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HANDBOOK OF CHILD PSYCHOLOGY

FIFTH EDITION

Volume 1: Theoretical Models of Human Development

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CHAPTER 18

Life-Span Theory in Developmental Psychology

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HISTORICAL INTRODUCTION	1031
TOWARD PSYCHOLOGICAL THEORIES OF LIFE-SPAN DEVELOPMENT: FIVE LEVELS OF ANALYSIS	1035
The Overall Architecture of Life-Span Development: A First View from the Perspectives of Biological and Cultural Co-Evolution (Level 1)	1036
Life-Span Changes in the Relative Allocation of Resources to Distinct Functions of Development (Level 2)	1040
A Family of Metatheoretical Propositions about Life-Span Developmental Theory (Level 3)	1042
An Example of a Systemic and Overall Theory of Life-Span Development: Selective Optimization with Compensation (Level 4)	1054
INTELLECTUAL FUNCTIONING ACROSS THE LIFE SPAN	1059
The Biology and Culture of Life-Span Intellectual Development	1059
The Fluid Mechanics of Cognition	1062
The Crystallized Pragmatics of Cognition	1067
Varieties of Mechanic/Pragmatic Interdependence	1071
Malleability (Plasticity) in Intellectual Functioning across Historical and Ontogenetic Time	1074
Relative Stability in Intellectual Functioning across the Life Span	1075
Changes in Heritability across the Life Span	1077
The Mechanics and Pragmatics in Very Old Age	1079
Life-Span Intellectual Development: Conclusions	1081
FOCI AND FACETS OF LIFE-SPAN DEVELOPMENT IN SELF AND PERSONALITY	1082
Current Research Traditions in the Field of Self and Personality Development	1082
Key Features of a Life-Span Approach to the Development of Self and Personality	1083
Illustrations of the Role of Biology and Culture in Self and Personality Development	1087
The Allocation of Resources in the Area of Self and Personality	1089
The Development of Self and Personality as Life-Long Transactional Adaptation	1090
Self and Personality: Between Stability, Growth, and Decline or between Continuity and Discontinuity	1094
Empirical Evidence Based on Growth Models of Personality Development	1097
What Are the Intra- and Extrapersonal Conditions That Transact to Produce Continuity or Discontinuity? Opportunities and Constraints of Self and Personality Development	1100
Reserve Capacities of Self and Personality Development	1102
Summarizing Foci and Facets of Life-Span Development in Self and Personality	1111
CONCLUDING COMMENTARY	1113
ACKNOWLEDGMENT	1114
REFERENCES	1114

Life-span developmental psychology deals with the study of individual development (ontogenesis) from conception into old age (P. Baltes & Goulet, 1970; P. Baltes & Reese, 1984; Dixon & Lerner, 1988; Neugarten, 1969). A core assumption of life-span developmental psychology is that development is not completed at adulthood (maturity). Rather, the basic premise of life-span developmental psychology is that ontogenesis extends across the entire life course and that lifelong adaptive processes are involved. A further premise is that the concept of development can be

used to organize the evidence about lifelong adaptive processes, although it is necessary to reformulate the traditional concept of development (D. Harris, 1957; Wohlwill, 1973) for this purpose.

Sequencing in the life span gives temporal priority to earlier times and events in life. Aside from this temporal order of any developmental process, however, life-span developmental researchers expect each age period of the life span (e.g., infancy, childhood, adolescence, adulthood, old age) to have its own developmental agenda; and to make

some unique contribution to the organization of the past, present, and future in ontogenetic development. Moreover, life-span developmental scholars, if they focus on processes and mechanisms of mind and behavior (such as identity of self or working memory) rather than age, proceed from the assumption that these processes and mechanisms express manifestations of developmental continuity and change across the entire life span.

Psychology deals with the scientific study of mind and behavior, including practical applications that can be derived from such scientific inquiry. Within this substantive territory of psychology, the objective of life-span psychology is: (a) To offer an organized account of the overall structure and sequence of development across the life span; (b) to identify the interconnections between earlier and later developmental events and processes; (c) to delineate the factors and mechanisms which are the foundation of life-span development; and (d) to specify the biological and environmental opportunities and constraints which shape life-span development of individuals. With such information, life-span developmentalists further aspire to determine the range of possible development of individuals, to empower them to live their lives as desirably (and effectively) as possible, and to help them avoid dysfunctional and undesirable behavioral outcomes.

To this end, life-span researchers have focused on searching for models and definitions of successful (effective) development. One general approach to this topic has been to define successful development as the maximization of gains and the minimization of losses (M. Baltes & Carstensen, in press; P. Baltes, 1987; Baltes & Baltes, 1990b; Brandtstädter & Wentura, 1995; Marsiske, Lang, Baltes, & Baltes, 1995). Such an approach is consistent with the postulate that there is no development (ontogenetic change) without a loss, as there is no loss without a gain (P. Baltes, 1987; P. Baltes, Reese, & Lipsitt, 1980; Labouvie-Vief, 1982). What is considered as a gain in ontogenetic change and what is a loss, is a topic of theoretical as well as empirical inquiry. Suffice it at this point to mention that the nature of what is considered a gain and what a loss changes with age, involves objective in addition to subjective criteria, and is conditioned by theoretical predilection, cultural context, as well as historical time.

We offer one more introductory observation on the objectives of life-span developmental psychology which it shares with other developmental specialties. Methodologically

speaking, the study of ontogenesis is inherently a matter of general *and* differential psychology (P. Baltes, Reese, & Nesselroade, 1988; Kreppner, 1992; R. Lerner, 1986; Weinert & Perner, 1996). Thus, life-span research and theory is intended to generate knowledge about three components of individual development: (a) Commonalities (regularities) in development; (b) inter-individual differences in development, and; (c) intra-individual plasticity in development (Anastasi, 1970; P. Baltes et al., 1980; R. Lerner, 1984; Nesselroade, 1991a, 1991b). Joint attention to each of these components of individual variability and intra-individual potential, and specification of their age-related interplays, are the conceptual and methodological foundations of the developmental enterprise. Recognizing the methodological significance of the distinction among, and subsequent theoretical integration of, commonalities in development, inter-individual differences in development, and intra-individual plasticity has been a continuing theme in life-span research and theory since its inception (Stern, 1911; Tetens, 1777).

