This article considers major paradigm shifts that have occurred as geropsychology progressed over the course of the 20th century as well as the author's perception of consequences of these shifts fort future directions. Included in this review are shifts in methodological paradigms, increasing interdisciplinarity of modern geropsychology, the impact of longitudinal studies on the body of knowledge of geropsychology, and the recent interest in research-based psychological interventions in the aging process.

Past and Future of Geropsychology at the Millennium

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The purpose of this article is to consider the major paradigm shifts that have occurred in geropsychology progress over the course of the second half of the 20th century. From my perception of the consequences of these shifts I will then try to project what future directions might look like in the new century. This account will, of course, reflect heavily those influences that have shaped my own views of adult development as they have developed over the past half century. These conceptions were shaped largely by my being engaged throughout my career in a set of large-scale longitudinal studies designed to systematically identify those influences that distinguish between those lucky individuals who age successfully (cf. Rowe & Kahn, 1987) and those exposed to a variety of hazards likely to lead to early decline and low levels of functioning in their last years (cf. Schaie, 1989, 1996). But they were also influenced by shifts in methodological paradigms, and perhaps even more by the increasing inter-disciplinarity that has characterized the development of modern geropsychology. Hence, I will begin by tracing the methodological and inter-disciplinary influences and then summarize the impact of longitudinal studies on the body of knowledge of geropsychology. I will also consider the recent interest in research-based psychological interventions in the aging process. Finally, I will make some prognostications as to the proximal future of the field.

THE INFLUENCE OF METHODOLOGICAL ADVANCES

Perhaps the most noteworthy development to impact geropsychology over the past half century can be found in methodological advances that shape our understanding of adult development (cf. Schaie, 1988). Here it was largely the paradigmatic shift from the predominance of cross-sectional studies of age differences to the understanding that antecedent-consequent relationships in development can only be elicited by following the same individuals over time. No less important, a second paradigmatic shift occurred when confirmatory factor analysis became a common method for hypothesis testing. This method made it possible to assess the invariance of the relationship between observed variables and the latent constructs of primary interest to science, a prerequisite for conducting studies comparing individuals and groups over long periods of time or comparing groups differing in salient characteristics such as gender or ethnicity.

A third important methodological development was the paradigmatic shift to consider chronological age as a dependent rather than an independent variable. First introduced conceptually by Wohlwill (1973), behavioral scientists soon began to realize that the study of age or duration time as a dependent variable could be operationalized via methods of survival or event-time analysis (Singer & Willett, 1991). Finally modern methods of multi-level modeling (MLM, Bryk & Raudenbush, 1987) have made it possible to disaggregate individual growth curves (and typologies of growth curves) from the group averages that had previously been almost the primary focus of inquiry.

THE INCREASING INTERDISCIPLINARITY OF GEROPSYCHOLOGY

A second major shift I have encountered during my career as a gerontologist (Schaie, 2000) has

been the ever-increasing prevalence of inter-disciplinarity in geropsychological research. I have come to recognize that behavioral change can only be understood (and predicted, for that matter) by examining behavioral change in the context of societal change (cf. Riley, Foner, & Riley, 1999), giving due recognition to lasting, heritable influences (cf. Schaie, Plomin, Willis, Gruber-Baldini, & Dutta, 1992), as well as to the obvious, age-related changes in the efficiency of the physiological infrastructure (Cristofalo, Tresini, Francis, & Volker, 1999). Over the course of this century, the many relevant variables from the social and biological sciences have required behavioral scientists to become less parochial and more comfortable in considering the convergence of scientific findings from adjacent disciplines. Hence, while outcome (dependent) variables for the discipline of psychology must always be sought in the domain of behavior, the predictor (independent) variables are increasingly located in domains where the collaboration of colleagues from neighboring disciplines is often essential. On the other hand, behavioral assessments have become increasingly important in the assessment of risk and the prediction of onset and severity of late life chronic diseases and the dementias.

An understanding of development from early adulthood to old age must include embedding what we know about development within the context of changing environmental influences and changes in individuals' physiological infrastructure. The initial bases for adult behavior must, of course, be attributed to both heritable (genetic) influences as well as early environmental influences typically experienced within the home of the biological parents. The early environmental influences will, of course, also exert influences on midlife social status. Genetic factors are also likely to be implicated in the rate of age-related decline in competence with increasing age. Thus far, the best-studied gene in this context is the Apo-E gene, one of whose alleles is thought to be a risk factor for Alzheimer's ailment.

THE ROLE OF LONGITUDINAL STUDIES IN GEROPSYCHOLOGY

It is interesting to note that, from the very beginning of empirical inquiry on development beyond adolescence, substantive concerns were limited primarily to the areas of intellectual development and personality traits. Investigators interested in the age-related aspects of learning and memory largely adopted the paradigms popular in early experimental child psychology and thus limited themselves to age-comparative studies of young and old adults. Only recently have we seen an interest in this area in studies that would investigate the developmental mechanisms by use of longitudinal paradigms (see Salthouse, 1999). But for the areas of intellectual development and cognition as well cross-sectional studies predominated until the late 1930s and clouded our understanding of adult development due to the confusion of age-related development with secular changes expressed as cohort effects.

The initial longitudinal studies that have formed our understanding of adult development were of two types. First, there were studies that began with a focus on early childhood and child rearing practices but whose participants were followed into adulthood. A prime example of such a study is the follow-up of the Berkeley Growth and Guidance studies (Eichorn, Clausen, Haan, Honzik, & Mussen, 1981). A second group of studies traced participants who had been assessed as young adults as part of their college experience and reassessed in midlife or later. An example of such studies is Owens (1966) follow-up of persons in their 50s who had first been assessed as ROTC members during World War I.

