A Life Course Perspective on Aging

Multigenerational families provide a vivid illustration of the life course perspective: Aging is a gradual, lifelong process we all experience, not something that happens only in later life.
Learning Objectives

After reading Basic Concepts I, “A Life Course Perspective on Aging,” readers will:

1. Understand aging as a lifelong experience that is multifaceted and shaped by the contexts in which individuals live.
2. Be familiar with the central theories developed to understand and explain aging.
3. Be able to identify the main biological processes thought to regulate the aging process.
4. Appreciate the ways in which social construction and historical factors influence our understandings of age, aging, and later life.

When we think about “aging,” we often call to mind the image of an old person. But the process of aging actually begins much earlier in life. We cannot fully understand what old age means unless we understand it as part of the entire course of human life, and this approach is called the life course perspective (Fuller-Iglesias, Smith, & Antonucci, 2009; Settersten, 2003).

Often our image of old age is misleading. For example, try to conjure a mental image of a college student. Now imagine a recent retiree, a grandmother, and a first-time father. Hold those images in mind and then consider the following facts:

- Each year, half a million people over age 60 are studying on college campuses.
- Retirees from the military are typically in their 40s or 50s.
- In some inner-city neighborhoods, it is not at all unusual to meet a 35-year-old grandmother whose daughter is a pregnant teenager.
- It is no longer surprising for men in second marriages to become fathers for the first time at age 40 or 50.

Did some of those facts contradict the images you conjured, particularly images related to how old people are when they fill certain roles? What this exercise tells us is that roles such as “student,” “retiree,” “grandmother,” and “first-time father” are no longer necessarily linked to chronological age. Today, what we are learning about aging is forcing us to reexamine traditional ideas about what it means to grow old. Both biomedical science and social behavior among older adults depart from stereotypical images of what is “right” or “appropriate” for a specific age.

Although we tend to think of old age as a stage at the end of life, we recognize that it is shaped by a lifetime of experience. Conditions of living, such as social class, formal education, and occupation, are determinants of the individual’s experiences in old age. In other words, the last stage of life is the result of all the stages that come before it. The implication is that we no longer accept the quality of life in old age, or even the meaning of old age, as a matter of destiny. Rather, we view it as a matter of individual choice and social policy. Whether older people feel satisfaction and meaning may therefore depend on what they do and what social institutions do to give them new purpose in later life (Kohli, 2007).
Recent biological research demonstrates that indeed people do not suddenly become old at the time we have defined as old age. Aging is a gradual process, and many human capabilities survive long past the time when persons living in North America are considered of an age to retire. We are learning more every day about how and why people grow old, with the hope that we can make the last stage of life just as meaningful in its own way as earlier stages are.

**FOCUS ON PRACTICE**

What Should We Call Older Adults?

In a *New York Times* column “The New Old Age,” author Judith Graham asked: “What language do you think we should use to describe people who have advanced beyond the middle of their lives, and why?” She conducted informal interviews with several experts in the field to see what they had to say, and what she found speaks to the complexity of this issue. Senior citizen, elderly, older adult, older person, and elder are the most common terms used to refer to such a person. And there are arguments for and against using each of these terms. But what do persons who are in the later years of the life course call themselves? What do they want to be called? What might your future older self want to be called? These are important questions to ask in the context of the study of aging, as the focus of our research and practice is “people who have advanced beyond the middle years of their lives.”


**AGE IDENTIFICATION**

A central concept in any discussion of aging is the meaning of age itself. Age identification is partly an acknowledgment of chronological age or years since birth, but it is also a powerful social and psychological dimension of our lives.

From early childhood, we are socialized to think about what it means to “act your age,” a process described as age differentiation. We learn that different roles or behaviors are considered appropriate depending on whether we are a toddler or a teenager, an adult or an older person. Age grading refers to the way people are assigned different roles in society depending on their age (Streib & Bourg, 1984). Theorists of age stratification emphasize that a person’s position in the age structure affects behavior or attitudes.

People also come to define themselves, at least in part, in terms of their age. Consider when you started thinking of yourself as an adult instead of a child. Did you suddenly lose interest in some of the things that had once fascinated you because you considered them “childish” interests? Do you anticipate that when you become “middle aged” or “old” you will no longer be quite the same person you are now? Where do these ideas regarding what is “appropriate” at a particular age come from?

People within a culture have widely shared expectations about the “right time” for an event to happen. In Western society, for example, marriage at age 13 or retirement at age 30
would be considered “off time,” but graduation from college at 22 or retirement at age 65 would be “on time.” In other words, we all have a shared, socially constructed social clock concerning the appropriate age for life events (Helson, Mitchell, & Moane, 1984). However, the timetable for life events varies somewhat with social class and occupation; the career timetable of a medical student, for instance, is quite different from that of a migrant farmworker. In addition, age norms change over time. For example, Americans today tend to first marry in their mid- to late 20s, but a century ago, people that age (particularly women) would have been considered rather old for a first marriage.

Cultural understandings about what is “age appropriate” are part of a tradition going back to antiquity (Falkner & de Luce, 1992). In the comedy of ancient Rome, for example, older adults are often ridiculed for unseemly behavior, and hostility is expressed toward old men who take young lovers, a theme often repeated in medieval literature (Bertman, 1976).

What do we think is appropriate for “older people” in our culture today? For one answer, we can look to the images in our symbols, rituals, and myths. Storytellers and minstrels have expressed traditional societies’ concepts of age, but today in advanced industrial societies, those concepts are frequently transmitted and reinforced by TV and other mass media. As a rule, people on TV are young and good looking; older people are not visible on TV in anything like their proportion of the actual population (Davis & Davis, 1985; Peterson & Sautter, 2003). When they are depicted, they tend to be one step removed from the action. Even when advertisers try to appeal to the “gray market” of older consumers, they present idealized images of good health and vigorous activity. It seems sometimes that we are trying to ignore the inevitability of old age.

Beyond stereotypes, electronic and social media have a latent effect that is both more subtle and more pervasive. Media occupy a perpetual present dominated by novelty and momentary images (Meyrowitz, 1985). The effect is to weaken any sense of continuity over the life course and to undercut any authority or meaning for old age. Traditional cultures tend to prize their older members as links in a historical chain reaching back to the ancestors. But the contemporary culture of communication technology and social media tends to put all age groups on an equal footing (Gilleard & Higgs, 2000). The result is the “disappearance of childhood” and perhaps of old age too (Postman, 1982).

Mythic images of aging are of course oversimplified and based on fantasy. But sometimes they provide insight into the deeper meaning of the last stage of life. The Western view of old age tends to be ambivalent. In the Hebrew Bible, for instance, old age is venerated as a reward for righteous living: The Fifth Commandment to honor one’s parents contains a promise of long life. In contrast, there is a realistic dread of frailty and a fear that children may reject aged parents (Isenberg, 2000). The book of Job even questions the assumption that old age brings wisdom and recognizes that the wicked can live just as long as the righteous.

Greek and Roman views of late life also reflect profound ambivalence. In the first great work of Western literature, Homer’s Iliad, we find worship of youth in the figure of the young, strong warrior Achilles, but the aged Nestor is revered for his wisdom. In the philosophical tradition, Plato and Aristotle took opposing views on aging. For Plato, later life offered a possibility of rising above the body to attain insight into the eternal nature of reality. In contrast, Aristotle saw middle age as the summit of life, a time when creative intellectual powers were at their peak, with later life as a time of decline (Minois, 1989).

In our culture today, we explore similar issues, especially in feature-length films. The myths of aging range from the quest for rejuvenation through the fountain of youth (Cocoon)
to the psychological self-fulfillment of the aged hero returning home (Wild Strawberries or The Trip to Bountiful). At its best, film can present images of the older person as a genuine hero triumphing over circumstance (Driving Miss Daisy or The World's Fastest Indian) or living later life with zest and openness to new adventures (The Best Exotic Marigold Hotel). The images of old age purveyed by mass media have a profound effect on attitudes toward aging in all industrialized societies (Featherstone & Wernick, 1995).

The Stages of Life

Since the dawn of civilization, human beings have recognized a progression through the life course, from infancy through old age. The overall progression appears universal, yet the time between birth and death has been organized in distinctive ways by different societies (Boyle & Morriss, 1987). The simplest division was into two stages: childhood and adulthood. But as societies become more complex and as longevity increases, they tend to develop a greater number of life stages.

Greek and Roman ideas were influential in shaping how we think today about aging and the life course. One of the greatest Greek tragedies is the three-part Oedipus cycle, the last play written when its author, Sophocles, was nearly 90 years old. In this story, Oedipus becomes king because he solves the famous riddle of the Sphinx: “What creature walks on four legs in the morning, two legs at noon, and three legs in the afternoon?” The answer is the human being at successive life stages: infancy (crawling on four legs), adulthood (walking on two), and old age (using a cane, a third leg, to support the other two). The Greek medical writer Hippocrates described four stages of life, or “ages,” corresponding to the four seasons of the year. Similar ideas were put forward by the Roman physician Galen and by the astronomer Ptolemy. Ptolemy developed an idea of seven stages of life, which had great influence during the Middle Ages.

During the Middle Ages, Christian civilization balanced the image of multiple stages with the metaphor of life as a journey or spiritual pilgrimage. From that standpoint, no single stage of life would be viewed as superior to another. Just as the natural life cycle was oriented by the recurrent cycle of the seasons, so the individual soul would be oriented toward the hope of an afterlife (Burrows, 1986). The human life course as both cycle and journey was thereby endowed with transcendent meaning and wholeness (Cole, 1992).

With the coming of the Reformation and the Renaissance, ideas about the life course changed into forms we recognize as modern. Writing in this epoch, Shakespeare expressed the traditional idea of the “Seven Ages of Man”:

All the world’s a stage
And all the men and women merely players,
They have their exits and entrances;
And one man in his time plays many parts,
His acts being seven ages.

(As You Like It, Act II, Scene 7)
To Shakespeare, the periods of life were merely “roles” acted out on the stage of society, and the role losses of old age appeared as the final act of the play. Thus, a theatrical metaphor replaced the ideal of a cosmic cycle or a spiritual journey.

At the dawn of modern times, a generation after Shakespeare, drawings and engravings began to depict the stages of life in a new way. The traditional image of a completed circle became an image of a rising and falling staircase, where midlife occupied the peak of power. That image promoted the idea of life as a “career,” in which individuals could exercise control over later life through, for example, extended education, good health care, and capital accumulated through savings during earlier stages.

During the 16th and 17th centuries, the stages of life began to be demarcated in ways we recognize today. Childhood became a period of life in its own right, separate from adulthood and old age (Aries, 1962). By the 20th century, as the practice of retirement became well established, old age became a distinct phase as well. Some sociologists argue that such stages reflect patterns of socialization tied to dominant institutions such as the school or workplace (Dannefer, 1984; Kohli, 2007); in other words, retirement exists as a separate phase of life partly because society needs to make way in the workplace for younger workers.

Today, a person will spend, on average, at least one fourth or even one third of adulthood in retirement (Kohli, 1987). Partly as a consequence, distinctions are made between the young-old (ages 65–74), the old-old (ages 75–84), and now the oldest-old (ages 85 and over). Demarcating a stage of life following the working years is more important to us than ever, yet we have simultaneously become less certain about what it means to grow older or to “act your age” at any point in life. Issues around the potential for new forms of self-expression and contributions to society in later life are discussed later in this book.

**THE LIFE COURSE AND AGING**

The study of aging as a historical phenomenon reveals a variety of views about the stages of life, about when old age begins, and about what it involves (Troyansky, 2015). When we read about aging in the Bible or in works by such writers as Shakespeare and Cicero, we might imagine that “old age” is a fixed stage of life, always part of the natural pattern of things, such as birth and death. But now, at the beginning of the 21st century, it has become clear that human aging is far more ambiguous than might have been imagined in earlier epochs. We can most fruitfully understand old age not as a separate period of life, but as part of the total human life course from birth to death.

Increasingly, aging is seen from this life course perspective (Markson & Hollis-Sawyer, 2000; Mortimer & Shanahan, 2003). In other words, we look at old age as one phase of the entire course of life and the result of influences that came from earlier periods than old age. We distinguish here between the span of a lifetime, which is the total number of years we live, and the course of life, which refers to the meaningful patterns seen in the passing of time. Gerontology is enriched and broadened by the life course perspective. Instead of merely describing the limited characteristics of old age, which are tied primarily to biophysical changes, we shift the framework to include all phases of life, from childhood, adolescence, and adulthood right up through the last period of old age. We also view the complex interaction of age, social status, cohort effects, and history; the contexts in which aging occurs; and the timing of events and transitions in individuals’ lives (Elder & Johnson, 2003;
Riley & Riley, 1994). **Longitudinal research**, which follows individuals over long periods of time, is a key methodological design to reinforce the life course perspective because such an approach allows researchers to view developmental changes as they unfold over time within the same people.

The life course perspective insists that, to make sense of old age, we need to understand the entire life history. As people move through the life course, they are socialized to act in ways appropriate to successive social roles: student, parent, worker, retiree, and so on. But these structural factors only set boundaries; the meaning and experience of aging vary significantly by culture and are influenced by powerful factors such as gender, socioeconomic status (SES), and ethnicity. There is also room for individual variety and freedom of choice as human beings interpret age-related roles in distinctive ways.

**Life Transitions**

A life course perspective recognizes markers of the passage through life: important life events or transition points, such as graduation from school, first job, marriage, and retirement. In some respects, life transitions have become more predictable than was true earlier in history. For example, today people commonly die in old age, whereas in an earlier era, death was not unusual at any time of life. Thus, an event such as the death of a spouse or a parent is now a more predictable marker of later adulthood than it once was.

At the same time, however, certain transitions are less often tied to a particular age or stage of life than they might have been in earlier times. For example, during the 1950s and 1960s, college students were expected to graduate at the age of about 21. But today’s college students graduate at any age from the early 20s to the 30s and beyond, and news photos of a gray-haired grandparent wearing a cap and gown are no longer uncommon. Graduation may occur either before marriage, sometime during childbearing age, or well after. Whatever the age or circumstance of the graduate, however, the transition still marks a major role change.

Special events that mark the transition from one role to another—such as a bar mitzvah, confirmation, graduation ceremony, or wedding—are known as **rites of passage** (Van Gennep, 1960). These rituals reinforce shared norms about the meaning of major life events. Some traditional rites of passage, such as the sequestration of adolescents prior to induction into adult society, are no longer commonly observed in our society. However, we continue to observe a great many, including markers of old-age transitions such as retirement parties, 50th wedding anniversaries, and funerals.

How are we to understand the significance of life transitions? As the human life course became an object for scientific study, the stages of life were no longer seen as part of a cosmic order of meaning (Cole & Gadow, 1986; Katz, 1996). Instead, psychology tried to explain change over the course of life as a natural process unfolding in individuals as they travel through time. The result was the rise of a new field: life span development psychology. Erik Erikson, an influential developmental psychologist, depicted the life course as a series of psychological tasks, each requiring the person to resolve conflicting tendencies (Erikson, 1963). For middle age, Erikson posited a conflict between stagnation and generativity: roughly, being trapped by old habits versus going beyond self-absorption to nurture the next generation (Kotre, 1984). For old age, Erikson saw a conflict between ego integrity and despair—that is, accepting one’s life versus feeling hopeless and depressed about the limited time remaining.
Related to Erikson’s basic ideas has been the attention on psychological changes during midlife transition, a time when people in middle age confront facts about mortality and the limits of youthful dreams (Jacques, 1965). Psychologist Daniel Levinson (1978) has described life transitions characteristically associated with ages such as 30, 40, and 50. These are times when people at midlife reassess themselves and ask, “Where have I come from, and where am I going?” Many of these psychological “passages” or changes of adult life have been popularized by journalists. However, doubts have been raised about just how universal such “passages” and age-related transitions actually are (Braun & Sweet, 1984). Midlife, just like old age, turns out to be a time of life that is different for different people (Brim, Ryff, & Kessler, 2004).

In contrast, many theorists today see personality in terms of continuity or flexible adaptation over the life course. These theories are more optimistic than those that see old age as a time of loss resulting in either passive adjustment or dependency and depression. Today, most gerontologists believe that people bring positive resources to aging, including a personal sense of meaning, which in turn can promote resilience or adaptation to losses in later life. Empirical studies show that people generally cope well with life transitions such as retirement, widowhood, and the health problems of age. When problems come, styles of coping tend to remain intact, and people adapt. Because of this capacity for adaptation, old age is not usually an unhappy time.

Nevertheless, many behavioral or psychological problems come about because of the difficulties of preparing for transitions without the help of widely observed rituals for rites of passage and institutional structures. For example, the transition from adolescence to adulthood is typically marked by events such as marriage, parenthood, and employment (Hogan & Astone, 1986). Although schools, job orientation, and marriage counseling help people make transitions to adulthood, the situation is different in later life. Few social institutions exist to help people with the transitions in the second half of life.

In addition, we currently have no consensus about how people are supposed to act when in later life they confront events traditionally linked to younger ages (Chudakoff, 1989). For example, how are older widows supposed to go about dating? How much help should older parents expect from their children who are themselves at the point of retirement? When confronted with a 70-year-old newlywed or a 60-year-old “child,” we recognize that norms are unsettled when it comes to transitions in later adulthood (Featherstone & Hepworth, 1993).

**Traditional Theories of Aging**

**Modernization Theory**

How do we make sense of the contradictory images of aging found in modern culture? One influential account that tries to do so is the modernization theory of aging (Cockerham, 1997). According to this theory, the status of older adults declines as societies become more modern. The status of old age was low in hunting-and-gathering societies, but it rose dramatically in stable agricultural societies, where older people controlled the land. With the coming of industrialization, it is said, modern societies have tended to devalue older people. The modernization theory of aging suggests that the role and status of older adults are inversely related to technological progress. Factors such as
urbanization and social mobility tend to disperse families, whereas technological change 
tends to devalue the wisdom or life experience of elders, leading to a loss of status and 
power (Cowgill, 1986). Modernization may thus be related to the declining status of 
older people in different societies (Clark, 1992–1993).

This account strikes a responsive chord because it echoes the “golden age” picture of 
later life, which depicts the old as honored in preindustrial societies (Stearns, 1982), a ver-
sion of the “world-we-have-lost” syndrome (Laslett, 1965/1971). But imagining that elders 
were all well treated in “the good old days” is a big mistake, and modernization theory has 
been widely criticized (Haber, 1983; Quadagno, 1982). As we have seen already, in primi-
tive, ancient, and medieval societies, older adults were depicted and treated in contradictory 
ways: sometimes abandoned, sometimes granted power. The history of old age includes 
variations according to race, gender, social class, and culture. Modernization has clearly 
reshaped the meaning of old age, yet the image and reality of old age have never entirely 
coincided, as the cross-cultural study of aging confirms (Holmes & Holmes, 1995).

At the core of the history of old age, there has always been ambivalence: both resentment 
and guilt, both honor and oppression. The psychological basis for ambivalence is under-
standable. Why shouldn’t adults feel guilt and dread at the sight of vulnerable old age 
stretching before them? Why shouldn’t we harbor ambivalent feelings toward those who 
accumulate power and wealth over a long lifetime? We see the same ambivalence today. 
Older people as a group receive many benefits from the government based on their age, yet 
they are sometimes depicted, perhaps unfairly, as selfish or unconcerned with other gener-
ations. The truth is different from and more complex than what popular images convey.

A decisive change with industrialization was growing rationalization and bureaucratiza-
tion of the life course—a greater rigidity among the “three boxes of life” of childhood, 
adulthood, and old age (Bolles, 1981). At the same time, as we have seen, mass media and 
rapid flux in cultural values have begun to erode any special qualities linked to distinctive 
life stages. With rising longevity, more people are living to old age, and older adults as a 
group are becoming a larger proportion of the total population. The power of older people 
has grown by sheer numbers. Meanwhile, the achievement of old age has been devalued 
simply by becoming more familiar. Perhaps most important, old age has been stripped of 
any clear or agreed-on meaning because the entire life course has changed in ways that will 
have unpredictable effects on what aging may be in the 21st century.

There is a big problem with constructing an overall theory of aging for social gerontology. 
The problem can be compared with a parallel challenge in the biology of aging: Is aging truly 
something inevitable (Olshansky & Carnes, 2002)? Evolutionary biology begins with a par-
adox: Why should aging appear at all? From the standpoint of survival of the fittest, there 
seems to be no reason for organisms to live past the age of reproduction. Old age, in short, 
should not exist. Yet human beings do live long past the period of fertility; indeed, human 
beings are among the longest-living mammals on earth.

Thus, the meaning of old age is a problem even for biology, and biologists have put 
forward a whole variety of theories to explain it: somatic mutation theory, error catastrope 
theory, autoimmune theory, and so on. No single theory has proved decisive, but all have 
stimulated research enabling us to better understand the biology of aging. Similarly, 
the changing conditions and meanings of old age have provoked a variety of theories in 
social gerontology. Just as with the biology of aging, there is no clear agreement that a 
single theory is best. But some early theories of aging are still worth closer examination
because they demonstrate just how deeply held values affect all theories of aging and how these theories are related to enduring questions about the meaning of old age: disengagement theory, activity theory, and continuity theory.

**URBAN LEGENDS OF AGING**

“Respect for elders was higher in the past.”

This is a common myth, debunked by historian Peter Laslett 40 years ago in his classic *The World We Have Lost* (1965/1971). Maybe there’s a reason why the Bible contains the Fifth Commandment, “Honor thy father and thy mother.” It’s the only Commandment that carries a reward for following it.

**Disengagement Theory**

One of the earliest comprehensive attempts to explain the position of old age in modern society is the disengagement theory of aging (Cumming & Henry, 1961). The disengagement theory looks at old age as a time when both the older person and society engage in

Becoming a grandparent can be an important life course transition.
mutual separation, as in the case of retirement from work. From the perspective of this theory, this process of disengagement is understood to be a natural and normal tendency reflecting a basic biological rhythm of life. In other words, the process of disengagement is assumed to be “functional,” serving both society and the individual. The disengagement theory is related to modernization theory, which posited that the status of older adults must decline as society became more modern and efficient, so it was natural for older adults to disengage.

Disengagement theory grew out of an extensive body of research known as the Kansas City Study of Adult Life, which was a 10-year longitudinal study of the transition from middle age to old age (Williams & Wirths, 1965). The idea of disengagement presented itself not only as an empirical account based on those findings but also as a theory to explain why the facts turned out the way they have: For example, why has the practice of retirement spread in modern societies? But gerontologists have criticized the theory of disengagement (Hochschild, 1975); some have pointed out that the theory evolved during the 1950s and reflected social conditions quite different from those of today.

Although the original disengagement theory is no longer often accepted, the pattern of disengagement does describe some behavior of some older people—for example, the popularity of early retirement. But there are growing numbers of older people whose behavior cannot be well described as withdrawal or disengagement from society. Disengagement as a global pattern of behavior can hardly be called natural or inevitable.

Another problem arises when we describe disengagement as “functional,” which is a synonym for “useful.” The same process that might be functional or useful for an organization—for instance, compulsory retirement at a predictable age—may not be at all useful for individuals, who might prefer flexible retirement or who may need to continue working because of economic necessity. In fact, it was widespread resentment at being forced to retire at a fixed age that led Congress to end mandatory retirement for most jobs in 1986.

There is also a lack of clarity about what behavior is actually being described by the concept of disengagement. For example, individuals might partially withdraw from one set of activities, such as those in the workplace, to spend more time on other activities, such as family and leisure pursuits; total withdrawal is quite uncommon. Although advancing age at some point is usually accompanied by losses in health, physical ability, and social networks, those who age most “successfully” adjust to and compensate for these losses by putting the changes of later life into a wider perspective, an attitude sometimes described as “wisdom.” Later life today, at least for those who remain healthy, is often filled with a rich range of activities. The Kansas City Study investigators also found that with advancing age, there is, in fact, a trend toward greater interiority, meaning increased attention to the inner psychological world (Neugarten, 1964). Individuals appear to reach a peak of interest in activity and achievement in their middle years. As they anticipate later life, they may become more detached, more inclined to “ego transcendence,” as if in anticipation of predictable role losses in later life (Tornstam, 2005).

Understood in this way, “disengagement” need not necessarily describe the outward behavior of individuals, but may refer to an inner attitude toward life. Furthermore, there is no reason to assume that all older people are inclined toward even a psychological stance of disengagement; some may have ambivalence about their own activities and attachments. Perhaps the greatest example in literature of that ambivalence is the tragic fate of Shakespeare’s King Lear, who tries to give up his role as king but is not quite able to withdraw from power and prestige. As a result, he brings disaster on his family and himself.
King Lear’s example suggests that disengagement depends on having some sense of personal meaning that is distinct from the office one holds. The ability to achieve some degree of detachment, at any age, is a matter of wide individual difference. In later life, disengagement is the preferred style for some, whereas continued activity remains attractive for others.

**Activity and Continuity Theories of Aging**

At the opposite pole from the disengagement theory is the activity theory of aging, which argues that the more active people are, the more likely they are to be satisfied with life. Activity theory assumes that how we think of ourselves is based on the roles or activities in which we engage: We are what we do, it might be said. The activity theory recognizes that most people in later life continue with the roles and life activities established earlier because they continue to have the same needs and values.

The continuity theory of aging makes a similar point, noting that as people grow older they are inclined to maintain as much as they can the same habits, personality, and style of life they developed in earlier years (Costa & McCrae, 1990). According to both the activity theory and the continuity theory, any decreases in social interaction are explained better by poor health or disability than by some functional need of society to “disengage” older people from their previous roles (Havighurst, Neugarten, & Tobin, 1968).

A large body of research seems to support some aspects of activity theory. Continued exercise, social engagement, and productive roles all seem to contribute to mental health and life satisfaction. But other studies indicate that informal activity or even merely perceived social integration may be more important in promoting subjective well-being. In other words, our attitudes and expectations about activity or detachment may be more important than our formal participation patterns (Longino & Kart, 1982). In fact, what counts as “activity” depends partly on how we look at the meaning of things, not on external behavior alone. This point is emphasized by those who adopt a phenomenological approach to the interpretation of aging.

If retirement or age limitations make actual participation impossible, the activity theory suggests that people will find substitutes for roles or activities they have to give up (Atchley, 1985). A great many social activities encouraged by senior centers or long-term-care facilities are inspired by an assumption that if older people are active and involved, then all will be well (Katz, 2000). This “busy ethic” and its hostility to retirement are expressed in similar terms, and the sentiment seems widely shared (Ekerdt, 1986). For instance, former *Cosmopolitan* magazine editor Helen Gurley Brown (1993), in a self-help book for older women (*The Late Show*), wrote that work is “our chloroform . . . our life . . . our freedom from pain . . . supplier of esteem.” Along the same lines, essayist Malcolm Cowley (1980), in his book *The View From 80*, also expressed the ideal of the activity theory of aging when he wrote: “Perhaps in the future our active lives may be lengthened almost to the end of our days on earth; that is the most we can hope for.”

But such active involvement may be more feasible for the young-old than for the old-old, and certainly there are differences between individuals as well. Biological limitations cannot easily be overcome by voluntary effort. The ideal of active aging seems more like a prolongation of the values of middle age than something special or positive about the last stage of life. Finally, despite progress in recent years, society still places many obstacles to social engagement in old age. For example, remarriage is more difficult for older women...
than for older men because the proportion of older women is larger than the proportion of older men in the population at every age after 65, and in the labor market, age discrimination is a real barrier preventing middle-aged and older people from taking up a second career. According to the U.S. Department of Labor, anyone over age 40 is officially an “older worker.” A more realistic recognition of these facts might allow adults to live out their years with greater dignity instead of trying to stay forever young.

**Influences on the Life Course**

Every theory of aging has its limits: None of them fully explains the variety of ways in which individuals experience old age, and many theories seem to reflect the social values during particular historical times in uncritical ways—for example, by holding up either activity or disengagement as the ideal goal or social norm for later life. The advantage of thinking in terms of age transitions throughout the life course is that we can see adult development as more open ended than people have tended to see it in the past. As a result, the meaning of old age is less fixed, and the choices are more varied. We can contrast this wider social freedom with stereotypes that still persist about human development in the second half of life.

The most widely pervasive view of adulthood is not based on positive development at all, but assumes continuous deterioration and decline. Consider the message on birthday cards: Aging is a disaster; after youth, it’s all downhill (Demos & Jache, 1981). This pessimistic, age-as-decline model gives priority to biological factors and is the basis for the widely shared prejudice called ageism (Applewhite, 2016; Nelson, 2004). We are better off appreciating how social class, life history, and social institutions and policies create variation in the experience of aging. Although aging is a negative experience for some people, for others, it opens the door to meaningful new roles and activities.

