC: American Psychological Association.
- Magnusson, D. (Ed.). (1996). *The lifespan development of individuals: Behavioral, neurobiological, and psychosocial perspectives: A synthesis*. New York: Cambridge University Press.
- Magnusson, D., & Bergman, L. R. (1990). A pattern approach to the study of pathways from childhood to adulthood. In L. N. Robins & M. Rutter (Eds.), *Straight and devious pathways from childhood to adulthood* (pp. 101–115). Cambridge, England: Cambridge University Press.

- Maier, S. F., Seligman, M. E. P., & Solomon, R. L. (1969). Pavlovian fear conditioning and learned helplessness. In R. Church & B. Campbell (Eds.), *Punishment and aversive behavior* (pp. 299–342). New York: Appleton-Century-Crofts.
- Marquis, D. B. (1931). Can conditioned responses be established in the newborn infant? *Journal of Genetic Psychology*, 39, 479–492.
- Mason, W. A. (1980). Social ontogeny. In P. Marler & J. G. Vandenbergh (Eds.), *Social behavior and communication*. New York: Plenum Press.
- Mason, W. A., & Kinney, M. D. (1974). Redirection of filial attachments in rhesus monkeys: Dogs as mother surrogates. *Science*, 183, 1209–1211.
- Mateer, F. (1918). *Child behavior: A critical and experimental study of young children by the method of conditioned reflexes*. Boston: Badger.
- McArdle, J. J., & Nesselroade, J. R. (2003). Growth curve analysis in contemporary psychological research. In J. A. Schinka & W. F. Velicer (Vol. Eds) & I. B. Weiner (Editor-in-Chief) *Handbook of Psychology: Research methods in psychology*, Vol. 2 (pp. 447–477). Hoboken, NJ: John Wiley & Sons.
- McCarthy, D. (1931). Language development. In C. Murchison (Ed.), *A handbook of child psychology* (pp. 278–315). Worcester, MA: Clark University Press.
- McCarthy, D. (1933). Language development in children. In C. Murchison (Ed.), *A handbook of child psychology* (2nd ed., pp. 329–373). Worcester, MA: Clark University Press.
- McCarthy, D. (1946). Language development in children. In L. Carmichael (Ed.), *Manual of child psychology* (pp. 476–581). New York: Wiley.
- McCarthy, D. (1954). Language development in children. In L. Carmichael (Ed.), *Manual of child psychology* (2nd ed., pp. 492–630). New York: Wiley.
- McDougall, W. (1906–1908). An investigation of the colour sense of two infants. *British Journal of Psychology*, 2, 338–352.
- McDougall, W. (1926). *An introduction to social psychology* (Rev. ed.). Boston: Luce.
- McGraw, M. (1935). *Growth: A study of Johnny and Jimmy*. New York: Appleton-Century-Crofts.
- McGraw, M. B. (1946). Maturation of behavior. In L. Carmichael (Ed.), *Manual of child psychology* (pp. 332–369). New York: Wiley.
- McNemar, Q. (1940). A critical examination of the University of Iowa studies of environmental influences upon the IQ. *Psychological Bulletin*, 37, 63–92.
- Mead, G. H. (1934). *Mind, self and society*. Chicago: University of Chicago Press.
- Miller, N. E., & Dollard, J. (1941). *Social learning and imitation*. New York: McGraw-Hill.
- Miller, N. E., Sears, R. R., Mowrer, O. H., Doob, L. W., & Dollard, J. I. (1941). The frustration-aggression hypothesis. *Psychological Review*, 48, 337–342.
- Mills, W. (1898). *The nature and development of animal intelligence*. London: Unwin.
- Mills, W. (1899). The nature of animal intelligence and the methods of investigating it. *Psychological Review*, 6, 262–274.
- Minton, H. L. (1984). The Iowa Child Welfare Research Station and the 1940 debate on intelligence: Carrying on the legacy of a concerned mother. *Journal of the History of the Behavioral Sciences*, 20, 160–176.
- Mischel, W. (1973). Toward a cognitive social learning reconceptualization of personality. *Psychological Review*, 80, 252–283.
- Mishler, E. G. (2004). Historians of the self: Restorying lives, revising identities. *Research in Human Development*, 1(1&2), 101–121.