What about the status and location of life-span developmental psychology within the territory of developmental psychology? Is life-span developmental psychology a special developmental psychology, is it the overall integrative developmental conception of ontogenesis, or is it simply one of the many orientations to the study of development (P. Baltes, 1987)? Perhaps most scholars view life-span developmental psychology as one of the specializations in the field of developmental psychology, namely, that specialization which seeks to understand the full age spectrum of ontogenesis. In this case, the lens of life-span developmental psychologists is focused on the entire life course with less consideration for the details of age-related specificities.

Life-span theory, however, can also be seen as the coordinated integration of various age-based developmental specializations into one overarching, cumulative framework of ontogenesis. Using such a life span-coordinating lens, one could argue that, if there is a general theory of ontogenetic development, it needs to be a theory that takes into account that ontogenesis extends from conception into old age. Thus, even if one is primarily interested in the study of infants and infant development, part of one's intellectual agenda requires attention to life-span development (Brim, 1976; Lipsitt, 1982; Thompson, 1988). One example relevant for infancy researchers is the interest in the sequelae of infancy, in the search for its long-term consequences. Another example is the developmental context of

infancy, which includes adults as socialization agents who themselves develop. Thus, to understand infant-adult interaction, it is important to recognize that adults are not fixed personages but that they are themselves subject to developmental goals and challenges (Hetherington, Lerner, & Perlmutter, 1988; see also, Elder, this Volume).

What about the organizational frame of life-span theory? On a strategic level, there are two ways to construct life-span theory: *Person-centered (holistic)* or *function-centered*. The holistic approach proceeds from consideration of the person as a system and attempts to generate a knowledge base about life-span development by describing and connecting age periods or states of development into one overall, sequential pattern of lifetime individual development (see also, Magnusson & Stattin, Ch. 12, this Volume; Thelen & Smith, Ch. 10, this Volume). An example would be Erikson's (1959) theory of eight life-span stages. Often, this holistic approach to the life span is identified with *life-course psychology* (Bühler, 1933; see also, Elder, 1994, Ch. 16, this Volume).

The second way to construct life-span theory is to focus on a category of behavior or a function (such as perception, information processing, action control, identity, personality traits, etc.) and to characterize the life-span changes in the mechanisms and processes associated with the category of behaviors selected. An example would be the life-span comparative study of the developmental organization, operation, and transformation of working memory or fluid intelligence (Salthouse, 1991c).

To incorporate both approaches to life-span ontogenesis, the holistic person-centered and the function-centered one, the concept of *life-span developmental psychology* (P. Baltes & Goulet, 1970) was advanced. From our point of view, then, life-course psychology is a special case of life-span developmental psychology. However, this distinction between life-course and life-span developmental psychology should not be seen as categorically exclusive. It's more a matter of pragmatics and scientific history. In the history of the field, scholars closer to the social sciences, the biographical study of lives, and personality psychology have come to use the term life-course development (e.g., Bertaux & Kohli, 1984; Bühler, 1933; Caspi, 1987; Clausen, 1986; Elder, 1994; Mayer, 1986). Scholars closer to psychology, with its traditional interest in mechanisms and processes as well as the decomposition of mind and behavior into its component elements, seem to

prefer life-span developmental psychology, the term chosen when the West Virginia Conference Series on the field was initiated (Goulet & P. Baltes, 1970).

HISTORICAL INTRODUCTION

While this section may seem to speak more about the past than the present, it is important to recognize that present theoretical preferences are in part the direct result of historical contexts of science and cultural scenarios rather than of carefully elaborated theoretical arguments. And some of the current issues surrounding life-span developmental psychology and its location in the larger field of developmental psychology are difficult to appreciate unless they are seen in their historical and societal contexts (R. Lerner, 1983; Reinert, 1979; Riegel, 1973a, 1973b). For instance, how is it that, especially in North America, life-span developmental psychology is a relatively recent advent? Historically speaking, this is surprising because the life-span view of human development is not new at all but can be traced to the very origins of developmental psychology as several reviews have demonstrated (P. Baltes, 1979a, 1983; P. Baltes & Goulet, 1970; Groffmann, 1970; Hofstätter, 1938; Lehr, 1980; Reinert, 1979).

Many German developmental historians, for instance, consider Johann Nikolaus Tetens as the founder of the field of developmental psychology (Müller-Brettel & Dixon, 1990; Reinert, 1979). To Anglo-American developmentalists, however, Tetens is a relatively unknown figure. When Tetens published his two-volume monumental work on human nature and its development (*Menschliche Natur und ihre Entwicklung*) more than 200 years ago, in 1777, the scope of this first major opus covered the entire life span from birth into old age (see also, Carus, 1808, for another early contribution to the field of developmental psychology). The length and intellectual effort which Tetens devoted to all age periods of the life course was about the same. In addition, as elaborated at length by Reinert (1979) and also by P. Baltes (1979a, 1983), the content and theoretical orientation of this historical classic by Tetens included many of the current-day signatures of what has come to be known as the life-span developmental theoretical orientation. For instance, development was not only elaborated as a life-long process by Tetens, but also as a process which entails gains and losses, a process embedded

in and constituted by sociocultural conditions, and as a process which is continuously refined and optimized (*vervollkommnet*) by societal change and historical transformations (see Table 18.1).

The second major early work on human development, written some 150 years ago by the Belgian Adolphe Quetelet (1835, translated in 1842 into English), continued in a similar tradition. His treatment of human qualities and abilities was entirely life-span in orientation, and because of his analysis of the dynamics between individual and historical development, Quetelet prefigured major developments in developmental methodology (P. Baltes, 1983). For instance, he anticipated the distinction between cross-sectional and longitudinal study designs as well as the need to conduct successions of age studies in order to disentangle effects of age from those of secular change and historical period (P. Baltes, 1968; Schaie, 1965; Schaie & P. Baltes, 1975).