**Social Class and Life History**

Americans often don’t like to talk about social class, but it is impossible to understand the heterogeneity of later life experience without recognizing the importance of class and inequality. The 21st century so far has seen an extensive increase in inequality, as economists on all sides have recognized (Stiglitz, 2015). The “end game” of our final years is shaped by the years that came before (Abramson, 2015). Increasing inequality among older people, especially those generations now approaching old age, suggests that we will see greater financial stress for poor older adults in years to come (Crystal, Shea, & Reyes, 2016).

We know that health challenges arise in later life. But the causes come much earlier. Social class has a lifelong influence on health status later in life, as demonstrated by the important Whitehall study in the United Kingdom (Hemingway et al., 1997). Early life events have long-lasting effects. The basic rule of accumulated advantage or disadvantage is that “the rich get richer and the poor get poorer.” For example, early completion of college and entry into a favorable occupation is converted during middle age into increased wealth in the form of home ownership and pension vesting (Henretta & Campbell, 1976). Women who enter the labor force at the beginning of childbearing usually have to accept career interruptions and tend to have diminished income later in life; thus, gender differences in old-age poverty are explainable partly as the result of life course choices made decades earlier.
History also plays a profound role in shaping lives. For example, a large historical event like the Great Depression can cause a dramatic and unexpected drop in income and status for many people (Elder, 1974). The cohort who were in their prime working years at the time were typically worse off financially in old age than their children, the current generation of retirees. This recognition of the influence of historical events has stimulated new interest in using interviews and oral history to understand how social forces affect people’s lives (Cole & Knowles, 2001).

Unpredictable or non-normative life events, such as getting divorced or losing a job, also have a significant effect on the life course. Longitudinal studies show that a significant number of people will experience an unexpected but significant drop in income due to such non-normative life events, such as illness or a financial reversal (Duncan, 1988). Research has also shown that negative life events such as widowhood or job loss can cause a dramatic downturn in personal health and can profoundly affect an individual’s financial status during retirement. Such events induce a psychosomatic response to stress, and negative life events therefore become risk factors that predict the onset of illness (Holmes & Rahe, 1967). Yet the impact of life events is not a simple process. The same stressful life event—for example, becoming a widow—may have different effects on different people. The impact depends on whether the event was expected or anticipated and also on what kind of personal or family resources are available. Support from family and friends can help older people cope with stress and maintain self-esteem.

**Social Institutions and Policies**

The structure of the life course in modern times has been shaped by the power of the educational system and the workplace. In the 19th century, the rise of public schools began to lengthen the period of formal education and introduce credential requirements for most types of work. The United States, a self-consciously “modern” nation, took a lead in these progressive developments (Achenbaum, 1978; Fischer, 1977). Early in the 20th century, adolescence was recognized as a distinct phase of life and became more prolonged, whereas middle age became an important period of the life course (Neugarten, 1968).

The industrial revolution brought far-reaching demographic and economic changes, as well as new cultural ideas about age-appropriate behavior (Hareven & Adams, 1982). Bureaucratic institutions, from local school systems to the Social Security Administration, always favor rule-governed, predictable procedures, so it is not surprising that with the rise of bureaucracy came an emphasis on defining life stages by chronological age. With falling birthrates in the 20th century, the modernized life course became established.

Today, social institutions and policies still define transitions throughout the life course. The educational system defines the transition from youth to adulthood, just as retirement defines the transition from middle age to old age.

Like progression through the school system, the movement into retirement seems more orderly than midlife transitions because employment policies and pension coverage closely regulate retirement. But the timing of retirement today is becoming less predictable than in the past because of turbulence in the U.S. labor market and because of the disappearance of mandatory retirement. Economic pressures force some to retire early, whereas others are encouraged to go back to school or take on part-time employment. The result is that previously clear boundaries—“student,” “retiree,” and so on—are becoming blurred.
If societal forces shape the life course, then it is reasonable to think that some of the negative features of old age may be due, at least in part, to institutional patterns that could be changed. A good example is the pattern known as learned helplessness, or dependency and depression reinforced by the external environment (Peterson, Maier, & Seligman, 1993). It has been suggested that some of the disengagement often seen in old age is not inevitable, but comes from social policies and from practices in institutions that care for dependent older adults (Baltes & Baltes, 1986). For instance, nursing home residents often suffer a diminished locus of control, in which they lose the ability to control such basic matters as bedtime and meal choices. When residents feel manipulated by forces beyond their personal control, they may become more withdrawn, fail to comply with medical treatment, and become fatalistic and depressed. They may also experience “excess disability,” or more disability than necessary because the environment in which they live is either too challenging or not challenging enough in response to their needs and abilities (Drossel & Fisher, 2006).

Without interventions to reduce dependency, older adults in ill health all too commonly lose hope and self-esteem as they experience declining control (Rodin, Timko, & Harris, 1985). But this downward spiral is not inevitable. The institutional structures responsible for such dependency can be changed. In a now-classic experiment with nursing home residents, psychologists offered small opportunities to increase locus of control—for example, allowing residents to choose activities or giving them responsibility for taking care of plants. The result was a dramatic improvement in morale and a decline in mortality rates (Rodin & Langer, 1980).

**AGING IN THE 21ST CENTURY**

Today, in the early 21st century, we no longer have a shared map for the course of life. The timing of major life events has become less and less predictable at all levels of society. In upper socioeconomic groups, for example, a woman with a graduate degree and career responsibilities may delay having a first child until age 35 or later; in other parts of society, where teenage pregnancy rates have soared, a 35-year-old woman may well be a grandmother. We are no longer so surprised when a 60-year-old retires from one career and takes up a new one, perhaps in consulting if the retiree has been an executive or a professional, or in small-electronics repair if the retiree has been a technician. In many other ways as well, the life course is becoming more “deinstitutionalized,” more fragmented, disorderly, and unpredictable (Held, 1986; Hockey & James, 2003). Major events of life are no longer parts of what are often considered to be predictable or natural patterns.

Although the rigidity of the linear life plan has failed to keep up with new demographic realities, it did offer a degree of security. In the new, “postindustrial” life course, we are increasingly each on our own. Familiar social institutions such as marriage and employment can no longer be counted on for security throughout adulthood, and therefore the last stage of life also becomes less predictable.

Society has not yet come to terms with the meaning of “aging” in such unpredictable times. Optimists believe that medical science could permit us to delay aging-related decline until later and later in life. Yet economic forces seem to move in the opposite direction. In science and engineering, knowledge becomes obsolete within 5 or 10 years, so life experience counts for less than exposure to the latest technological advances. On the one hand,
biology promises to postpone aging, but on the other hand, social forces such as age discrimination make the impact of aging on individuals more important than ever.

**Time and the Life Course**

Expectations about time remain a major element in how we think about aging and the life course today (Hendricks & Peters, 1986). Just as industrialization imposed time schedules on workers to improve efficiency in the workplace, so the life course became “scheduled” by differentiated life stages. The factory and the assembly line had their parallel in the linear life plan. But that mode of organization has become outdated. In a postindustrial “information economy,” the pace of life is speeding up, and flexible modes of production require a more flexible life course. The volatile economy demands multiple job changes and thereby makes every career unpredictable. Individuals at any age may be called on again and again to rewrite their biographies, although reinventing oneself gets more difficult as the résumé gets longer.

Another example of our contemporary time orientation is the prolonged period of life devoted to education. The knowledge explosion and pressure for specialization put a premium on added years of schooling, and the job market has fewer places for those without advanced skills. Our postindustrial economy is increasingly based on “knowledge industries,” where emerging fields, such as computer software and biotechnology, favor cognitive flexibility.

The trend toward cognitive flexibility also poses a distinct challenge for an aging society. Middle-aged and older workers, who are perceived to be less creative than younger workers, may be at a disadvantage in the fast-moving labor market. For instance, in some branches of media or advertising, employees are viewed as “old” if they are over the age of 40. But if retirement, the defining institutional feature of old age, is to remain economically feasible, then we will have to develop ways to keep people working as long as they can remain productive. Retraining for displaced workers of whatever age is likely to become an imperative in the future. These trends underscore the importance of adaptability and lifelong learning.

Parenthood offers still another example of our changing time orientation. Demographers estimate that, in the 1930s, 90% of a woman’s years after marriage were spent raising dependent children (Gee, 1987). By the 1950s, that proportion had dropped to 40%, giving rise to what some observers have dubbed the “empty nest syndrome”—an extended postparental period of life that occurs after children have grown up and left home (Lowenthal & Chiriboga, 1972). Because of women’s roles and responsibilities in the family, their later lives typically have greater variability than do men’s (Rindfuss, Swicegood, & Rosenfeld, 1987). Gender roles are increasingly shaped by the power of culture (Gullette, 2004).

Another change has been the postponement of childbearing. People often spend more of their lives in their roles as adult children of aging parents than as parents themselves (Brubaker, 1990). But what does it mean, in psychological and social terms, when a “child” is 50 or 60 years old or even older? Even to ask these questions shows that the human life course has changed in ways that are still not fully recognized.

**The Moral Economy of the Life Course**

The changing structure of the life course has profound implications for obligations and expectations across the life course. We can speak about these expectations in terms of the
“moral economy” of the life course (Minkler & Estes, 1998). The moral economy embodies expectations of what is fair or right: Stay in school and you’ll get a good job, become a senior citizen and you’ll have a right to retirement income, and so on. In other words, the assumption is that moving through the life course means following the rules and getting what you deserve. But the old moral economy, with its characteristic distribution of work and leisure according to chronological age, is losing its power, and we do not have anything as well defined to replace it.

To overcome limitations of the old map of life, we may need to develop bolder ideas about the positive social contributions that can be made by the old; we also need to think more deeply about the meaning of life’s final stage. Cicero (106–43 BC), author of the classic essay “On Old Age,” offered a realistic account of both the gains and the losses of aging. Cicero was inspired by the hope that the mind can prevail over the body. Thus, he viewed old age not exclusively as a time of decline or loss but also as an opportunity for cultivating compensatory wisdom. Cicero, in fact, was one of the first and most eloquent proponents of the ideal of “successful aging” (Baltes & Baltes, 1990).

Despite Cicero’s wise words about later life, we should not sentimentalize the status of old age in the past. But at least in the past, those who had lived a full life span could take for granted shared values and shared experience across the generations simply because the pace of change was slower. With the rapid social changes of the 21st century, we can too easily stereotype those who are older as people who are “behind the times” or lacking in creativity and wisdom.

One role well suited to older people in such an environment might be mentoring, or guiding the next generation in the capacity of teacher, coach, or counselor (Neikrug, 2000). This idea is attractive for several reasons: It encourages intergenerational relationships, and it takes advantage of generativity and wisdom, the virtues to be cultivated in the second half of life, according to Erikson. Older adults who are serving as mentors, however, still have to develop up-to-date skills and attitudes if their advice is to be respected by younger workers.

There appears to be a mismatch between the flexibility of the individual aging experience and the rigidity of outdated social attitudes, such as age discrimination and retirement practices (Riley & Riley, 1994). Instead of treating the life course as fixed, in the future we may come to see later life as a period more susceptible to intervention and improvement. Instead of viewing aging only as decline, it is possible to create a new model of aging as a shared lifelong process and of later life as a period of new opportunities. The goal would be to move from an age-differentiated society to an age-integrated society, where opportunities in education, work, and leisure are open to people of every age and across the entire life course.

**THE BIOLOGY OF AGING**

The life course perspective on aging offers an optimistic view of possibilities open to older people. That view is sensible, given the prolongation of vigor among older people in our times. But will changes in aging go even further in the future? For instance, the film *Cocoon* (1985) tells the story of older adults who gain access to a drug that can reverse the process of aging and make them young again. In the movie, the audience has the experience of seeing famous older actors Don Ameche and Hume Cronyn grow young before their eyes. The film, of course, is science fiction. But it’s only the latest version of a recurrent hope as
old as humanity: the search for the fountain of youth (Olshansky & Carnes, 2002). Sometimes the dream takes the shape of the “hyperborean theme”: a conviction that people in a remote part of the earth—for example, the Caucasus or the mountains of Peru—live extremely long lives. James Hilton’s novel Lost Horizon (1933) popularized the idea of an imaginary place called “Shangri-La,” which harbored the secret of longevity, and a movie based on the book had wide appeal.

But researchers have never found groups of people who live beyond the maximum life span. Scientists who have diligently examined the facts have failed to find any place on earth where people live beyond a human life span of around 120 years. Death remains a biological inevitability, and so far, we have not learned how to overcome the physiological limits that we know as aging. Could it be different? Perhaps, but it hasn’t happened yet.

The biology of aging remains one of the great unsolved mysteries of science. Scientists ask how the same process that leads to decline and death can be intrinsic to life. From an evolutionary point of view, aging poses a puzzle: How can a process of physiological decline—detrimental to the survival of organisms—actually be preserved by natural selection (Hayflick, 1996)? Biologists who study how aging takes place have accumulated a large body of knowledge, and experiments with lower organisms have proved that genetic and environmental manipulations can change life expectancy and maximum life span. Thus, scientists are now beginning to confront the question of whether it is possible to postpone, or even reverse, the process of biological aging (Scientific American Editors, 2013).

The New Science of Longevity

Normal aging is not a disease but instead denotes a series of progressive changes associated with increasing risk of mortality. But not all age-related changes involve mortality. For example, hair often turns gray with advancing age, but hair color does not diminish survival prospects. By contrast, other progressive changes lead to losses in functional capacity or the ability of biological structures to perform their proper jobs. For example, as blood vessels age, they tend to lose elasticity, a tendency known as arteriosclerosis or hardening of the arteries. Over time, arteriosclerosis can increase the likelihood of blockage and therefore the risk of damage that we describe as stroke or heart attack.

At the biological level, aging seems to result from changes taking place at the level of molecules, cells, tissues, and the whole organism. How do we recognize such changes? The simplest way to study the effects of aging at these levels is to compare younger and older organisms and note the differences. Such studies employ a cross-sectional methodology; that is, they look at physical function of people at different chronological ages, but at a single point in time. The general conclusion from such studies of human beings suggests that most physiological functions decline after age 30, with some individual variations.

A purely cross-sectional design is not necessarily the best way, however, to measure the changes presumably brought about by aging. For one thing, it is difficult to be sure we have taken into account all of the possible variables that might contribute to changes with age in the organism. Thus, a contrasting methodological approach, a longitudinal design, is sometimes used. The same individuals are followed over a long period to measure changes in physical function, or other abilities, at different ages. This approach also has problems. For instance, with human beings, we need to consider the influences of a changing external environment.
Furthermore, carrying out longitudinal studies is expensive and not easy when the subject is a long-lived organism like a human being. But the results can be of great importance.

One of the most important studies of this kind has been the Baltimore Longitudinal Study of Aging, sponsored by the National Institute on Aging (Shock et al., 1984). In the Baltimore study, scientists looked at 24 distinct physiological functions (Sprott & Roth, 1992). These functions are called biomarkers, or biological indicators that can identify features of the basic process of aging (Shock, 1962). Some of the most commonly measured biomarkers are diastolic and systolic blood pressure and auditory or visual acuity. Others include the ability of the kidney to excrete urine and the behavior of the immune system. All of these biomarkers tend to decline with chronological age (Warner, 2004), but the rate and amount of decline differ between individuals. The search for biomarkers continues, but biologists have failed to find a “magic clock” that would give us definitive measurement of the rate of aging in individuals (Carnes, 2016).

Many age-related changes in physical function have already been documented, some of them familiar. For instance, with increased age, height tends to diminish while weight increases; hair becomes thinner, and skin tends to wrinkle. Another change is the loss in vital capacity, or the maximum breathing capacity of the lungs. With aging, both respiratory and kidney function decrease. But this decline chiefy results in a loss of reserve capacity, or the ability of the body to recover from assaults and withstand peak-load demands, as during physical exertion. Diminished reserve capacity may not have any discernible impact on the normal activities of daily living. For instance, not having reserves to run a marathon race is probably irrelevant to most activities of daily life.

A key finding from studies of biological aging is that chronological age alone is not a good predictor of functional capacity or “biological age.” In other words, people of the same chronological age may differ dramatically in their functional age, which can be measured by biomarkers (Anstey, Lord, & Smith, 1996).

Scientists have not yet identified a single overall mechanism that gradually reduces functional capacity. Increasingly, however, they have come to believe that the process of aging is controlled at the most basic level of organic life. The key to reversing the process of aging may lie in the strands of the molecule called DNA (deoxyribonucleic acid), the basis for heredity in living cells. At the same time, we can recognize aging at the levels of cells, tissues, and organ systems, such as the nervous system or circulatory system.

For each species, there appears to be a maximum time, or life span, for how long a member of that species can survive. By contrast, life expectancy from birth is the average number of years an individual may be expected to live. Maximum life span, in other words, is always higher than average life expectancy. Maximum human life span, or longevity, may be determined by biological processes separate and distinct from those that bring about the time-related declines we see as aging. In fact, it might turn out that maximum life span is determined by factors much simpler than whatever degrades functional capacity. At this point, it seems likely that longevity is genetically determined. Some scientists have argued that natural selection may have promoted longevity-assurance genes (Olshansky & Carnes, 2002; Sacher, 1978). In other words, evolution may have arranged for us to live as long as we do, but not necessarily for us to have the signs and symptoms of aging that we do.

Medawar (1952) was one of the first to advance the idea that a species might carry harmful genes whose time of onset was delayed until after the period of reproduction. If those same genes had the positive virtue of promoting reproduction, then such genes would be
transmitted to future generations. This idea of a trait being beneficial in early life but harmful in later life is known as antagonist pleiotropy. For example, the disease known as sickle-cell anemia, prevalent in Africa, is genetically linked to resistance to malaria. Those people born with the sickle-cell trait are more likely to survive malaria and pass the gene on to their children. This idea helps explain how diseases and senescence could actually be the product of natural selection through evolution (Williams, 1957).

Much remains to be discovered about genetic links between evolution and longevity. Genes with a favorable influence early in life, perhaps by maintaining reproductive capacity for a longer time, could have a harmful influence later on by allowing individuals to pass on linked genes with a negative impact, such as a shorter life span. In contrast, the genes that determine maximum life span could turn out to be linked to genetic factors that forestall the degenerative diseases of late life. Thus, under the most favorable scenario, if we were to discover and intervene in the genetic causes of longevity, we might also find the key to reducing the disabilities and dysfunctions of old age.

Scientists studying genetic influences on aging and longevity have moved in a number of suggestive research directions. From an evolutionary point of view, for example, there seems to be no obvious reason that human beings should live beyond 30 or 40 years, which gives them enough time to reproduce. There seems to be a trade-off between the biological investment made in survival for reproduction and maintaining organs and tissues beyond the end of the reproductive period.

In fact, we see from population studies of animals in the wild that aging rarely exists. The sea anemone, for example, seems to exhibit no physiological losses with chronological age at all. Animals in the wild exhibit survival curves similar to those of human populations; that is, most individuals die during a certain age range, but others die when very young or when very old. What follows from this evolutionary argument is that there is no intrinsic biological necessity for aging, and thus no reason why raising the maximum life span would be impossible.

According to one optimistic view, most of the decremental changes associated with aging—including potentially preventable diseases, such as Alzheimer’s—are not the result of any preprogrammed, built-in requirement for decline, but are the result of environmental causes (Cutler, 1983). However, maximum life span seems to be largely shaped by specific genetic endowment, rather than environmental factors. Perhaps, then, aging is a passive or indirect result of biological processes, whereas maximum life span is a positive or direct result of evolution. From this perspective, it follows that both the rate of aging and the maximum life span of a species could change—and change relatively quickly.

Some provocative questions follow: Would it be possible by direct intervention to alter the genetic code and thus delay the onset of age-dependent illnesses and perhaps to retard the rate of aging itself (Austad, 2015)? With deeper biological knowledge, could the maximum life span be extended to 150 or 200 years or beyond? Even to ask these questions shows just how far we have come from a traditional view of the human life course, in which birth, aging, and death were facts simply taken for granted as part of the unalterable nature of things (Aaron & Schwartz, 2004; Pew Research Center, 2013).

**Mechanisms of Physical Aging**

We sometimes think of aging as a process applying uniformly to the whole organism, yet physiological studies show that different parts of the body age at different rates. For example,
white blood cells die and are replaced within 10 days, but red blood cells last 120 days. The stem cells that produce all blood cells reveal no signs of aging at all. Cells in the brain last as long as the body lives; once the brain is fully formed, neurons do not exhibit significant cell division, and unless damaged by illness, they remain largely intact. But apart from long-living stem cells and brain cells, most parts of the body are constantly subjected to damage and repair. The mechanisms that contribute to this process of aging include wear and tear, the effects of free radicals, and the decline of the immune system.

**Wear and Tear**

The organic process of life is a delicate balance between forces that wear down structures—forces that lead to cell death, for instance—and those that repair damage at the molecular and cellular levels. The structure and metabolism of each living thing maintain this balance over time. But over time, the balance begins to shift: Damage occurs faster than it can be repaired. Moreover, repair capacity is not unlimited; mechanisms for maintenance and repair can be maintained only at a certain cost. In other words, there are trade-offs involved in longevity. As a result, damage tends to accumulate with age, and the body gradually loses its capacity to repair that damage.

Like other components of the body, DNA in the nucleus of cells is always being damaged and repaired, although not always perfectly. Among mammals, the longer-lived species are the ones that have greater capacity to repair damaged DNA. But as DNA replicates over and over, those small errors, or mutations, progressively alter the organism’s genetic code.

Can we conclude that we could possibly control aging by reprogramming our genes? Perhaps, but manipulating genes to retard aging might not increase the human life span. Imagine that an older person starts to exhibit signs of arteriosclerosis, and so we “fix” the individual’s DNA. We might prolong one person’s life, but we haven’t really done anything to prolong the lives of that person’s children or successive generations. They will also need DNA fixes when they become older. The problem is that a harmful mutation expressed at an advanced age, only after reproduction, will not be removed from the gene pool. In fact, we may want to leave a mutation that contributes to aging in place for the next generation because the mutated gene could have positive effects at an earlier age. In other words, the same biological processes promoting health and vigor among young organisms can have a negative impact in later life.

**Free Radicals**

Like the effects of wear and tear, the action of free radicals contributes to physical aging (Halliwell & Gutteridge, 2015). As they engage in metabolism, all cells produce waste products. Among those waste products are free radicals, or molecules of ionized oxygen, which have an extra electron. Those ionized oxygen molecules cause damage because they more readily bond with proteins and other physiological structures. Sometimes the proteins become inactive and unable to carry out their functions. Even oxygen, the essential element required for energy transformation in living organisms, can become a destructive force.

Certain physiological processes can fight the effects of free radicals, but over time the reduction of functional capacity damages the organism. Free radicals have been implicated in many processes of physical aging (Armstrong et al., 1984). A similar mechanism of physical aging is glycosylation. Among the most universal of all chemical changes in living things are
those involving sugar (glucose). Along with oxygen, glucose is the basis for metabolism in all organisms. When foods such as meat and bread are heated, the proteins combine with sugar and turn brown, in a process known as caramelization. In our bodies, the sticky by-products of this chemical reaction can literally gum up our cells. Glycosylation is behind much of the damage created in adult-onset diabetes, as well as stiffened joints and blocked arteries.

Is it possible to reverse the signs of aging caused by free radicals or glycosylation? Perhaps so, but that intervention is not likely to be simple—at least not as simple, for instance, as taking an “antiaging pill.”

The Immune System

The decline of the immune system is another important mechanism of biophysical aging (Muller & Pawelec, 2015). It has even received a name: immunosenescence, which notes that age brings increasing susceptibility to diseases, as well as weaker response to treatments. The immune system’s job is to defend the body from invaders like viruses, bacteria, and parasites. To perform this job, it sends a variety of cells, which are categorized as T cells, B cells, and accessory cells, coursing through the body. These cells interact in complex ways to destroy or neutralize antigens, the foreign organisms that trigger an immune response. The cells of the immune system also remove damaged and mutant cells produced within the body, which may become cancers.

With normal aging, the immune system’s ability to fight off invaders and mutants gradually declines; it may even begin mistakenly attacking healthy cells. The process begins at puberty, when the levels of a certain hormone begin to decrease. The components of the immune system, particularly the T cells, gradually lose their efficiency.

The aging immune system leaves the body increasingly vulnerable. No longer does it mount the maximum response to very small doses of antigen; below a certain dose, it may no longer even recognize some antigens. It seems to develop an especially sluggish response to some tumor cells. Thus, infection and age-related cancers, such as prostate and colon cancer, become more likely. In addition, the immune system becomes more likely to attack healthy cells, which may lead to an increase in rheumatoid arthritis and other autoimmune diseases. However, most autoimmune diseases do not seem to be a function purely of age, and genetic predisposition may also play a role. In any case, the gradual decline of the immune system leaves the body more and more susceptible to a wide variety of diseases, each of which takes its toll on the functioning and vigor of the organism as a whole.

Aging and Psychological Functioning

Research continues into ways to forestall physical aging in the hopes that someday we will discover a way to stay young as long as we live. The crusade against senescence and death is particularly appealing to Americans, who idealize success and are enamored with youth. The sentiment “You’re only as old as you think you are!” expresses an optimistic outlook that fits well with our can-do attitude toward life. According to this optimistic picture of later life, both physical and psychological decline can be offset by vigorous exercise and engagement with the world. “Use it or lose it!” seems to be the motto here, a philosophy that has been applied to everything from “sex after 60” to lifelong learning.
No wonder that the strategy called “successful aging” has become the goal of many gerontologists. In part, they wish to reject age-based stereotypes, and in part, they wish to counter the assumption that aging means a rapid decline into frailty and senility (Rowe & Kahn, 1997). They are certainly right to reject such stereotypes. But the idea of successful aging should never be based on denial of real losses in functioning in the last stage of life. The importance of the idea of successful aging is that it encourages older people to optimize the capacities that remain while compensating for inevitable losses (Baltes & Baltes, 1990). The measure of successful aging is life satisfaction and a sense of well-being in the face of decline. Successful aging therefore involves the psychological side of aging, including self-concept, social relationships, social roles, and cognitive processes.

**Self-Concept and Social Relationships**

The way people see themselves has several dimensions, including personality, self-esteem, body image, and social roles. The aspect of self-concept that changes least with age seems to be personality. For instance, an extroverted person, one who enjoys interacting with other people, is likely to remain extroverted from childhood into the final stage of life. An older person who is skeptical or gullible is likely to have been that way all along.

Other aspects of self-concept do tend to change, however. The aging mind is not so much the impetus for change as is the progression of circumstances in which people find themselves. Take body image, for example. Naturally, the image of one’s body changes as hair becomes grayer and skin gets more wrinkled. Self-esteem varies throughout life with one’s successes, whether they are interpersonal, occupational, intellectual, or otherwise.

Social relationships in old age tend to exhibit the most predictable types of change. For one thing, people’s social networks become smaller as time goes on. With retirement, work relationships diminish, if not disappear. An older person may have survived a great many friends and family members. In addition, it is difficult to add new members to the network if one is no longer engaged in work or wider community life.

**Social Roles**

Another aspect of self-concept that changes with age has to do with the social roles we occupy. Growing up and growing older, we leave behind earlier roles, such as child, student, employee, parent, and eventually, perhaps, spouse and friend. In the process, whether as an adolescent or a recent retiree, it is natural enough to ask: Who am I? Psychologist Carl Jung described the psychological task of the second half of life as “individuation”—that is, becoming more and more our genuine individual self as opposed to carrying out the social roles required of people in midlife (Chinen, 1989).

Gerontologists have spoken about this late-life transition as a matter of role loss or role discontinuity. In earlier-life transitions, role losses are typically accompanied by new roles that take their place: Ceasing to be a child in one’s family of birth, one grows up and takes on the role of parent. But in old age, some roles, such as those ended by widowhood or retirement, may never be replaced.

From one sociological standpoint, then, old age can be described as a roleless role (Blau, 1981). Once defined in this way, it is a natural step to see aging as a “social problem.” A different perspective is possible, however. Other sociologists look on old age as a period
when individuals maintain informal roles that are individually negotiated and perhaps continually redefined and constructed. In other words, the meaning of age, subjectively experienced, would not be decisively determined by the external roles, such as spouse, employee, and parent, that typically shape behavior earlier in the life course. On the contrary, once freed from conventional roles, the development of the self in later life may become a highly individual matter. From a philosophical point of view, old age can actually appear as an unexpected form of “late freedom” (Rosenmayr, 1984).

The importance of the meaning we bring to situations encountered in life has been underscored by several theories of aging. For example, Hans Thomae has developed his cognitive theory of aging based on empirical results of the Bonn Longitudinal Study of Aging (Rudinger & Thomae, 1990). The cognitive theory of aging argues that it is perception of change, rather than actual objective change, that has the most impact on behavior. The same life event—such as retirement—might be perceived by one person as loss and by another as freedom from an oppressive work situation. Cognitive, emotional, and motivational factors shape the way we perceive any event, and adjustment depends on a balance that changes over the life course. Studies of stress and coping in old age reveal individual differences in mastery depending on perception and adaptation.