- Molenar, P.C.M. (2004). A manifesto on Psychology as a idiographic science: Bringing the person back into scientific psychology, this time forever. *Measurement*, 2, 201–218.
- Monroe, W. S. (1899). *Die Entwicklung des sozialen Bewusstseins der Kinder*. Berlin: Reuther & Reichard.
- Morgan, C. L. (1896). *Habit and instinct*. London: Edward Arnold.
- Morgan, C. L. (1902). “New statement” from Professor Lloyd Morgan. In J. M. Baldwin (Ed.), *Development and evolution* (pp. 347–348). New York: Macmillan.
- Morgan, C. L. (1903). *An introduction to comparative psychology*. London: W. Scott. (Original work published 1894)
- Morrison, F. J., & Ornstein, P. A. (1996). Cognitive development. In R. B. Cairns, G. H. Elder, Jr., & E. J. Costello (Eds.), *Developmental science* (pp. 121–134). New York: Cambridge University Press.
- Mowrer, O. H. (1938). Apparatus for the study and treatment of enuresis. *American Journal of Psychology*, 51, 163–168.

- Mueller, E. (1972). The maintenance of verbal exchanges between young children. *Child Development*, 43, 930–938.
- Mueller, R. H. (1976). A chapter in the history of the relationship between psychology and sociology in America: James Mark Baldwin. *Journal of the History of Behavioral Sciences*, 12, 240–253.
- Munn, N. L. (1954). Learning in children. In L. Carmichael (Ed.), *Manual of child psychology* (2nd ed., pp. 374–458). New York: Wiley.
- Munn, N. L. (1965). *The evolution and growth of human behavior* (2nd ed.). Boston: Houghton Mifflin.
- Munroe, R. L. (1955). *Schools of psychoanalytic thought*. New York: Dryden Press.
- Murchison, C. (Ed.). (1931). *A handbook of child psychology*. Worcester, MA: Clark University Press.
- Murchison, C. (Ed.). (1933). *A handbook of child psychology* (2nd ed.). Worcester, MA: Clark University Press.
- Murchison, C., & Langer, S. (1927). Tiedemann's observations on the development of the mental faculties of children. *Journal of Genetic Psychology*, 34, 205–230.
- Murphy, L. B. (1937). *Social behavior and child personality: An exploratory study of some roots of sympathy*. New York: Columbia University Press.
- Mussen, P. H. (Ed.). (1970). *Carmichael's manual of child psychology* (2 vols.). New York: Wiley.
- Nesselroade, J. R., & Ram, N. (2004). Studying intraindividual variability: What we have learned that will help us understand lives in context. *Research in Human Development* 1(1&2), 9–29.
- Oppenheim, R. W. (1973). Prehatching and hatching behavior: Comparative and physiological consideration. In G. Gottlieb (Ed.), *Behavioral embryology* (pp. 163–244). New York: Academic Press.
- Oppenheimer, J. M. (1959). Embryology and evolution: Nineteenth century hopes and twentieth century realities. *Quarterly Review of Biology*, 34, 271–277.
- Ornstein, P. A. (Ed.). (1978). *Memory development in children*. Hillsdale, NJ: Erlbaum.
- Osborn, H. F. (1896). Ontogenetic and phylogenetic variation. *Science*, 4, 786–789.
- Paris, S. G. (1978). Coordination of means and goals in the development of mnemonic skills. In P. A. Ornstein (Ed.), *Memory development in children* (pp. 259–273). Hillsdale, NJ: Erlbaum.
- Paris, S. G., & Cairns, R. B. (1972). An experimental and ethological investigation of social reinforcement in retarded children. *Child Development*, 43, 717–729.
- Parke, R. D., Ornstein, P. A., Rieser, J. J., & Zahn-Waxler, C. (1994). The past is prologue: An overview of a century of developmental psychology. In R. D. Parke, P. A. Ornstein, J. J. Rieser, & C. Zahn-Waxler (Eds.), *A century of developmental psychology* (pp. 1–70). Washington, DC: American Psychological Association.
- Parten, M. B. (1933). Social play among preschool children. *Journal of Abnormal and Social Psychology*, 28, 136–147.
- Parton, D. A., & Ross, A. O. (1965). Social reinforcement of children's motor behavior: A review. *Psychological Bulletin*, 64, 65–73.