The 1777 work of Johann Nikolaus Tetens was never translated into English. This is unfortunate because reading Tetens' deep insights into the interplay among individual, contextual, and historical factors is a humbling experience. Equally impressive are his many concrete everyday examples and analyses of phenomena of human development (for instance, in the area of memory functioning), which make clear that ontogenetic development is not simply a matter of growth but the outcome of complex and multilinear processes of adaptive transformation. Because of these consistencies between the early work of Tetens and Quetelet and modern research in life-span development, life-span

researchers like to argue that these are examples of why and how a life-span orientation spawns a particular theoretical and methodological manner of looking at human development (P. Baltes, 1987; P. Baltes et al., 1980).

Indeed, inspecting and comparing the largely forgotten Tetens (or other early heralds of developmental psychology such as F. A. Carus and Quetelet) with modern life-span theory suggests that there is a conceptual orientation toward a science of ontogenesis that emerges when considering the entire life span rather than focusing on its onset, such as on infancy or childhood. As we know from other scholarly endeavors, the point of departure can make a difference in what one finds along the way. As a result, the relative emphasis on particular age periods in the study of development has resulted in variations in theory and research. For example, how the topical and institutional territory of developmental psychology is charted today differs considerably, for instance, between German- and English-speaking countries. In German-speaking countries, developmental psychology is institutionalized in textbooks and scientific organizations as a field that covers the entire life span. Thus, for German-speaking psychologists (P. Baltes, 1983; Bühler, 1933; Grossmann, 1996; Lehr, 1980; Oerter & Montada, 1995; Thomae, 1959, 1979; Weinert, 1994a), developmental psychology never became almost synonymous with child psychology, as seems to be true for many North American developmental psychologists.

There are several reasons why German developmental psychology never lost its integrative concern for ontogenesis as life-long development. It is difficult to trace historical lines and identify major reasons for such country differences, but among them could be the disciplinary foundations from which developmental psychology arose and was nurtured. In German-speaking countries, for instance, philosophy, in addition to biology, was a major springboard. Note that at the time of the publication of Tetens' work in 1777, there was no established field of psychology as an empirical science, nor was there a science of ontogenesis grounded in the field of genetics and evolutionary biology. One dominant approach to human development, at least in continental Europe of that time, was shaped by the humanities and philosophy, and within philosophy by the tradition of the philosophy of idealism. This philosophical tradition included a strong concern for questions of optimality in human development and the role of education (*Bildung*).

Table 18.1 Table of Contents of Tetens (1777), Vol. 2: *On the Perfectability and Development of Man*

Chapter	Title
1	On the perfectability of human psyche (<i>Seelennatur</i>) and its development in general
2	On the development of the human body
3	On the analogy between the development of the psyche (mind) and the development of the body
4	On the differences between men (humans) in their development
5	On the limits of development and the decline of psychological abilities
6	On the progressive development of the human species
7	On the relationship between optimization (<i>Vervollkommnung</i>) of man and his life contentment (<i>Glückseligkeit</i>)

Because of this close tie to philosophy and the humanities, human development in Germany was widely understood to reflect factors of education and socialization. In addition, there was also a focus on the topic of human development beyond early adulthood (Groffmann, 1970; Reinert, 1979). The widespread knowledge and discussion of essays on old age, such as the ancient texts of Cicero (44 B.C., 1744) or the then contemporary text of Grimm (1860), are examples of this 19th-century interest among German scholars in issues of development beyond early adulthood. According to these traditions, fueled primarily by philosophy and the humanities, a widely held position among German scholars was that it was within the medium of "culture" that individuals "developed." With very little biological science on "maturity" or "growth" at that time, there was no reason to assume that development should be identified with physical growth and, therefore, should stop at adolescence or early adulthood. One could argue that this productive interplay between the humanities and developmental psychology in Germany continues into the present, for instance, regarding such topics as collective-societal memory (J. Assmann, 1992) and wisdom (A. Assmann, 1994).

In contrast, the *Zeitgeist* in North America and also in some other European countries, such as England, was different when developmental psychology emerged as a speciality, around the turn of the century (1900). At that time, the newly developed fields of genetics and biological evolution (such as Darwinism) were in the forefront of ontogenetic thinking. From biology, with its maturation-based concept of growth, may have sprung the dominant American emphasis in developmental psychology on child psychology and child development. In North America, at least until the advent of social-learning and operant psychology-based theory in the 1960s (Bandura & Walters, 1963; Bijou & Baer, 1961; Reese & Lipsitt, 1970), biological conceptions of "growth" and "maturation" (D. Harris, 1957) led the organization and intellectual agenda in ideas about development.

Not surprisingly, therefore, in combination with other political and social forces, children became the primary focus of attention in North American developmental psychology. In fact, in North America the focus on childhood was so pervasive that historical accounts of developmental psychology published in the centennial birth year of American psychology (Parke, Ornstein, Rieser, & Zahn-Waxler,

1991) were entirely devoted to child and adolescent development. No mention was made of the major historical life-span scholars such as Tetens, Charlotte Bühler, or Sidney Pressey. Even Sheldon White, the author of the article on G. Stanley Hall, one of the American founders of developmental psychology who late in his career turned to adulthood and old age to complete his agenda of developmental studies (Hall, 1922), ignored this opportunity to treat ontogenesis as a life-long phenomenon. White (1992) mentioned the fact of Hall's late-life publication, but did not elaborate.

