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**PART ONE**

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**INTRODUCTION AND OVERVIEW**

## CHAPTER 1.1

# The Problem of Theory in Gerontology Today

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Are theories of ageing necessary? Of course from one perspective, that of traditional science, theories of ageing help us to systematize what is known, explain the *how* and *why* behind the *what* of our data, and change the existing order to solve problems, such as age-related disabilities or memory disorders.

But from other perspectives, theories of ageing are not only unnecessary, but may be impossible. One argument is that the development of explanations is an arm-chair enterprise that may be interesting, and occasionally valuable, but is largely irrelevant to the major activity of researchers – to collect observations (data) and construct empirical generalizations. Many researchers in ageing, from geriatricians to epidemiologists to anthropologists, probably share this view. Another argument is that science and positivism are severely limiting, if not irrelevant, for understanding aspects of ageing. Social gerontologists from constructivist and critical orientations suggest that there are other ways to look at, interpret and develop knowledge about ageing, which may not entail scientific theories at all.

A third perspective is shared by many advocates, practitioners, and policymakers in ageing: we have enough research and we have enough theories about ageing. What we must focus on is application, helping older people and their families surmount the problems associated with ageing. To this, scientists, engineers and other policymakers might reply: you must have good theory in order to ameliorate problems successfully through policy and interventions! Policy without a theoretical foundation runs the risk

of causing more harm than good. A fourth argument is that there is no such thing as a theory or theories *of* ageing per se, only theories *in* ageing that explain changes in outcomes with the passage of time, outcomes such as health, memory and perception, social connectedness or loneliness, economic status, or retirement satisfaction.

In this chapter we review current theoretical developments in gerontology, with particular focus on social gerontology. By theory, we mean the construction of explicit explanations that account for empirical findings (Bengtson *et al.*, 1999). We will argue that in building theory, researchers rely on previous explanations of behavior that have been organized and ordered in some way. Whenever researchers begin a project, they are operating under some implicit theory about how a set of phenomena may be related, and these expectations or hunches are derived from previous explanations. Yet too often research agendas proceed absent any stated theory about how things work. If empirical results are not presented within the context of more general explanations or theory, the process of building, revising and interpreting how and why phenomena occur is limited. Particularly in the area of public policy applications or program interventions in gerontology, it is crucial to specify the theoretical assumptions of a research investigation or program intervention before investing large sums of money in it. If the theory is inadequate, it is unlikely the research intervention program or public policy will achieve its objectives. If the research findings are not backed by tested theoretical assumptions, then it is difficult to judge whether an intervention

policy is grounded in supportable assumptions about why things happen.

### THE QUEST FOR EXPLANATION IN GERONTOLOGY

The field of gerontology has accumulated vast amounts of data over the past several decades, creating a goldmine of potential theoretical knowledge. Yet explicit theory development has lagged – prompting some to observe that gerontology remains data-rich and theory-poor (Birren, 1999; Settersten and Dobransky, 2000). Several factors may have impeded theoretical progress in gerontology: (1) the inability or unwillingness to integrate theory-based knowledge within topic areas and synthesize theoretical insights in the context of existing knowledge; (2) the difficulty of crossing disciplinary boundaries in order to create multidisciplinary explanations and interpretations of phenomena of ageing; (3) the strong “problem-solving” orientation of gerontology that tends to detract from basic research programs where theory plays a central role; (4) the trend towards focusing on individuals in micro settings while ignoring wider social contexts, which tends to dampen even middle-range theory building (Hagestad and Dannefer, 2001); (5) epistemological debates over the virtues of the scientific approach to knowledge or whether human behavior can be understood at all in terms of laws, causes and prediction (mirroring theoretical disagreements within sociology since the mid 1960s).

#### What Do We Have to Explain? The Age-Old Problem of Ageing

Why do we age? What is the nature of senescence and can its process be altered? Why do we live long after our peak reproductive years and why has the postreproductive span of life increased so significantly over the last century? How can we live healthier and more fulfilling lives? How can we better address the needs of elderly people and unleash their potentialities? At the societal level, the rapid ageing of populations presents researchers and policymakers with new and difficult questions. In all countries of the world, population ageing is altering dependency ratios and dramatically increasing the number of elders who will need care. Gerontologists –

whether as scientists, practitioners or policymakers – concern themselves with these questions.