- Patterson, G. R. (1979). A performance theory for coercive family interaction. In R. B. Cairns (Ed.), *The analysis of social interactions: Methods, issues, and illustrations* (pp. 119–162). Hillsdale, NJ: Erlbaum.
- Pauly, P. J. (1981). The Loeb-Jennings debate and the science of animal behavior. *Journal of the History of the Behavioral Sciences*, 17, 504–515.
- Peréz, B. (1878). *La psychologie de l'enfant: Les trois premières années* [The first three years of childhood] (A. M. Christie, Ed. & Trans.). Chicago: Marquis. (Original work published 1851)
- Peterson, J. (1925). *Early conceptions and tests of intelligence*. Yonkers-on-Hudson, NY: World Book.
- Peterson, J. (1931). Learning in children. In C. Murchison (Ed.), *A handbook of child psychology* (pp. 316–376). Worcester, MA: Clark University Press.
- Peterson, R. C., & Thurstone, L. L., (1933). Motion pictures and the social attitudes of children. In W. W. Charters (Ed.), *Motion pictures and youth* (Pt. 3, pp. 1–75). New York: Macmillan.
- Phelps, E., Furstenberg, F. F., & Colby, A. (2002). *Looking at Lives: American Longitudinal Studies of the Twentieth Century*. New York: Russell Sage Foundation.
- Piaget, J. (1926). *The language and thought of the child*. New York: Harcourt Brace. (Original work published 1923)
- Piaget, J. (1931). Children's philosophies. In C. Murchison (Ed.), *A handbook of child psychology* (pp. 377–391). Worcester, MA: Clark University Press.
- Piaget, J. (1951). *Play, dreams, and imitation in childhood*. New York: Norton.
- Piaget, J. (1952). [Autobiography]. *A History of Psychology in Autobiography*, 4, 237–256.
- Piaget, J. (1973). *Le jugement moral chez l'enfant* (4th ed.). Paris: Presses Universitaires de France. (Original work published 1932)
- Piaget, J. (1978). *Behavior and evolution*. New York: Pantheon Books.
- Piaget, J. (1984). The role of imitation in the development of representational thought. In G. Voyat (Ed.), *The world of Henri Wallon* (pp. 105–114). New York: Jason Aronson.
- Pressey, S. L., Janney, J. E., & Kuhlen, J. E. (1939). *Life: A psychological survey*. New York: Harper.

- Preyer, W. (1885). *Specielle Physiologic des Embryo*. Untersuchungen über die Lebenserscheinungen vor der Geburt. Leipzig: Grieben.
- Preyer, W. (1888–1889). *The mind of the child* (2 vols.). New York: Appleton. (Original work published 1882)
- Quine, W. V. (1981). *Theories and things*. Cambridge, MA: Belknap Press.
- Reinert, G. (1979). Prolegomena to a history of life-span developmental psychology. In P. B. Baltes & O. G. Brim (Eds.), *Life-span development and behavior* (Vol. 2, pp. 205–254). New York: Academic Press.
- Romanes, G. J. (1884). *Mental evolution in animals*. New York: Appleton.
- Romanes, G. J. (1889). *Mental evolution in man: Origin of human faculty*. New York: Appleton.
- Rosenblatt, J. S., & Lehrman, D. S. (1963). Maternal behavior of the laboratory rat. In H. L. Rheingold (Ed.), *Maternal behavior in mammals*. New York: Wiley.
- Ross, D. G. (1972). *Stanley Hall: The psychologist as prophet*. Chicago: University of Chicago Press.
- Rotter, J. B. (1954). *Social learning and clinical psychology*. Englewood Cliffs, NJ: Prentice-Hall.
- Sameroff, A. J. (1983). Developmental systems: Contexts and evolution. In P. H. Mussen (Series Ed.) & W. Kessen (Vol. Ed.), *Handbook of child psychology: Vol. 1. History, theory, and methods* (4th ed., pp. 237–294). New York: Wiley.
- Schaffer, H. R., & Emerson, P. E. (1964). The development of social attachments in infancy. *Monographs of the Society for Research in Child Development*, 29(3, Whole No. 94).
- Schallenger, M. E. (1894). A study of children's rights, as seen by themselves. *Pedagogical Seminary*, 3, 87–96.