The earlier cross-sectional studies had placed peak performance in intelligence and other positive, psychological attributes in late adolescence or early young adulthood, with linear decline thereafter. By contrast, the longitudinal follow-up studies suggested that psychological growth continued generally into early midlife and for some variables (notably the verbal abilities) at least into the 50s.

In the early 1960s, I became convinced that the cross-sectional vs. longitudinal issue needed to be confronted directly by following a structured cross-sectional sample covering most of the adult life span over time. I therefore designed a study that converted my original cross-sectional study into a series of short-term, longitudinal studies of mental abilities, each extending over a simultaneous seven-year period. My replicated cross-sectional findings were quite similar to the original findings, but the longitudinal data showed later ages of peak performance, maintenance of average function on most abilities until the 60s, and only modest decline through the 70s. Further extensions of these studies (with some longitudinal data over as long as 42 years) over the past several decades have consistently replicated these findings, with dramatic declines not experienced until the 80s (Schaie, 1996).

The early work on adult development was pretty much oriented within the context of a lifespan development framework, but the field of

geropsychology soon divided into at least two rather different orientations. Some of us remained committed to the notion that an understanding of the aging process required the careful charting of human development, at least across the entire adult life span. This orientation, which I share, holds that our primary interest should be directed to the understanding of the mechanisms that contribute to the behavioral differences between youth and old age within a process that extends across the life span. The other orientation, sometimes labeled the "clinker method" (after the residue that remains when charcoal is produced), considers the characteristics of the elderly as the primary interest, and would investigate the aging process only from that period of life when a categorical transformation has begun (such as leaving the world of work or family dissolution due to death of a spouse).

The second orientation argued for longitudinal studies of the elderly that begin at an advanced age, anywhere from the 60s to the 80s, and follow individuals through the remainder of their lives. Perhaps the most prominent of studies begun in late life has been the Duke Longitudinal Study (Palmore, Busse, Maddox, Nowlin, & Siegler, 1985). But many others can be found in the literature conducted in various industrialized societies (see Schaie & Hofer, 2001 for a general review of longitudinal studies).

These studies generally find less behavioral decrement than would be suggested by cross-sectional data, with only small average decline in the 60s, with increasingly steep decrement for each successive age decade. There is also a strong suggestion that decline accelerates as a precursor of eventual death. But most important, all of these studies call attention to vast individual differences in rate of change occurring for individuals of all levels of original functioning and socioeconomic status. Thus, while the frequency of individuals who show some decline increases at a near logarithmic rate once the 60s are passed, there are still rare individuals to be found even in their mid-80s who function exceedingly well. What many of these studies also suggest is that there may be an individualized pattern of developmental trajectories. For example, in the case of mental abilities, most individuals by the time they reach their 60s will have experienced a significant drop in one of their abilities, but that ability will be specific to the individual (Schaie, 1989). Indeed, it is only from the longitudinal study of adult development that it is possible to inquire into possible mechanisms and/or causes of these vast, individual differences in developmental progressions through adulthood.

INTERVENTION STUDIES IN GEROPSYCHOLOGY

A final development worth mentioning is an increasingly important shift from studies designed to understand behavioral aging to programming of research-based interventions that attempt to gain partial control over the aging process. These studies involve behavioral interventions that are designed to remediate age-related declines or slow the rate of decline and maintain independent functioning in older persons.

In a number of laboratories (primarily in the United States and in Germany) training programs have been developed that have been applied in the laboratory, and more recently in cooperative, multi-site intervention trials. These interventions have been directed toward the enhancement of cognitive competence to increase self-efficacy or train caregiving behaviors. In contrast to training young children where it can be assumed that new skills are conveyed, older adults are likely to have had access to the skills being trained but through disuse have lost their proficiency. Information from longitudinal studies is therefore particularly useful in distinguishing individuals who have declined from those who have remained stable. In the former, training is directed toward remediation of loss while in the latter the enhancement of previous levels of functioning is sought with the intention of compensating for possibly cohort-based disadvantage of older persons (see Willis, 2001 for greater detail).

FUTURE IMPLICATIONS

The study of adult psychological development is increasingly informed by relevant neighboring disciplines that investigate the genetic basis, physiological infrastructure, and societal context of the developing individual. Hence, I would predict that the study of the life course of single psychological variables that was common in the first two-thirds of the past century will be largely displaced by multivariate multi-disciplinary efforts. Indeed, many of the more recent longitudinal studies of adults already display these characteristics. Cross-sectional investigations, except as exploratory pilot studies or as the first stage of a prospective longitudinal study, will become rare. They will be replaced by more programmatic, long-range investigations that may frequently include experimental paradigm and, in particular, interventions designed to modify rate of development.

With our increasing sophistication in psychological measurement, we will take advantage of the work on structural invariance to develop better scales, perhaps applying item response theory for those robust

marker variables that seem to do well in measuring behavior across the entire adult life span. Common archives are being developed that will make available web-based access to large data sets from many different populations and covering a wide range of psychological attributes. This development calls even more urgently for the development of "gold standards" for a core set of measures that can then be used to link disparate data sets and provide the basis for substantively meaningful meta-analyses.

The investigation of adult development will increasingly turn to the identification of mechanisms and processes that underlie developmental interventions and that are relevant to public policy questions. Hopefully, we can expect the development of a strong, applied psychology of adult development, one that will find ways to enhance the quality of our existence in that large portion of life we call adulthood.

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ACKNOWLEDGMENT

Preparation of this article was supported in part by grant R37 AG08055 from the National Institute on Aging.