Gerontologists focus on three sets of issues as they attempt to analyze and understand the phenomena of ageing. The first set concerns *the aged*: the population of those who can be categorized as elderly in terms of their length of life lived or expected lifespan. Most gerontological research in recent decades has focused on the functional problems of aged populations, seen in human terms as medical disability or barriers to independent living. A second set of issues focuses on *ageing* as a developmental process. Here the principal interest is in the situations and problems, which accumulate during the lifespan and cannot be understood separate from developmental experiences and processes across a lifetime. Gerontologists examine the biological, psychological and social aspects of the ageing process as including variable rates and consequences.

A third set of issues involves the study of *age* as a dimension of structure and behavior within species. Social gerontologists are interested in how social organizations are created and changed in response to age-related patterns of birth, socialization, role transitions and retirement or death. The phenomena to be explained relate to how institutions such as labor markets, retirement and pension systems, healthcare organizations, and political institutions take into account or deal with “age.” The study of age is also a concern of zoologists, primate anthropologists and evolutionary biologists who note its importance as an organizing principle in many species’ behaviors and survival (Wachter and Finch, 1997). While these three emphases are quite different in focus and inquiry, they are nonetheless interrelated in gerontological research and practice. Theoretical engagement helps to distinguish among these basic categories of interest.

#### The New Problem of Societal Ageing

Rapid population ageing and higher dependency ratios will create major challenges for states and economies over the next half-century. Less obvious but equally important is the profound effect that population ageing will have on social institutions such as families. Who will care for the growing numbers of very old members of human societies? Will it be state governments? The aged themselves?

Their families? Private care providers? These challenges are the result of four remarkable sociodemographic changes that have occurred since the start of the twentieth century and particularly since the 1970s.

**EXTENSION OF THE LIFECOURSE.** Over this period, there has been a remarkable increase in life expectancy, and an astonishing change in the normal, expected lifecourse of individuals, especially in industrialized societies. Remarkably, an entire generation has been added to the average span of life over the past century.

**CHANGES IN THE AGE STRUCTURES OF NATIONS.** This increase in longevity has also added a generation to the social structure of societies. In many economically developed nations, those aged 80 and over are the fastest growing portion of the total population. At the same time, total fertility rates in developed nations have plummeted. Several countries in Europe (notably Germany) as well as Japan are beginning to lose population. Most nations today have many more elders, and many fewer children, than fifty years ago.

**CHANGES IN FAMILY STRUCTURES AND RELATIONSHIPS.** Families look different today than they did fifty years ago. We have added a whole generation to the structure of many families. Some of these differences are the consequence of the expanding lifecourse. Others are the result of trends in family structure, notably higher divorce rates and the higher incidence of childbearing to single parents. Still others are outcomes of changes in values and political expectations regarding the role of the state in the lives of individuals and families.

**CHANGES IN GOVERNMENTAL EXPECTATIONS AND RESPONSIBILITIES.** For most of the twentieth century, governmental states in the industrialized world increasingly assumed more responsibility for their citizens' welfare and wellbeing. Since the mid 1990s, however, this trend appears to have slowed or reversed as states make efforts to reduce welfare expenditures. The economic and social implications of ageing and the aged for societies are vast.

### Problems of Theory-Building in Gerontology

The field of gerontology has accumulated many findings, and has begun to establish several important traditions of theory (Bengtson *et al.*, 1997). It seems, however, that gerontologists (especially social gerontologists) have lost sight of the essential contributions of theory. Recently published findings in ageing research suggest many researchers and practitioners are relatively unconcerned about theories of ageing. In the biology of ageing, for example, many researchers seem focused on empirical models that *describe* ageing at the cellular or molecular levels, leaving integrative theories of ageing to other investigators (for exceptions, see Cristofalo *et al.*, 1999; Finch, 1990, 1997; and Finch and Seeman, 1999). In the psychology of ageing, the pursuit of experimental models of age differences has seldom been accompanied by similar efforts to integrate findings with theory (Birren, 1999; Salthouse, 1991, 1999), although Baltes and his associates have begun to draw up broader theoretical frameworks (Baltes and Smith, 1999). In the sociology of ageing, there has been an increase in empirical analyses but a decrease in efforts at theoretical explanation concerning such critical social phenomena as the consequences of population ageing, the changing status of ageing individuals in society, and the interdependency of age groups in the generational compact (Bengtson *et al.*, 1997; O'Rand and Campbell, 1999). We suggest that, in gerontology today, the problems of theory-building and the development of a corpus of cumulative knowledge can be attributed to several factors.