- Schneider, W. H. (1992). After Binet: French intelligence testing, 1900–1950. *Journal of the History of the Behavioral Sciences*, 28, 111–132.
- Schneirla, T. C. (1933). Studies on army ants in Panama. *Journal of Comparative Psychology*, 15, 267–299.
- Schneirla, T. C. (1957). Theoretical consideration of cyclic processes in Doryline ants. *Proceedings of the American Philosophical Society*, 101, 106–133.
- Schneirla, T. C. (1959). An evolutionary and developmental theory of biphasic processes underlying approach and withdrawal. In M. R. Jones (Ed.), *Nebraska Symposium on Motivation, 1958* (pp. 1–42). Lincoln: University of Nebraska Press.
- Schneirla, T. C. (1966). Behavioral development and comparative psychology. *Quarterly Review of Biology*, 41, 283–302.
- Schneirla, T. C. (1972). Levels in the psychological capacities of animals. In L. A. Aronson, E. Tobach, J. S. Rosenblatt, & D. S. Lehrman (Eds.), *Selected writings of T. C. Schneirla* (pp. 199–237). San Francisco: Freeman.
- Scott, J. P. (1962). Critical periods in behavioral development. *Science*, 138, 949–958.
- Scott, J. P. (1963). *The process of primary socialization in canine and human infants* (Monographs of the Society for Research in Child Development, 28, 1). Lafayette, IN: Child Development.
- Sears, R. R. (1944). Experimental analysis of psychoanalytic phenomena. In J. McV. Hunt (Ed.), *Personality and the behavior disorders* (Vol. 1, pp. 306–332). New York: Ronald Press.
- Sears, R. R. (1951). A theoretical framework for personality and social behavior. *American Psychologist*, 6, 476–483.
- Sears, R. R. (1975). Your ancients revisited: A history of child development. In E. M. Hetherington (Ed.), *Review of child development research* (Vol. 5). Chicago: University of Chicago Press.
- Sears, R. R., Maccoby, E. E., & Levin, H. (1957). *Patterns of child rearing*. Evanston, IL: Row-Peterson.
- Sears, R. R., Rau, L., & Alpert, R. (1965). *Identification and child rearing*. Stanford, CA: Stanford University Press.
- Sears, R. R., Whiting, J. W. M., Nowlis, V., & Sears, P. S. (1953). Some child-rearing antecedents of aggression and dependency in young children. *Genetic Psychology Monographs*, 47, 135–234.
- Senn, M. J. E. (1975). Insights on the child development movement in the United States. *Monographs of the Society for Research in Child Development*, 40(Serial No. 161).
- Sewney, V. D. (1945). *The social theory of James Mark Baldwin*. New York: King's Crown Press.
- Shakow, D., & Rapaport, D. (1964). *The influence of Freud on American psychology*. New York: International Universities Press.
- Sherman, M., & Key, C. B. (1932). The intelligence of isolated mountain children. *Child Development*, 3, 279–290.
- Shinn, M. (1893–1899). Notes on the development of a child. *University of California Publications*, 1.
- Shinn, M. (1900). *Biography of a baby*. Boston: Houghton Mifflin.
- Shirley, M. M. (1931). *The first two years. A study of twenty-five babies: Vol. 1. Postural and locomotor development*. Minneapolis: University of Minnesota Press.
- Shirley, M. M. (1933a). *The first two years. A study of twenty-five babies: Vol. 2. Intellectual development*. Minneapolis: University of Minnesota Press.
- Shirley, M. M. (1933b). *The first two years. A study of twenty-five babies: Vol. 3. Personality manifestations*. Minneapolis: University of Minnesota Press.

- Siegler, R. S. (1992). The other Alfred Binet. *Developmental Psychology*, 28, 179–190.
- Sigismund, B. (1856). *Kind und Welt: Vatern, Muttern und Kinderfreuden gewidmet*. Braunschweig: Vieweg.
- Skeels, H. M. (1966). Adult status of children with contrasting early life experiences. *Monographs of the Society for Research in Child Development*, 31(3, Whole No. 105).
- Skeels, H. M., Updegraff, R., Wellman, B. L., & Williams, H. M. (1938). A study of environmental stimulation: An orphanage preschool project. *University of Iowa Studies in Child Welfare*, 15(No. 4).