The subjective experience of meaning is closely related to individual well-being, as Carol Ryff (1989) has argued. She has defined multiple psychological dimensions, including self-acceptance, which may come from reviewing one’s life; positive relations with other people; autonomy and self-determination; mastery of the surrounding environment; beliefs that give purpose to life; and a sense of personal growth and development over the life course. Ryff’s conceptualization gives a new approach to the definition of activity by shifting our attention to the inner dimension of the relationship between ourselves and the world.

But the old theory of disengagement has received some support as well—for example, through the idea of “gerotranscendence,” Lars Tornstam (2005) has suggested that people find the deepest meaning in the last stage of life by overcoming self-centeredness and fear of death in favor of a spiritual focus.

**Cognitive Functioning**

The search for interpretive meaning in later life underscores the importance of cognitive functioning in old age. Contrary to the popular stereotype, we don’t “lose a million neurons every day” as we grow older. Most people ages 65 and older do not suffer from memory defects or dementia. Among all those ages 65 and older, there are a moderate number—perhaps one in five—who have mild or moderate mental impairment. That means the overwhelming majority of older people have no mental impairment. Memory defects are actually quite limited among the large majority of older people. Nevertheless, some thinking processes do decline or change with age. Cognitive skills such as remembering, solving complex problems, paying attention, and processing language are affected by age- and disease-related changes in the brain.

Cognitive functioning is a critical issue because it is the aspect of psychological functioning most affected by aging. In addition, cognition has a greater effect than the other types of psychological functioning on the ability to perform the activities of daily living (ADLs) (Klimczuk, 2016). Those whose memories fail may not be able to keep up with needed medications or remember to turn off the stove when they’ve finished cooking. People who
lose their judgment or become more impulsive may make extremely foolish decisions about how to spend their money or whom to trust. What’s worse, they may lose the ability to recognize their own mental shortcomings.

The picture for most older people, however, is considerably more positive. Although memory, reaction time, and basic information-processing and problem-solving abilities appear to decline with normal aging, other cognitive functions seem to remain stable or even improve. Wisdom and knowledge about the ways of the world, for example, are typical strengths of older people. In addition, training and practice in problem-solving skills, memory techniques, and other cognitive strategies can noticeably improve the abilities of older people.

It is important to remember the influence of life history and context as well. Older people who never learned a foreign language, for example, might have a more difficult time doing so in retirement than would an older person who had been bilingual from childhood. A person who worked as a carpenter in middle age might later be able to solve simple geometry problems faster than someone who worked as a nurse simply because the retired carpenter had been called on to solve geometry problems all his life.

Older people also remain adaptive and learn ways to cope with losses in cognitive functioning. For example, other people may help them to compensate for cognitive losses through a social process dubbed “interactive minds” or “collaborative cognition” (Baltes & Staudinger, 1996). Imagine that a young relative has asked two older adult sisters about their parents. One may start out with the story of how their parents met but be stymied by the issue of who introduced them. The other sister may say, “Remember, it was their friend from the old neighborhood. What was his name? He always used to bring us butterscotch candies.” “Oh, I know who you mean,” says the first sister. “The man who played the accordion.” The other sister then remembers his name: “Yes, Mr. Catano. His family lived next door to Mother’s family, and he was in the band that Dad played in.” Similar teamwork helps older people function cognitively much better than they might on their own. That is one of the reasons that losing a spouse, another relative, a close friend, or some other central member of one’s social network can be such a problem for the older adults.

Another form of cognitive adaptation is “selective optimization with compensation” (Baltes & Baltes, 1990), which is actually one definition of successful aging. The idea of selective optimization is that older people gradually narrow the scope of the capabilities they seek to maintain to those that are most useful, just as we all do throughout life. For instance, a freshman college student may begin studying engineering, but by the time she begins to pursue a career, she may decide to specialize in the microchips that make appliances work and forget about becoming knowledgeable about hydraulics, engines, or other aspects of engineering.

The idea of compensation is that people seek new ways of accomplishing things that become difficult or impossible because of losses in functional capacity. An example of selective optimization with compensation is the case of pianist Arthur Rubinstein. As Rubinstein grew older, he reduced the music he played to those piano pieces he knew best and then practiced just those pieces more often (selective optimization). When it came time to play the faster passages, he would slow down his playing speed just beforehand to maintain the apparent difference between the slower and faster passages (compensation).

Although much research remains to be done on cognitive capacity in old age, particularly among the oldest-old, it is safe to say that the old stereotype of feebleminded seniors is not...
only counterproductive but also inadequate as a description of cognitive functioning in later life. Older people do seem to experience some cognitive challenges, but the losses through normal aging are gradual and for the most part can be accommodated. What is more, older people often have other cognitive gains to offer. Their experience of living gives them an understanding of the world and an ability to apply its lessons that younger people typically have not had time to develop.

**Conclusion**

As long as there have been old people, there has been ambivalence about old age. The psychological basis for ambivalence is understandable. Why shouldn’t people feel uncertain dread at the prospect of vulnerable old age stretching before them? In contrast, why shouldn’t they look forward to a time when it seems possible to finally drop the burdens of coping with the complications of life? We see the same ambivalence today, but the truth is different from what popular images often convey. Old age in our day cannot easily be characterized. Especially in early old age, just past retirement, most people remain active and capable despite their removal from economically productive roles. Inevitably, the human body declines and dies, but normally, even in middle and late old age, humans retain more capabilities than they are often given credit for.

Industrialization brought growing rationalization and bureaucratization of the life course, a greater rigidity that took the shape of stronger demarcations between youth and adulthood and between adulthood and old age. At the same time, rapid developments in medical science and cultural values have begun to erode the concept of distinctive life stages. With rising longevity, more people are living to old age, and older adults as a group are becoming a larger, more influential proportion of the total population. Today, because the entire life course is changing, the meaning of old age is ambiguous.

The problem of understanding what it means to be old in postindustrial society can be compared with a parallel problem in the biology of aging: Why does physical aging occur? There seems to be no reason for organisms to live much past the age of reproduction. Old age, in short, should not exist. Yet human beings do live long past the period of fertility; indeed, human beings are among the longest-living mammals on earth. But the challenge is not just to discover why we live so long—or even how to allow people to live longer. It is to understand how we can make the final phase of the life course more meaningful—for our elders and, eventually, for our future selves.

**Toward a New Map of Life**

We can think of the stages of life as a kind of “map” of unknown territory through which we must travel. Until recently, some regions of that territory, such as the midlife transition, were completely “unmapped” and unacknowledged. Other regions, such as adolescence, have been delineated or cultivated only in the past century, although now they seem familiar and predictable. The symbolism of life stages was once easily understood in societies where a map was thought to depict a common geographic or social “space” that was stable and enduring, the same for each generation. This familiar ideal of life stages reappears in popular forms of life span developmental psychology, such as the
theories of Erikson and Levinson. The ideal seems to correspond to a fundamental and universal fact about human psychology: the need to define the predictability of life. Now, however, some observers are coming to call into question this whole approach to the life course. Perhaps the metaphor of a map is mistaken.

Today, in the second decade of the 21st century, we no longer have confidence in a shared timetable for the course of life. The timing of major life events has become less and less predictable at all levels of society. As a result, we may need a new “map of life” corresponding to the changed conditions of demographic circumstances, economics, and culture in a postindustrial society (Laslett, 1991).

The meaning of aging has changed in contradictory ways. Optimists believe that medicine will soon permit us to displace aging-related disease and decline until later and later in life, a pattern known as compression of morbidity. Yet economic forces seem to move in the opposite direction from biology as some individuals accumulate financial assets during a lifetime of working.

To overcome limitations of the old map of life, we need to develop bolder ideas about the positive social contributions that can be made by older people; we also need to think more deeply about the meaning of life’s final stage. Without such new understanding, there is a risk that older people may be dismissed as “uncreative” or that people will lose any shared sense of the positive meaning from survival into old age. Successful aging in the future will involve new ways of tapping the creative potential of later life in support of a long bright future in years to come (Carstensen, 2011).

Creativity and wisdom depend on cognitive development over the life course. Whether our society cultivates such qualities among older people will depend, in the end, on creating more imaginative policies and institutions. The challenge of an aging society in the 21st century is to nurture the special strengths that develop as we age in an environment that prizes change, novelty, and flexibility. That challenge is what is ultimately at stake in debates about the meaning of the last stage of life (Bateson, 2011; Roszak, 1998).

### Suggested Readings


Controversy 1

DOES OLD AGE HAVE MEANING?

A human being would certainly not grow to be seventy or eighty years old if this longevity had no meaning for the species. The afternoon of human life must also have a significance of its own and cannot be merely a pitiful appendage to life’s morning.

—Carl Jung

THE MEANING OF AGE

Most of the characteristic qualities we associate with old age are uniquely human. For instance, among animal species in the wild, we never see offspring take care of the aging parents who gave birth to them. On the contrary, young animals typically leave their parents when they themselves reach maturity, like baby birds that leave the nest to fly on their own. It is only the human being who cares for and honors the oldest members of the species, just as only human beings care for and remember their dead. In both cases, we might ask: Why?

The answer is that human beings live in a symbolic world of shared meaning, and the power of meaning can be a matter of life and death. For example, acts of bravery in crisis or wartime prove that people are willing to sacrifice their lives for what outlives the individual self—whether they act on behalf of family, religion, patriotism, or something else. Outliving the self—what Erik Erikson called “generativity”—is not limited to acts of sacrifice (Kotre, 1984). Awareness of a meaning that transcends individual life is a universal human quality. Transcendence and the search for meaning are what make us human (Frankl, 2006).

Human beings contemplate aging and death, and they reach backward and forward in time to pose questions about the meaning of existence. In remembering the dead and in caring for the aged, we express our deepest convictions about the meaning of life. Old age is a time when we are likely to come face-to-face with questions about ultimate meaning. In fact, it was only in the 20th century that a sizable proportion of the population survived to experience old age, and it is therefore natural that, in our time, the meaning of old age has become an issue.

The question about whether old age has meaning is both a personal question and a challenge for gerontology. The personal question is ultimately a matter of values: What is it that
makes my life worth living into the last stage? Put this way, it may seem like an abstract or philosophical question. But as we see in discussion about end-of-life decisions, this question becomes practical for families, health professionals, and, in truth, everyone.

Whether old age has meaning is central to what we understand to be life satisfaction or morale in old age (Ardelt & Edwards, 2015; Kaufman, 1986). If aging threatens deeply held values—such as the desire to be independent, to have control, or to be socially esteemed—then both society and individuals will seek to avoid age or deny it as much as possible. The denial of aging and the denial of death are central problems for our society (Becker, 1973; Schillace, 2015).

Thus, there are at least three questions we need to examine: Does old age have a meaning for society? How do individuals actually experience their lives as meaningful in the last stage of life? And, for you, the reader of this book, how do you imagine your future older self, and what do you imagine will be meaningful to you? These questions are related, and all pose a challenge to gerontology. A key issue is whether we have a theory of aging that can explain the facts about old age, including the different meanings old age takes on over the course of life and through history. To focus on these questions about meaning and aging, we can begin with two domains—leisure and religion—that express contrasting values of activity and disengagement and thereby offer alternative perspectives on how people find meaning in later life.

**Leisure Activities in Later Life**

Old age is characteristically a time when the work role becomes less constricting. Leisure may take its place as a way of finding meaning in life. We might think of leisure simply as “discretionary time,” which becomes more available during the retirement years. But more deeply, leisure can be defined as activity engaged in for its own sake, as an end in itself. Leisure is not simply what we do with “leftover time,” but a multidimensional quality of life different from paid employment, household maintenance, or other instrumental activities. Aristotle described leisure as a realm in which human beings gain freedom for self-development when the necessities of life have been taken care of.

Does leisure actually replace the work role in later life? Does it become a powerful source of meaning in its own right? The answer to these questions depends on the quality of subjective experience during leisure. Leisure may be an end in itself, but moments of leisure also have a developmental structure; they are not complete in themselves. For example, if we play sports, perform music, participate in political or civic activities, or read a book, each moment leads to the next in some purposeful developmental pattern. By contrast, other common leisure activities, such as TV viewing, take up a lot of time for older people, but tend to be passive or less demanding. If leisure activity is to be a path to deeper meaning, then it must have some dimension of growth or personal development (McGuire, Boyd, & Tedrick, 2004).

As people get older, they usually engage in the same activities as earlier in life, but with advancing age, there tends to be an overall decline in the level of participation. It is a mistake to think in stereotypes about “old people’s” activities, such as shuffleboard, bingo, and singing old-time songs. That stereotype is wrong because age alone does not serve as a good predictor of what people do with their leisure in later life. Old people are not all alike. Variations and
individual differences, along with the influence of gender, education level, and socioeconomic status, play a big part.

**Changing Leisure Participation Patterns**

How do patterns of leisure activity change over the life course? Broadly speaking, people ages 65 and older continue to engage in the same activities with the same people as they did in middle age. Although there is some selective age-related withdrawal, active engagement remains a key to life satisfaction and positive meaning in later life. As well, participation in intellectual and political leisure activities may have protective benefits for cognition during later life (Kareholt et al., 2010).

Social structures, not age itself, determine the uses of time in later life. According to surveys of time use, as people age, they spend varying proportions of time in paid work, family care, personal care, and free time. Most of the variation comes from a decrease in time spent working, not from any demonstrable effects of aging. People who are still in the labor force after age 65 have time use patterns similar to those of younger people. Retirement frees up time—findings from the 2014 American Time Use Survey indicate that persons 75 years of age and older engage on average in 8 hours of leisure time daily (Bureau of Labor Statistics, 2014). After taking into account household labor, most of this gain in time is taken up by watching TV, reading, relaxing and thinking, and socializing. Some leisure activities decline with age, but others remain the same. A study of leisure found that the number of people starting new activities does diminish as we get older (Iso, Jackson, & Dunn, 1994). In addition, certain activities show a marked decline in participation rates: For example, moviegoing drops from 38% in midlife to 17% after age 65. Involvement in indoor fitness shows a decline, and travel diminishes significantly among people over age 75. Other activities, such as outdoor gardening, show only modest declines, and still others, such as TV viewing, watching sports, and engaging in informal discussion, show no age-related decline at all. Church participation and community activities tend to be maintained. Age-related declines appear to come partly from barriers to physical exertion or access. Activities based in the home, such as reading or socializing with familiar people, remain strong until well into advanced old age. However, we must keep in mind that subgroups among older adults display markedly different patterns. For instance, the “young-old”
can generally be categorized as the “active-old,” a group of increasing interest to advertisers and marketers (Furlong, 2007). As well, there may be variations in the leisure time pursuits of older adults in different minority groups (for example, the rate of church participation).

Patterns of late-life leisure have important implications for the economy in an aging society. Americans over the age of 50 offer a huge and growing market for business. They command more than half of all discretionary income and account for 40% of consumer demand. Older consumers are highly heterogeneous, varying by family status, ethnicity, education, geography, and social class. As we will discuss in Controversy 12 on the new aging marketplace, the “gray market” is stratified by age. The young-old are much more likely to be interested in travel than the old-old. Old-age leisure is often advertised as a consumption good or a status symbol, but leisure is also a means of affirming one’s identity, a vital dimension of our phenomenological “life world” at a time when other roles may be lost. Leisure time activities, then, are an important part of our personal world of meaning and also part of a shared horizon of socioeconomic transactions that shape the meaning of leisure over the entire life course.

**Explaining Patterns of Leisure**

A study of activity patterns in old age sheds interesting light on different theories of aging, such as activity theory, disengagement theory, and continuity theory. The Canadian Longitudinal Study of Aging found that most Ontario residents ages 45–85 engage in familiar activities and maintain stable activity patterns, as continuity theory would predict (Singleton, Forbes, & Agwani, 1993). The Canadian study also found that education and income are big factors, however. Retired people who have more choices because they have more resources are also likely to change their patterns of activity more often.

We also find some support for the idea of disengagement as people age, but not as a global generalization or stereotype. Disengagement, in other words, is not a universal pattern, but is highly selective, an example of selective optimization with compensation (Baltes & Baltes, 1990). As long as leisure activities remain accessible, people will go on doing what they find worthwhile and meaningful as long as they can. When physical impairments impose obstacles, most people adapt to optimize whatever resources they still have. Most people do not simply disengage altogether from meaningful activities.

Other explanations for the decline in leisure participation can also be found. For a segment of the older population with limited income, travel or cultural activities may be economically out of reach, perhaps an example of how social inequality accumulates over the life course and affects outcomes in later life (Ferraro & Shippee, 2009). But those with limited income may pursue activities outside the marketplace: for example, informal socializing with others. Another cause for constricted activity is declining health or age-related decline in vision, which might limit participation in fitness or sporting activities, as well as driving at night. Even among those who remain healthy, loss of companions for leisure activities can be a limiting factor. As a result, decline in leisure, as we might expect, is most severe among the oldest-old.

**Religion and Spirituality**

According to Gallup Poll data, 52% of U.S. adults consider religion to be important in their lives, 54% are affiliated with a church or synagogue, and 36% attend services weekly.
(Gallup, 2015). It is worth noting that each of these figures has declined since 2012, consistent with findings from the Pew Research Center that Americans are becoming less religious. Interestingly, 90% of older adults surveyed for the 2012 Pew Research Center’s Religion and Public Life Project indicated that they are “religiously affiliated.” For comparison, 67% of adults ages 18–29 report being “religiously affiliated,” perhaps an example of a cohort difference. On the one hand, it seems natural to expect that interest in religion might increase with advancing age given the association of old age with increased mortality. On the other hand, the continuity theory of aging reminds us that, as people age, they tend to maintain earlier patterns of practice and belief.

But religion is more complicated than responses to a poll or attending a worship service might indicate. To understand the role of religion, we need to distinguish formal religious behavior from subjective attitudes toward religion, what we might call an inner attitude of spirituality. Across many different dimensions, religion and spirituality continue to play vital roles in the lives of older adults and help them find meaning in later life (Atchley, 2009).

**Religious Involvement Over the Life Course**

Religious involvement in old age displays a pattern that some investigators have called “multidimensional disengagement.” What this means is that as people grow older, they may withdraw from some activities, such as attending church, but at the same time show an increase in personal religious practice, such as Bible study or listening to religious TV and radio. The number who report praying “once a day” or “several times a day” increases steadily from age 55 to the highest levels among those over 75. By contrast, other empirical studies show declining frequency of church attendance after age 75, perhaps reflecting frailty and physical limitations among the old-old. Older people seem to disengage from some organized religious roles, but make up for this loss by intensifying their nonorganizational religious involvement—for example, personal prayer, meditation, and other forms of spiritual practice.

Self-reported data from Gallup (2015) for religious affiliation of adults of all ages reveal the following: 38% identify as Protestant, 9% as “unaffiliated” Christian, 23% as Catholic, and 2% as Jewish. Interestingly, the same survey shows that the percentage of religiously “unaffiliated” persons has increased. This compares to long-standing data suggesting that as they grow older, Americans continue to display patterns of religious identification similar to those among younger age groups: 65% identify themselves as Protestant, 25% as Catholic, and 3% as Jewish (Pew Research Center, 2012a). According to ongoing Gallup Poll surveys, older women tend to have higher levels of religious participation and belief than do men. Although survey data vary, it seems that overall, anywhere from 30% to 60% of all older adults attend religious services at least once a week, and attendance tends to be positively related to measures of personal adjustment. When we look at church attendance from a life course perspective, we see the influence of family structure. Parents with young children often get involved in church activities, but after middle age, attendance falls off.

Despite these variations, older people are still more likely to be involved with church or synagogue than with other kinds of community organizations. Among mainstream Protestant and Catholic churches, as well as Jewish synagogues, a large proportion of the congregation is over age 50. Adults ages 65 and older are twice as likely to attend church regularly as those under 30. But it is a mistake to assume that people simply become more religious as
they get older. Today’s older generation appears to be more religious, but that effect may be due more to cohort or generational effects than to age. For instance, older adults may have gone to Sunday school or been involved in religious activities throughout life. Such lifelong religious identification explains higher religiosity in old age. Recent poll data suggest that these patterns may be changing over time as cohorts move through the life course and the boomers—people born between 1946 and 1964—enter into later life. For example, the percentage of “nones” or religiously unaffiliated persons is increasing, and current young adults are more likely to be religiously unaffiliated than other cohorts were at the same age (Pew Research Center, 2016).

Churches and religious organizations play many roles in the lives of older people: in formal religious programs, through pastoral care programs, and as sponsors or providers of social services. Elders find fulfillment in a variety of church-sponsored volunteer activities, but ironically, organized religion has often emphasized services and activities for youth. Innovative programs—such as Bible classes geared to older people, intergenerational programs, and new volunteer roles—could change that picture in the future. Congregations represent a great, partly untapped resource for older people to find meaning, provided that religious groups recognize that later-life spirituality may take a different form than participation in the religion of youth or midlife (Atchley, 2009).

**Religious Participation and Well-Being**

Researchers have been interested in the benefits that religion and spirituality can have for older people. Cross-sectional studies have found a positive correlation between measures of well-being and religious beliefs among the old (MacKinlay & McFadden, 2004). Those with high levels of religious commitment also have higher levels of life satisfaction than those for whom religious commitment is not as important. This relationship holds true even when controlling for age, marital status, education, and perceived health status.

But the significance of these correlations may be less than meets the eye. How do we define or measure what “religiousness” actually means in people’s lives? Another difficulty is the partial confounding of religious involvement with measures of functional health status. Does religious engagement actually promote physical health?

Empirical studies have shown that religion can serve as a means of helping older people cope with stress. For example, the Duke Longitudinal Studies of Aging found that older persons who used religion as a coping mechanism were more likely to exhibit higher levels of adjustment than others, even during intense life stress, such as bereavement and chronic illness. Nearly half of the respondents in the Duke studies reported that religious attitudes or behavior helped them cope with stressful life events. Among those who relied on religion, coping strategies reflect different patterns of disengagement or activity. Private religious beliefs and behaviors, such as trust, faith in God, and prayer, were cited as coping strategies more frequently than church-related and religious social activities.

Investigators theorize that religion helps older adults cope in a variety of ways:

- By reducing the impact of stress in late-life illness
- By providing a sense of order and meaning in life
- By offering social networks tied to religious groups
- By strengthening inner psychological resources, such as self-esteem
Participation in religious activities and spiritual practices has been connected to well-being in later life.

**URBAN LEGENDS OF AGING**

“Religion is good for your health.”

It’s true that people who attend church tend to live longer, but no one knows why. Some studies suggest that volunteerism, the arts, lifelong learning, or even having a pet will give the same result. It could be that religion has little to do with it; maybe bowling would do the same (but not bowling alone). Here, as so often, correlation is not causation.

**Spirituality and the Search for Meaning**

Habits of religiosity, like other behaviors, tend to remain stable as people move into later life, but faith can take on new meanings as we grow older. One research team found that, among those who had undergone some distinct change in religious faith, 40% reported experiencing such a change after the age of 50. The researchers concluded that changes in religious faith are not limited to youth but can occur at any time in the life course (Koenig, 1994).

Often the personal search for meaning leads to deeper understanding of religious faith. James Fowler (1981) developed a framework of “faith stages” describing how people move
from simpler, more literalist ideas of religion to levels where they see themselves and their lives in more universal terms, as the greatest saints and mystics have preached. As examples of those who have reached the highest stage of faith, Fowler cites personalities like Dag Hammarskjöld, Abraham Heschel, Thomas Merton, and Mahatma Gandhi.

Theologians who have reflected on the life course tend to view aging not as a problem that calls for a solution but as an existential condition that can provide an opportunity for personal growth, or what some have called a “spiritual journey” (Bianchi, 2011) that can lead to a contemplative dimension for aging (Tornstam, 1997). In terms of Erik Erikson’s developmental theory, older adults struggle with a psychological conflict between ego integrity and despair. Faith can be a way of enhancing ego integrity—an attitude of acceptance toward life and the world that is part of positive mental health. Stressing the importance of religion for mental health, Blazer (1991) has identified six dimensions of spiritual well-being: self-determined wisdom, self-transcendence, the discovery of meaning in aging, acceptance of the totality of life, revival of spirituality, and preparation for death. None of these tasks is easy, but the fact that some older people undertake this spiritual journey makes us believe that the effort can yield a profound sense of meaning for the later years.

GLOBAL PERSPECTIVE

The Search For Meaning in Asian Religions

The great civilizations of India, China, and Japan have all paid attention to the search for meaning in later life. Images of positive aging are embodied in these traditional religions of Asia.

Hindu Stages of Life

According to traditional Hinduism, spiritual freedom is the ultimate goal of life, to be attained by introspection and meditation. Aging as part of the total life course was understood to be crucial in ancient Hindu culture, which divided life into four major stages (ashramas). The first stage is discipleship, or learning from a guru. The second stage is the householder, based on marriage and family. The third stage is becoming a forest dweller, devoted to study of scripture. The fourth stage is complete renunciation, becoming a sannyasi, which may include teaching others as part of the path of transcendence.

Religion in China

According to Chinese Confucianism, filial piety is the primary virtue, including a duty to keep our body healthy to fulfill the demands of justice. We should feel gratitude toward elders and toward all of nature. The other traditional Chinese religion was Taoism, which emphasized health promotion even more. Taoists have even believed that immortality could be possible if only human beings followed the true laws of nature. Taoism, in this way, joins forces with traditional Chinese medicine and its emphasis on attaining a proper balance among the various elements and energies in the human body.
Does Old Age Have Meaning?

As a branch of the human sciences, gerontology tries to depict the facts about old age as a way of understanding the meaning of aging. But the approach of gerontology sometimes looks at “meaning” from the outside. Perhaps a better place to begin is to ask: What do older people themselves say about what gives meaning to their lives? When a sample of participants at a senior center was asked that question, nearly 90% of respondents described their lives as meaningful (Burbank, 1992). For most of them (57%), the meaning came from human relationships, followed by service to others (12%), religion, and leisure activities.

Another study revealed that the most damaging threat to well-being in later life is loss of life purpose and boredom, not fear of absolute destitution or poor health. Responses show that people find purpose or meaning in a variety of ways: work, leisure, grandparenting, and intimate adult relationships. Respondents reported that, unless they were sick or depressed, they “didn’t feel old” (Thompson, 1993), which suggests what has been called “the ageless self” (Baars, 2012; Kaufman, 1986).

Looking at verbal responses or patterns of behavior is suggestive but may not get us any closer to understanding meaning in the last stage of life. Questionnaires about life satisfaction tell us only a limited amount about these deeper issues (Windle & Woods, 2004). Inevitably, values and philosophical assumptions reveal themselves in our discourse.

According to one widely shared view, the agenda for gerontology should be to promote better social integration of the aged (Rosow, 1967) by means of group activities, social involvement, and participatory roles of all kinds. We see that view in the popularity of “productive aging,” intergenerational programs, and other strategies. The ideal of an “age-integrated society” is a comprehensive enunciation of the same goal (Riley & Riley, 1994).

### Japanese ikigai

The Japanese word *ikigai* can be translated as “source of value in one’s life” or “what makes life worth living.” *Ikigai* can have a range of meanings, extended from devotion to one’s children up to wider needs for fulfillment, such as personal growth, freedom, and self-actualization. In this respect, the concept of *ikigai* is similar to what contemporary psychologist Abraham Maslow called a “hierarchy of needs.” The ideal of *ikigai* has not been relegated to traditional virtues. This ideal has now been adopted by Japan’s Ministry of Health, Labour and Welfare in its national health promotion plan encouraging people to remain active beyond age 80.

**SOURCES:**


Whether through work, leisure, or attendance at religious services, the aim of social integration is for people to stay engaged throughout life. Workers in senior centers and nursing homes often share this outlook. But if we view role losses of old age as an opportunity for self-development beyond conventional roles, then integration in group activities may no longer seem so compelling. Other values, sources of meaning, and uses of what time one has left might assume greater importance.

We might still encourage older people to maintain social connections or affiliate with groups, but the form of that engagement would be based on a strategy for individual development, not conformity to social norms or activities. An example of such individual development might be a creative arts program designed to encourage self-expression; another example might be a religious retreat designed to permit individual prayer and meditation. These last kinds of pursuits seem in keeping with the potential for interiority and individuation in later life. Whether individual contemplation or social activity is the more desirable approach still remains debatable, of course, but that is precisely what is at issue in the controversy about whether old age has meaning or offers some special opportunity not readily available at other stages of life. The question is what makes it important for gerontology to look more deeply at what inspires a shared sense of meaning in life’s last stage (Cole & Gadow, 1986).