**THE PROBLEM OF TACIT ASSUMPTIONS.** Gerontologists, whether their disciplinary focus is biological, behavioral or sociological, approach their research or study with certain assumptions and tacit theoretical orientations, even if these are not made explicit. In their eagerness to exploit new data sources and analytic techniques, and generate findings for the solution of the problems associated with ageing, many gerontologists neglect to spell out clearly their theoretical assumptions. One of the purposes that theories on ageing should achieve is to lay out these tacit assumptions and orientations in an explicit and systematic way.

**THE PROBLEM OF RESTRICTING THEORY TO EMPIRICAL GENERALIZATIONS.** Skepticism about the importance of theory, as well as the proliferation of single-aspect research which tends to lack theoretical grounding, has led some gerontology researchers to substitute empirical generalization for theory. Propositional statements based on empirical generalizations are about specific events in particular empirical settings rather than about more general processes that occur across a range of contexts. Often empirical generalizations are little more than summaries of research findings that require a theory to explain them (Turner, 2003). There is a need to raise these empirical generalizations to the level of explanation. Many gerontology researchers appear to have ignored theory altogether. For example, a review of articles published between 1990 and 1994 in eight major journals relevant to the sociology of ageing found that 72 percent of the publications made no mention of any theoretical tradition (Bengtson *et al.*, 1997). An unfortunate consequence is that current gerontological research may be accumulating a vast collection of empirical generalizations without the parallel development of integrated knowledge.

**THE PROBLEM OF DISCIPLINARY BOUNDARIES.** Is theorizing across disciplinary boundaries possible? The field of gerontology itself is in need of integration, because so many more factors are now recognized to be involved in human ageing (Birren, 1999). For the mountains of data to yield significant new insights, an integrating framework is essential. But this cannot be done without theories and concepts that are broader and more general in scope. This lack of integration in theories of ageing is also an artifact of disciplinary specialization. In the increasingly differentiated fields of inquiry that now constitute gerontology, the factors which militate against comprehensive theory development are multiplying. The various disciplines study a growing diversity of outcomes, hence there is little overlap in theoretical explanations. In the social and behavioral sciences, for example, some perspectives such as critical and postmodern theories and strains of feminist theory embrace a more “relativistic” stance towards knowledge and the study of ageing. This poses a further challenge for integrating theory and findings across the sciences when distinct areas of

inquiry pursue knowledge under different epistemological assumptions.

**THEORY DEVELOPMENT AS A SOCIAL ENTERPRISE** As Thomas Kuhn (1962) so forcefully argued four decades ago, science is a social endeavor that cannot be separated from social and professional considerations. Science reflects the concerns, careers and competitiveness of collective groups of practitioners. Moreover, like the ageing process itself, theoretical development processes – and the explanations that ensue – are embedded in institutional and historical contexts. Achenbaum (1995) observes how the development of gerontological theories paralleled the historical construction of gerontology around new scientific methods and medical practices. Not surprisingly, the biomedicalization of ageing remains a guiding research paradigm. We must be mindful of the connections between scientific inquiry and the social milieu at particular points in time that influence how a subject matter is conceived. In recent years, interpretive and critical social gerontologists have called attention to these connections (Hendricks and Achenbaum, 1999), cautioning researchers to be more reflective on their own values or biases as they interpret findings, develop explanations and make policy recommendations.

### THE CURRENT STATE OF THEORY IN GERONTOLOGY

Gerontology in the U.S. emerged as a distinct field of study following the Second World War when a number of American scientists from the fields of biology, psychology and human development founded the Gerontology Society of America. Since its beginnings, gerontology’s scholarly and scientific interests were broadly defined – because old age was considered “a problem” that was unprecedented in scope (Achenbaum, 1987). Indeed, ageing has become one of the most complex subjects facing modern science (Birren, 1999). To understand and explain the multifaceted phenomena and processes of ageing required the scientific insights of biology and biomedicine, psychology and the social sciences. Over time, the field expanded beyond these core disciplines to include anthropology, demography, economics, epidemiology, history, the

humanities and arts, political science and social work, as well as the many professions that serve older persons.