Before the life-span view of ontogenesis entered the field of developmental psychology more forcefully in North-American circles in the 1960s and 1970s (Brim & Wheeler, 1996; Erikson, 1959; Goulet & Baltes, 1970; Havighurst, 1948; Neugarten, 1969), several earlier contributions attempted to broaden developmental psychology toward a consideration of the entire life span (e.g., Hollingworth, 1927; Pressey, Janney, & Kuhlen, 1939; Sanford, 1902). In our view, these early American publications on themes of life-span development resulted not so much in redirecting developmental psychology from child psychology, but in setting the foundation for the emergence of the field of aging (gerontology). Indeed, many of the active life-span psychologists who promoted life-span thinking were closely affiliated with efforts to build a psychological science of aging (Birren, 1959; Birren & Schaie, 1996; Goulet & Baltes, 1970; Havighurst, 1948, 1973; Kuhlen, 1963; Neugarten, 1969; Riegel, 1958; Schaie, 1970; Thoma, 1959, 1979; Welford & Birren, 1965).

As a consequence, in American psychology there evolved a strong bifurcation between child developmentalists and adult developmentalists or gerontologists. One indication of this bifurcation was the creation of two relatively independent divisions concerned with ontogenesis within the American Psychological Association (Division 7: Developmental Psychology; Division 20: Maturity and Old Age, later renamed into Adult Development and Aging). This divide was also reflected in APA publications. Whereas the first developmental journal of the American Psychological Association, *Developmental Psychology*, started in 1969 as a life-span developmental publication, the introduction of *Psychology of Aging* in 1986 marked a departure from such a life-span integrative posture and regenerated separatism. In the interdisciplinary science of ontogenesis, too, age-specific organizations and journals were created, such as

the journal of *Child Development* by the Society for Research in Child Development and the *Journal of Gerontology* by the Gerontological Society of America, resulting in further age segmentation.

On the one hand, the creation of a multitude of organizations and journals heralded the arrival of a comprehensive behavioral science of ontogenesis. On the other hand, for life-span developmental scholars, these age-specific creations were unfortunate events because they did not promote an integrative effort at constructing life-span theory. The only institutional exception to this trend was the formation of the *International Society for the Study of Behavioral Development* in 1969, which defined as its substantive territory the study of development at all stages of the life span. The German Hans Thoma was the leader in creating this society.

That a life-span approach became more prominent during the recent decades was dependent on several other factors and historical trends. A major factor was a concurrent concern with issues of life-span development in neighboring social-science disciplines, especially sociology. In sociology, *life-course sociology* took hold as a powerful intellectual force (Brim & Wheeler, 1966; Clausen, 1986; Elder, 1985, 1994; Featherman, 1983; Kohli, 1978; Neugarten, 1969; Riley, 1987; Riley, Johnson, & Foner, 1972; Sorenson, Weinert, & Sherrod, 1986).

Within psychology, three conditions nurtured the burgeoning of interest in life-span development (P. Baltes, 1987). First, demographically speaking, there was the fact that the population as a whole was "aging." In order to be responsive to issues of social policy and modernity, developmental psychologists were challenged to generate knowledge relevant to the lives of the fastest growing segment of the population, the group of older adults (Eisdorfer & Lawton, 1973). Meanwhile, this historical change in the demographic context of human development has been fully reflected in the organization of the American Psychological Association. Perhaps surprising to child developmentalists, the Division (20) devoted to adult development and aging has grown larger than Division 7, called developmental psychology but which, when using the focus of the work of the scholars elected to its presidency, or the scope of its primary journal as indicators, is more or less entirely devoted to the topic of development from infancy through adolescence.

The second related historical event of life-span work in the study of ontogenesis was the concurrent emergence of gerontology (aging research) as a field of specialization, with its search for the life-long precursors of aging (Birren, 1959; Birren & Schaie, 1996; Cowdry, 1939). The Gerontological Society of America, for instance, is larger than its counterpart organization, the Society for Research in Child Development. In fact, linking the study of gerontology to the study of life-span development is a critical task of current developmental theory. Are theories of development the same as theories of aging? Do we need different conceptions of ontogenesis to characterize development and aging (Welford & Birren, 1965)? For instance, does one approach deal with phenomena of growth, and the other with decline?

A third factor, and a major source of rapprochement between child developmentalists and adult developmentalists, was the "aging" of the participants and of the researchers in the several classical longitudinal studies on child development begun in the 1920s and 1930s (Caspi & Elder, 1988; Grossmann, 1996; Kagan, 1964; Kagan & Moss, 1962; Sears & Barbee, 1977; Thoma, 1959). What are the effects of child development on later life? Which childhood developmental factors are positive or risk-prone for later healthy development? These were questions that were increasingly pursued beginning in the 1970s as the children of the classical longitudinal studies reached early adulthood and midlife (P. Baltes, 1976; Eichorn, Clausen, Haan, Honzik, & Mussen, 1981; Elder, 1974). Some of these studies have even provided a basis for a better understanding of processes in the last phases of life (Block, 1971, 1981, 1993; Elder, 1985, 1986, 1994; Holahan, Sears, & Cronbach, 1995; Sears & Barbee, 1977).

Out of these developments has emerged new territory in developmental scholarship. The need for better collaboration among all age specialities of developmental scholarship, including child development, has become an imperative of current-day research in developmental psychology (Hetherington et al., 1988; Lipsitt, 1982; Rutter & Rutter, 1993; Thompson, 1988). But for good life-span theory to evolve, it takes more than courtship and mutual recognition. It takes a new effort and serious exploration of theory that—in the tradition of Tetens (1777)—has in its *primary* substantive focus the structure, sequence, and dynamics of the entire life course.

TOWARD PSYCHOLOGICAL THEORIES OF LIFE-SPAN DEVELOPMENT: FIVE LEVELS OF ANALYSIS

We will approach psychological theories of life-span development in five sequential but interrelated steps. Each step will bring us closer to specific psychological theories of life-span development. As shown in Table 18.2, we move from the distal and general to the more proximal and specific in our treatment of life-span ontogenesis. This movement also implies a movement from the metatheoretical to the more empirical.