The Meaning of Aging in the 21st Century

The life course perspective views “stages of life” as social constructions reflecting broader structural conditions of society. As conditions change, so will our view of how people find meaning at different stages of life. Consider the weakening of age norms and beliefs about what is “appropriate” for different stages of life. In a world where retired people may go back to college or where a woman may have a first child at age 40, it makes less sense to link education or work with strict chronological ages. Indeed, one attractive strategy for an aging society might well be to introduce more flexibility for people of all ages to pursue education, work, and leisure over the entire course of life, rather than link these activities stereotypically to periods of youth, middle life, and old age, as modern societies have done in the past.

It is not clear how the meaning of old age will change in contemporary postindustrial societies. On the one hand, older Americans have achieved gains in income levels, health, and political power. On the other hand, as the stages of life have evolved and become blurred, the entire image of “old age” is giving way to more of an “age-irrelevant” image of the life course (Neugarten, 1983). As an empirical matter, chronological age, by itself, loses predictive value and importance for many purposes.

Does this trend mean that old age, as a distinct stage of life, no longer has any special meaning or significance? Here, we again must distinguish between a meaning that society ascribes to old age and what individuals find meaningful in their own lives. In postmodern culture, it is increasingly difficult to ascribe anything special to the last stage of life. But if nothing special is to be found in later life, we wonder, does it follow that personal meaning in old age must simply be “more of the same,” that is, continuing whatever values gave meaning earlier in life? Or does lifelong growth imply a constant effort to overcome old habits and change our view of what offers meaning in life—perhaps by composing a new version of our life story (Bateson, 2011)? These questions have no easy answers but are important to consider.
The previous discussion initially looked at two classical theories of aging—disengagement and activity. We saw how both theories implicitly appeal to deeply held values but point in opposite directions. When we think about the question of whether old age has meaning, we come back, over and over again, to two fundamental alternatives: on the one hand, continuation of midlife values into old age, and on the other hand, discovering some new or special challenge that belongs to the last stage of life.

The selection by Simone de Beauvoir offers the view of a philosopher who rejects traditional ideals of old age as a time of tranquility or disengagement. On the contrary, she believes that only continued activity on behalf of new goals will give our lives meaning, whether in old age or at any other time of life. Along these lines, John Rowe and Robert Kahn’s strategy of “successful aging” represents a way of preserving meaning by adapting ourselves to diminished reserve capacity. Rowe and Kahn believe that “success” is best defined by optimizing capacity for continued engagement with the activities of life.

Erik Erikson, writing with Joan Erikson and Helen Kivnick, shares this endorsement of engagement, but takes a different approach. Erikson sees each stage of life as a period with its own purpose or psychological task to be achieved. Old age is different from other stages because it offers a kind of culmination to life as a whole. Erikson believes that, through concern for the welfare of future generations, older people find a sense of meaning in later life. In the personal journal of Florida Scott-Maxwell, we find an echo of Carl Jung’s belief that advanced age is a time for turning inward for deeper reflection. Her rich reflections prove that even when outer activity is cut off, it is still possible to find deep meaning in the last stage of life (Berman, 1986).

It seems ironic that modernization has made it possible for people to live a greater portion of their lives in old age than ever before in history. At the same time, the distinctive stance of postmodern culture tends to preclude finding any special meaning or purpose for the last stage of life. Whether modernization has reduced the power of the old seems debatable. Public spending for old-age benefits suggests that just the opposite may be true. But there is no doubt that modernization has helped to erode traditional ideas about fixed “stages of life” once based on shared meaning (Gruman, 1978). The result is a sense of openness or uncertainty about the meaning of old age. Such openness to new ideas and to contradictory answers is disconcerting to some and exhilarating to others. However, the future of an aging society will be shaped by all of us because, in the end, the old are simply “our future selves.”

FOCUS ON PRACTICE

Reminiscence and Life Review

As people grow older, it is not unusual for them to reminisce about the “good old days.” Feelings of both nostalgia and regret are commonly part of this attitude toward the past. A stereotypical response to reminiscence is to assume that older people are interested only in the past or, still
worse, to see those who dwell on past memories as showing signs of escapism or even mental impairment. But late-life reminiscence may be a normal form of life review, which Robert Butler (1963) defined as a natural, even universal process stimulated by awareness of approaching death. He also wrote:

The life review is characterized by a progressive return to consciousness of past experience, in particular the resurgence of unresolved conflicts which can now be surveyed and integrated. . . . If unresolved conflicts and fears are successfully reintegrated they can give new significance and meaning to an individual's life. (Butler, 1974, p. 534)

Butler’s view is similar to that of Erik Erikson, who sees the psychological task of late life as achieving ego integrity, a reintegration of all aspects of the individual’s life. Both Erikson and Butler based their psychological theories on the importance of finding meaning in the last stage of life. But do the facts support their theories? Just how important is reminiscence in old age?

Some studies have shown that older adults actually do not spend much more time daydreaming about the past than do people of other ages (Gambria, 1977), so it may be a mistake to see life review as a universal process. However, regardless of frequency, reminiscence may have adaptive value; that is, it may promote better mental health in old age. One early study of reminiscence found that people who spend time thinking about the past are less likely to suffer depression (McMahon & Rhudick, 1967). Some psychologists who have studied life review feel it may be a psychological defense mechanism that helps some people adjust to memories of an unhappy past. In that sense, reminiscence could be described as an adaptive feature of old age (Coleman, 1974), which is something to be encouraged (Brennan & Steinberg, 1983–1984).

Reminiscence and life review appear to help some older people bolster their self-image. By recalling the past, older adults can improve self-esteem and establish solidarity with others of their own generation. We might interpret older people’s interaction with the young as a way to help them maximize perceived power or status, just as the exchange theory of aging predicts. When activity is the preferred style, older people are likely to downplay reminiscence in favor of talking about present or future events. But when disengagement is the preferred style, older people may emphasize past accomplishments.

Some gerontologists recommend that reminiscence and life review can have great value for older people who can no longer remain active (Haight & Haight, 2007). For that reason, reminiscence groups have been encouraged as a form of therapy among some nursing home residents and senior center participants. Guided autobiography is a method used as a basis for education in the later years (Birren & Cochran, 2001). Spiritual autobiography groups have played a similar role in religious congregations.

All these methods can be useful for practitioners who work with older people, but techniques to encourage reminiscence as a form of practice must not divert us from a basic question: Is reminiscence or life review the best way of achieving a sense of meaning in old age? The response to that question cannot be purely scientific, but depends on basic values and philosophy of life. For example, if we follow philosopher Simone de Beauvoir’s view, then activity and future orientation are the best approach to finding meaning in old age. She would therefore discourage people from
spending time reminiscing about the past, unless past memories can somehow contribute to improving the world. Psychologist Carl Jung, in contrast, would see great value in inwardness or interiority in old age. The purpose or meaning of old age, in his view, is not necessarily to be active, but to know ourselves better and to accept ourselves as individuals (Sawin, Corbett, & Carbine, 2014). If life review can promote that goal, then Jung would encourage it, and Florida Scott-Maxwell, for example, follows along the lines suggested by Jung.

Do the reminiscence and life review by older people have meaning for people of other ages? Clearly, there is something special about old age precisely because it is the final stage of life. The last stage includes an awareness of finitude and a shortened time perspective (Kastenbaum, 1983). Furthermore, as the pace of social change increases, older people can no longer take for granted that their values will be shared by other cohorts; the 1960s and World War II generations may be quite different, not only from one another but from Generation X, born during the baby bust after the mid-1960s. The old may be perceived by others or perceive themselves as belonging to “the past,” regardless of their own subjective time orientation. Young people may assume that reminiscence is something appropriate only for the old.

In fact, the process of life review or autobiographical consciousness is not limited to old age, but occurs at transitions across the adult life course—for instance, in self-assessment after a job loss or another major life change. The life course perspective helps us appreciate links between subjective and objective time orientations and to see life review in broader terms. The search for meaning in life occurs not only at the end of life, but every time human beings become aware of their limited time on earth. It is perhaps for that reason that in the Bible the Psalms include a prayer for God to help us all to “number our days” and thus to cherish each passing moment, whatever our age may be.
Die early or grow old: there is no other alternative. And yet, as Goethe said, “Age takes hold of us by surprise.” For himself each man is the sole, unique subject, and we are often astonished when the common fate becomes our own—when we are struck by sickness, a shattered relationship, or bereavement. I remember my own stupefaction when I was seriously ill for the first time in my life and I said to myself, “This woman they are carrying on a stretcher is me.” Nevertheless, we accept fortuitous accidents readily enough, making them part of our history, because they affect us as unique beings: but old age is the general fate, and when it seizes upon our own personal life we are dumbfounded. “Why, what has happened?” writes Aragon. “It is life that has happened, and I am old.” . . . When we are grown up we hardly think about our age anymore: we feel that the notion does not apply to us; for it is one which assumes that we look back towards the past and draw a line under the total, whereas in fact we are reaching out towards the future, gliding on imperceptibly from day to day, from year to year. Old age is particularly difficult to assume because we have always regarded it as something alien, a foreign species: “Can I have become a different being while I still remain myself?” . . .

Thus, the very quality of the future changes between middle age and the end of one’s life. At sixty-five one is not merely twenty years older than one was at forty-five. One has exchanged an indefinite future—and one had a tendency to look upon it as infinite—for a finite future. In earlier days, we could see no boundary mark upon the horizon: now we do see one. “When I used to dream in former times,” says Chateaubriand, harking back to his remote past, “my youth lay before me; I could advance towards the unknown that I was looking for. Now I can no longer take a single step without coming up against the boundary-stone.” . . .

A limited future and a frozen past: such is the situation that the elderly have to face up to. In many instances, it paralyzes them. All their plans have either been carried out or abandoned, and their life has closed in about itself; nothing requires their presence; they no longer have anything whatsoever to do. . . .

Clearly, there is one preconceived notion that must be totally set aside—the idea that old age brings serenity. From classical times, the adult world has done its best to see mankind’s condition in a hopeful light; it has attributed to ages that are not its own, virtues that they do not possess: innocence to childhood, serenity to old age. It has deliberately chosen to look upon the end of life as a time when all the conflicts that tear it apart are resolved. What is more, this is a convenient illusion: it allows one to suppose, in spite of all the ills and misfortunes that are known to overwhelm them, that the old are happy and that they can be left to their fate. . . .

Why should an old person be better than the adult or child he was? It is quite hard enough to remain a human being when everything—health, memory, possessions, standing, and authority—has been taken from you. The old person’s struggle to do so has pitiable or ludicrous sides to it, and his fads, his meanness, and his deceitful ways may irrate one or make one
smile; but in reality it is a very moving struggle. It is the refusal to sink below the human level, a refusal to become the insect, the inert object to which the adult world wishes to reduce the aged. There is something heroic in desiring to preserve a minimum of dignity in the midst of such total deprivation.

On the intellectual plane, old age may also bring liberation: it sets one free from false notions. The clarity of mind that comes with it is accompanied by an often bitter disillusionment. In childhood and youth, life is experienced as a continual rise; and in favourable cases—either because of professional advancement or because bringing up one’s children is a source of happiness, or because one’s standard of living rises, or because of a greater wealth of knowledge—the notion of upward progress may persist in middle age. Then all at once a man discovers that he is no longer going anywhere, that his path leads him only to the grave. He has climbed to a peak, and from a peak there can be a fall. “Life is a long preparation for something that never happens,” said Yeats. There comes a moment when one knows that one is no longer getting ready for anything and one understands that the idea of advancing towards a goal was a delusion. Our personal history had assumed that it possessed an end, and now it finds, beyond any sort of doubt, that this finality has been taken from it. At the same time, its character of a “useless passion” becomes evident. A discovery of this kind, says Schopenhauer, strips us of our will to live. “Nothing left of those illusions that gave life its charm and that spurred on our activity. It is only at the age of sixty that one thoroughly understands the first verse of Ecclesiastes.”

If all were vanity or deceit, there would indeed be nothing left but to wait for death. But admitting that life does not contain its own end does not mean that it is incapable of devoting itself to ends of some kind. There are pursuits that are useful to mankind, and between men there are relationships in which they reach one another in full truthfulness. Once illusions have been swept away, these relationships, in which neither alienation nor myth form any part, and these pursuits remain. We may go on hoping to communicate with others by writing even when childish images of fame have vanished. By a curious paradox, it is often at the very moment that the aged man, having become old, has doubts about the value of his entire work that he carries it to its highest point of perfection. This was so with Rembrandt, Michelangelo, Verdi, and Monet. It may be that these doubts themselves help to enrich it. And then again it is often a question of coincidence: Age brings technical mastery and freedom while at the same time it also brings a questioning, challenging state of mind.

Freedom and clarity of mind are not of much use if no goal beckons us anymore: but they are of great value if one is still full of projects. The greatest good fortune, even greater than health, for the old person is to have his world still inhabited by projects: then, busy and useful, he escapes from both boredom and decay. The times in which he lives remain his own, and he is not compelled to adopt the defensive or aggressive forms of behavior that are so often characteristic of the final years.

There is only one solution if old age is not to be an absurd parody of our former life, and that is to go on pursuing ends that give our existence a meaning—devotion to individuals, to groups, or to causes—social, political, intellectual, or creative work. In spite of the moralists’ opinion to the contrary, in old age, we should wish still to have passions strong enough to prevent us from turning in upon ourselves. One’s life has value so long as one attributes value to the life of others, by means of love, friendship, indignation, compassion. When this is so, then there are still valid reasons for activity or speech. People are often advised to “prepare” for old age. But if this merely applies to setting aside money, choosing the place for retirement, and laying on hobbies, we shall not be much the better for it when the day comes. It is far better not to think about it too much, but to live a fairly committed, fairly justified life so that one may go on in the same path even when all illusions have vanished and one’s zeal for life has died away.
Satchel Paige, baseball’s legendary, indestructible African-American pitcher, was as famous for his fast answers as for his fastball. He began pitching at the age of seventeen and was for many years restricted to what was then called the Negro Baseball League. Born near the turn of the century, he was already a veteran at the pitcher’s mound when the racial barrier was relaxed. However, the decades rolled by, and he continued to pitch. As he did so, Paige became purposefully vague about his age, a subject of increasing speculation among sportswriters. When one of them put the question bluntly—“How old are you?”—Paige gave him a classic answer: “How old would you be if you didn’t know how old you was?” The question—and Paige’s answer—have as much to do with society’s definitions and expectations of aging, and successful aging, as with Paige’s own personal experience. By physical measures, at least, Paige was certainly aging successfully. But his wariness about coming clean with a hard number speaks volumes about our society’s skepticism about competence in old age. What, after all, does it mean to “age successfully”? Does America think of aging per se as a bad thing, even when good things continue to develop—or emerge for the first time— with age? What, actually, is “success”? . . .

**Successful Aging or the Imitation of Youth?**

Modern society, perhaps especially American society, seems to regard aging as something to be denied or concealed. Women are freed, happily, from the corsets and similar instruments of torture that fashion once decreed. But a massive and inventive cosmetics industry does its best to persuade middle-aged and elderly women—and, increasingly, men—that they will lead happier lives if they change their hair color from gray to some improbable shade of blonde or red, camouflage their hair loss, and cover, erase, or abrade their wrinkles.

Photographs that advertise the products in question show people who are invariably young in appearance; photographer and makeup artist collaborate to send the incessant message of youth. And what cosmetics and computer-enhanced photography cannot do, plastic surgery offers to accomplish. The implication of all this information and misinformation is that the ultimate form of successful aging would be no aging at all. A psychologist might be tempted to say that underlying this denial of the aging process is a more deep-seated denial: refusal to acknowledge the fact of human mortality and the inevitability of death.

**Source:** From *Successful Aging* edited by John Wallis Rowe and Robert L. Kahn (pp. 36–37, 48–49, 51–52). Copyright © 1998 by John Wallis Rowe, MD, and Robert L. Kahn, PhD. Reprinted by permission of International Creative Management, Inc.
Our view of successful aging is not built on the search for immortality and the fountain of youth. George Bernard Shaw, when he was in his nineties, was asked whether he had any advice for younger people. He did. “Do not try to live forever,” said Shaw, “you will not succeed.” Or, as psychologist Carol Ryff put it in a thoughtful article, “Ponce de León missed the point.”

In short, successful aging means just what it says—aging well, which is very different from not aging at all. The three main components of successful aging—are avoiding disease and disability, maintaining mental and physical function, and continuing engagement with life—are important throughout life, but their realization in old age differs from that at earlier life stages.

Old age has been called a “roleless role,” a time when it is no longer clear what is expected of the elderly person or where he or she can find the resources that will make old age successful. For earlier life stages, the expectations are clearer. Children are expected to attend school; in fact, they are legally required to do so. Able-bodied adults are expected to be employed or to be actively seeking paid employment. Parents of young children are expected to care for them. None of these societal expectations generates perfect compliance, but all of them are felt and most of them are backed by law.

The years after child-rearing and employment present a sharp contrast to these expected patterns and arrangements for their fulfillment. Almost nothing is expected of the elderly. The spoken advice from youth to age is “take it easy,” which means do nothing or amuse yourself. The unspoken message is “find your own way and keep out of ours.”

Many older men and women do better than that. They find new friends, partially replace paid employment with useful voluntary activity, maintain some form of regular exercise, and enjoy a measure of increased leisure. But many others do much less and age less well.

**READING 3**

**Vital Involvement in Old Age**

Erik H. Erikson, Joan M. Erikson, and Helen Q. Kivnick

Elders have both less and more. Unlike the infant, the elder has a reservoir of strength in the wellsprings of history and storytelling. As collectors of time and preservers of memory, those healthy elders who have survived into a reasonably fit old age have time on their side—time that is to be dispensed wisely and creatively, usually in the form of stories, to those younger ones who will one day follow in their footsteps. Telling these stories, and telling them well, marks a certain capacity for one generation to entrust itself to the next, by passing on a certain shared and collective identity to the survivors of the next generation: the future. Trust . . . is one
of the constant human values or virtues, universally acknowledged as basic for all relationships. Hope is yet another basic foundation for all community living and for survival itself, from infancy to old age. The question of old age, and perhaps of life, is how— with the trust and competency accumulated in old age—one adapts to and makes peace with the inevitable physical disintegration of aging.

After years of collaboration, elders should be able to know and trust, and know when to mistrust, not only their own senses and physical capacities, but also their accumulated knowledge of the world around them. It is important to listen to the authoritative and objective voices of professionals with an open mind, but one’s own judgment, after all those years of intimate relations with the body and with others, is decisive. The ultimate capacities of the aging person are not yet determined. The future may well bring surprises.

Elders, of course, know well their own strengths. They should keep all of these strengths in use and involved in whatever their environment offers or makes possible. And they should not underestimate the possibility of developing strengths that are still dormant. Taking part in needed and useful work is appropriate for both elders and their relationship to the community.

With aging, there are inevitably constant losses—losses of those very close, and friends near and far. Those who have been rich in intimacy also have the most to lose. Recollection is one form of adaptation, but the effort skillfully to form new relationships is adaptive and more rewarding. Old age is necessarily a time of relinquishing—of giving up old friends, old roles, earlier work that was once meaningful, and even possessions that belong to a previous stage of life and are now an impediment to the resiliency and freedom that seem to be requisite for adapting to the unknown challenges that determine the final stage of life.

Trust in interdependence. Give and accept help when it is needed. Old Oedipus well knew that the aged sometimes need three legs; pride can be an asset but not a cane.

When frailty takes over, dependence is appropriate, and one has no choice but to trust in the compassion of others and be consistently surprised at how faithful some caretakers can be.

Much living, however, can teach us only how little is known. Accept that essential “notknowingness” of childhood and with it also that playful curiosity. Growing old can be an interesting adventure and is certainly full of surprises.

One is reminded here of the image Hindu philosophy uses to describe the final letting go—that of merely being. The mother cat picks up in her mouth the kitten, which completely collapses every tension and hangs limp and infinitely trusting in the maternal benevolence. The kitten responds instinctively. We human beings require at least a whole lifetime of practice to do this. The religious traditions of the world reflect these concerns and provide them with substance and form.

THE POTENTIAL ROLE OF ELDERS IN OUR SOCIETY

Our society confronts the challenge of drawing a large population of healthy elders into the social order in a way that productively uses their capacities. Our task will be to envision what influences such a large contingent of elders will have on our society as healthy old people seek and even demand more vital involvement. Some attributes of the accrued wisdom of old age are fairly generally acknowledged and respected. If recognized and given scope for expression, they could have an important impact on our social order. We suggest the following possibilities.

Older people are, by nature, conservationists. Long memories and wider perspectives lend urgency to the maintenance of our natural world. Old people, quite understandably, seem to feel more keenly the obstruction of open waterfronts, the cutting of age-old stands of trees, the paving of vast stretches of fertile countryside, and the pollution of once clear streams and lakes. Their longer memories recall
the beauty of their surroundings in earlier years. We need those memories and those voices.

With aging, men and women in many ways become less differentiated in their masculine and feminine predilections. This in no way suggests a loss of sexual drive and interest between the sexes. Men, it seems, become more capable of accepting the interdependence that women have more easily practiced. Many elder women today, in their turn, become more vigorously active and involved in those affairs that have been the dominant province of men. Some women come to these new roles by virtue of their propensity to outlive the men who have been their partners. Many younger women have made a similar transition by becoming professional members of the workforce. These women seem capable of managing parenting and householding along with their jobs, particularly if they have partners who learn cooperation in these matters as an essential component of the marriage contract.

Our subjects demonstrate a tolerance and capacity for weighing more than one side of a question that is an attribute of the possible wisdom of aging. They should be well suited to serve as arbiters in a great variety of disputes. Much experience should be a precursor of long-range vision and clear judgment.

The aged have had a good deal of experience as societal witnesses to the effects of devastation and aggression. They have lived through wars and seen the disintegration of peace settlements. They know that violence breeds hatred and destroys the interconnectedness of life here on our earth and that now our capacity for destruction is such that violence is no longer a viable solution for human conflict.

Ideally, elders in any given modern society should be those who, having developed a marked degree of tolerance and appreciation for otherness, which includes “foreigners” and “foreign ways,” might become advocates of a new international understanding that no longer tolerates the vicious name-calling, depreciation, and distrustfulness typical of international relations. It is also possible to imagine a large, mature segment of the aging population, freed from the tension of keeping pace with competitors in the workplace, able to pursue vigorously art activities of all varieties. This would bring an extraordinary liveliness and artfulness to ordinary life. Only a limited portion of our adult population now has either the time or the money to be involved in activities of art expression or as appreciative supporters of the performing arts. Widespread participation in the arts is possible only if children are encouraged to develop those roots of imaginative play that arise from stimulating sensory experience. Elders learn this as they undertake to open these new doors of experience and could promote the inclusion of the arts in the educational system. The arts offer a common language, and the learning of that language in childhood could contribute to an interconnection among the world’s societies.

The development of a new class of elders requires a continued upgrading of all facilities for the health care and education of people at all stages of life, from infancy to old age. Organisms that are to function for a hundred years need careful early nurturing and training. Education must prepare the individual not only for the tasks of early and middle age, but for those of old age as well. Training is mandatory for both productive work and the understanding and care of the senses and the body as a whole. Participation in activities that can enrich an entire lifetime must be promoted and made readily available. In fact, a more general acceptance of the developmental principle of the life cycle could alert people to plan their entire lives more realistically, especially to provide for the long years of aging.

Having started our “joint reflections” with some investigation of the traditional themes of “age” and “stages,” a closing word should deal with the modern changes in our conception of the length and the role of old age in the total life experience. As we have described, modern statistics predict for our time and the immediate future a much longer life expectancy for the majority of old individuals rather than for a
select few. This amounts to such a radical change in our concept of the human life cycle that we question whether we should not review all the earlier stages in the light of this development. Actually, we have already faced the question of whether a universal old age of significantly greater duration suggests the addition to our cycle of a ninth stage of development with its own quality of experience, including, perhaps, some sense or premonition of immortality. A decisive fact, however, has remained unchanged for all the earlier stages, namely, that they are all significantly evoked by biological and evolutionary development necessary for any organism and its psychosocial matrix. This also means that each stage, in turn, must surrender its dominance to the next stage, when its time has come. Thus, the developmental ages for the pre-adult life stages decisively remain the same, although the interrelation of all the stages depends somewhat on the emerging personality and the psychosocial identity of each individual in a given historical setting and time perspective.

Similarly, it must be emphasized that each stage, once given, is woven into the fates of all. Generativity, for example, dramatically precedes the last stage, that of old age, establishing the contrast between the dominant images of generativity and of death: one cares for what one has generated in this existence while simultaneously preexperiencing the end of it all in death.

It is essential to establish in the experience of the stages a psychosocial identity, but no matter how long one’s life expectancy is, one must face oneself as one who shares an all-human existential identity, as creatively given form in the world religions. This final “arrangement” must convince us that we are meant as “grandparents,” to share the responsibility of the generations for each other. When we finally retire from familial and generational involvement, we must, where and when possible, bond with other old-age groups in different parts of the world, learning to talk and to listen with a growing sense of all-human mutuality.

Age puzzles me. I thought it was a quiet time. My seventies were interesting and fairly serene, but my eighties are passionate. I grow more intense as I age. To my own surprise, I burst out with hot conviction. Only a few years ago, I enjoyed my tranquility; now I am so disturbed by the outer world and by human quality in general that I want to put things right, as though I still owed a debt to life. I must calm down. I am far too frail to indulge in moral fervor.

Old people are not protected from life by engagements, pleasures, or duties; we are open to our own sentience; we cannot get away from it, and it is too much. We should ward off the problematic and, above all, the insoluble. These are far, far too much, but it is just these that attract us. Our one safety is to draw in and enjoy the simple and immediate. We should rest within our own confines. It may be dull and restricted, but it can be satisfying within our

**SOURCE:** From *The Measure of My Days* by Florida Scott-Maxwell. Copyright © 1968 by Florida Scott-Maxwell. Used by permission of Alfred A. Knopf, a division of Random House, Inc.
own walls. I feel most real when alone, even most alive when alone.

Age is truly a time of heroic helplessness. One is confronted by one's own incorrigibility. I am always saying to myself, "Look at you, and after a lifetime of trying." I still have the vices that I have known and struggled with—well it seems like since birth. Many of them are modified, but not much. I can neither order nor command the hubbub of my mind. Or is it my nervous sensibility? This is not the effect of age; age only defines one's boundaries. Life has changed me greatly, it has improved me greatly, but it has also left me practically the same. I cannot spell, and I am overcritical, egocentric, and vulnerable. I cannot be simple. In my effort to be clear, I become complicated. I know my faults so well that I pay them small heed. They are stronger than I am. They are me.

Another day to be filled, to be lived silently, watching the sky and the lights on the wall. No one will come probably. I have no duties except to myself. That is not true. I have a duty to all who care for me—not to be a problem, not to be a burden. I must carry my age lightly for all our sakes, and thank God I still can. Oh that I may to the end. Each day, then, must be filled with my first duty, I must be "all right." But is this assurance not the gift we all give to each other daily, hourly?

Another secret we carry is that, although drab outside—wreckage to the eye mirrors a mortification—inside we flame with a wild life that is almost incomunicable. In silent, hot rebellion, we cry silently—"I have lived my life haven't I? What more is expected of me?" Have we got to pretend out of noblesse oblige that age is nothing, in order to encourage the others? This we do with a certain haughtiness, realizing now that we have reached the place beyond resignation, a place I had no idea existed until I had arrived here.

It is a place of fierce energy. Perhaps passion would be a better word than energy, for the sad fact is this vivid life cannot be used. If I try to transpose it into action, I am soon spent. It has to be accepted as passionate life, perhaps the life I never lived, never guessed I had it in me to live. It feels other and more than that. It feels like the far side of precept and aim. It is just life, the natural intensity of life, and when old we have it for our reward and undoing. It can—at moments—feel as though we had it for our glory. Some of it must go beyond good and bad, for at times, although this comes rarely, unexpectedly—it is a swelling clarity as though all was resolved. It has no content, it seems to expand us, it does not derive from the body, and then it is gone. It may be a degree of consciousness which lies outside activity and which when young we are too busy to experience.

It has taken me all the time I've had to become myself, yet now that I am old, there are times when I feel I am barely here, no room for me at all. I remember that in the last months of my pregnancies, the child seemed to claim almost all my body, my strength, my breath, and I held on wondering if my burden was my enemy, uncertain as to whether my life was at all mine. Is life a pregnancy? That would make death a birth.

Easter Day. I am in that rare frame of mind when everything seems simple—when I have no doubt that the aim and solution of life is the acceptance of God. It is impossible, imperative, and clear. To open to such unimaginable greatness affrights my smallness. I do not know what I seek, cannot know, but I am where the mystery is the certainty.

My long life has hardly given me time—I cannot say to understand—but to be able to imagine that God speaks to me, says simply—"I keep calling to you, and you do not come," and I answer quite naturally—"I couldn't, until I knew there was nowhere else to go." I am uncertain whether it is a sad thing or a solace to be past change. One can improve one's character to the very end, and no one is too young in these days to put the old right. The late clarities will be put down to our credit I feel sure.