- Skinner, B. F. (1938). *The behavior of organisms: An experimental analysis*. New York: Appleton-Century-Crofts.
- Skinner, B. F. (1953). *Science and human behavior*. New York: Macmillan.
- Skrondal, A., & Rabe-Hesketh, S. (2004). Generalized latent variable modeling. Multilevel, longitudinal, and structural equation models. Boca Raton: Chapman & Hall.
- Smith, L. B., & Thelen, E. (Eds.). (1993). *A dynamic systems approach to development: Applications*. Cambridge, MA: MIT Press.
- Solomon, R. L., & Wynne, L. C. (1953). Traumatic avoidance learning: Acquisition in normal dogs. *Psychological Monographs*, 67(No. 354).
- Spalding, D. A. (1873). Instinct: With original observations in young animals. *Macmillan's Magazine*, 27, 282–293.
- Spelt, D. K. (1938). Conditioned responses in the human fetus in utero. *Psychological Bulletin*, 35, 712–713.
- Spemann, H. (1938). *Embryonic development and induction*. New Haven, CT: Yale University Press.
- Spencer, H. (1886). *A system of synthetic philosophy: Vol. 1. First principles* (4th ed.). New York: Appleton.
- Spock, B. (1946). *The common sense book of baby and child care*. New York: Duell, Sloan and Pearce.
- Stern, W. (1911). *Die differentielle Psychologie in ihren methodischen Grundlagen*. Leipzig: Barth.
- Stern, W. (1914). *The psychological methods of testing intelligence* (F. M. Whipple, Trans.). Baltimore: Warwick & York.
- Stern, W. (1918). *Grundgedanken der personalistischen Philosophie*. Berlin: Reuther & Reichard.
- Stevenson, H. W. (1965). Social reinforcement with children. In L. P. Lipsitt & C. C. Spiker (Eds.), *Advances in child development and behavior* (Vol. 2, pp. 97–126). New York: Academic Press.
- Sullivan, H. S. (1940). Some conceptions of modern psychiatry. *Psychiatry*, 3, 1–117.
- Sullivan, H. S. (1953). *The interpersonal theory of psychiatry*. New York: Norton.
- Suloway, F. J. (1979). *Freud, biologist of the mind: Beyond the psychoanalytic legend*. New York: Basic Books.
- Sully, J. (1896a). Review of “Mental development in the child and the race: Methods and processes.” *Mind*, 5, 97–103.
- Sully, J. (1896b). *Studies of childhood*. New York: Appleton.
- Suomi, S. J., & Harlow, H. F. (1972). Social rehabilitation of isolate-reared monkeys. *Developmental Psychology*, 6, 487–496.
- Taine, H. (1876). Note sur l'acquisition du langage chez les enfants et dans l'espèce humaine. *Revue Philosophique*, 1, 3–23.
- Terman, L. M. (1906). Genius and stupidity. *Pedagogical Seminary*, 13, 307–313.
- Terman, L. M. (1916). *The measurement of intelligence*. Boston: Houghton Mifflin.
- Terman, L. M. (1925). *Genetic studies of genius: Vol. 1. Mental and physical traits of a thousand gifted children*. Stanford: Stanford University Press.
- Thelen, E., & Adolph, K. E. (1992). Arnold L. Gesell: The paradox of nature and nurture. *Developmental Psychology*, 28, 368–380.
- Thelen, E., & Adolph, K. E. (1994). Arnold L. Gesell: The paradox of nature and nurture. In R. D. Parke, P. A. Ornstein, J. J. Rieser, & C. Zahn-Waxler (Eds.), *A century of developmental psychology* (pp. 357–387). Washington, DC: American Psychological Association.
- Thelen, E., & Smith, L. B. (Eds.). (1994). *A dynamic systems approach to the development of cognition and action*. Cambridge, MA: MIT Press.
- Thieman, T. J., & Brewer, W. F. (1978). Alfred Binet on memory for ideas. *Genetic Psychology Monographs*, 97, 243–264.
- Thomas, D. S. (1929). *Some new techniques for studying social behavior* (Child Development Monographs No. 1). New York: Teachers College, Columbia University Press.
- Thomas, W. I., & Thomas, D. S. (1928). *The child in America: Behavior problems and programs*. New York: Knopf.