Over the past several decades, gerontology has endeavored to define itself as a “science” (Achenbaum, 1995). Scientific theories are premised on the idea that the natural universe has fundamental properties and processes that explain phenomena in specific contexts, that knowledge can be value-free, that it can explain the actual workings of the empirical world, and that it can be revised by a better theory as a result of careful observations of empirical events (Turner, 2003).

### The Structure of Theories in Gerontology

Contemporary theories of ageing differ in several respects: (1) their underlying assumptions (particularly about human nature – whether human behavior is essentially determined and thus predictable – or whether individuals are essentially creative and agentic); (2) their subject matter (reflecting specific disciplinary interests, or whether the focus is on macrolevel institutions or on microlevel personal encounters and interactions); (3) their epistemological approach (positivistic, interpretive or critical); (4) their methodological approach (deductive or inductive); and (5) their ultimate objectives (whether they aim largely at describing things, explaining or even predicting them, or changing the way things are). The positivistic approach continues to characterize mainstream gerontological research, as reflected for example in the *Journals of Gerontology* in its four-part publication framework – biological science, clinical science, behavioral science and social science.

The classical definition of a scientific theory is essentially a deductive one, starting with definitions of general concepts and putting forward a number of logically ordered propositions about the relationships among concepts. Concepts are linked to empirical phenomena through operational definitions, from which hypotheses are derived and then tested against empirical observations. A general theory allows investigators to deduce logically a number of quite specific statements, or explanations, about the nature and behavior of a large class of phenomena (Turner, 2003; Wallace and Wolf, 1991). Because such theories are useful in predicting

and hence manipulating our environments, they are considered essential for the design of programs aimed at ameliorating problems associated with ageing, especially by government funding agencies.

Some researchers have generated explanations of ageing phenomena using inductive or “grounded” theoretical approaches (Glaser and Strauss, 1967; Strauss and Corbin, 1990) and qualitative methods, starting with the data and leading in the final stages of analysis to the emergence of key concepts and how they relate to one another. Research using quantitative methods can also proceed inductively. For example, the relatively new subdiscipline of neuropsychology proceeds from the “bottom up,” starting with data and developing theory (Woodruff-Pak and Papka, 1999), which mirrors grounded theory in sociology.

*Is gerontology a science?* Today, not all researchers in gerontology agree with the scientific approach to knowledge. In social gerontology, as in sociology more generally, there is controversy over the definition of theory and whether *social* theories can be scientific. Many social gerontologists – in particular those espousing social constructionist and critical perspectives – believe there are other “non-scientific” ways to look at, interpret and develop knowledge about ageing. They argue that general explanatory arguments are likely to miss so much of people’s experiences that they are seriously flawed and inadequate. Researchers in these traditions focus on describing and understanding how social interactions proceed, and on the subjective meanings of age and ageing phenomena. Knowledge of the social world derives from the meanings individuals attach to their social situations. A “theory” – many social constructionists prefer the term “sensitizing scheme” – is useful to the extent it provides a deeper understanding of particular social events and settings (Gubrium and Holstein, 1999). The interpretive perspective is premised on the notion that individuals are active agents and can change the nature of their social environments. Thus there cannot be general theories of ageing reflecting “immutable laws” of human social organization (Turner, 2003).

The critical theory perspective, most often associated with the Frankfurt School of epistemology represented by Habermas (1970), questions positivism and the search for scientific natural laws as a principal source of knowledge. The understanding



of meanings (which Habermas termed hermeneutic/historical knowledge) and the analysis of domination and constraints in social forces (termed critical knowledge) are equally as important as “objective knowledge” in understanding phenomena (Bengtson *et al.*, 1997; Moody, 2001). Critical theory assumes that values cannot be separated from “facts” and that all research is value-laden. Thus social constructionist and critical perspectives in gerontology today operate under different assumptions about the subject and the purpose of ageing research. At the same time, the insights provided by these approaches about the experience of ageing, what it means to grow old and be old, and about issues of social justice for the aged, have filled a gap in the knowledge base obtained through the positivist paradigm, and we feel they have enriched the field of gerontology. An example is the extraordinary contribution of Barbara Myerhoff’s (1978) classic ethnographic study of Jewish elders, *Number our days*. It should be remembered, however, that, while different in their objectives and methods, all these theoretical approaches do involve a set of concepts, which are the building blocks of any theory.