It was something other than this that had caught my attention. In fact, it was the exact
opposite. It was the comfortable number of things about which we need no longer bother. I know I am thinking two ways at once, justified and possible in a notebook. Goals and efforts of a lifetime can at last be abandoned. What a comfort. One’s conscience? Toss the fussy thing aside. Rest, rest. So much over, so much hopeless, some delight remaining.

One’s appearance, a lifetime of effort put into improving that, most of it ill judged. Only neatness is vital now, and one can finally live like a humble but watchful ghost. You need not plan holidays because you can’t take them. You are past all action, all decision. In very truth, the old are almost free, and if it is another way of saying that our lives are empty, well—there are days when emptiness is spacious and non-existence elevating. When old, one has only one’s soul as company. There are times when you can feel it crying, you do not ask why. Your eyes are dry, but heavy, hot tears drop on your heart. There is nothing to do but wait and listen to the emptiness which is sometimes gentle. You and the day are quiet, and you have no comment to make.

I don’t like to write this down, yet it is much in the minds of the old. We wonder how much older we have to become and what degree of decay we may have to endure. We keep whispering to ourselves, “Is this age yet? How far must I go?” For age can be dreaded more than death. “How many years of vacuity? To what degree of deterioration must I advance?” Some want death now as a release from old age; some say they will accept death willingly, but in a few years. I feel the solemnity of death and the possibility of some form of continuity. Death feels a friend because it will release us from the deterioration of which we cannot see the end. It is waiting for death that wears us down and the distaste for what we may become.

These thoughts are with us always, and in our hearts we know ignominy as well as dignity. We are people to whom something important is about to happen. But before then, these endless years before the end, we can summon enough merit to warrant a place for ourselves. We go into the future not knowing the answer to our question.

But we also find that as we age we are more alive than seems likely, convenient, or even bearable. Too often our problem is the fervor of life within us. My dear fellow octogenarians, how are we to carry so much life, and what are we to do with it?

Let no one say it is “unlived life” with any of the simpler psychological certitudes. No one lives all the life of which he was capable. The unlived life in each of us must be the future of humanity. When truly old, too frail to use the vigor that pulses in us, and weary, sometimes even scornful, of what can seem the pointless activity of mankind, we may sink down to some deeper level and find a new supply of life that amazes us.

All is uncharted and uncertain; we seem to lead the way into the unknown. It can feel as though all our lives we have been caught in absurdly small personalities, circumstances, and beliefs. Our accustomed shell cracks here, cracks there, and that tiresomely rigid person we supposed to be ourselves stretches, expands, and, with all inhibitions, is gone. We realize that age is neither failure nor disgrace, although mortifying we did not invent it. Age forces us to deal with idleness, emptiness, not being needed, not able to do, helplessness just ahead perhaps. All this is true, but one has had one’s life, one could be full to the brim. Yet it is the end of our procession through time, and our steps are uncertain.

Here we come to a new place of which I knew nothing. We come to where age is boring, one’s interest in it by-passed; further on, go further on, one finds that one has arrived at a larger place still, the place of release. There one says,

Age can seem a debacle, a rout of all one most needs, but that is not the whole truth. What of the part of us, the nameless, boundless part who experienced the rout, the witness who saw so much go, who remains undaunted and
knows with clear conviction that there is more to us than age? Part of that which is outside age has been created by age, so there is gain as well as loss. If we have suffered defeat we are somewhere, somehow beyond the battle. . . .

A long life makes me feel nearer truth, yet it won’t go into words, so how can I convey it? I can’t, and I want to. I want to tell people approaching and perhaps fearing age that it is a time of discovery. If they say, “Of what?,” I can only answer, “We must each find out for ourselves, otherwise it won’t be discovery.” I want to say, “If at the end of your life you have only yourself, it is much. Look, you will find.”

FOCUS ON PRACTICE

Conscious Aging

In recent years, there has been a surge of public interest in spiritual topics especially related to development in later life. This interest in things spiritual takes different forms, ranging from an interest in exotic New Age phenomena to a revival of traditional mystical teachings from Judaism and Christianity.

Some recent research suggests that mystical experience is becoming more common, with broad implications for an aging society. For example, Jeffrey Levin (1993) looked at age differences in reports of extrasensory perception, spiritualism, and numinous experience, which he defined as being “close to a powerful, spiritual force that seemed to lift you out of yourself.” Using data from a representative cross-sectional population survey, Levin found that between 1973 and 1988, composite mysticism scores increased with successive age cohorts. Private and subjective religiosity is positively related to overall mystical experience, but organizational religiosity is inversely related, suggesting that those pursuing spiritual growth may find it in places other than church on Sunday. In light of Levin’s findings, it is not surprising that large proportions of older Americans are already making use of so-called alternative therapies, including meditation, as part of their health practices (McMahan & Lutz, 2004).

Compared with European societies, the United States has historically been more religiously oriented, but spiritual revival today goes beyond mainstream religion. Individual growth is the new watchword. In keeping with that trend, one of the most fascinating developments today is the rise of “conscious aging,” an idea based on an assumption that late life can be a period for positive spiritual growth. Zalman Schachter-Shalomi, a pioneer of the Jewish Renewal movement, and Ram Dass, once a Harvard psychology professor and later a spiritual teacher, emerged as national leaders of the conscious-aging movement. Holistic health care, life review, and mystical religion are all important elements in conscious aging (Schachter-Shalomi & Miller, 1995).

A central practice of conscious aging is personal meditation (Goleman, 1988), whether it takes the form of yoga, Zen, and other Eastern disciplines or the form of contemplative prayer, which has a long history in the Christian church. Meditation as a spiritual discipline is a way of looking at ourselves as beings with depths beyond the conscious mind or ego. The same outlook permeates the work of Jungian psychiatrist Allan Chinen, who has opened up new vistas for the interpretation of fairy tales about the second half of life (Chinen, 1989). Conscious aging represents a coming together of religion and psychology so that each can enrich the other.

(Continued)
Conscious aging goes beyond conventional assumptions about adaptation or personality development over the life course. An early proponent of this view was Abraham Maslow, founder of humanistic psychology. Maslow believed that most people use only a small part of human potential, a potential demonstrated in what he called “peak experiences.” At these high points in our life, we have a chance to move toward self-actualization, that is, to become more fulfilled as human beings. Maslow himself believed that most people who are self-actualized are to be found among those who are mature in years—middle aged or older.

Mainstream psychology has, for the most part, not looked closely at the higher reaches of human potential, whether in young people or in old. One result of that limitation may be the “decline-and-fall” view of aging criticized by researchers who have looked at the emergence of wisdom in later life (Baltes, 1993). But some life span developmental psychologists go further. They argue that mature thought in adulthood entails a dimension of “transcendence” (Miller & Cook-Greuter, 1994), the province of transpersonal psychology (Walsh & Vaughan, 1993). Transpersonal psychology includes elements such as attention training, emotional transformation, refining awareness, and the achievement of wisdom through detachment and integration.

The conscious-aging perspective may have something to contribute to gerontology on matters such as health care, intergenerational relations, and adult education. For example, research over the past two decades has documented the tangible benefits of meditation for physical and mental health. What happens in meditation has long been familiar to medical and psychological researchers under the name of “autogenic training,” or self-induced modification of lower brain centers. More than two decades ago, Herbert Benson of Harvard Medical School published his groundbreaking article on “the relaxation response,” which explained altered states of consciousness in yoga and Zen in terms of the central nervous system. Since then, extensive research on biofeedback and alpha waves in the brain has confirmed the feasibility of studying consciousness.

There has also been some interesting experimental confirmation of strategies of conscious aging as a means of overcoming what psychologist Robert Kastenbaum (1984) calls habituation. In Kastenbaum’s view, the essence of aging is a process of becoming gradually deadened or more mechanical in our response to life because of the power of habits. By contrast, meditation can be viewed as a progressive growth in powers of attention to overcome habituation in old stimulus–response patterns.

Conscious aging is a struggle to establish new cognitive structures, new ways of looking at the world. Researcher Arthur Deikman (1966/1990) has described how the process of deautomization can come from practicing meditative disciplines such as yoga or Zen. Deikman, for instance, conducted a procedure of “experimental meditation,” after which subjects reported sensory experience that was more vivid and luminous. Deikman’s work and other experiments like it suggest that deliberate concentration and meditation can modify the selectivity of sensory input to the brain.

These findings could have implications for an aging society. For example, a controlled study in a geriatric population found that meditation-relaxation techniques can have a major impact in reducing anxiety and depression, an impact superior to conventional cognitive-behavioral techniques (DeBerry, Davis, & Reinhard, 1989). Another study, funded by the National Institute of Mental Health, looked at the impact of Transcendental Meditation to see whether it can have benefits beyond simple relaxation. That study confirmed the point that cultivation of “mindfulness,” a
state of consciousness free of content but alert, does have measurable consequences for learning, cognitive flexibility, and overall mental health. These positive results remained with the participants years later (Alexander et al., 1989).

Conscious aging is trying to apply these lessons from research and practice to a growing older population. Interest in health promotion, productive aging, and lifelong learning is likely to make conscious aging a subject of continuing importance as the United States becomes an aging society in the 21st century. It may prove an intriguing glimpse of things to come.

Questions for Writing, Reflection, and Debate

1. Some critics have argued that disengagement theory may have accurately characterized the behavior of the older population in the 1950s, but that it was a mistake to infer that this pattern was universal. According to these critics, activity theory or continuity theory might well be a better description of how older people live today. If the critics’ view is correct, does it mean that any theories of aging simply express the way aging appears at a certain time in history? If so, how would it be possible to develop an account that is more general and not limited to a certain time and place?

2. The United States as a society tends to place a high value on success and achievement. Does that fact suggest that the goal of “successful aging” is an appropriate approach to thinking about growing old in the United States? Are there aspects of growing older that could present a problem for the goal of successful aging?

3. Psychologist Carl Jung believed that the psychological goal of later life is to become more and more oneself as an individual. What does this goal mean in practice? What drawbacks to this idea can you think of? If we adopt Jung’s approach, how would we evaluate older people who remain very much as they have always been, in contrast to older people who dramatically change their lives, say, after the point of retirement or widowhood?

4. Imagine that you are now 80 years old and have discovered that you may not have long to live. Your grandchildren have asked you to write about what you’ve learned about the meaning of life, especially in the last few years. In your statement, contrast what you believe now (as a future 80-year-old) with what you believed in the past (at what is your present age).

5. Assume that you are the activities director of a church-affiliated nursing home that prides itself on promoting the quality of life of residents. Write a memorandum for the nursing home director outlining a range of activities that would help enhance the residents’ sense of the meaning of life in the long-term care facility.

6. Is the idea of “meaning” in life something purely personal and private, or does it have some wider social importance? Does discussing the question of meaning give us an understanding of older people’s behavior, or is it simply confusing? In addressing this question, consider other issues discussed in this book, such as assisted suicide, work and leisure, and the allocation of health care resources for life prolongation. How would the idea of a meaning for old age affect one’s view of these questions?

7. Visit the website devoted to “religion, aging and old age” at http://www.trinity.edu/~mkearl/ger-relg.html. Based on what you see at this site, what recommendations would you make to a reporter whose editor has given an assignment to write a general article on “religion and old age”?

8. Consider carefully Lars Tornstam’s concept of “gerotranscendence.” Using only the simplest and most everyday language, try to give an explanation of gerotranscendence to a friend or relative who knows nothing about gerontology and is not particularly sympathetic to religion.
Suggested Readings


Student Study Site

Visit the Student Study Site at [http://study.sagepub.com/moody9e](http://study.sagepub.com/moody9e) for these additional learning tools:

- Flash cards
- Web quizzes
- Chapter outlines
- SAGE journal articles
- Web resources
- Video and audio resources

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Oliver Wendell Holmes (1858/1891), in his poem “The Wonderful One-Hoss Shay,” invokes a memorable image of longevity and mortality, the example of a wooden horse cart or shay that was designed to be long-lasting:

Have you heard of the wonderful one-hoss shay,
That was built in such a logical way,
It ran a hundred years to a day . . . ?

This wonderful “one-hoss shay,” we learn, was carefully built so that every part of it “aged” at the same rate and didn’t wear out until the whole thing fell apart all at once. Exactly a century after the carriage was produced, the village parson was driving this marvelous machine down the street, when

What do you think the parson found,
When he got up and stared around?
The poor old chaise in a heap or mound,
As if it had been to the mill and ground!
You see, of course, if you’re not a dunce,
How it went to pieces all at once,
All at once, and nothing first,
Just as bubbles do when they burst.

The wonderful one-horse shay is the perfect image of an optimistic hope about aging: a long, healthy existence followed by an abrupt end of life, with no decline. The one-horse shay image also suggests that life has a built-in “warranty expiration” date. But where does this limit on longevity come from? Is it possible to extend life beyond what we know? The living organism with the longest individual life span is the bristlecone pine tree found in California, more than 4,500 years old, with no end in sight.
The maximum human life span appears to be around 120 years. In fact, we have no valid records of anyone living much beyond that length. There have been claims of people living to the advanced age of 150 or even longer. Some claims have persuaded the National Enquirer, and others even convinced a scientist at Harvard Medical School. But whatever the Enquirer or Harvard wanted to believe, there has never been proof of such longevity. Quite the contrary. Despite the fact that we have millions upon millions of verified birth records in the 20th century, until recently, there were no proven cases at all of any human being living beyond age 120. Then, in 1995, a Frenchwoman named Jeanne Louise Calment did just that, before dying in 1997 at the proven age of 122 (Robine, 1998). Madame Calment actually remembered seeing Vincent van Gogh as a child!

Some scientists argue that even the idea of maximum life span is based only on empirical observation. With biological breakthroughs in the future, might we someday surpass that limit? Indeed, optimists ask, why settle for the one-horse shay?

On the face of it, prolonging the human life span sounds good. But is it feasible? Will it make our lives better? One cartoon in The New Yorker shows a middle-aged man at a bar complaining to his companion: “See, the problem with doing things to prolong your life is that all the extra years come at the end, when you’re old” (Mankoff, 1994). Another cartoon depicts two nursing home residents in wheelchairs confiding to each other: “Just think. If we hadn’t given up smoking, we’d have missed all this.”

These cartoons point to the fact that often the consequences of biophysical aging appear well before reaching maximum life span. Some observers believe that the proper aim of medicine should therefore be to intervene, perhaps even to slow down the rate of aging, so that more and more of us can remain healthy up to the very end of life. At that point, the body would simply “fall apart” all at once, like the wonderful one-horse shay (Avorn, 1986). This view, mentioned earlier, is known as the compression of morbidity, an idea developed and promoted by James Fries (1988, 2004).

The compression-of-morbidity hypothesis looks forward to greater numbers of people who postpone the age of onset of chronic infirmity (Brooks, 1996). In other words, we would aim for a healthy old age, followed by rapid decline and death. Sickness or morbidity would be compressed into the last few years or months of life. But things don’t always work out that way. We may succeed in postponing deaths from heart disease, cancer, or stroke. But what happens if we live long enough to get other diseases? The same preventive measures can have, as an unintended result, increased rates for chronic conditions such as dementia, diabetes, hip fracture, and arthritis (Roush, 1996). Many observers worry that as increasing numbers of people live to advanced ages, the challenge of compressing morbidity will become more and more difficult. One study of mortality did find some evidence that survival curves became more rectangular—that is, deaths became concentrated around a point later in life (Nusselder & Mackenbach, 1996), but other studies have found the opposite. Investigators such as Eileen M. Crimmins and Hiram Beltrán-Sánchez (2011) have found that the length of life with disease and limited mobility had increased between 1998 and 2008, a trend that does not support the idea of compression of morbidity. In addition, there is increasing evidence of social inequalities in longevity and the potential for experiencing a healthy old age; gender, ethnicity, and socioeconomic status are interconnected factors to consider in the compression-of-morbidity discussion (Olshansky et al., 2012).

It is important to distinguish here between life expectancy and maximum life span. Life expectancy, or expected years of life from birth, has risen, but life span, which is defined as
the maximum possible length of life, has evidently not changed at all. As mentioned earlier, to the best of our knowledge, no human being has ever lived beyond 120 years or so. The causes of maximum life span and of aging itself still remain unknown. Biological evidence suggests that maximum life span is genetically determined, and therefore fixed, for each species. Another important idea related to life expectancy and aging is referred to as “disability free” or “active” life expectancy, the number of years an individual can expect to live beyond age 65 without significant functional impairment due to disability or chronic illness (Cherlin, 2010; World Health Organization, 2015).

With this concept of life span limit in mind, compression of morbidity is attractive because delaying dysfunction would enhance the quality of life, extend life expectancy, and reduce health care costs (Butler, 1995). A compression-of-morbidity strategy would move life expectancy closer to the hypothetical upper bound of maximum life span. Instead of expecting to live only to age 85, people who reached 65 could expect to become centenarians, yet in good health nearly to the end of life.

Such a gain in active life expectancy would have dramatic consequences for our society. To judge whether this strategy for compression of morbidity is feasible, we need to examine in more detail what is involved in normal aging. We need to understand what is known about the biology of aging and what may be discovered in the future.

**The Process of Biological Aging**

In favorable conditions, a human being can live to around a hundred years old: A few live a bit longer than that, but not many and not for much more. Why is that? We don’t live to be a thousand years old, and, unlike some species, we don’t live only a few months. Why is that? Why a hundred years and not a few months or many centuries? This is a basic question about the process of biological aging.

Normal aging can be defined as an underlying time-dependent biological process that, although not itself a disease, involves functional loss and susceptibility to disease and death. One way to measure susceptibility to death is to look at death rates. For contemporary humans, these rates double every 8 years. This pattern is known as Gompertz law (Kowald, 2002). In other words, a 38-year-old is about twice as likely to die as a 30-year-old, a 46-year-old is four times more likely to die than a 30-year-old, and so on. At any given age, there is an important gender difference: Although men and women age at the same rate, women at every age are less biologically fragile than men—just the contrary to what our cultural stereotypes might suggest. However, as we will discuss later in this book, there are disparities between women and men when it comes to patterns of chronic illness, disability, and “active life expectancy.”

Studies of different species of organisms show that aging is almost universal, but the causes of aging are complex. For instance, among animals whose body mass and metabolism are comparable, the rate of aging varies greatly (Olshansky & Carnes, 2002). Consider the differences in maximum life span among some familiar animal species shown in Exhibit 1.

The rate of aging can be correlated, in a general way, with the amount of time it takes for the mortality rate of a species to double. The doubling time is around 8 years for humans today, but only 10 days for a fruit fly and 3 months for a mouse. In rough terms, we can say that a mouse ages at around 25 times the rate of a human being.
What accounts for these clear differences in rates of aging and life span across species? Comparative anatomy—the study of the structure of different species—generates some insights into this question. For example, among mammals and other vertebrates, an increase in relative brain size is positively related to an increased life span. Other factors correlated with life span are lifetime metabolic activity, body size, body temperature, and the rate of energy use. For example, a tiny hummingbird has a rapid heartbeat and a high rate of energy metabolism; it also lives a comparatively short time, as if it were more quickly using up its total lifetime energy or action potential (Sacher, 1978).

Biologists have discovered intriguing relationships among life span, body size, relative brain size, and metabolic intensity. For example, a chipmunk has a maximum life span of 8 years, but an elephant can achieve 78 years. These facts suggest a more general idea known as the rate-of-living concept: roughly, the concept that metabolism and life expectancy are closely correlated. Smaller organisms, which tend to have a more rapid metabolism for each unit of body mass, also tend to have shorter life spans. A short-lived mouse and a long-lived elephant both have approximately the same temperature, but the mouse produces more heat per unit of mass. At the other extreme, slow-moving turtles are likely to have life spans longer than the more active mammals. Another fascinating fact is that no matter their total body mass, mammals have approximately the same number of heartbeats in a lifetime. Still, despite these tantalizing correlations, the rate-of-living theory has largely been rejected by

### Exhibit 1  Some Organisms’ Maximum Life Span

<table>
<thead>
<tr>
<th>Organism</th>
<th>Maximum Life Span (in Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tortoise</td>
<td>177</td>
</tr>
<tr>
<td>Human being</td>
<td>120</td>
</tr>
<tr>
<td>African elephant</td>
<td>78</td>
</tr>
<tr>
<td>Horse</td>
<td>62</td>
</tr>
<tr>
<td>Golden eagle</td>
<td>50</td>
</tr>
<tr>
<td>Chimpanzee</td>
<td>37</td>
</tr>
<tr>
<td>Dog</td>
<td>34</td>
</tr>
<tr>
<td>American buffalo</td>
<td>26</td>
</tr>
<tr>
<td>Domestic cat</td>
<td>21</td>
</tr>
<tr>
<td>Kangaroo</td>
<td>16</td>
</tr>
<tr>
<td>Domestic rabbit</td>
<td>12</td>
</tr>
<tr>
<td>House mouse</td>
<td>3</td>
</tr>
<tr>
<td>Fruit fly</td>
<td>25 days</td>
</tr>
</tbody>
</table>

**SOURCE:** Data compiled from Walford (1983), Encyclopædia Britannica online, and from the educational website “Did You Know?”
biologists, along with the notion that biological aging is somehow necessary for the good of the species (Austad, 1997).

In comparison with other species of mammals, the human being has the longest life span and also expends more energy per body weight over the total life span than any other mammal. Energy metabolism per body weight across the life span in humans is about four times greater than that for most other species of mammals. Human beings have an average life expectancy and a maximum life span about twice as great as those of any other primate.

Compare the chimpanzee and the human being. The maximum human life span appears to be around 110 to 120 years; the chimpanzee’s is close to 40 years. But when we look at DNA from both species, we find that their DNA is more than 98% identical. These figures suggest that the rate of aging may be determined by a relatively limited part of the genetic mechanism. Calculations suggest that if a cell is determined by around 100,000 genes, then perhaps no more than a few hundred alterations in the genetic code are needed to change the rate of aging.

Scientists have posited that a large increase in maximum human life span occurred fairly recently—probably within the past 100,000 years. The speed of this development suggests that only a tiny portion of the human genome, representing less than 1% of the genetic code, was likely to be involved. If so few genetic mechanisms determine aging, then we can perhaps hope to intervene to delay the process of aging (Finch, 1990).

**Biological Theories of Aging**

The facts about aging and maximum life span have led many biologists to believe that biophysical aging, or senescence, may have a single fundamental cause. In their efforts to find such a single primary process to explain those time-dependent changes that we recognize as biophysical aging, they have developed many different ideas. Biologist Zhores Medvedev (1972) enumerated more than 300 biological theories of aging. At present, no single theory of aging explains all the complex processes that occur in cells and body systems, but ongoing research is under way that is leading to new insights into why we grow old.

Broadly speaking, we can distinguish between two kinds of theories of aging (Finch & Kirkwood, 2000):

- **Chance.** Some theories see aging as the result of external events, such as accumulated random negative factors that damage cells or body systems over time. For example, these factors might be mutation or damage to the organism from wear and tear.
- **Fate.** Some theories see aging as the result of an internal necessity, such as a built-in genetic program that proceeds inevitably to senescence and death.

In either case, the question remains open: Is it possible to intervene to correct damage to the aging body or modify the genetic program? The most likely interventions are those that would make sense depending on which theory best explains the facts about aging (Ludwig, 1991).

**Wear-and-Tear Theory**

The wear-and-tear theory of aging sees aging as the result of chance. The human body, like all multicellular organisms, is constantly wearing out and being repaired. Each day,
thousands of cells die and are replaced, and damaged cell parts are repaired. Like components of an aging car, parts of the body wear out from repeated use, so the wear-and-tear theory seems plausible.

The wear-and-tear theory is a good explanation for some aspects of aging—for example, the fact that joints in our hips, fingers, and knees tend to become damaged over the course of time. A case in point is the disease of osteoarthritis, in which cartilage in joints disintegrates. Another is cataracts, in which degeneration causes vision loss. Our hearts beat several billion times over a lifetime, so with advancing age, the elasticity of blood vessels gradually weakens, causing normal blood pressure to rise and athletic performance to decline.

The wear-and-tear theory of aging goes back to Aristotle but in its current form was expounded by one of the founding fathers of modern biogerontology, August Weismann (1834–1914). He distinguished between the two types of cells in the body: germ plasm cells, such as the sperm and egg, which are capable of reproducing and are in some sense “immortal,” and somatic cells comprising the rest of the body, which die. Weismann (1889), in his famous address “On the Duration of Life,” argued that aging takes place because somatic cells cannot renew themselves, and so living things succumb to the wear and tear of existence.

What we see as aging, then, is the cumulative, statistical result of “wear and tear.” Consider the case of glassware in a restaurant, which follows a curve similar to that for human populations. Over time, fewer and fewer glasses are left unbroken, until finally all are gone. The “life expectancy” or survival curve of the glassware follows a linear path over time, but the result for each individual glass comes about because of chance. Nothing decrees in advance that a specific glass will break at a fixed time. Glasses are just inherently breakable, so normal wear and tear in a restaurant will have its inevitable result. Like everyone born in a certain year (e.g., 1880), the “glasses” disappear one by one until none are left.

Some modern biological theories of aging are more sophisticated versions of this original wear-and-tear theory. For example, the somatic mutation theory of aging notes that cells can be damaged by radiation and, as a result, mutate or experience genetic changes (Szilard, 1959). The somatic mutation hypothesis would seem to predict higher cancer rates with age, yet survivors of the atomic bomb at Hiroshima showed higher rates of cancer but no acceleration of the aging process.

Even without actual mutation, over time, cells might lose their ability to function as a consequence of dynamic changes in DNA. According to the so-called error accumulation theory of aging, or error catastrophe theory, decremental changes of senescence are essentially the result of chance or random changes that degrade the genetic code (Medvedev, 1972). The process is similar to what would happen if we were to use a photocopy to make another copy. Over time, small errors accumulate. The errors eventually make the copies unreadable. Similarly, the error catastrophe theory suggests that damaged proteins eventually bring on what we know as aging through dysfunction in enzyme production.

The accumulative waste theory of aging points to the buildup in the cells of waste products and other harmful substances. The accumulation of waste products eventually interferes with cell metabolism and leads to death. Although waste products do accumulate, there is little evidence of harm to the organism. The key to longevity may be the extent to which cells retain the capacity to repair damage done to DNA. In fact, DNA repair capacity is correlated with the metabolic rate and life span of different species. Some studies suggest that DNA damage in excess of repair capacity may be linked to age-related diseases such as cancer.
Autoimmune Theory

The immune system is the body’s defense against foreign invaders such as bacteria. The immune system protects and preserves the body’s integrity, and it does this by developing antibodies to attack hostile invaders. We know that the immune system begins to decline after adolescence, and the weakening of immune function is linked to age-related vulnerability. According to the autoimmunity theory of aging, the system may eventually become defective and no longer distinguish the body’s own tissues from foreign tissues. The body may then begin to attack itself, as suggested by the rising incidence of autoimmune diseases, such as rheumatoid arthritis, with advancing age (Kay & Makinodan, 1981).

Aging-Clock Theory

According to the aging-clock theory of aging, aging is programmed into our bodies like a clock ticking away from the moment of conception. One of the best examples of an aging clock in humans is the menstrual cycle, which begins in adolescence and ends with menopause. The aging-clock theory is part of programmed aging, in which aging is seen as a normal part of a sequence leading from conception through development to senescence and finally to death.

One version of the aging-clock theory emphasizes the roles of the nervous and endocrine systems. This version postulates that aging is timed by a gland, perhaps the hypothalamus, the thymus, or the pituitary gland. Such a gland acts like an orchestra conductor or a pacemaker to regulate the sequence of physiological changes that occur over time. Some support for this idea comes from observations that the hormone dehydroepiandrosterone (DHEA) is found in higher levels among younger people. Experimenters have also discovered that DHEA supplements help laboratory rats live longer.

The aging-clock theory has encouraged research on the role of hormones secreted by the thyroid, pituitary, and thymus glands (Lamberts, van den Beld, & van der Lely, 1997). These include human growth hormone, which can now be manufactured in quantity through genetic engineering. In experiments, volunteers injected with growth hormone lost flabby tissue and grew back muscle, essentially reversing some manifestations of the aging process for a time. Other investigators are interested in hormones produced by the pineal gland, which may help regulate the “biological clock” that keeps time for the body.

Hormones and the endocrine system clearly play a major role in the process of aging. Hormones control growth, development, and reproduction in plants and animals. Biologists recognize a phenomenon here called semelparity. The best example is the Pacific salmon, which swims upstream to lay its eggs and then dies. So-called annual plants also exhibit semelparity: The tomato plant flourishes, produces fruit, and then dies away as the autumn leaves begin to fall.