- Thompson, R. F., & Robinson, D. N. (1979). Physiological psychology. In E. Hearst (Ed.), *The first century of experimental psychology* (pp. 407–454). Hillsdale, NJ: Erlbaum.
- Thorndike, E. L. (1898). Animal intelligence: An experimental study of the associative processes in animals. *Psychological Monographs*, 2(Whole No. 8).
- Thurstone, L. L. (1952). [Autobiography]. *A History of Psychology in Autobiography*, 5, 295–331.

- Tiedemann, D. (1787). Beobachtungen über die Entwicklung _der Seelenfähigkeiten bei Kindern. *Hessische Beiträge zur Gelehrsamkeit und Kunst*, 2(2/3, Whole No. 6/7).
- Tinbergen, N. (1972). *The animal in its world; explorations of an ethologist, 1932–1972*. London: Allen & Unwin.
- Tolman, E. C. (1932). *Purposive behavior in animals and men*. New York: Appleton-Century-Crofts.
- Tucker, W. H. (1994). Fact and fiction in the discovery of Sir Cyril Burt's flaws. *Journal of the History of the Behavioral Sciences*, 30, 335–347.
- Valsiner, J. (1988). *Developmental psychology in the Soviet Union*. Brighton, England: Harvester Press.
- Valsiner, J. (Ed.). (1986). *The individual in scientific psychology*. New York: Plenum Press.
- Valsiner, J., & Van der Veer, R. (1988). On the social nature of human cognition: An analysis of the shared intellectual roots of George Herbert Mead and Lev Vygotsky. *Journal for the Theory of Social Behavior*, 18, 117–135.
- Valsiner, J., & Van der Veer, R. (1993). The encoding of distance: The concept of the zone of proximal development and its interpretations. In R. R. Cocking & K. A. Renninger (Eds.), *The development and meaning of psychological distance* (pp. 35–62). Hillsdale, NJ: Erlbaum.
- Van der Veer, R., & Valsiner, J. (1991). *Understanding Vygotsky: A quest for synthesis*. Oxford, England: Blackwell.
- Viteles, M. S. (1932). *Industrial psychology*. New York: Norton.
- von Eye, A. (1990). *Statistical methods in longitudinal research: Principles and structuring change*. New York: Academic Press
- von Eye, A., & Bergman, L.R. (2003). Research strategies in developmental psychopathology: Dimensional identity and the person-oriented approach. *Development and Psychopathology*, 15, 553–580.
- von Eye, A., & Gutiérrez Peña, E. (2004). Configural Frequency Analysis -- the search for extreme cells. *Journal of Applied Statistics*, 31, 981–997.
- Vonèche, J. J. (1982). Evolution, development, and the growth of knowledge. In J. M. Broughton & D. J. Freeman-Moir (Eds.), *The cognitive developmental psychology of James Mark Baldwin: Current theory and research in genetic epistemology* (pp. 51–79). Norwood, NJ: ALEX.
- Vygotsky, L. S. (1939). Thought and speech. *Psychiatry*, 2, 29–54.
- Vygotsky, L. S. (1962). *Thought and language*. Cambridge, MA: MIT Press.
- Vygotsky, L. S., & Luria, A. R. (1929). The function and fate of egocentric speech. *Proceedings and Papers of the 9th International Congress of Psychology*, 464–465.
- Waddington, C. H. (1939). *An introduction to modern genetics*. New York: Macmillan.
- Waddington, C. H. (1971). Concepts of development. In E. Tobach, L. R. Aronson, & E. Shaw (Eds.), *The biopsychology of development* (pp. 17–23). New York: Academic Press.
- Wallon, H. (1984a). Genetic psychology. In G. Voyat (Ed.), *The world of Henri Wallon* (pp. 15–32). New York: Jason Aronson.
- Wallon, H. (1984b). The psychological and sociological study of the child. In G. Voyat (Ed.), *The world of Henri Wallon* (pp. 205–224). New York: Jason Aronson.
- Walters, R. H., & Parke, R. D. (1964). Social motivation, dependency and susceptibility to social influence. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 1, pp. 232–276). New York: Academic Press.
- Warren, H. C. (1894). Review of Binet's L'introduction à la psychologie expérimentale. *Psychological Review*, 1, 530–531.
- Washburn, R. W. (1929). A study of the smiling and laughing of infants in the first year of life. *Genetic Psychology Monographs*, 6, 397–537.