Specifically, we consider five levels of analysis. Level 1, the most distal and general one, makes explicit the cornerstones and "norms of reaction" or "potentialities" (Brent, 1978a, 1978b; R. Lerner, 1986; Schneirla, 1957; see also, Gottlieb, Wahlsten, & Lickliter, this Volume) of life-span ontogenesis. With this approach, which is also consistent with the levels of integration notion of Schneirla, we obtain information on what we can expect about the general scope and shape of life-span development based on evolutionary, historical, and interdisciplinary views dealing with the interplay between biology and culture during ontogenesis (Asendorpf, 1996; P. Baltes & Graf, 1996).

Levels 2 and 3 bring us closer and closer to psychological theories of individual development. On these levels of analysis, while keeping the initial overall framework in mind, we shall describe, using an increasingly more fine-grained level

of analysis, specific conceptions of life-span developmental psychology. We begin with a general view on the overall form of gains and losses across the life span (Level 2) followed by the description of a family of metatheoretical perspectives (Level 3). We argue that this family of metatheoretical perspectives is useful when articulating more specific theories of life-span development. On Level 4, we advance one concrete illustration of an overall life-span developmental theory, a theory which is based on the specification and coordinated orchestration of three processes: Selection, optimization, and compensation. On Level 5, we move to more molecular phenomena and functions. Specifically, we characterize life-span theory and research in such areas of psychological functioning as cognition, intelligence, personality, and the self.

We have chosen this approach—of proceeding from a broad level of analysis to more and more specific and micro levels of psychological analysis—because it illustrates one of the central premises of life-span developmental psychology, that development is embedded in a larger historical and cultural context (P. Baltes et al., 1980; Labouvie-Vief, 1982; R. Lerner, 1986; Magnusson, 1996; Riegel, 1973a). Moreover, this strategy permits us to join the early origins of life-span theory (Tetens, 1777) with present theories. Without having a good understanding of either biological evolution or societal functioning, Tetens had communicated a deep belief in the power of the past, present, and future social-cultural context on the "nature" of human development. Similarly, though at a much higher level of precision, current-day psychologists claim to have achieved new insights from studying the evolutionary precursors and cultural-social conditions of human behavior (e.g., Asendorpf, 1996; Barkow, Cosmides, & Tooby, 1992; Bateson, 1987; Cole, 1996; Cosmides & Tooby, 1989; Durham, 1991; Gigerenzer, 1996; Gottlieb, 1991, 1996; Gould, 1984; Grossmann, 1996; Hammerstein, 1996; Klix, 1993; Trevarthen, 1993). In short, there is a strong argument for the conclusion that the form of current-day ontogenesis has powerful determinants in past biological and cultural evolution. Moreover, psychological theories which are blind to evolutionary and cultural perspectives on the nature of human behavior run the risk of ignoring some of the most important sources of human behavior and its ontogeny.

Recognizing the powerful conditioning of human development by biological and cultural evolution and

Table 18.2 Toward Psychological Theories of Life-Span Development: Five Levels of Analysis

Level 1:	Biological and Cultural Evolutionary Perspectives: On the Incomplete Architecture of Human Ontogenesis and the Life-Span Developmental Dynamics between Biology and Culture
Level 2:	Dynamics of Gains and Losses: Life-Span Changes in the Relative Allocation of Resources in Development to Functions of Growth vs. Maintenance (Resilience) vs. Regulation of Loss
Level 3:	A Family of Metatheoretical Propositions about the Nature of Life-Span Development
Level 4:	An Example of a Systemic and Overall Theory of Successful Life-Span Development: Selective Optimization with Compensation
Level 5:	Life-Span Theories in Specific Functions and Domains: Intelligence, Cognition, Personality, Self

co-evolution (P. Baltes, 1991; Durham, 1990, 1991; see also, chapters by Gottlieb et al., Thelen & Smith, Ch. 10, this Volume) emphasizes that the future is not fixed either, but includes features of an open system. In other words, the future is not something we simply enter but also something that we help create and that is dependent on future genetic, environmental, and cultural conditions. Appreciating this potential of the future is especially important as we contemplate the nature of old age. Human aging, gerontologists like to argue, carries a paradoxical feature. Historically and anthropologically speaking, old age is young and, therefore, still rather underdeveloped. Thus, it is in the second half of life where the relative incompleteness of the biology- and culture-based architecture of human development becomes most conspicuous (P. Baltes, 1994, 1996, 1997; Baltes & Baltes, 1992; P. Baltes & Graf, 1996).

The Overall Architecture of Life-Span Development: A First View from the Perspectives of Biological and Cultural Co-Evolution (Level 1)

Let us now turn in our quest for understanding life-span development to the first level of analysis chosen, the overall biological and cultural architecture of life-span development (P. Baltes, 1993, 1996, 1997). The catch-phrases we use for this purpose comes from the changing dynamics between biology and culture across the life span and the associated incompleteness of the architecture of human ontogenesis.

The questions about the how and why of the role of biology (heredity) and culture (environment) have formed one of the main intellectual frames in developmental psychology (Anastasi, 1970; Asendorpf, 1996; R. Lerner, 1986; Plomin, 1994; Plomin & Thompson, 1988; Scarr, 1993). What is the role of cultural and biological factors in ontogenesis, how do they interact and condition each other? What is the "zone of development," the "norm of reaction" (Hirsch, 1970; R. Lerner, 1986; Schneirla, 1957) that we can expect to operate during ontogenesis? Based on genetic and evolution-based factors and on cultural structures, for instance, only certain pathways can be implemented during ontogenesis, and some of these are more likely to be realized than others (P. Baltes, 1987; Cole, 1996; Edelman, 1987; Edelman & Tononi, 1996; Labouvie-Vief, 1982; R. Lerner, 1986; Maciel, Heckhausen, & Baltes, 1994; Marsiske et al., 1995; Staudinger, Marsiske, & Baltes,

1995; Waddington, 1975; see also, chapter by Gottlieb et al., Ch. 5, this Volume). Despite the sizeable plasticity of homo sapiens, not everything is possible in ontogenetic development and development follows principles which make universal growth impossible.