But we find no comparable biological process in humans. We do recognize the profound age-related hormonal change of menopause, which comes with the loss of cells in the ovary that produce estrogen. Female mammals are born with a finite number of egg cells, so menopause is an example of a “preprogrammed” life event linked to age. Menopause is not a disease itself—it is, rather, a normal part of aging—but it is tied to health problems of aging because the loss of estrogen often weakens bone-mineral metabolism, resulting in thinner bone structure—a condition known as osteoporosis. Thin bones can lead to fractures, which in turn may compromise an older person’s ability to live independently.
Cross-Linkage Theory

Connective tissue in the body, such as the skin or the lens of the eye, loses elasticity with advancing age. We recognize the result as wrinkling of skin and cataracts. The explanation for this change lies in a substance known as collagen, a natural protein found in skin, bones, and tendons. According to the cross-linkage theory of aging, the changes we see result from the accumulation of cross-linking compounds in the collagen, which gradually become stiff. As in the waste accumulation theory, the piling up of harmful molecules is thought to eventually impair cell function. Some of this cross-linking may be caused by free radicals, which are cited in several different theories of aging. Cross-linkage and collagen, therefore, are related to other changes in macromolecules and organ systems as they age (Bilder, 2016).

Free Radicals

Free radicals are unstable organic molecules that appear as a by-product of oxygen metabolism in cells (Armstrong et al., 1984). Free radicals are highly reactive and toxic when they come in contact with other cell structures, thus generating biologically abnormal molecules. The result may be mutations, damage to cell membranes, or damage by cross-linkage in collagen.

Free-radical damage has been related to many syndromes linked with aging, such as Alzheimer’s disease, Parkinson’s disease, cancer, stroke, heart disease, and arthritis. According to the free-radical theory of aging, damage created by free radicals eventually gives rise to the symptoms we recognize as aging.

An important point about this theory is the fact that the body itself produces so-called antioxidant substances as a protection against free radicals. These antioxidants “scavenge” or destroy free radicals and thus prevent some of the damage to cell structures. The production of antioxidants is, in fact, correlated with the life span of many mammals.

Free-radical theory has prompted some observers to believe that consuming antioxidant substances, such as vitamin E, might retard the process of aging. Genetic engineering techniques can now be used to produce antioxidants in vast quantities, but antioxidants are also supplied by the food we eat. Vitamins A, C, and E, as well as less familiar enzymes, play a role as antioxidants. Animal studies to date, however, show that consumption of antioxidants produces only minimal effects on aging.

Biologists recognize the importance of diet in longevity. It turns out that the dramatic doubling of human longevity, compared with other primates, could be understood in terms of inflammation. Inflammatory processes appear to have a role in conditions such as atherosclerosis (buildup of plaques in arteries), Alzheimer’s, cancer and diabetes. Gains in longevity may be understood in terms of reduced levels of inflammation. For that reason, an anti-inflammatory diet is the subject of important research today (Finch, 2007).

Cellular Theory

A major finding from cell biology is that normal body cells have a finite potential to replicate and maintain their functional capacity. This potential appears to be intrinsic and preprogrammed, part of the genetic code. The cellular theory of aging argues that aging
ultimately results from this progressive weakening of capacity for cell division, perhaps through exhaustion of the genetic material. That cellular limit, in turn, may be related to the maximum life span of species.

One of the major milestones in the contemporary biology of aging was the discovery that cells in laboratory culture have a fixed life span. Leonard Hayflick and associates (1965) found that normal human cells in tissue culture go through a finite number of cell divisions and then stop. This maximum number of divisions is known as the **Hayflick limit**. Hayflick found that cells replicate themselves around 100 times if they are taken from fetal tissue. But if taken from a 70-year-old, they reach their limit of “aging” after 20 or 30 divisions.

Cells taken from older organisms divide proportionately fewer times than those taken from younger ones. Normal human cells that are frozen at a specific point in their process of replication and later thawed seem to “remember” the level of replication at which they were frozen. Furthermore, normal cells from a donor animal that are transplanted will not survive indefinitely in the new host.

Cell division in the laboratory sheds light on an interesting question: Can human bodies become immortal? The answer is yes, but there’s a catch. We have to get cancer to do it. The classic instance is the case of so-called “HeLa” cells—an immortal remnant of a terminally ill young woman named Henrietta Lacks (HeLa), who died in Baltimore in 1951 (Skloot, 2010). Before she died, a few cancerous cells were removed from her body and put into tissue culture: essentially, put down on a glass lab dish and supplied with cell nutrients. Scientists were surprised to find that these HeLa cells just kept dividing and growing. In the years since, the cells haven’t stopped growing. So we might say that a little piece of Henrietta Lacks has achieved immortality in a laboratory dish.

By contrast, in normal cell differentiation, cells divide and become more specialized, and their ability to live indefinitely simultaneously declines. The Hayflick limit may be not so much an intrinsic limit on living cells as a limit on when cells begin to differentiate, as in development of the embryo. When cells approach a limiting point, a genetic program normally shuts down the capacity for further division. If the genetic program doesn’t work, the result is uncontrolled multiplication, or cancer. The Hayflick limit doesn’t keep all cells from dividing—after all, germ cells such as eggs and sperm continue to divide—but it may give a clue about why aging brings an increase in cancer and a weakening of the immune system.

Studying aging by examining cells in a test tube raises some questions. For instance, the nutrient medium in a cell culture does not contain all the nutrients and hormones that a cell would normally receive. In addition, cells in the body become differentiated tissues and organs and remain in equilibrium in ways quite different from the way cells replicate in a test tube.

Fundamentally, the cellular theory of aging sees aging as somehow “programmed” directly into the organism at the genetic level. In this view, it is just as “natural” for the body to grow old as it is for the embryo or the young organism to develop to maturity, as we see in annual plants or the Pacific salmon. Does the cellular program theory of aging therefore apply to higher organisms such as mammals and, specifically, human beings? Perhaps, but it does not apply as obviously as it does to organisms in which rapid aging is tied to reproduction.

One of the most intriguing points in favor of the cellular approach to aging is the discovery that tiny tips at the ends of chromosomes—structures known as **telomeres**—become
shorter each time a cell divides. Telomeres, it seems, comprise a biological clock marking the unique age of a cell as it divides. Studies are under way to explore the link between aging at the cellular level and what we recognize as aging in complete organisms. Elizabeth Blackburn won the Nobel Prize in Medicine for discovering the role of telomeres, which evidently play a crucial role in cellular aging (Brady, 2009).

### Is Aging Inevitable?

The biological aging process may not be the result of a rigid genetic program; it may simply be the complex and indirect result of multiple traits in the organism tied to normal development. In other words, the body may not be reprogrammed to acquire gray hair, wrinkles, or diminished metabolic functions. Rather, these supposed signs of aging may simply be telltale side effects of activities of the organism.

Consider the analogy of an aging car. Suppose a distinctive “species” of automobile were designed to burn fuel at a fixed temperature with an efficient rate of combustion. That specific rate of combustion is required for appropriate acceleration, cruising speed, fuel mileage, and so on. But, alas, when the car performs this way, it also inevitably produces certain emission by-products. Over time, these by-products clog the cylinders, reduce efficiency, and lead to the breakdown and final collapse of the machine.

In the case of the human “car,” burning oxygen in normal metabolism generates harmful by-products—namely, free radicals that prove toxic to the organism. The trade-off is that oxygen is essential for life yet harmful to our long-term well-being. Although the human “car” is not intentionally designed to accumulate toxic emissions in order to collapse, the car cannot function at optimum levels without creating destructive by-products.

Now suppose we could find some special fuel additive that eliminates toxic emissions. Would we then have an “immortal” car? Probably not. Changing the fuel in your car won’t prevent accidents, nor will any fuel additive prevent rusting or the wearing down of springs and shock absorbers.

The “human car” analogy has its limits because an organism, unlike a manufactured object, has a capacity for repair and self-regeneration, at least up to a certain point; unlike an automobile, human beings have consciousness and can make choices about how to live out their life span. Nevertheless, to find out how we might modify or retard biological aging, we must find out why capacity for self-repair seems unable to keep up with the damage rate—in short, why aging and death appear to be universal.

One response to the question “Is aging inevitable?” would be to find organisms that do not grow old at all. As it turns out, there are such species. One of these is the hydra, a simple, freshwater animal similar to the jellyfish. Do hydras age at all, or are they, in principle, immortal? The rate of death for the hydra does not seem to increase with time. Hydra cells are continually dividing and replicating themselves, and their telomeres remain the same length as well. Some species of flatworms show similar capacity for regeneration without signs of aging.
URBAN LEGENDS OF AGING

“Antiaging medicine today is making rapid progress.”

No progress is being made at all. No intervention has ever been shown to slow the biological process of aging, other than caloric restriction (eating drastically less), but recent findings are even calling that strategy into question (Mattison et al., 2012). Herbal supplements sold in health food stores are totally unregulated; many are dangerous. None, including antioxidants, has ever been proven effective in slowing aging.

WAYS TO PROLONG THE LIFE SPAN

Most theories of aging depict biological aging as an inevitable process, like a disease to which we must all eventually fall victim. Some theories look on the organism as succumbing to chance events, whereas others see it as driven by a built-in biological clock. Yet whether aging is thought to occur by chance or by fate, most theories seem to reach a pessimistic conclusion about the inevitability of aging.

But aging is not a disease; rather, it is a process of change, part of which may make us vulnerable to disease. Instead of being driven by a single primary process timed through a single biological clock, aging is driven by many different clocks, each on a different schedule and unfolding in parallel developmental patterns.

Biological theories of aging could have enormous importance for an aging society. For example, the compression-of-morbidity idea assumes that there is a definite human life span, roughly 85 years, with a broad range from 70 to 100 years. There are thousands who live beyond age 100, but the maximum number of years any human being has lived is 122 years. An age around that level is often assumed to be the maximum life span possible. But today, basic research in the biology of aging is challenging assumptions about a fixed maximum life span and the inevitability of aging as a biological process. Two approaches have been found that could extend the maximum life span for a species: one based on environmental intervention through diet, the other on a genetic approach.

Biological aging is inevitable, but diet and exercise may promote healthier aging.
“Aging is not a disease.”

Most gerontologists agree that aging is not a disease. Yet a growing number of biologists reject this proposition, and serious work on slowing the process of aging is now underway in the laboratory. In other words, they treat aging as if it’s a curable pathological condition. Of course, no one has ever defined exactly what a “disease” is, so it’s hard to prove the point one way or another (Moody & Hayflick, 2003).

**Environmental Approach**

For more than 60 years, scientists have known of only one environmental intervention—restricting food intake—that extends life span in mammals. Dietary restriction produces gains in longevity in laboratory animals, raising maximum life span by up to 40% and reducing diseases of aging.

As long ago as the 1930s, scientists discovered that the life span of rats can be extended by restricting food intake after weaning. Caloric restriction in mice has similar effects even when it is begun in midlife. Rodents live longer if they eat a diet with 40% fewer calories than normal, as long as their diet remains otherwise nutritionally sound. When caloric intake is restricted, age-related deterioration slows down, and age-related diseases, such as kidney problems and autoimmune syndromes, are diminished (Bronson & Lipman, 1991). The rats’ condition does not deteriorate until late in a long life. Under such a diet, both average life expectancy and maximum life span increase by 30%. Apparently, the rate of acceleration of aging has been reduced.

What accounts for this dramatic, well-established impact of dietary restriction in enhancing longevity? The longevity gain is achieved not through reduction in any specific component of the diet, but simply because of fewer total calories consumed. One possible explanation is that caloric reduction slows metabolism, or the rate at which food is transformed into energy (Demetrius, 2004). With caloric reduction, the basic biological clock slows down. But we cannot be sure of the explanation because caloric restriction is consistent with many different mechanisms of biological aging, including DNA, free radicals, and a stronger immune system. The results are clear enough for rodents, and experiments with primates have begun to confirm that caloric restriction is effective there as well (Couzin, 1998). However, more recent research has found just the opposite: Caloric restriction with rhesus monkeys did not contribute to “improved survival” (Mattison et al., 2012).

In human terms, caloric reduction would mean surviving on a diet of 1,400 calories a day, but, in return, it would mean, in theory, gaining 30 extra years of life. To achieve this goal, Roy Walford (1986), one of the premier investigators of the biology of aging, has proposed a so-called high-low diet that incorporates high nutritional value with low calories.

A similar approach is suggested by cryobiology, or the study of organisms at low temperatures. Lowering internal body temperature can increase life span in fruit flies as well as vertebrates, such as the fence lizard, an animal that lives twice as long in New England as...
its cousins do in sunny Florida. Experiments with fish demonstrate that with lower temperature, life span is prolonged in the second half of life. Lower temperature can significantly reduce DNA damage. We don’t yet know whether cryobiological processes apply to warm-blooded animals like humans. However, calorie restriction also seems to lower body temperature a small amount. Calorie-restricted mice have a lower average body temperature, and the temperature changes according to biorhythm.

Caloric restriction somehow protects genes from damage by the environment and perhaps serves to strengthen the immune system. Caloric restriction also reduces the incidence of cancer. The experimental findings on caloric reduction converge with what is known about indirect regulation of genetic expression that controls the aging process. Research is under way to explore the implications of caloric restriction for increasing human longevity, but if the findings from research with other species are any indication, the relationship between caloric restriction and longevity for humans may not be straightforward or clear.

**Genetic Approach**

Many lines of evidence point toward the central role of genetics in fixing the longevity for each species, although for any individual, length of life will be the result of both genetic and environmental factors. We often think of genetic inheritance as the element that is fixed and unalterable, but some genetic studies have shown a dramatic ability to improve maximum life span over generations.

For example, studies have been conducted on bread mold, fruit flies, mice, and nematode worms. In all these species, genetic manipulation has been shown to modify maximum life span. For example, some mutated forms of nematode worms have exhibited substantial increases. Among mice, large differences in average life expectancy and maximum life span exist among different strains because of hereditary differences. In the fruit fly, scientists have achieved an increase in average as well as maximum life span by using artificial selection as a breeding technique.

Some recent genetic experiments have produced astonishing gains in longevity. For example, Michael Rose, a population geneticist, used artificial selection to produce fruit flies with a life span of 50 days—double the normal average of 25 days; the equivalent would be a human being living to 240 years of age. Rose, in effect, has in the laboratory mimicked an increase in the evolutionary rate of change. As a result, successive generations of fruit flies passed along genes favoring prolonged youth and longevity (Rose, 2005).

Thomas Johnson, a behavioral geneticist, went further and altered a single gene (known as Clock-1) out of the roundworm’s 10,000 genes. He also achieved a doubling of the worm’s 3-week life span (Johnson, 1990). Still other studies suggest that in some fruit fly populations, the risk of mortality may decrease with advancing age, a finding that challenges previous assumptions about maximum life span (Barinaga, 1992). These dramatic successes, through breeding or direct genetic manipulation, point to the way that genetic change may have come about rapidly through natural selection.

Whether any of these findings can be applied to humans is, again, unknown, but we can draw some conclusions about the genetics of aging. For instance, in at least several of the animal studies cited here, the genes involved governed antioxidant enzymes and mechanisms for repair of damage to DNA, which have been at the center of several theories about the biology of aging. Second, in the species benefiting from genetic change, a small number
of genes have been involved in determining longevity. Thus, these results could possibly be applied to higher animal species.

New horizons for genetic application are already visible. Scientists have found a way to double the life of skin cells by switching off the gene that regulates production of a specific protein responsible for manifestations of aging. A similar method of genetic engineering has been used with tomatoes, permitting them to be stored and shipped without decay. The key here is the so-called mortality genes, which determine the number of times that cells divide. Thus, this intervention addresses the Hayflick limit, which remains central to aging at the cellular level. Even without affecting maximum life span, this sort of gene therapy could have major applications in the future, perhaps leading to a cure for age-related diseases such as Parkinson’s, Alzheimer’s, and cancer.

The recent Human Genome Project has produced a comprehensive map of the entire sequence of genes on the human chromosome. Genetic engineering could draw on that knowledge in ways that might dramatically change what we have thought of as the process of aging and even our assumptions about the maximum human life span. Such speculations, however, belong to the future.

**GLOBAL PERSPECTIVE**

**Blue Zones for Longer Life**

When we think of Italy, we often think of pizza or the ancient city of Rome. But if you’re thinking about longevity, think instead about the Italian island of Sardinia. Demographers have identified its mountain slopes as a distinctive Blue Zone, a region of high longevity. In fact, the proportion of centenarians in Sardinia is more than twice as high as in the rest of Italy. That prompts a question: Why do people there live so long? Both lifestyle and genetics may play a part, but in what proportion? The isolated, mountain-dwelling Sardinians tend to be descendants of settlers dating back to the Bronze Age. Sardinians have also been known for eating a Mediterranean diet and for maintaining a traditional, family-oriented way of life. So, gerontologists wonder, what makes Sardinia such a standout as a Blue Zone for extreme longevity?

Some answers can be found on the opposite side of the globe, in Okinawa, an island portion of Japan, the country with the greatest longevity. Okinawans have an average life expectancy of more than 82 years and also enjoy an old age largely free of disabilities. Rates of heart disease, cancer, and dementia are lower than among Americans. Again, we wonder, what’s the reason? Some observers point to the Japanese word *ikigai*, which means “purpose for living.” A traditional Okinawan diet of vegetables, tofu, and a small amount of fish
Biology has not yet succeeded in unraveling the mystery of aging, so it is not surprising that medical science has produced no technology or method for raising the maximum life span of human beings. Caloric reduction and genetic methods have worked with lower organisms, but human beings are more complex organisms, and the research studying humans has yet to provide conclusive evidence on this point. To extend life expectancy and promote healthy aging, we may need to identify genes responsible for harmful mutations, whether expressed early or late in life. A parallel approach would be to identify those environmental agents (e.g., diet, sunshine, and smoking) that have a cumulative impact on sickness and survival. Health promotion might then succeed in postponing chronic illness, thereby making the idea of the one-horse shay more possible.

Progress in these directions depends on answering the question of why we age. In the reading titled “Why Do We Live as Long as We Do?” Leonard Hayflick highlights some basic facts about the biology of aging that are relevant to our hopes for compressing or extending our longevity.

In the other readings that follow, we hear different voices in the compression-of-morbidity debate. On one side, James F. Fries and Lawrence Crapo take the optimistic position that improving life expectancy will also lead to compressed morbidity: People will live longer and not be sick until the very end of their natural life span. Fries and Crapo believe that successful aging involves optimizing life expectancy while reducing physical, psychological, and social morbidity. Their “sunny” view of aging is paradoxical, in a way, because it presumes that the maximum life span remains fixed, a limitation other biologists might reject. In support of their view, we can note that some postponement of morbidity has already occurred; Declining death rates from heart disease and stroke reflect improvements in health due to lifestyle, diet, hypertension detection, and so on.

But not everyone is persuaded by Fries and Crapo’s interpretation of the evidence on morbidity and death rates. Researchers and demographers disagree about whether compression of morbidity is occurring and whether maximum human life span is really finite, as Fries believes. Vincent Mor notes that, although it seems that morbidity rates and functional decline have decreased in the industrialized world, because of population aging, there will be more older people than ever before suffering from chronic and disabling health conditions. Still other conditions, such as depression and sensory losses, are not linked to causes...


Compressing or Prolongation of Morbidity?

Blue Zones around the world are natural laboratories for the study of longevity. Lessons learned from these regions can help give guidance for a healthier and happier old age closer to home.
of improved life expectancy at all, so we remain haunted by the fear that longer life might mean only prolongation of morbidity (Olshansky, Carnes, & Cassel, 1990; Verbrugge, Lepkowski, & Imanaka, 1989).

Finally, as we look further into the 21st century, we might consider possibilities beyond the range of current science and medicine. Marti G. Parker and Mats Thorslund suggest that, in tracking changes in compression of morbidity and health among older adults, we need to be thinking about the implications of these trends for providing services and resources. In more visionary terms, biologist Aubrey de Grey believes, contrary to most gerontologists, that aging is a disease, a condition to be “cured.” S. Jay Olshansky, by contrast, reminds us that a “cure for aging” is a fantasy that has deluded seekers for biological immortality down through the ages. Olshansky does favor research on the biology of aging, but he distrusts any claim that raising the maximum life span is right around the corner.

The debate over why we grow old shows that scientific “facts” are rarely as simple as we imagine. The meaning of the facts depends on our theories and interpretations, and our own hopes about the aging experience, and it is therefore subject to debate and construction in different ways. Different views of the facts about illness and survival in old age today are leading us to new ways of thinking about mortality and morbidity among older adults. Indeed, the debate about compression of morbidity is rooted in biology, but it has implications for health care economics in an aging society, as well as how individuals experience later life. What can we expect in the future if medical technology succeeds in prolonging life still more? How much emphasis should we give to health promotion as opposed to curing diseases in old age? Whatever our view, the compression-of-morbidity theory stands out as an important reminder of how critical biological research will be for the future of an aging society.

**FOCUS ON PRACTICE**

**Health Promotion**

Can we take steps now to control our own longevity? The consumer market for “antiaging” products is growing. Magazines on the subject can be found on every newsstand. But most claims for life-extending products are not proved by science. For example, melatonin, antioxidants, human growth hormone, and DHEA have all been hailed as antiaging breakthroughs, but proof has not lived up to the promise. There are no diets, hormone injections, or vitamin or mineral supplements that have so far been proven to slow down the process of aging (Butler et al., 2002). However, it is possible that a breakthrough in our knowledge of the biology of aging could give us ways to slow down aging in the 21st century.

When we think about the prospect of slowing the process of aging or dramatically extending maximum life span, many questions present themselves. Would people really want to triple their life spans? Would they want to hold the same job or be married to the same person for 150 years? What would society be like if people lived for centuries instead of decades (Post & Binstock, 2004)?
These questions are still in the realm of science fiction, but many interventions already have been shown to promote health and longevity in ways that can benefit people today (Haber, 2016). For example, the death rate from cardiovascular disease has been cut in half in the past two decades chiefly because of a reduction in high-risk behaviors such as smoking. Changes in diet or exercise patterns could provide further gains in adult life expectancy.

The secrets to keeping the effects of aging at bay are actually well known (Brody, 2001). Most of the causes of lost years of life today are related to lifestyle choices: alcohol, tobacco, exercise, and diet (Arking, 1991). Herbert de Vries, a highly regarded exercise physiologist from the University of Southern California, has estimated that regular exercise could give a huge boost to the life expectancy of most people. Millions of Americans have already started eating a low-fat, high-fiber diet, just as they have given up smoking. Others go even further and seek to minimize free radical damage to cells by including more antioxidant carotenoids in their diets (Walford, 1986).

The topic of health promotion and aging engenders a familiar argument between “optimists” and “pessimists.” On the one hand, Hayflick argues that calorie-restricted, long-living mice are merely living out their fixed natural life spans. In the end, our genetic program prevails, and environmental interventions, such as diet, can accomplish only a limited amount. If Hayflick is right, then Walford (1986), like Juan Ponce de León, has embarked on a vain search for the fountain of youth.

But the optimists hold a different view. According to one scenario for the future, as a result of prudent nutrition and more exercise, the average life span could well rise from 76 to beyond 80 years during the 21st century. Then, early in the next century, through hormone replacement and genetic engineering, the maximum life span could push well beyond the current limit of 120 years. Optimists believe that lifestyle enhancement and new technologies could combine to delay or even reverse aging, thus extending youthfulness and pushing the limits of the life span itself (Hall, 2003).

Steps to improve longevity are already becoming part of the popular culture. Changes in diet and exercise, reductions in smoking, and health-promotion activities of many kinds are now far more common than they were two decades ago. As baby boomers experience middle age, these activities are likely to spread and have an impact on longevity.

In thinking about these scenarios for the future, we should retain a measure of skepticism. We should also focus on practical steps that are proven and feasible right now. Health promotion has to be based on science, not on conjecture, fear of frailty and mortality, or hopes for the future.

Health promotion seems clearly to be a desirable trend, but it also raises some difficult questions about personal and social responsibility (Centers for Disease Control and Prevention, 2003). What should we do about groups in our society who cannot or will not change their unhealthy behaviors? Are harmful behaviors ultimately a matter of free choice, or do environmental and social factors also shape behavior? The cost of Medicare depends a great deal on the cost of chronic illnesses. If we embrace an ethic of personal responsibility for health care, might we be less willing to support public funding for medical care? Should health promotion take into account inequality in income, education, and access to health care? How do we motivate people in favor of health promotion when the results of “bad choices”—such as smoking, poor diet, lack of exercise, or use of alcohol—don’t show up until decades later? These questions will remain both personal and societal issues for years to come.
“Drinking red wine will make you live longer.”

A lot of people believe this one based on a TV story on 60 Minutes. There is a substance, resveratrol, found in red wine and grapes that has been shown by some laboratory studies to promote longevity in mice (Bauer, 2006). But you would have to drink amounts of wine far beyond what is humanly possible in order to have any of the hypothetical effects. Studies of resveratrol on human longevity continue, but in the meantime, wine lovers will need to find a different excuse for drinking more wine.
The premise upon which the following ideas rest is that the survival of a species depends upon a sufficient number of its members reaching sexual maturation and producing enough progeny that reach independence to guarantee the continuation of the species. Natural selection, guided by beneficial mutations, has molded the biology and the survival strategies of all living things to achieve this fundamental goal. As previously indicated, the best strategy to guarantee that an animal or human will survive long enough to mature sexually is to provide it with more than the minimum required capacity in its vital organs. In this way, if damage or pathology occurs in an essential system before sexual maturation, there is a greater likelihood that the animal will still survive to reproduce and pass on to its progeny its superior physiological capacity. This general strategy, essential for the survival of all species, has evolved in different ways for various life forms. Energy and purpose are concentrated to achieve reproductive success which assures the immortality of the genes. The continuation of the germ line is the driving force of natural selection. Longevity of individual animals is of secondary importance.

Animals are selected through evolution for having physiological reserves greater than the minimum necessary to reach sexual maturation and rear progeny to independence, but once this critical goal has been attained, they have sufficient excess reserve capacity to “coast” for a period of time, the remainder of which we call their life span. This time period, then, is indirectly determined genetically. During the coasting period the animal functions on its excess capacity. This physiological reserve of energy and functional capacity does not renew at the same rate that it incurs losses, so molecular disorder—entropy—increases. Random changes or errors appear in previously well-ordered molecules, resulting in the normal physiological losses that we call age changes. These changes increase the vulnerability of the animal or human to predation, accidents, or disease (Holiday, 2004).

What happens after reproductive success and raising progeny to independence is not important for the survival of a species. What happens next, of course, is aging and, ultimately, death. Wild animals, because they rarely live long enough, do not experience aging. The entire scenario is analogous to the ticking on of a cheap watch after the guarantee period has ended. The watch’s guarantee period corresponds to the time spent by animals to reach sexual maturation and to finish rearing progeny. After the warranty period ends, the watch does not simply “die” because it would be prohibitively expensive to put a mechanism in a cheap watch that would cause it to self-destruct on the day after the guarantee expires. Likewise, it would cost too much of energy to make a system in an animal that would cause it to die precisely on the day that its progeny become independent. What happens after the guarantee period expires in watches and after the reproductive period in animals is aging, which inexorably leads to failure in watches and death in animals.
In this way of thinking, survival to sexual maturation is accomplished by postponing until after reproductive maturity the effects of genes that perform well in youth but become mischief-makers later. When these once good, now harmful genes eventually do switch on, they provide the blueprint for age changes. . .

Until now we have almost always thought about aging by asking, “Why do we age?” And biogerontologists have designed their experiments to attempt to answer this question. The results have not been impressive. With the exception of the discovery that age changes occur within individual cells, we do not know much more today about the fundamental cause of aging than we did a century ago. Most of what we have learned is descriptive: we know much more about what happens than we did before but very little about why it happens. Biogerontologists have described changes that occur as we age from the molecular level up to the level of the whole animal. However, these descriptive observations add little to our understanding of the basic process.

It is for this reason that George Sacher proposed that we have been asking the wrong question. Instead of asking “Why do we age?” we should ask “Why do we live as long as we do?” By asking that question we might reorder our thinking and be able to design experiments to obtain more fundamental information. I think this is a useful new approach and I hope that more biogerontologists will come to appreciate the subtle but important reason for asking this better question.

Implicit in the question “Why do we live as long as we do?” is the idea that our longevity has increased and may be capable of increasing further. That appears to be true, since the human life span is known to have increased since prehistoric times. If our life span has increased, then it is likely that the start of the aging process has changed within the new time frame. Based on this reasoning, we may conclude that the aging process is malleable, that we can understand how it occurs, and that perhaps we can tamper with it. . .