- Watson, J. B. (1914). *Behavior: An introduction to comparative psychology*. New York: Henry Holt.
- Watson, J. B. (1924). *Psychology, from the standpoint of a behaviorist* (2nd ed.). Philadelphia: Lippincott.
- Watson, J. B. (1926). What the nursery has to say about instincts. In C. Murchison (Ed.), *Psychologies of 1925* (pp. 1–35). Worcester, MA: Clark University Press.
- Watson, J. B. (1928). *Psychological care of infant and child*. New York: Norton.
- Watson, J. B. (1936). [Autobiography]. *History of Psychology in Autobiography*, 3, 271–281.
- Watson, J. B., & Morgan, J. J. B. (1917). Emotional reactions and psychological experimentation. *American Journal of Psychology*, 28, 163–174.
- Watson, J. B., & Rayner, R. A. (1920). Conditional emotional reactions. *Journal of Experimental Psychology*, 3, 1–14.
- Werner, H. (1948). *Comparative psychology of mental development* (Rev. ed.). Chicago: Follett. (Original work published 1940)
- Wheeler, L. R. (1942). A comparative study of East Tennessee mountain children. *Journal of Educational Psychology*, 33, 321–334.
- White, S. H. (1992). G. Stanley Hall: From philosophy to developmental psychology. *Developmental Psychology*, 28, 25–34.

- White, S. H. (1996). The relationship of developmental psychology to social policy. In E. F. Zigler, S. L. Kagan, & N. W. Hall (Eds.), *Children, families, and governments: Preparing for the twenty-first century* (pp. 409–426). New York: Cambridge University Press.
- Whiting, B. B., & Whiting, J. W. M. (1975). *Children of six cultures: A psycho-cultural analysis*. Cambridge, MA: Harvard University Press.
- Whitman, C. O. (1899). Animal behavior. In E. B. Wilson (Ed.), *Biological lectures from the Marine Biological Laboratory, Wood's Hole, MA, 1898*. Boston: Ginn.
- Wickens, D. D., & Wickens, C. D. (1940). A study of conditioning in the neonate. *Journal of Experimental Psychology*, 26, 94–102.
- Willett, J. B. (2004). Investigating individual change and development: The multilevel model for change and the method of latent growth modeling. *Research in Human Development*, 1(1&2), 31–57.
- Wilson, E. O. (1975). *Sociobiology: The new synthesis*. Cambridge, MA: Harvard University Press.
- Wohlwill, J. (1973). *The study of behavioral development*. New York: Academic Press.
- Wolf, T. H. (1973). *Alfred Binet*. Chicago: University of Chicago Press.
- Wozniak, R. J. (1982). Metaphysics and science, reason and reality: The intellectual origins of genetic epistemology. In J. M. Broughton & D. J. Freeman-Moir (Eds.), *The cognitive developmental psychology of James Mark Baldwin: Current theory and research in genetic epistemology* (pp. 13–45). Norwood, NJ: ABLEX.
- Wozniak, R. J. (Ed.). (1993). *The roots of behaviourism*. London: Routledge/Thoemmes Press.
- Wozniak, R. J. (Ed.). (1995). *Mind, adaptation, and childhood*. London: Routledge/Thoemmes Press.
- Wundt, W. (1907). *Outlines of psychology* (C. H. Judd, Trans.). New York: Stechert.
- Wundt, W. (1916). *Elements of folk psychology: Outlines of a psychology history of the development of mankind*. New York: Macmillan.
- Yarrow, M. R., Campbell, J. D., & Burton, R. V. (1968). *Child rearing: An inquiry into research and methods*. San Francisco: Jossey-Bass.
- Young, C. H., Savola, K. L., & Phelps, E. (1991). *Inventory of longitudinal studies in the social sciences*. Newbury Park, CA: Sage Publications.
- Young, K. (1924). The history of mental testing. *Pedagogical Seminary*, 31, 1–48.
- Zazzo, R. (1984). Who is Henri Wallon? In G. Voyat (Ed.), *The world of Henri Wallon* (pp. 7–14). New York: Jason Aronson.
- Zenderland, L. (1988). From psychological evangelism to clinical psychology: The child-study legacy. *Journal of the History of the Behavioral Sciences*, 24, 152–165.