### Debates over Epistemology

To understand the controversies in social gerontology surrounding forms of knowledge and the use of theory, we must concern ourselves with epistemology: *how we know what we think we know*. Is there a reality out there? Are social phenomena real facts? Or is reality itself socially constructed through the collaborative definitional and meaning-sharing activities of people who observe it (Marshall, 1999). Such concerns are “meta-theoretical,” and they have been the subject of a great deal of debate in recent years among scholars in the sociology of ageing. Meta-theories (technically, theories of theories) are concerned with more fundamental epistemological and metaphysical questions addressing such things as the nature of human activity about which we must develop theory; the basic nature of human beings or the fundamental nature of society; or the appropriate way to develop theory and what kind of theory is possible (scientific theories, interpretative frameworks, general concepts that sensitize and orient, or critical approaches) (Turner, 2003). Given their incommensurability, we suggest that the way

to address these epistemological questions in social gerontology is to regard these perspectives as providing different lenses that can enrich our understanding of the multiple facets of ageing. But is there any prospect of them finding a common currency of ideas and concepts that would allow a synthesis to emerge?

### Biological, Psychological and Sociological Theories of Ageing

In the [next section](#) we provide an overview of the major biological, behavioral and social theoretical perspectives in gerontology. Theory development in the biological and behavioral sciences seems to have been a less difficult process than it has been for social gerontology. In the biology and psychology of ageing there is little disagreement that science is the appropriate paradigm for building knowledge. Admittedly, these disciplines are closer to the “natural sciences” where the discoveries of science have given humankind extraordinary progress in overcoming infectious diseases, combating cancers, ameliorating the devastating symptoms of mental illness, and advancing our knowledge of cognitive processes in later life. Theoretical progress has been more challenging for social gerontology, in part because social phenomena are considerably more complex and fluid, and researchers approach their topics with different epistemological assumptions.

### BIOLOGICAL THEORIES OF AGEING

Biological theories address ageing processes at the organism, molecular and cellular levels. Instead of a defining theory of biological ageing, there are a multitude of smaller theories, no doubt reflecting the fact that there is no single cause, mechanism or basis for senescence. Most of these biological theories fall into one of two general classes: stochastic theories, and programmed (developmental-genetic) theories (Cristofalo *et al.*, 1999). Since the early 1990s, however, evolutionary senescence theory has gained prominence as an explanation of why and how ageing occurs.

#### Stochastic Theories

This class of theories explains ageing as resulting from the accumulation of “insults” from the environment, which eventually reach a level

incompatible with life. The best-known is the *somatic mutation theory*, which came to prominence after the Second World War as a result of research on radiation exposure and damage. The theory states that mutations (genetic damage) will produce functional failure eventually resulting in death. Cristofalo (1996) notes, however, that an explanation of a shortened lifespan as a consequence of gene-altering exposure is not at all the same as explaining the normal processes of ageing. In general, experiments have not supported somatic mutation theory. Another stochastic explanation, *error catastrophe theory*, proposes that a defect in the mechanism used for protein synthesis could lead to the production of error-containing proteins, resulting in the dysregulation of numerous cellular processes that eventually results in the death of the individual. While appealing, there is no convincing evidence for error catastrophe (Cristofalo *et al.*, 1999).

### Developmental-Genetic Theories

This class of biological theories of ageing proposes that the process of ageing is continuous with and probably operating through the same mechanisms as development, hence genetically controlled and programmed. Three categories of developmental-genetic theories have received empirical support (Cristofalo *et al.*, 1999). First are the *neuroendocrine theories*, which posit functional decrements in neurons and their associated hormones as central to the ageing process. One such theory proposes that the hypothalamic/pituitary/adrenal axis is the primary regulator of the ageing process, and that functional changes in this system are accompanied by or regulate functional decrements throughout the organism (Finch and Seeman, 1999). There is considerable evidence relating ageing of the organism to loss of responsiveness of the neuroendocrine tissue to various signals. A second neuroendocrine explanation, the *immunological theory of ageing* (Walford, 1969), is based on the observation that the functional capacity and fidelity of the immune system declines with age, as indicated by the strong age-associated increase in autoimmune disease. A third neuroendocrine explanation, *free radical theory* (Harman, 1956), proposes that most ageing changes are due to damage caused by free radicals. Free radicals are highly chemically reactive agents that are generated in single electron transfer reactions

to metabolism. This theory is more general in that it provides a mechanism applicable to all aerobic tissues (Cristofalo, 1996). Another explanation that relates differential rates of metabolism and lifespan expectancy is that of *caloric restriction* (Cristofalo *et al.*, 1999).