With a view on the future and future societal changes, we need to recognize first that the overall architecture of human development is incomplete (P. Baltes, 1994, 1997; P. Baltes & Graf, 1996): The overall biological and cultural architecture of human development continues to evolve. A second insight is that what is most "undeveloped" in the gene-environment interplay is both the genetic base and the culture of old age (Baltes & Baltes, 1992; P. Baltes & Graf, 1996). While earlier age periods of the life course have a long tradition of biological and cultural co-evolution (Durham, 1991) and fine-tuning, the "anthropological tradition" of biological and cultural co-evolution for later phases of life, historically speaking, is younger. The evolutionary (biological and cultural) incompleteness of the overall architecture of the life span increases, therefore, as we move from childhood to old age.

Figure 18.1 illustrates the main lines of argument (P. Baltes, 1994, 1997). Note first that the specific form (level, shape) of the functions characterizing the overall life-span dynamics between biology and culture across the life span is not critical. What is critical is the overall direction and reciprocal relationship between these functions. Figure 18.1 identifies three such directional principles that regulate the nature of ontogenetic development.

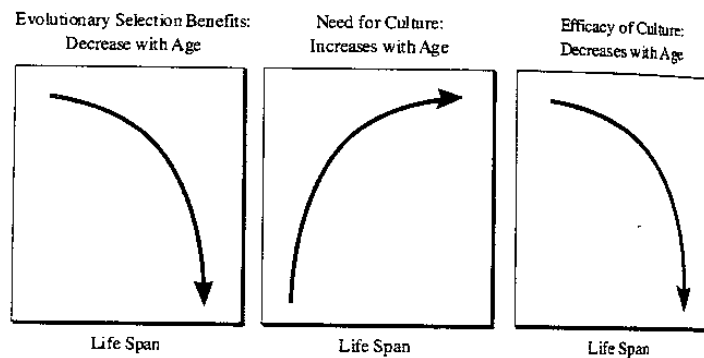


Figure 18.1 Schematic representation of basic facts about the average dynamics between biology and culture across the life span (after Baltes, 1995). There can be much debate about the specific forms of the functions, but less about directionality.

of biological factors in life-span development. Where evolutionary selection and the biology of aging are concerned, the ontogenetic life span of humans displays a kind of unfinished architecture; because of this incompleteness of biological ontogenesis, biology-based negative consequences increase with age. These insights may be captured with the sentence: "Biology is not a good friend of old age." Certainly after physical maturity, the biological potential of the human organism declines. With age, the genetic material, associated genetic mechanisms, and genetic expressions become less effective and less able to generate or maintain high levels of functioning.

Age-Related Increase in Need for Culture

What about the role of culture and culture-related factors during ontogenesis? With culture, we mean here the entirety of psychological, social, material, and symbolic (knowledge-based) resources which humans developed over millennia; and which, as they are transmitted across generations, make human development as we know it possible (Cole, 1996; Damon, 1996; D'Andrade, 1995; Durham, 1990, 1991; Klix, 1993; Shweder, 1991; Valsiner & Lawrence, 1996). These cultural resources include cognitive skills, motivational dispositions, socialization strategies, physical structures, the world of economics as well that of medical and physical technology.

Figure 18.1(b) and 18.1(c) summarizes our view of the life-span dynamics associated with culture and culture-based processes. Figure 18.1(b) represents in graphic form the proposition that an age-associated increase in the "need" for cultural resources characterizes the interplay between culture and age across the life span. There are two parts to the argument for an *age-related increase in the "need" for culture*.

The first argument is that for human ontogenesis to have reached higher and higher levels of functioning, whether in physical (e.g., sports) or cultural (e.g., reading and writing) domains, there had to be a conjoint evolutionary increase in the richness and dissemination of culture (Cole, 1996; Durham, 1991; Shweder, 1991; Valsiner & Lawrence, 1996). Thus, human development the way we know it in the modern world is essentially and necessarily tied to the evolution of culture. And the further we expect human ontogenesis to extend itself into adult life and old age, the more it will be necessary for particular cultural factors and resources to emerge to make this possible. A case in point

is the historical evolution of medical knowledge, knowledge about health behavior, and the availability of economic resources to create and use medical technology.

To appreciate the power of the evolution of such culture-based resources consider what happened to average life expectancy during the 20th century in industrialized countries. It was not the genetic make-up of the individual or the population that evinced marked changes during this time. On the contrary, it was economic and technological innovations that produced significant additions to average life expectancy, from an average of about 45 years in 1900 to about 75 years in 1995. Similarly, the dramatic increase in literacy rates over the last centuries in industrialized nations were not the result of a change in the genome (that requisite evolution took place at a much earlier time many millennia ago; e.g., Klix, 1993), but above all a change in environmental contexts, cultural resources, and strategies of teaching.

The trajectory depicted in Figure 18.1(b), however, does not mean that children require little cultural input and support. Early in ontogenetic life, because the human organism is still undeveloped biologically, infants and children need a wide variety of psycho-social-material-cultural support. But in terms of overall resource structure, this support in childhood is focused on basic levels of functioning such as environmental sensory stimulation, nutrition, language, and social contact. Subsequent age stages, however, require increasingly more and more differentiated cultural resources, especially if one considers the high levels of knowledge and technology that adults need to function well in modern societies. Thus, it is primarily through the medium of more advanced levels of culture that individuals have the opportunity to continue to develop across life (Cole, 1996; D'Andrade, 1995; Shweder, 1991).

There is a second argument for the theory that, with age, the need for the supportive role of culture increases. Because of the biological weakening associated with age described in Figure 18.1(a), the "need" for culture increases even further as individuals reach old age. While individuals aspire to maintain their previous levels of functioning as they age, the biological resources available for that purpose are increasingly declining. That is, the older individuals are, the more they are in need of culture-based resources (material, social, economic, psychological) to generate and maintain high levels of functioning.