I do not believe that we have a sufficient understanding of either the aging process or the determinants of life span to expect to significantly manipulate either during our lifetime. A more important issue, however, is whether it would be desirable to manipulate either process. The capacity to halt or slow the aging process, or to extend longevity, would have consequences unlike most other biomedical breakthroughs. Virtually all other biomedical goals have an indisputably positive value. It is not at all clear whether or not the ability to tamper with the processes that age us or determine our life span would be an unmixed blessing. As pointed out earlier, resolution of all disease and other causes of death would result in a life expectation of about one hundred years. I am apprehensive about extending average life expectation beyond age one hundred once the leading killers are resolved because the result would be disease-free but nonetheless functionally weaker, still inexorably aging people. . .

Virtually all biomedical research has the implicit goal of eliminating disease in all of its forms. It is logical to ask what will happen if we are successful. The answer seems to be that if we are successful, our life expectation will be increased but we will eventually die from the basic aging processes that lead to failure in some vital system.
Why do we age? Why do we die? How can we live longer? How can we preserve our youth? Questions about life, aging, and death are fundamental to human thought, and human beings have speculated about the answers to these questions for centuries. Our own age values the methods of science—the methods of gathering evidence, of observation, of experiment—above the musings of philosophy. Yet, philosophical speculation and scientific theory may interact and enhance each other. The scientific theories of Copernicus and the conception of a sun-centered solar system, of Newton and an orderly universe, of Einstein and the relationship between matter, energy, and spacetime, of Darwin and the evolution of species have influenced our notions of who we are, where we are, how we came to be here, and the meaning of life itself. Similarly, the study of health and aging may contribute a new philosophical perspective to these age-old questions about life and death.

The implications of new scientific discoveries are often not widely appreciated for many years. Scientific knowledge develops by small increments within a relatively cloistered scientific community, whose members are sometimes more interested in the basic ideas than in their social implications. . . .

So it is with the study of human aging. The ancient philosophical questions have largely fallen to those who search for the biological mechanisms that affect our vitality and that cause our death. The study of aging as a separate scientific discipline is relatively new and is not yet the province of any single science. Independent observations have been made in medicine, in psychology, in molecular biology, in sociology, in anthropology, in actuarial science, and in other fields. There are remarkable parallels in the ideas that have emerged from these independent fields of research. It is our intention to review these parallel developments and to present a synthesis of scientific ideas about human aging that will offer insights into the fundamental questions about the nature and meaning of the life process, aging, and death.

**THE INCOMPLETE PARADIGM**

The growth of scientific knowledge historically has been impeded by thought systems (paradigms) that worked well for a time but that increasingly failed to explain new observations. For the study of aging, the contemporary paradigm is often called the medical model. The medical model defines health as the absence of disease and seeks to improve health by understanding and eradicating disease. This model of life and health, while useful, has obscured a larger perspective. There are four prevalent beliefs in the medical model that have proved to be limiting (see box). Certainly, few present scholars hold these beliefs literally, but these ideas nonetheless have largely defined contemporary opinion about the aging process.
Death does not require disease or accident. If all disease and all trauma were eliminated, death would still occur, at an average age not much older than at present. If premature death were eliminated, and it may be in large part, we would still face the prospect of a natural death.

Medical treatment is not the best way to approach current national health problems. The major chronic diseases (atherosclerosis, cancer, emphysema, diabetes, osteoarthritis, and cirrhosis) represent the major present health threats. They are deserving of continued medical research, and further advances are to be expected. But abundant evidence points to personal health habits as the major risk factors for these diseases. Preventive approaches now hold far more promise than do therapeutic approaches for improving human health.

Aging does not appear to be under direct control of the central nervous system or the genes. Rather, the aging process occurs in cells and in organs. The aging process is most likely an essential characteristic of biological mechanisms. The process of aging, or senescence, is an accumulation in cells and organs of deteriorating functions that begins early in adult life. Aging may result from error-prone biological processes similar to those that have led to the evolution of species.

So the prevailing ideas about aging are incomplete. An increasing body of new scientific information requires revision and extension of these ideas. The time for a new synthesis has arrived, heralded by a number of new discoveries that do not fit well into the old paradigm but that as yet lack a coherent paradigm of their own.

**COMPETING THEMES**

Changes in our ideas about health and aging are now being reflected in our social institutions and lifestyles. Change in a prevalent system of thought is often turbulent, and such turbulence is now manifest in health by a set of new movements. Within the medical community, there has
been increasing recognition of the importance of preventive medical approaches. Such technical strategies as mass screening have been promoted. New departments of preventive medicine have been developed within medical schools; previously, such efforts were largely carried out within schools of public health. These developments are not entirely successful (screening efforts have proved disappointing, and some departments of preventive medicine have not thrived), but their very creation acknowledges the ferment of new approaches to health care.

The public has asked for more active involvement in consumer choices and for more accurate information on which to base such choices. In response, a self-care movement in health has developed, which now represents a considerable social force. At its best, this movement encourages critical consumption of medical services and increased autonomy from professional dominance. At its worst, the self-care movement takes an adversary stance and would replace professional medical treatment with idiosyncratic folk remedies. Still, the growth of these movements indicates discontent with the prevailing medical orthodoxy.

Recent changes in personal lifestyles have been even more significant. Joggers organize footraces in which tens of thousands compete, and cocktail party conversations concern the number of miles run per week. The number of militant antismokers has grown, and the nonbelievers are being packed into smaller and smaller spaces in the back of the airplane. Such spontaneous social changes are very likely to have constructive effects on health, and we applaud them, but the point is that the phenomenon itself represents a profound changing of the public consciousness.

Within professional medicine, new themes are evident. There is an increased interest in long-term patient outcome as a goal and less interest in correcting the trivial laboratory abnormality that does not materially affect the patient. Benefit-cost studies are sometimes advocated as a solution to the astronomical increases in the cost of medical care. Many observers have pointed out that orthodox medical approaches have reached the area of diminishing returns. The quality of life, rather than its duration, has received increasing emphasis.

Both psychologists and physicians have recently described strong relationships between psychological factors and health, and theories explaining such relationships have been developed that emphasize life crises, helplessness, loss of personal autonomy, depression, and other psychological factors. Correction of some psychological problems, it is implied, will improve health, and indeed the circumstantial evidence that this may be true is quite convincing. Again these approaches are outside the orthodoxy of the medical model.

Two new research areas have recently been emphasized—chronic disease and human aging. Increasingly, researchers recognize the central roles that aging and chronic disease play in our current health problems. The study of aging and chronic disease is oriented toward long-term outcomes, is interdisciplinary, requires preventive strategies, seeks to demonstrate the relevance of psychological factors, and uses lifestyle modification as a major tactic. The student of aging and the student of the diseases of the aged now have a unique opportunity to harmonize the incomplete old orthodoxy and the emerging new themes.

**A New Syllogism**

Using new knowledge of human aging and of chronic disease, we attempt here to provide a model that harmonizes these competing and chaotic themes, one that points toward new strategies of research and of health attainment. Our theoretical structure allows predictions to be made, and the predictions are strikingly different from those traditionally expected.

These curves are correct. They converge at the same maximum age, thereby demonstrating that the maximum age of survival has been fixed over this period of observation.
Figure 1 shows the actual data. Quite... startling conclusions follow from these data. The number of extremely old persons will not increase. The percentage of a typical life spent in dependency will decrease. The period of adult vigor will be prolonged. The need for intensive medical care will decrease. The cost of medical care will decrease, and the quality of life, in a near disease-free society, will be much improved.

Adult life may be conveniently divided into two periods, although the dividing line is indistinct. First, there is a period of independence and vigor. Second, for those not dying suddenly or prematurely, there is a period of dependence, diminished capacity, and often lingering disease. This period of infirmity is the problem; it is feared, by many, more than death itself. The new syllogism does not offer hope for the indefinite prolongation of life expectancy, but it does point to a prolongation of vitality and a decrease in the period of diminished capacity.

There are two premises to the syllogism; if they are accepted, then it follows that there will be a reversal of the present trend toward increasing infirmity of our population and increased costs of support of dependency... The first premise is almost certain; the second is very probable. If, after careful evaluation of the supporting data, one accepts the premises of this syllogism, then one must accept the conclusion and the implications of the conclusion.

Some Questions of Semantics

Nuances of meaning may mask the substance of a subject, and slight changes in emphasis may allow a new perspective to be better appreciated. There are problems with several of the terms often used to describe health, medical care, and aging. Among these are cure, prevention, chronic, premature death, and natural death. We will use these terms in slightly different senses than is usual.
illness in developed countries. We have defined *premature death* simply as death that occurs before it must, and we have used *natural death* to describe those deaths that occur at the end of the natural life span of the individual.

**A New Syllogism**

1. The human life span is fixed.
2. The age at first infirmity will increase.
3. Therefore the duration of infirmity will decrease.

**The Rectangular Curve**

Survival curves for animals show a similar pattern of rectangularization with domestication or better care. Old age in wild animals is very rare, as it probably was for prehistoric man living in a dangerous environment. In uncivilized environments, accidental deaths and violent deaths account for a greater proportion of deaths than the biologically determined life-span limit. For the great majority of wild animal species, there is a very high neonatal mortality, followed by an adult mortality rate that is almost as high and is nearly independent of age. In such environments, death occurs mostly as a result of accidents and attacks by predators. One day is about as dangerous as the next.

By contrast, animals in captivity begin to show survival curves much more rectangular in shape. Such animals are removed from most threats by accident or predator, and for them the second term of the equation, that of the species’ life span, begins to dominate. Figure 2 shows theoretical calculations of this phenomenon after Sacher (1977). Such rectangularization has been documented for many animals, including dogs, horses, birds, voles, rats, and flies.

Figure 3 is drawn from the data Shock developed in 1960, and it is modified only slightly from what has been called “the most frequently shown data in the field of gerontology.” The data show that many important physiological functions decline with age, and the decline is quite close to being a straight line. It is important to emphasize that these data were obtained from healthy human subjects in whom no disease could be identified that was related to the function being measured. Thus, the observed decline does not depend on disease.

Figure 3 is a major oversimplification of complex data. The lines are not actually as straight as portrayed, and some of the data have been contested. The point is that a considerable body of research supports a gradual, nearly linear decrease in organ function with age.

Figure 2  
**Theoretical Survival Curves for an Animal Become Progressively More Rectangular as the Environment Progresses From Wild to Domestic**

![Figure 2](image-url)
Normal, healthy organisms maintain an excess organ reserve beyond immediate functional needs. We have four to ten times as much reserve function as we need in the resting state. The heart during exercise can increase its output sixfold or more. The kidneys can still excrete waste products adequately if five-sixths of the functional units, the nephrons, are destroyed. Surgeons can remove one entire lung, and sometimes part of the second, and still have an operative success. Three-fourths of the liver can be removed, under some circumstances, and life is still maintained.

However, the mean level of reserve in many of our organs declines as we grow older. We seldom notice this gradual loss of our organ reserve. Only in the circumstances of exceptional stress do we need all that excess function anyway. Shock and others suggest that the decline may be plotted as a straight line.

**Homeostasis and Organ Reserve**

The human body may be viewed as a remarkable assembly of components functioning at various levels of organization. Systems of molecules, cells, and organs are all marvelously integrated to preserve life. The eminent nineteenth-century physiologist Claude Bernard emphasized that these integrated components act to maintain a constant internal environment despite variable external conditions. Bernard saw life as a conflict between external threats and the ability of the organism to maintain the internal milieu.

These fundamental observations have stood well the test of time. Indeed, the human organism cannot survive if the body temperature is more than a few degrees from normal, if acid-base balance is disturbed by a single pH unit, or if more than 20% of the body water is lost. Body chemicals are regulated closely, often to within 2% or 3% of an average value. A change in one direction in body constituent is often followed by a complicated set of responses that act to restore equilibrium.

Bernard also noted that living beings change from a period of development to a period of senescence or decline. He stated that “this characteristic of a determined development, of a beginning and an end, of continuous progress in one direction within a fixed term, belongs inherently to living beings.”

The regulation of bodily functions within precise limits was termed *homeostasis* by Cannon (1932). Living organisms under threat from an extraordinary array of destructive sources maintain their internal milieu despite the perturbations, using what Cannon called the “wisdom of the body.” Dubos (1965) has pointed out that this “wisdom” is not infallible. Homeostasis is only an ideal concept; regulatory mechanisms do not always return bodily functions to their original state, and they can sometimes be misdirected. Dubos sees disease as a “manifestation of such inadequate responses.” Health corresponds to the situation in which the organism responds adaptively and restores its original integrity.

**Figure 3** The Linear Decline of Organ Function With Age

![Graph showing the linear decline of organ function with age]

The ability of the body to maintain homeostasis declines inevitably with decreasing organ reserve. Figure 3 shows the decline for lungs, kidneys, heart, and nerves. The decline is not the same for all individuals, nor is the decline the same for all organs. For example, nerve conduction declines more slowly than does maximal breathing capacity. And some organs, such as the liver, intestinal lining cells, and bone marrow red cells, seem to show even less decline with age.

The important point, however, is that with age there is a decline in the ability to respond to perturbations. With the decline in organ reserve, the protective envelope within which a disturbance may be restored becomes smaller. A young person might survive a major injury or a bacterial pneumonia; an older person may succumb to a fractured hip or to influenza. If homeostasis cannot be maintained, life is over. The declining straight lines of Figure 3 clearly mandate a finite life span; death must inevitably result when organ function declines below the level necessary to sustain life.

**Implications of the Rectangular Curve**

The rectangular curve is a critical concept, and its implications affect each of our lives. The rectangular curve is not a rectangle in the absolute sense, nor will it ever be. The changing shape of the curve results from both biological and environmental factors. Many biological phenomena describe what is often called a normal distribution. This is the familiar bell-shaped or Gaussian curve. If one studies the ages at death in a well-cared-for and relatively disease-free animal population, one finds that their ages at death are distributed on both sides of the average age of death, with the number of individuals becoming less frequent in both directions as one moves farther from the average age at death. A theoretical distribution of ages at death taking the shape of such a curve in humans is shown in Figure 4. This simple bell-shaped curve, with a mean of 85 years and a standard deviation of 4 years, might exemplify the age at death of an ideal disease-free, violence-free human society. The sharp downslope of the bell-shaped survival curve is analogous to the sharp downslope of the rectangular curve. In Figure 5, the first part of the curve becomes ever flatter, reflecting lower rates of infant mortality. Several factors prevent the total elimination of infant mortality and thus prevent the curve from becoming perfectly horizontal. These premature deaths are the result of birth of defective babies, premature disease, and violent death. Improvements in medicine can lower but never eliminate the birth of defective babies and premature disease. It seems likely that the ever dominant proportion of violent deaths during early life will prove recalcitrant to change and will form an ever larger fraction of total premature deaths.

So, the rectangular curve has an initial brief, steep downturn because of deaths shortly after birth, a very slow rate of decline through the middle years, a relatively abrupt turn to a very steep downslope as one nears the age of death of the ideal Gaussian curve, and a final flattening of the curve as the normal biological distribution of deaths results in a tail after the age of 90.

Thus, two profound characteristics of the mortality of man, the elimination of premature disease and the development of the sharp downslope

**Figure 4** Sequential Survival Curves in the United States

![Sequential Survival Curves in the United States](http://example.com/figure4.png)

time have noted the increasingly rectangular shape of the curve, and many have speculated that it represents a natural species life limit. Entire theories of the aging process . . . have been built around the observed fact of a natural life span in man and animals. Yet, the public has remained largely ignorant of these developments.

A society in which life expectancy is believed to increase at every age and in which one becomes increasingly feeble as one grows older is a society heading for trouble. A society moving according to the curves of Figure 5, as our society is, is a society moving toward a world in which there is little or no disease, and individuals live out their natural life span fully and vigorously, with a brief terminal period of infirmity. . . . Dramatic changes in mortality patterns result in equally dramatic social changes.

REFERENCES


READING 7

The Compression of Morbidity Hypothesis

A Review of Research and Prospects for the Future

Vincent Mor

Cross-national evidence for the validity of the compression of morbidity hypothesis originally proposed by Fries is generally accepted. Generational improvements in education and the
increased availability of adaptive technologies and even medical treatments that enhance quality of life have facilitated continued independence of older persons in the industrialized world. Whether this trend continues may depend upon the effect of the obesity epidemic on the next generation of older people.

For more than 2 decades, gerontologists have been debating the implications of the progressive reductions in old-age mortality and increasing survival of the very old, with some noting that lengthening life necessarily extends the duration of functional dependency in an aging population. It has been hypothesized that increasing survival does not necessarily mean that the added years of life accruing to older individuals would be spent sick and disabled. This compression of morbidity hypothesis stated that better health care, an active lifestyle, and greater preventive health behavior would preserve health even in the face of increasing survival. Shortly thereafter, other researchers were able to quantify “active life expectancy,” setting the stage for the application of sophisticated demographic techniques to test the hypothesis that the duration of morbidity and disability would not increase or might even be reduced in the population, even as mortality was decreasing.

There are several important clarifications that should be made to better understand the dispute surrounding the compression of morbidity hypothesis. First, using morbidity and disability interchangeably ignores the evidence that the presence of different diseases may have quite different effects on mortality, hospitalization (a health services use-based marker of real morbidity), disability, and functional impairment. For example, although cardiovascular disease mortality declined, partially because of improved treatment, outreach efforts also led to earlier identification of more individuals with early-stage disease. Earlier detection of disease (morbidity) is one reason why increases in the prevalence of chronic illness have not translated into increases in disability and impaired function.

Efforts to understand what has caused the reduced rate of functional decline in the aged population have focused on the improved education of the newer cohorts of elderly, improvements in the built environment (e.g., barrier-free housing, elevators) and material amenities, and improvements in function-enhancing medical interventions. First, the average 75-year-old in developed countries of the 1990s is less likely to be constrained by stairs and more likely to have an automobile and to live in housing that is architechnically barrier free. Second, that same older person has his/her Social Security check directly deposited, meals warmed in a microwave, and groceries ordered over the telephone. Third, the disability of cataracts has been virtually eliminated with new surgical techniques, disabling arthritic hips and knees are routinely replaced, and improvements in the medical management of heart disease, for example, clearly facilitate retained functioning and independence. The relative contributions of each of these major classes of technological innovations to improvements in population functioning is not known, but it is likely that these, as well as other significant shifts in the lives of older persons in the industrialized world, have improved their quality of life and functional independence. Indeed, it may be that the education advantage observed in most studies that find reduced functional decline is partially achieved by older persons being able to manipulate the environment without exertion.

Nevertheless, before we celebrate and ignore the pending explosion of the aged population in all industrialized countries in the world, it is critical to understand that, even if the rate of functional decline has dropped several percentage points over the last decades, the sheer numerical increase in the size of the aged population over the next 30 years will mean that the number of older persons who are dependent, disabled, and suffering the functional consequences of multiple chronic conditions will be larger than it has ever been, far larger than most countries are prepared to manage. Healthy life expectancy (another expression of
“active life expectancy”) is increased via reductions in mortality and morbidity, but disease prevalence is increasing, so functional independence must be maintained in the face of advancing age and comorbidity.11

The emerging epidemic of obesity among the middle-aged population, particularly in the United States, is another factor that may temper the optimism some have expressed about being able to compress the duration of functional morbidity.6, 15, 16 Recent evidence of the rising prevalence of obesity in the middle aged and the consequences of obesity for independence and for the ability to function and fill social roles suggests that we may be in for a reversal of the hard-fought gains of functional decline.12, 17–19 Indeed, these findings reinforce the importance of an active lifestyle and low-risk health habits such as avoiding obesity in maintaining functional independence into the advanced years. Although technology, the built environment, and medical care advances may have yielded benefits in function and quality of life for the “greatest” generation, unless the health habits of the baby boomers change dramatically, future researchers may be trying to explain the cohort effect that found a short-lived reduction in the duration of age-related functional impairment.

Notes

Health trends in the fastest growing sector of the population, the oldest old, have received much attention during the past decade because of the rising costs of medical and long-term care. Many studies have suggested a compression of morbidity in this sector, implying that the future care needs of elderly people will not follow the demographic prognoses. Most of these studies have used health indicators based on disability, a concept that is contextually embedded. We have taken a closer look at health-trend surveys with a focus on the health indicator used. Our findings reveal that although disability measures often show improvement, there is a simultaneous increase in chronic disease and functional impairments—health components that require care resources. That is, an expansion of other health problems may accompany a compression of disability. Therefore, a concept of general morbidity is not sufficient when discussing health trends and the need for care services in the elderly population. Because different indicators do not show the same trends over time, we suggest a more refined discussion that distinguishes between different health components. In addition, different components have different implications for the amount and kind of care resources needed. If the current positive trends in disability continue, future need for social services and long-term care may not parallel demographic projections. Trends in disease and functional limitations seem to have taken a different direction, suggesting a parallel or increased need for resources in medical care, rehabilitation, and compensatory interventions such as assistive technology.

The 20th century was incredibly successful in regard to aging. Although change first appeared in infant mortality, mortality also decreased in elderly age groups due to improvements in living conditions, better control of infectious diseases, and medical advancements (Centers for Disease Control and Prevention, 1999). In the second half of the century, cardiovascular disease replaced infectious diseases as the major killer, but survival here also has increased dramatically. Even elderly people who were once considered to have a very high mortality risk now seem to be surviving longer (Crimmins & Saito, 2000; Rosén & Haglund, 2005).

The prevalence of health problems increases sharply with age with associated costs for medical care, social services, and long-term care. Therefore, health trends in the oldest sector of the population are of particular interest when estimating need for future care resources. As the average expected life span increases, an important issue is whether the years added to life are characterized by good health and independence or by health problems and the need for care.

Bearing in mind the complex interplay for mortality and morbidity, we pose the following question: How should researchers best measure the health of the elderly population to reflect need for care? Different population surveys utilize different kinds of measures, all of which are

related to health and are therefore often loosely referred to as health indicators. When used in surveys of the oldest sectors of the population, indicators need to span the entire spectrum of health. Representative samples will include healthy and independent people as well as people who are bedridden and dependent on extensive social and medical services. Thus it is difficult to construct health indicators that avoid floor and ceiling effects. Disease, one of the most common measures of ill health, usually reflects a need for medical care, but without clinical information about severity, disease may say little about the need for the most expensive service, long-term care. For example, people who report that they have heart failure or Parkinson’s disease could be fully independent or institutionalized. Consequently, most surveys use measures of function or disability (i.e., measures that reflect the cumulative consequences of disease and other living conditions). There is no consensus about how to define these concepts or which are the best health or function indicators for population surveys.

The idea of compressed morbidity among the oldest sector of the population has received wide publicity because of its optimistic implications for future resource need. It suggests that, although the population is aging, future elderly cohorts may not need as many care resources as do current cohorts. In this discussion, however, it is important to remember that even the most optimistic prognoses foresee an absolute increase in resource need.

**Commonly Used Health Indicators**

**Global Self-Rated Health**

This item asks respondents to rate their own general health on a 3- to 5-point scale. Self-rated health reflects the total picture of health as perceived by the individual. As such, it probably reflects dimensions of health that are most meaningful to each individual.

**Specific Self-Reported Health Items**

Many surveys include items that ask about specific health problems, either diseases or symptoms. When posed in survey interviews, questions about diseases often necessitate that the respondent be diagnosed, be informed of the diagnosis, remember the diagnosis, and report it during the interview.

**Functional Impairment**

Many surveys include instruments or items that refer to specific functions (e.g., walking, rising from a chair, lifting a heavy object, or seeing and hearing).

Mobility is one of the most commonly studied functions because of its importance in independent living.

**Disability**

One of the most commonly used indicators of health trends in the elderly population is disability. It is particularly useful because of its close correlation with need for social services. Most often researchers measure it with some form of primary activities of daily living (ADLs; e.g., ability to dress, use the toilet, eat, bathe) and secondary instrumental ADLs (IADLs; e.g., ability to clean house, prepare food, shop for groceries).

**Tests of Function**

Several surveys have incorporated simple tests of function in their batteries. Tests provide more objective measures that are less susceptible to individual interpretations or expectations. They are also less affected by environmental factors.

**Conflicting Evidence**

Table 1 presents the trends for the indicators mentioned previously as a summary of health-trend studies of the elderly population over the past two decades.
Results of trend studies using self-rated health and measures of self-rated function have shown mixed results: Some have shown improvement, and others have shown worsening. Results concerning specific diseases and symptoms have leaned overwhelmingly toward increased prevalence.

Results for ADL limitations (severe disability) have been mixed, although there is much evidence for improvement or no change. Results for IADL limitations (moderate disability) have leaned heavily toward improvement. We found no study showing increased prevalence of IADL limitations.

**Discussion**

From this overview of international studies, it is clear that research results diverge, and even conflict, in regard to health trends among elderly populations. Investigators can expect to see different trends in different countries due to different demographic and mortality patterns.

**Explaining Change in Prevalence Rates**

One can explain some change in prevalence over time as a result of changes in reporting, particularly for symptoms and diseases. Most population surveys are based on self-reports from respondents or proxies. Many factors other than the pathological condition of the respondent can influence these reports.

Awareness of problems such as depression or hypertension among elderly people has increased in the medical profession, leading to more frequent diagnosing. Physicians may also be more likely today than they were in previous years to tell their patients about the diagnoses. In general, it has also become more socially acceptable to talk about certain problems, such as depression and incontinence; respondents may therefore be more willing to report these problems now than their counterparts would have been years ago.

Nonetheless, there also seems to be substantial evidence for increases in disease prevalence among older sectors of the population.

How can investigators explain the increased prevalence of health problems, both reported disease and symptoms as well as tested functional ability? Most population studies, understandably, look at prevalence at a particular time. As the mortality rate decreases, more people—even those with diseases—survive with their problems. In particular, survival among even very old people with stroke and cardiac infarct has improved (Rosén & Haglund, 2005). Many of these people survive, but they often have chronic health problems.

**Table 1** Health Trends in Elderly Populations According to Various Health Indicators

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<tr>
<td>Self-rated health</td>
<td>Mixed results</td>
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<td>Specific health items: diseases and symptoms</td>
<td>Increased prevalence</td>
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<td>(self-ratings, costs, medical journals)</td>
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<tr>
<td>Self-rated physical function</td>
<td>Mixed results</td>
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<td>Self-rated activities of daily living</td>
<td>Mixed, mostly improvement</td>
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<td>Self-rated instrumental activities of daily</td>
<td>Improvement or no change</td>
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<tr>
<td>living</td>
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<tr>
<td>Tests of functional ability</td>
<td>Increased prevalence or no change</td>
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</table>
Despite the widely divergent results, the general tendency seems to be that older sectors of the population report more diseases and health problems at the same time that they seem to be coping better with many of the activities necessary for independent living (Crimmins, 2004; Parker et al., 2005; Spillman, 2004). Decreases in disability levels do not seem to be the result of less disease or fewer symptoms.

The fact that most studies have found that IADL disability seems to be improving could well reflect the many environmental changes that can facilitate these activities: improved accessibility, wheeled walkers with baskets, ready-made meals, and microwave ovens. There are fewer technological interventions available to facilitate primary ADLs such as maintaining personal hygiene, dressing, and eating.

**Conclusions**

The study of health patterns over time will lead to better understanding of contextual factors that may be correlated to health. Experts may also use health trends in the oldest sectors of the population to make projections of possible future resource need. However, most studies aimed at estimating future need do not specify which kinds of resources will be needed. Studies that use only disability measures give misleading results in regard to the total resource need that can be expected in the future. Elder care includes a wide variety of services, from highly specialized medical care to long-term-care facilities to simple but essential home services. The resources, in terms of cost and competence, vary accordingly. Therefore, if the study of health trends is going to be of any use in planning resource distribution in the future, investigators must examine the different components of health separately. This entails using a variety of measures as indicators.

Nebulous concepts of morbidity have clouded discussion on, and research about, health trends. Studies have shown that during a single time period there are different trends for different components of health in the elderly population and that the correlations between different components also change. This review suggests that the prevalence of symptoms, disease, and functional limitations is expanding at the same time that disability is being compressed, or at least postponed.

Functional limitations imply rehabilitative and compensatory measures, whereas disability among elderly people often entails need for social services and/or long-term care.

In summary, trend studies using disability measures give a skewed picture of overall health development in the elderly population. Furthermore, the implication that future need for care may be lower for future cohorts of elderly people is dangerously deceptive. To adequately study health trends among the very old, surveys need to include multiple health indicators.

**References**


Ageing is a physical phenomenon happening to our bodies, so at some point in the future, as medicine becomes more and more powerful, we will inevitably be able to address ageing just as effectively as we address many diseases today.

I claim that we are close to that point because of the SENS (Strategies for Engineered Negligible Senescence) project to prevent and cure ageing.

It is not just an idea: it’s a very detailed plan to repair all the types of molecular and cellular damage that happen to us over time.

And each method to do this is either already working in a preliminary form (in clinical trials) or is based on technologies that already exist and just need to be combined.

This means that all parts of the project should be fully working in mice within just 10 years and we might take only another 10 years to get them all working in humans.

When we get these therapies, we will no longer all get frail and decrepit and dependent as we get older, and eventually succumb to the innumerable ghastly progressive diseases of old age.