### Theories of Cellular Ageing

While most well-known theories deal with the organism and its integrative functioning, the idea of ageing as a cell-based phenomenon is relatively recent (Cristofalo, 1996). Three cellular-level research directions have emerged. The first focuses on a genetic analysis of senescence primarily based on cell–cell hybridization. A second strand relates to analyzing steps in the growth factor signal transduction. More recently, a third area of cellular-level research focuses on DNA replication and telomere shortening as a mechanism, which eventually curtails replication.

### Evolutionary Theories

Martin (2003) argues that the single most important shift in biology-of-ageing paradigmatic thinking since the 1980s has been the widespread acceptance of evolutionary senescence theory as an explanation for why ageing happens. Challenging the developmental-genetic approach is the idea of the “selection” of ageing mechanisms through evolution. This has been accompanied by growing skepticism that the diverse scenarios and trajectories of ageing can be controlled by a process whose mechanisms regulate the precise processes of development (Cristofalo, 1996). Evolutionary theories attempt to explain the origin of ageing as well as the divergence of species lifespans (Kirkwood, 2001). Evolutionary explanations of ageing are based on three major theories. First is *mutation accumulation theory* (Medawar, 1952) which states that ageing is an inevitable result of the declining force of natural selection with age (that is, the expression of deleterious genes associated with senescence may be delayed until the postreproductive period). Mutation accumulation theory claims the accumulation of heritable, late-acting deleterious constitutional mutations, as distinct from the accumulation of somatic mutations. The second evolutionary theory of ageing, *antagonistic pleiotropy theory* (Williams, 1957), states



further that late-acting deleterious genes might even be favored by selection and actively accumulated if they have any beneficial effects early in life. Simply put, the theory posits there are genes that have good effects early in life and bad effects later in life. The third evolutionary theory is *disposable soma theory* (Kirkwood, 2001). This refers to a process whereby there is limited investment in soma cell durability because such cells have a short expected duration of use. Soma are those parts of the body which are distinct from the “germ-line” that produces the reproductive cells. From this perspective, an increased rate of ageing occurs through optimizing the investment in reproductive function as opposed to somatic maintenance functions. (See Kirkwood, this volume, for a detailed discussion of disposable soma theory.)

### A General Theory of Biological Ageing

To address the need to organize the diverse findings of biological ageing research into a comprehensive body of knowledge, Gavrilov and Gavrilova (2003) recently proposed the application of a general theory of systems failure known as *reliability theory* to explain ageing processes in humans. Their holistic approach complements the evolutionary perspective on ageing and longevity. Reliability theory predicts that a system may deteriorate with age even if it is built from nonageing elements. The theory postulates that it is the system’s redundancy for irreplaceable elements which is responsible for the ageing phenomenon. Gavrilov and Gavrilova note that the human species displays considerable system redundancy, and that the positive effect of system redundancy is damage tolerance (which decreases mortality and increases lifespan). This makes it possible for damage to be accumulated over time, thus producing the ageing phenomenon. Gavrilov and Gavrilova’s research demonstrates that systems that have higher redundancy show a higher ageing rate or expression of ageing. This helps explain the cases of negligible senescence observed in the wild and at extreme old ages.

### Neuropsychological Theories of Ageing

Drawing from the fields of neurology, physiology and psychology, the neuropsychology of ageing is

a relatively new discipline that scientifically investigates, clinically assesses, and develops treatments for age-related and neurodegenerative changes in brain function and behavior. Theorizing proceeds inductively from empirical observations to models and theoretical explanations – a “bottom up” approach. In a sense, the diagnosis is the theory (Woodruff-Pak and Papka, 1999). Contemporary theories of neuropsychology and ageing differentiate between normal age-related changes in brain function, and neurodegenerative changes.

**“THEORIES” OF NORMAL AGE-RELATED CHANGE.** There are two major configurations of change in cognitive functioning related to ageing: (1) change in the prefrontal cortex, and (2) change in the ability to form declarative memory. The prefrontal cortex is involved in executive function, attention, and working memory (Woodruff-Pak and Papka, 1999). Based on the principle that neural structures and related abilities laid down last should be the most vulnerable to processes of ageing, evidence indicates that the frontal lobes (the last structure to develop) are the part of the brain affected earliest by normal ageing. Declarative memory, which is dependent on circuitry in the medial temporal lobe or mammillary body, is involved in the manipulation and organization of memory; for example, “trying to learn” a task as opposed to performing a task (Woodruff-Pak and Papka, 1999). While memory resides in a constellation of interacting brain areas, the medial temporal lobe circuitry for declarative memory appears to be most affected by processes of both normal and neuropathological ageing.