Age-Related Decrease in Efficiency of Culture

Figure 18.1(c) illustrates a further overall characteristic of the life-span developmental dynamic between culture and age. Here, the focus is on a third cornerstone of the overall architecture of the life course, that is, the efficacy or *efficiency* of cultural factors and resources. During the second half of life, and despite the advantages associated with the developmental acquisition of knowledge-based mental representations (Klix, 1992, 1993), we submit that there is an age-associated reduction in the efficiency of cultural factors. With age, and conditioned primarily by the negative biological trajectory of the life course, the relative power (effectiveness) of psychological, social, material, and cultural interventions becomes smaller and smaller, even though there likely are large inter-individual differences in onset and rate of these decreases in effectiveness (Maddox, 1987; Nelson & Dannefer, 1992; Schaie, 1996).

Take cognitive learning in old age as an example (Bäckman, Mäntylä, & Herlitz, 1990; P. Baltes, 1993; Craik & Salthouse, 1992; Kliegl, Mayr, & Krampe, 1994; Lindenberger & Baltes, 1995a; Salthouse, 1991c). The older the adult, the more time, practice, and more cognitive support it takes to attain the same learning gains. And moreover, at least in some domains of information processing, and when it comes to high levels of performance, older adults may never be able to reach the same levels of functioning as younger adults even after extensive training (Kliegl & Baltes, 1987; Kliegl, Smith, & Baltes, 1990).

We submit that the three conditions and trajectories outlined in Figure 18.1 form a robust fabric (architecture) of the life-span dynamics between biology and culture. We argue that this fabric represents a first tier of life-span theory, though psychologists often prefer more proximal and more domain-specific forms of predictive and causal analysis. However, whatever the specific content and form of a given psychological theory of life-span continuity and change, we maintain that it needs to be consistent with the frame outlined in Figure 18.1.

To illustrate further the general implications of this Level 1 analysis, consider the following examples. During the last decade we have witnessed the advancement of "growth" models of adult development and aging (e.g., Alexander & Langer, 1990; P. Baltes, Smith, & Staudinger, 1992; Commons, Richards, & Armon, 1984; Labouvie-Vief, 1995; Perlmutter, 1988; Ryff, 1984, 1989a). With the

perspectives presented, we argue that the opportunity for positive development in the second half of life would need to rest primarily in culture-based incentives and resources. Furthermore, based on the arguments outlined in Figure 18.1, any theory of life-span development which were to posit "general" positive advances across broad domains of functioning in later adulthood is probably false. On the contrary, because of the overall architecture of life-span development as we deduced it from biological and cultural evolutionary perspectives, a major theme of the second half of life must be the management and regulation of losses in biological functioning and the reduced efficiency of optimizing interventions.

Furthermore, any developmental theory that would maintain that ontogenetic development is inherently and entirely a matter of gain, of a positive change in adaptive capacity, is likely to be false as well. Rather, it is more likely that ontogenesis right from the beginning involves multilinear and multidirectional patterns of change, as shown in the life-span dynamics represented in Figure 18.1. Why? As is true for evolution, in some sense ontogenetic adaptivity and ontogenetic attainments are always local, that is, space- and time (age)-bound. As we will describe later, this recognition of development as being time- and space-bound has led life-span researchers to reject any conception of development that is unilinear and based solely on the notion of growth as gain in quantity and quality of functioning (P. Baltes, 1979a, 1987; P. Baltes et al., 1980; Brandstädter, 1984; Labouvie-Vief, 1980, 1982; Labouvie-Vief & Chandler, 1978; Uttal & Perlmutter, 1989).

The overall landscape of life-span development summarized in Figure 18.1 links life-span theory and research with other important topics in the study of human behavior as well. Take the mind-body problematic as an instance. The scenario characterized in Figure 18.1 is the illustration of what has been identified, by cultural anthropologists and philosophers (Elwert, 1992; Plessner, 1965), as the growing gap (hiatus) between mind and body as ontogenesis extends into old age. In the developmental psychology of intelligence (P. Baltes, 1993; Cattell, 1971; Horn, 1970), the age-related increase in the gap between the fluid mechanics and the crystallized pragmatics is an illustration of this scenario (see below).

The future of old age, therefore, will depend to a large measure on our ability to generate and employ culture and

culture-based technology in compensating for the unfinished architecture of biology, for the age-correlated decrease in biological functioning, for the growing gap between mind and body. This age-associated increase in the gap between biological and cultural resources has many consequences. One is life-span changes in the functions of development to which resources are allocated, as discussed in the next section.

Life-Span Changes in the Relative Allocation of Resources to Distinct Functions of Development (Level 2)

Growth versus Resilience versus Regulation of Loss

Having characterized the overall landscape of human development as it has evolved through biological and cultural evolution, we now take the next step toward the specifics of a psychological theory of life-span human development. In doing so, we move toward a level of organization closer to central concepts of developmental psychology. In Table 18.2, this was designated as Level 2.

We take this next step by reflecting about functions (goals) of development. Thus, we ask to what degree the overall architecture of age-related dynamics between biology and culture outlined in Figure 18.1 prefigures pathways of development and the kind of adaptive challenges that individuals face as they move through life. One possibility is to distinguish between two functions of ontogenetic development: growth and resilience (maintenance and recovery) of functioning (Cicchetti, 1993; Garnezy, 1991; Rutter, 1987; Staudinger, Marsiske, & Baltes, 1993, 1995). Life-span researchers have added to these functions that of management or regulation of losses (P. Baltes, 1987; Brandtstädter & Baltes-Götz, 1990; Brandtstädter & Greve, 1994; Brim, 1988; Dixon & Bäckman, 1995; Staudinger et al., 1995).