**“THEORIES” OF NEURODEGENERATIVE CHANGE.** There are several age-linked neuropathological changes of the brain which produce observable degenerative deficits in cognitive functioning (the most prominent being Alzheimer’s, but also Lewy body, Parkinson’s, Huntington’s, epilepsy, and Creutzfeldt-Jakob disease). Theories of Alzheimer’s Disease relate to its neuropathological mechanisms (amyloid plaques and tangles associated with neuronal death); its genetic predisposition (presence of e4 allele within the ApoE genotypes and other factors modulating its expression; Woodruff-Pak and Papka, 1999); and various existing and potentially

new biochemical therapies (theories): manipulating the cholinergic system (acetylcholine), manipulating brain excitation or signaling (blocking glutamate's ability to activate NMDA receptors, controlling the effect of calcium on NMDA receptors), blocking the formation of beta amyloid (secretase inhibitors), and reducing brain inflammation (NSAIDs, Statins) (Walsh, 2004).

### PSYCHOLOGICAL THEORIES OF AGEING

The psychology of ageing is a complex field with several subfields (cognitive development, personality development, social development) and topic areas (memory, learning, sensation and perception, psycholinguistics, social psychology, motor skills, psychometrics and developmental psychology) (see Baltes *et al.*, this volume). Disciplinary boundaries can be amorphous. Schroots (1996) observes that sometimes psychological theories of ageing are labeled as psychosocial; at other times they are conceived as bibehavioral, behavioral genetic or neuropsychological. Theories in the psychology of ageing seek to explain the multiple changes in individual behavior, across these domains, in the middle and later years of the lifespan. As with biological and sociological theories of ageing, there is no defining psychology-of-ageing theory.

#### Lifespan Development Theory

One of the most widely cited explanatory frameworks in the psychology of ageing, lifespan development theory conceptualizes ontogenetic development as biologically and socially constituted and as manifesting both developmental universals (homogeneity) and inter-individual variability (for example, differences in genetics and in social class). This perspective also proposes that the second half of life is characterized by significant individual differentiation, multidirectionality and intraindividual plasticity. Using the lifespan development perspective, Baltes and Smith (1999) identify three principles regulating the dynamics between biology and culture across the ontogenetic life span: first, evolutionary selection benefits decrease with age; second, the need for culture increases with age; and third, the efficacy of culture decreases with age. Their focus is on how these dynamics contribute to the

optimal expression of human development and the production of outcomes of adaptive fitness. Drawing from evolutionary theory and ontogenetic theories of learning, Baltes and Smith (1999) also postulate that a condition of loss, limitation or deficit could play a catalytic role for positive change.

#### Selective Optimization with Compensation Theory

Lifespan development theory has produced one overall theory to explain how individuals manage adaptive (successful) development in later life (Baltes and Smith, 1999). The theory identifies three fundamental mechanisms or strategies: selection, optimization and compensation (Baltes and Carstensen, 1996, 1999). This is a model of psychological and behavior adaptation where the central focus is on managing the dynamics between gains and losses as one ages. Selection refers to the increasing restriction of an individual's life to fewer domains of functioning because of age-related loss in the range of adaptive potential. Optimization reflects the idea that people engage in behaviors which augment or enrich their general reserves and maximize their chosen lifecourses. Like selection, compensation results from restriction of the range of adaptive potential, and becomes operative when specific behavioral capacities are lost or are reduced below a standard required for adequate functioning. This life-long process of selective optimization with compensation enables people to age successfully (Schroots, 1996).

#### Socioemotional Selectivity Theory

In this theory, Carstensen (1992) combines insights from developmental psychology – particularly the selective optimization with compensation model developed by Baltes and Baltes (1990) – with social exchange theory, to explain why the social exchange and interaction networks of older persons are reduced over time (a phenomenon which disengagement theory tried to explain). Through mechanisms of socioemotional selectivity, individuals reduce interactions with some people as they age while increasing emotional closeness with significant others, such as an adult child or an ageing sibling. Carstensen's (1992) theory provides