Figure 18.2 displays our general life-span developmental script about the allocation of available resources for these three major adaptive tasks of growth, maintenance/recovery (resilience), and regulation of loss (P. Baltes, 1997; Staudinger et al., 1993, 1995). With the adaptive tasks of *growth*, we mean behaviors aimed at reaching higher levels of functioning or adaptive capacity. Under the heading of *maintenance* and *resilience*, we group behaviors which are aimed at maintaining levels of functioning in the face of

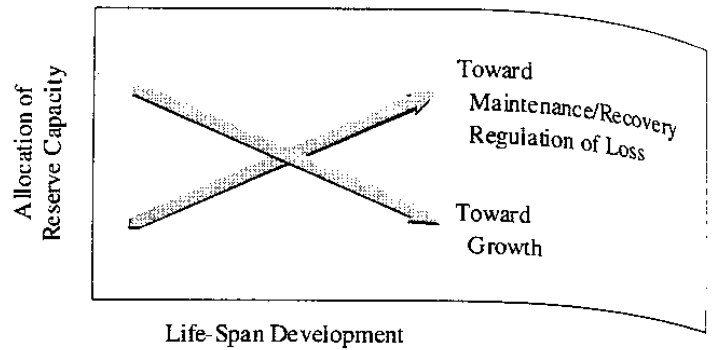


Figure 18.2 Life-span changes in the allocation of resources into distinct functions (objectives) of development: Growth, maintenance and recovery (resilience), and regulation (management) of loss (after Staudinger et al., 1995).

challenge or returning to previous levels after a loss. With the adaptive task of *regulation of loss*, we identify those behaviors which organize adequate functioning at lower levels when maintenance or recovery, for instance because of external-material or biological losses, is no longer possible. Note that for the present purpose, we have grouped together in Figure 18.2 resource allocations for the two functions of maintenance and recovery into one single category (resilience).

We proffer that there is a systematic script to these life-span changes in the relative allocation of resources. In childhood, the primary allocation of resources is directed toward growth; during adulthood, the predominant allocation is toward maintenance and recovery (resilience). In old age, more and more resources are directed toward regulation (management) of loss. In old age, few resources remain available to be allocated to growth. Such a characterization is an oversimplification as individual, domain, and contextual differences need to be taken into account. Thus, the characterization is one about relative probability.

Our general approach in this chapter on life-span theory is to exploit consistencies between levels of analysis. Therefore, note first that the scenario offered is consistent, in principle, with the life-span architecture of the dynamics between biology and culture outlined earlier (Figure 18.1). Growth, maintenance and recovery (resilience), and regulation of loss are important at all stages of the life course. However, their relative saliency and composition changes.

Let us reiterate the chief rationales underlying the life-span dynamic between growth, maintenance, and

regulation of losses outlined in Figure 18.2. Four factors are critical:

1. An age-related general reduction in the amount and quality of biology-based resources as individuals move toward old age.
2. The age-correlated increase in the amount and quality of culture needed to generate higher and higher levels of growth.
3. The age-associated biology-based loss in the efficiency with which cultural resources are used.
4. The relative lack of cultural, "old age-friendly" support structures.

As alluded to before, old age is young in the sense that, historically and demographically, the life period of old age is too recent to have permitted the evolution and refinement of an age-friendly biology and culture (Baltes & Baltes, 1992; Riley & Riley, 1989).

In our view (e.g., P. Baltes, 1987; Staudinger et al., 1995; for related arguments, see also, Brandtstädter & Greve, 1994; Brim, 1992; Edelman & Noam, 1982; Labouvie-Vief, 1982), the life-span shift in the relative allocation of biology- and culture-based resources to the functions of growth, resilience, and the management of loss is a major issue for any theory of life-span development. This is true even for those theories that, on the surface, deal only with growth or positive aging (e.g., Erikson, 1959; Perlmutter, 1988; Ryff, 1984). In Erikson's theory, for instance, the acquisition of generativity and wisdom are the positive developmental goals of adulthood. Despite the growth orientation of these constructs, note that even in Erikson's theory their attainment is inherently tied to recognizing and managing issues of generational turnover as well as of one's finitude and impending death.

In the history of life-span developmental psychology, the relative importance of resilience and the regulation of losses became more and more evident as researchers studied the everyday life context of adult and aging individuals. This was one reason that life-event theory became an early focus of researchers interested in the study of life-span development (Bandura, 1982; Brim & Ryff, 1980; Dohrenwend & Dohrenwend, 1974; Filipp, 1981; Hultsch & Plemons, 1979; Montada, Filipp, & Lerner, 1992). Furthermore, from the beginning efforts to construct a life-span

theory of developmental tasks (Havighurst, 1948, 1973), the adaptive challenges resulting from health-related issues as well as the loss of significant partners due to death in the period of adulthood and old age were highlighted.

The life-span trajectories outlined in Figure 18.2 regarding the functions of growth, resilience, and regulation of loss also emphasize the significance of the dynamics between these functions. Thus, the mastery of life often involves conflicts and competition among the three functions and objectives of human development. And in old age, the dynamic tilts more and more in the direction of management of vulnerability and loss (Baltes & Baltes, 1990b). Not surprisingly, therefore, life-span researchers have explored the notion that the occurrence and effective mastery of crises and conflicts represent not only risks, but also opportunities for new developments. Thus, dialectical conceptions of development were at the core of early work in life-span developmental theory (Datan & Reese, 1977; Riegel, 1976), as were theoretical efforts to identify trade-offs resulting from development-enhancing and development-challenging conditions (Labouvie-Vief, 1980, 1982).

As to current-day research, one telling example of the dynamics among the functions of growth, resilience, and regulation of loss is the life-span comparative study of the interplay between autonomy and dependency in children and older adults (M. Baltes, 1995, 1996; M. Baltes & Silverberg, 1994; M. Baltes & Wahl, 1992). While the primary focus of the first half of life is the maximization of autonomy, the developmental agenda changes in old age. In old age, to deal effectively with age-based losses and to retain some independence, the productive and creative use of dependency becomes critical. According to Margret Baltes, in order for older adults to maintain autonomy in select domains of functioning, the effective exercise and use of dependent behavior is a compensatory must. By invoking dependency and support, resources are freed up for use in other domains involving personal efficacy and growth.

In sum, we submit that a further step in developing life-span theory is to recognize and specify the nature of the dynamics of resource allocation for growth, maintenance (resilience), and regulation of loss. Of particular importance is the nature of the shift in this systemic interplay and orchestration over the life course. The script changes from a primary concern with growth toward a stronger and stronger concern with maintenance and recovery (resilience) and management of losses.