We will still die, of course—from crossing the road carelessly, being bitten by snakes, catching a new flu variant, etcetera—but not in the drawn-out way in which most of us die at present.

So, will this happen in time for some people alive today? Probably. Since these therapies repair accumulated damage, they are applicable to people in middle age or older who have a fair amount of that damage.

It is very complicated, because ageing is. There are seven major types of molecular and cellular damage that eventually become bad for us—including cells being lost without replacement and mutations in our chromosomes.
Each of these things is potentially fixable by technology that either already exists or is in active development.

**Should We Cure Ageing?**

Curing ageing will change society in innumerable ways. Some people are so scared of this that they think we should accept ageing as it is.

I think that is diabolical—it says we should deny people the right to life.

The right to choose to live or to die is the most fundamental right there is; conversely, the duty to give others that opportunity to the best of our ability is the most fundamental duty there is.

There is no difference between saving lives and extending lives, because in both cases we are giving people the chance of more life. To say that we shouldn’t cure ageing is ageism, saying that old people are unworthy of medical care.

**Playing God?**

People also say we will get terribly bored but I say we will have the resources to improve everyone’s ability to get the most out of life.

People with a good education and the time to use it never get bored today and can’t imagine ever running out of new things they’d like to do.

And finally some people are worried that it would mean playing God and going against nature. But it’s unnatural for us to accept the world as we find it.

Ever since we invented fire and the wheel, we’ve been demonstrating both our ability and our inherent desire to fix things that we don’t like about ourselves and our environment.

We would be going against that most fundamental aspect of what it is to be human if we decided that something so horrible as everyone getting frail and decrepit and dependent was something we should live with forever.

If changing our world is playing God, it is just one more way in which God made us in His image.

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**The Alternative View**

Nothing in gerontology even comes close to fulfilling the promise of dramatically extended lifespan.

—S. Jay Olshansky

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**“Youthful Not Frail”**

The length of life will be much more variable than now, when most people die at a narrow range of ages (65 to 90 or so), because people won’t be getting frailer as time passes.

The average age will be in the region of a few thousand years. These numbers are guesses, of course, but they’re guided by the rate at which the young die these days.

If you are a reasonably risk-aware teenager today in an affluent, non-violent neighbourhood, you have a risk of dying in the next year of well under one in 1,000, which means that if you stayed that way forever you would have a 50/50 chance of living to over 1,000.

And remember, none of that time would be lived in frailty and debility and dependence—you would be youthful, both physically and mentally, right up to the day you mis-time the speed of that oncoming lorry.

There is no difference between saving lives and extending lives, because in both cases we are giving people the chance of more life.

—Aubrey de Grey
Some 1,700 years ago the famous Chinese alchemist, Ko Hung, became the prophet of his day by resurrecting an even more ancient but always popular cult, Hsien, devoted to the idea that physical immortality is within our grasp.

Ko Hung believed that animals could be changed from one species to another (the origin of evolutionary thought), that lead could be transformed into gold (the origin of alchemy), and that mortal humans can achieve physical immortality by adopting dietary practices not far different from today’s ever-popular life-extending practice of caloric restriction.

He found arrogant and dogmatic the prevailing attitude that death was inevitable and immortality impossible.

Ko Hung died at the age of 60 in 343 AD, which was a ripe old age for his time, but Hsien apparently didn’t work well for him.

The famous 13th Century English philosopher and scientist, Roger Bacon, also believed there was no fixed limit to life and that physical immortality could be achieved by adopting the “Secret Arts of The Past.” Let’s refer to Bacon’s theory as SATP.

According to Bacon, declines in the human lifespan occurred since the time of the ancient patriarchs because of the acquisition of increasingly more decadent and unhealthy lifestyles.

All that was needed to reacquire physical immortality, or at least much longer lives, was to adopt SATP—which at the time was a lifestyle based on moderation and the ingestion of substances such as gold, pearl, and coral—all thought to replenish the innate moisture or vital substance alleged to be associated with aging and death.

Bacon died in 1292 in Oxford at the age of 78, which was a ripe old age for his time, but SATP apparently didn’t work well for him either.

Physical immortality is seductive. The ancient Hindus sought it, the Greek physician Galen from the 2nd Century AD and the Arabic philosopher/physician Avicenna from the 11th Century AD believed in it.

Alexander the Great roamed the world searching for it, Ponce de Leon discovered Florida in his quest for the fountain of youth, and countless stories of immortality have permeated the literature, including the image of Shangri-La portrayed in James Hilton’s book Lost Horizon, or in the quest for the holy grail in the movie Indiana Jones and the Last Crusade.

What do the ancient purveyors of physical immortality all have in common? They are all dead.
They claim unabashedly that the science of radical life extension is already here, and that all we have to do is “live long enough to live forever.”

What Kurzweil and others are now doing is weaving once again the seductive web of immortality, tantalising us with the tale that we all so desperately want to hear, and have heard for thousands of years—live life without frailty and debility and dependence and be forever youthful, both physically and mentally.

The seduction will no doubt last longer than its proponents.

**False Promises**

To be fair, the science of ageing has progressed by leaps and bounds in recent decades, and I have little doubt that gerontologists will eventually find a way to avoid, or more likely delay, the unpleasantries of extended life that some say are about to disappear, but which as anyone with their eyes open realises is occurring with increasing frequency.

There is no need to exaggerate or overstate the case by promising that we are all about to live hundreds or even thousands of years.

The fact is that nothing in gerontology even comes close to fulfilling the promise of dramatically extended lifespan, in spite of bold claims to the contrary that by now should sound familiar.

What is needed now is not exaggeration or false promises, but rather, a scientific pathway to improved physical health and mental functioning.

If we happen to live longer as a result, then we should consider that a bonus.
“You know, I really like her,” Tony began. “I mean I really fell for her. And now... I just don’t know...” Tony’s voice trailed off.

“What’s the problem?” Tony’s roommate asked.

“Well, you know that girl I’ve been dating—Cynthia? It turns out she’s a lot older than I thought she was.”

“So. How much older?” asked his roommate.

“Hey, she remembers the assassination of President Kennedy, which happened when she was 10. That makes Cynthia 77 years old. She’s 55 years older than I am! Can you believe that?”

Tony’s roommate was aghast. He’d seen Cynthia. He figured she was around 30, not much more. Tony was pleased about going out with an “older” woman. But neither Tony nor his roommate had guessed just how much older she really was.

“I don’t believe it! I mean, how could she be so old?” stammered Tony’s roommate.

“Well, I found out she’s had skin grafts and plastic surgery on her face; that’s why there are no wrinkles. And of course her hair is dyed, so there’s no gray at all. But it’s the rest of her that’s... I don’t know how to say it... that’s all been replaced. It’s weird. It’s like Cynthia’s body is artificial, the way it is with a cyborg.

“To begin with, she’s got silicone breast implants. OK, not so unusual. But inside she’s artificial, too: all plastic valves in her heart, a liver transplant, hip replacements, and a lot of artificial bones. She’s been on estrogen replacement for years and on other antiaging hormones, too. That’s why she looks so young.

“Cynthia never talked much about things that happened before the turn of the century, and now I see why. I never suspected that she was born in the early 1950s. She admitted it to me last night. I came home and suddenly realized I’ve been dating a cyborg!”

Science fiction stories have had titles such as “I Married a Martian,” and a Star Trek film, First Contact, featured a female “Borg” (for cyborg) as a leading character. Star Trek fans remember that the alien species known as the Borg are creatures that are part human and part machine. Like Tony, Captain Picard found himself in a relationship with a Borg and faced perplexing questions. Is the experience of Tony or Captain Picard a glimpse of things to come?

Cyborgs are not outside the realm of possibility (Clark, 2004). In fact, the era of modern bioethics may be said to have started in 1967, when Louis Washkansky received a heart transplant from Christiana Barnard. Tissue transplants have long become a standard part of modern medicine. Some tissues, such as cartilage and the cornea of an eye, are transplanted easily. With proper safeguards, blood can be safely transfused. Modern medicine has also shown success in transplanting skin, bone, kidneys, and, more recently, lungs, livers, and hearts. The development of monoclonal antibodies, which help suppress rejection of transplanted tissues, has opened up a vast field of surgery to replace organs diseased or worn out with age.
At the same time, biomedical scientists are developing artificial tissues and organs that have been successfully inserted into the human body. Bioengineering has already made possible a variety of “replacement parts”:

- **Skin**: Skin tissue has been successfully grown in the laboratory, and biotechnology companies are now producing it in quantity for use with burn victims.
- **Cartilage**: One of the most common effects of aging is the wear and tear on cartilage. Surgeons can now use cartilage grown in the lab to treat joint injuries.
- **Bone**: Hip replacements have long been a staple of geriatric medicine—even Elizabeth Taylor had one. Today, biotechnology companies are selling bone substitutes manufactured from artificial substances. Companies are working on grafts that would enable the body to replace living tissue with artificial bone.

More exciting innovations are on the horizon with the expanding field of regenerative biology and medicine (Stocum, 2012):

- **Breast Tissue Regeneration**: Breast implants made of silicone have long been in use, but the results have been controversial. Tissue engineers are working on new techniques to stimulate women's bodies to grow new breast tissue. Already, plastic surgery has become enormously popular. Tissue engineering and “body sculpting” are likely to become even more important in years to come.
- **Artificial Vision**: In *Star Trek: The Next Generation*, the character Geordi (played by LeVar Burton) is able to see by using a “VISOR”—an artificial vision device worn over the eyes. Today, older adults are the age group most likely to be afflicted with impaired vision or total blindness. But in the future, electronic devices may replace lost visual capacity.
- **Heart Valves**: Cardiovascular disease is the biggest cause of death among older Americans. Researchers have long been at work on a totally implantable artificial heart. Today, heart valves from pigs have been transplanted into humans. Researchers have discovered how to grow valves from blood vessel cells in the laboratory, and these lab-grown valves work well in lambs. In the future, thousands of people could benefit from artificially grown heart valves.
- **Bladder**: Urinary incontinence is one of the most troubling afflictions for older adults, and it is a factor in nursing home placement. But scientists are working on producing molded lab-grown cartilage that could function as a valve to keep urine flowing in the proper direction.
- **Pancreas**: Late-life diabetes is one of the most serious diseases of old age, entailing complications such as blindness, amputation, and heart failure. Diabetes results from basic organ failure. The pancreas doesn’t produce enough insulin to metabolize sugar properly. Bioengineers are now working on implants made of pig islet cells, which could produce insulin without injections for people who develop diabetes.
• **Brain:** No one expects medical science to produce anything like Donovan’s Brain, a tissue-culture brain that was the centerpiece of a 1950s science fiction movie. But drugs to stimulate nerve growth are under investigation today, and techniques may soon be available to implant cells or introduce growth factors that would reverse damage to the central nervous system.

So far, cyborgs, like Star Trek, are just science fiction. But bioengineering work on transplants and artificial organs is not fictional. Moreover, other scenarios are possible. For instance, Bruce Sterling’s (1996) novel Holy Fire has as its heroine a wealthy 94-year-old woman who gets total cellular rejuvenation based on new genetic material added to chromosomes in her body. The result is an organism constructed from “designer genes,” which is different from Cynthia and her replacement parts. Stay tuned as the 21st century progresses and biomedical technology reshapes our vision of what human aging is all about.

### Questions for Writing, Reflection, and Debate

1. What are the arguments for and against the view that aging in and of itself is actually a disease? Pick one side of this issue and then try listing the points that can rebut the opposing point of view.

2. What do James F. Fries and Lawrence Crapo mean by natural death? What is the relationship between natural death and the natural life span? Should we consider the natural life span to be identical to the maximum life span?

3. Swedish data have turned up the surprising fact that death rates for the oldest-old (85+) have actually been going down. Some scientific studies suggest an ever-increasing life expectancy is quite possible. These findings sound like good news. Do we have any reasons to believe that these findings are not good news? What would be Fries and Crapo’s response to these claims?

4. The Human Genome Project has now produced a complete map of all human chromosomes. Considering the different theories of aging, what are some of the ways in which new genetic knowledge might change how we think about the causes of biological aging? What are the social and ethical implications of that knowledge?

5. Write a science fiction or imaginary scenario of how the United States might look in the year 2030 if dramatic breakthroughs in the genetics of aging occur. In developing this scenario, be sure to state the year you expect the key discoveries or inventions to occur, and describe the likely social consequences of those discoveries or inventions.

6. What is the best scientific evidence in favor of, or against, the compression-of-morbidity thesis? Visit [http://www.pnas.org/content/103/48/18374.short](http://www.pnas.org/content/103/48/18374.short) where you can review disability trends among older adults. What questions are left open by this website’s report—for example, what exactly is “disability” as measured across different societies?

### Suggested Readings


BASIC CONCEPTS I  
A Life Course Perspective on Aging


Student Study Site

Visit the Student Study Site at http://study.sagepub.com/moody9e for these additional learning tools:

- Flash cards
- Web quizzes
- Chapter outlines
- SAGE journal articles
- Web resources
- Video and audio resources

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DO INTELLIGENCE AND CREATIVITY DECLINE WITH AGE?

We shall not cease exploring
And the end of all our exploring
Will be to arrive where we started
And know the place for the first time.

—T. S. Eliot, “The Four Quartets”

The view that intelligence and creativity decline with age is widely shared. Albert Einstein won a Nobel Prize for his contribution to quantum theory, a creative breakthrough that appeared in published form when he was only 26 years old. He later remarked that “a person who has not made his great contribution to science before the age of 30 will never do so.” Was Einstein right? The question of age and intellectual ability is an important one for individuals who worry about becoming irrelevant in a fast-paced world. The question is also important for society. French demographer Alfred Sauvy (1976) feared that an aging society would result in a “population of old people ruminating over old ideas in old houses.” As presented in the Prologue, in the coming decades, the U.S. population will become older. The workforce will be aging during a historical period when workplaces are being pushed to adopt new methods to improve competitive performance. Can we expect middle-aged and older workers to exercise creativity and initiative, or can we expect them to resist new ideas? What will happen to American inventiveness and scientific creativity as the average age of scientists goes up (Stephan & Levin, 1992)? These questions are disturbing for those who see in an aging America the “specter of decline” (Moody, 1988).

Some of these fears have foundation in fact. For instance, there is a common stereotype that older people take longer to learn new things, and this is a stereotype that turns out to be true. Compared with younger people, older people do tend to proceed more slowly in new learning situations, but slower speed is partly explained by lack of practice, differences in learning style, or motivation. In addition, reaction time tends to slow down with age—probably the result of “hardware” limits in the nervous system. But by itself, chronological age doesn’t explain much about learning ability (Merriam, Caffarella, & Baumgartner, 2007). In any case, slower speed or reaction time usually isn’t a factor in everyday performance. For example, short-term memory may weaken, but it usually doesn’t seriously affect daily life.
Along with the stereotype that with aging comes a reduction in creativity, there is a common assumption that older people overall are just plain bored, yet the Duke Longitudinal Studies of Aging found that nearly 9 out of 10 respondents said they had never been bored in the previous week (Palmore, 1981). Another stereotype suggests that older people cannot adapt to change, yet a little reflection shows this stereotype to be wrong. Consider only the enormous changes that most people are likely to face in their later years, such as retirement, widowhood, adapting to chronic illnesses, and so on.

The debate about age, intelligence, and creativity is important for America’s future. A number of gerontologists, perhaps with one eye on their own advancing years and the other on a changing society, have tried to determine what can be expected regarding cognitive changes that come with aging, especially whether creativity declines with age. They have faced a number of practical obstacles in their research, the most basic being an acceptable definition of creativity. Other types of cognitive function, notably intelligence and memory, have proved easier to pinpoint, although definitions of these cognitive functions are not without debate.

**Elements of Cognitive Function**

Creativity has been related to intelligence, specifically, fluid intelligence, which is intelligence applied to new tasks or the ability to come up with novel or creative solutions to unforeseen problems (Aizpurua & Koutstaal, 2016). Some observers believe the key to fluid intelligence is divergent thinking, which is the ability to come up with lots of different ideas in response to a problem-solving challenge.

The other side of the coin is crystallized intelligence, which reflects accumulated past experience and the effects of socialization (Ghisletta & Lecerf, 2016). Whereas fluid intelligence denotes a capacity for abstract creativity, crystallized intelligence may signify the acquisition of practical expertise in everyday life—in short, wisdom. Some components of wisdom have long been familiar. Philosophers going back to Socrates have argued that wisdom lies in a balanced attitude toward what we think we know: knowing what we do not know but, at the same time, refusing to be paralyzed by doubt (Staudinger & Lindenberger, 2013). Another key feature of wisdom would seem to be the ability to transcend bias or personal needs that may distort one’s perception of a given situation (Sternberg, 2005). Wisdom, then, involves more than cognitive development alone; it requires a degree of detachment and freedom from self-centeredness that has been described as ego transcendence (Peck, 1968).

Older people, if they develop a degree of detachment, might be in a position to achieve such wisdom. But, of course, no one has suggested that wisdom is a universal or inevitable result of chronological age alone. Something more is required than merely living a certain number of years, but psychologists do not agree about what that “something more” might be. Goldberg (2006) has argued that the mind can grow stronger as the brain grows older. This “wisdom paradox” comes from the capacity for pattern recognition. Moving into later life, the brain can build on a vast store of memories and shared patterns drawn from life experience. Such pattern recognition can result in habituation (Kastenbaum, 1984), which may be the opposite of wisdom. But an active mind may also provide a defense against habituation and instead lead to the development of wisdom (Cohen, 2006).
Some psychologists have wondered whether there is a trade-off between creativity and wisdom, with one declining while the other increases with advancing age. In this view, wisdom and creativity are seen in opposition to one another. Other psychologists argue that the cognitive processes involved in wisdom, intelligence, and creativity are all basically the same but are put to different uses by different kinds of people. Wise people, we might say, have a high tolerance for ambiguity because they appreciate how difficult it is to make reliable judgments. They see the world “in depth.” By contrast, the creative person seeks to go beyond whatever is given in the immediate environment to create something new.

Yet genuine creativity need not be identified with novelty for its own sake, as contemporary Western societies often do. In some societies of the East—for example, India, China, and Japan—old age is viewed as an appropriate time for spiritual exploration and artistic development. Late-life disengagement is balanced by opportunities for personal growth and creativity. “A Confucian in office, a Taoist in retirement,” goes the Chinese proverb, so retirement roles might include meditation or traditional landscape painting. In the Hindu doctrine of life stages, as well, later life is a period culminating in spiritual insight and wisdom.

What happens when a creative artist grows older and also develops a measure of wisdom applied to the creative process? Part of the answer may be found by looking at creative artists who continued to be productive in old age. One of the greatest examples is the Dutch painter Rembrandt, whose style changed and deepened as he grew older. The aged Rembrandt practiced looser brushwork and became more preoccupied with the inner world of the people he painted. Another example is the impressionist Monet, who continued to paint his famous water lilies even after he was confined to his home in his 70s. Frail health also plagued the aging Matisse, who was forced to give up painting in favor of creating colored cardboard “cutouts” that distilled a lifetime of artistic experience into simple, powerful designs. It is as if the older artist is able to discard mere technical achievement in favor of some essential and elemental quality of art. We see a similar development of “late style” among poets such as Goethe and W. B. Yeats. All these examples suggest that, in the last stage of life, many of the greatest creative minds experience a change or a deepening of their creative style that could be attributed to an accumulation of wisdom.

The sources of creativity and productivity in later life are complex and result from many different factors. For example, most productive individuals produce both successes and failures; they have more successes than do less productive individuals partly because they have more failures as well. And there is no law of fate that decrees that creativity must decline with age. Late-life creativity is unquestionably real, but it is far from universal, and it takes unpredictable forms. For example, it is well
known that so-called late bloomers—such as the painter Grandma Moses—may attain the peak of their careers much later in life than others. What is known about creativity in later life suggests that individual differences in creative potential are so substantial that they largely go beyond the effect of aging (Simonton, 1998). Finally, we should note that many examples of creativity in later life focus on extraordinary creative older people—a composer like Verdi or a choreographer like Martha Graham. But there is also creativity and intelligence manifest in everyday life. So-called ordinary people can exhibit capacity for new modes of thinking and acting with innovation and creativity.

**The Classic Aging Pattern**

Creativity in itself is difficult to define or measure, but psychologists have had long experience in measuring human intelligence. The *Wechsler Adult Intelligence Scale (WAIS)* is the most influential measure of global or general intelligence in use today. The WAIS includes verbal and performance scales, which are combined to assess IQ. The verbal part focuses on learned knowledge, including comprehension, arithmetic, and vocabulary; the performance part measures ability to solve puzzles involving blocks or pictures. As people grow older, their verbal scores on the WAIS tend to remain stable, but their performance scores tend to decline (Sattler, 1982). This persistent difference in performance on measures of the two components has been found so often that it is called the *classic aging pattern* (see Exhibit 1).

Some leading researchers have cautioned against taking the classic aging pattern too seriously. They question what is actually being measured by IQ tests. In other words, they challenge the very validity of IQ tests as a measure of the “real” intelligence of older adults. Perhaps test performance should not be equated with real differences in intelligence at all, they say. This controversy has a familiar ring. It is the same kind of challenge that has been heard about the use of IQ tests and SATs when those tests show poorer scores for some minority groups. Critics argue that “intelligence” is a more complex, multidimensional capacity than the tests measure (Gardner, 1985).

The evidence certainly indicates that age and intelligence have a complex relationship. In a test of basic memory skills of young and older adults, the average 70-year-old will take three or four times longer than a 20-year-old to identify a mental picture linking a word and a location and will tend to make more mistakes. Things are completely different when we test people for knowledge transmitted across generations through culture, however. Older people do well on tests for language skills as well as knowledge about how to handle life’s ups and downs. For example, when presented with a difficult hypothetical dilemma, older adults score much better than younger adults. How, then, do we develop a valid measure of late-life intellectual ability?

**Measures of Late-Life Intelligence**

Interest in the validity problem, or the problem of measuring “real” intelligence, has helped stimulate psychologists to ask whether any positive cognitive developments come with age. The long debate has at least confirmed that conventional methods of measuring intellectual abilities have not always acknowledged the skills used by adults in coping with the demands
Tests to measure the relation of wisdom or creativity to age are seeking to capture something elusive. Everyday intelligence—what we sometimes call “common sense”—involves pragmatic or social judgment, which is more than abstract reasoning (Cornelius, 1990). What is involved is something akin to everyday problem solving (Cornelius & Caspi, 1987) or expertise in life planning. Some of these same cognitive capacities are evident in what we call “wisdom.” The wisdom of later life probably includes several distinct but interrelated attributes—reflective judgment in the face of uncertainty, “problem finding” (as opposed to solving an already given problem), integrated thought about one’s life, and intuition (i.e., the empathic ability to understand a concrete situation). These qualities are obviously difficult to measure on a test.

Paul Baltes, perhaps the leading psychologist investigating wisdom today, has tried to develop a psychological test to measure wisdom. Baltes and his associates presented adult test subjects with questions such as this one: “A 14-year-old girl is pregnant. What should she, what should one, consider and do?” In scoring the test, Baltes was not looking for any specific answer, but instead was trying to measure how wise people go about dealing with difficult questions. Not all older people are wise, but more than half of the top responses on Baltes’s (1992) “wisdom test” came from people beyond 60 years of age.

Baltes went on to define wisdom as an expert knowledge system derived from experience and capable of dealing with pragmatic problems (Baltes & Staudinger, 1996). That definition is similar to the commonsense understanding of wisdom as consisting of good judgment in response to uncertain problems of living. If we follow this approach, we can understand why wisdom, potentially at least, might increase with age. The reason goes back to the distinction between fluid intelligence, which operates by the mechanics of information processing, and the content-rich, pragmatic knowledge of crystallized intelligence that is honed through long-life experience.

Steps toward defining or measuring wisdom are still in the early stages, but the effort holds promise. Research on the aging mind has moved from a simple view of growth versus decline to a more complex assessment of potentialities and limits. The cognitive mechanics of the computer—information processing—can be compared with fluid intelligence, which is biologically based and tends to decline with age. In contrast, cognitive pragmatics—factual knowledge and problem solving—can grow with age and can compensate for losses in processing power. We could say that with advancing age hardware declines, whereas software becomes enriched (Baltes, 1993).

**STUDIES OF AGE AND COGNITIVE FUNCTION**

Different research methodologies have been used to measure cognitive changes associated with aging. Cross-sectional methodology looks at groups of young and old people at a single point in time, and longitudinal research follows subjects over many years (see also Basic Concepts I). Optimists on the subject of creativity and age point out that cross-sectional studies of intelligence may be revealing differences that come not from age but from characteristics and experiences of different cohorts (Dixon, Backman, & Nilsson, 2004).
For instance, young people taking IQ tests tend to be quite familiar with test taking from recent experience in school. As a group, they show far less test anxiety than do older people (Whitbourne, 1976). Furthermore, many older people have internalized ageist attitudes and believe that with advancing age, intelligence—and especially memory ability—invariably declines. Older people also tend to be more cautious than younger people, and thus they may be more reluctant to guess at the right answers on an IQ test (Birkhill & Schaie, 1975). Finally, current cohorts of older people, on average, lack the formal schooling enjoyed by younger age groups, though recent census data suggest that educational attainment of persons aged 65 and older has increased steadily since 1970, and if this trend continues, it will be higher for future cohorts of older adults (see Exhibit 2).

Given the tendency of cross-sectional studies to overestimate the impact of chronological age, longitudinal studies make sense. One of the most extensive sources of knowledge about intelligence and aging comes from the Seattle Longitudinal Study, which followed individuals ranging in age from 25 to 81 years over two decades (Schaie, 1996). That investigation and others have found that the steepest average intellectual declines come after age 60. Averages conceal large differences among individuals, but even on longitudinal studies, the classic aging pattern emerges. Still, research findings do challenge the idea of inevitable, global intellectual decline for all individuals. Even more important, intellectual decline in older people may be halted or reversed by specific interventions, such as training and education (Boron et al., 2007). These findings suggest that intellectual decline in later life is by no means irreversible or inevitable.

Indeed, longitudinal studies show that successive cohorts of older people are, in fact, improving their performance on intelligence tests, perhaps reflecting higher educational attainment. In addition, anywhere from 60% to 85% of those tested maintain their scores over time or even improve specific abilities. Among those over age 80, only between 30% and 40% of participants in the Seattle study had declining scores.

These studies indicate that few people show any global decline in intelligence as they age, suggesting that people can optimize their cognitive functioning by drawing on their strengths or compensating for losses. This idea of “decrement with compensation” is fundamental to the idea of “successful aging.” It underscores the importance of resilience to well-being in later life (Fry & Keyes, 2013). Both cross-sectional and longitudinal studies show the classic aging pattern, with uniform decline among subjects beyond their 70s. But, more important, even in their 80s and 90s, people tend to remain quite competent in familiar everyday situations.

Studies of creativity, as opposed to cognitive function in general, have been more difficult to conduct. Again, the problem is defining creativity.

Both cross-sectional and longitudinal studies, using many different kinds of tests, have shown that divergent thinking does decline with advancing age, and the decline is not attributable simply to reductions in speed of response (McCrae, Arenberg, & Costa, 1987). The way that creativity is measured in this study is not completely satisfactory. However, in his classic study of creativity and aging, Harvey Lehman (1962) used a public consensus approach instead. First, he recognized public consensus about products that clearly demonstrate superior creativity—for example, Mozart’s symphonies, Newton’s theory of gravity, or Edison’s invention of new electrical devices. Lehman found that the curves of publicly acknowledged creativity followed exactly the curves of fluid intelligence: They both peaked after age 30 and declined with each subsequent decade.
Wayne Dennis (1966), a critic of Lehman’s work, looked at different data and found that for most people, the decades of the 40s and 50s were the most productive period. Dennis’s conclusions were based on quantitative measures of productivity, however (e.g., how many publications), not on qualitative measures (how important the contribution was). Therefore, Dennis’s results do not actually refute Lehman’s findings.

Still other investigators measuring scientific creativity found that productivity among scientists peaked in the early 40s—later than Lehman said—and then declined slowly after age 50 (Cole, 1979; Diamond, 1986). A longitudinal study of creativity among mathematicians found that those who published a great deal when young did continue to publish as they became older, at least through middle age. An important question about these findings has to do with whether there are specific styles of creative production in different professions or fields, such as scientific versus artistic fields, and, thus, whether professional creativity is a uniform phenomenon that can be studied one way.

The evidence thus shows that age does not necessarily mean loss of cognitive function. Nevertheless, performance on intelligence tests does decline. Psychologists speculating about the reasons cite strong evidence that declining speed with advancing age does have a negative effect on performance on intelligence tests, but the precise reasons remain unclear. Aging is, in fact, accompanied by a clear loss in cognitive reserve capacity—that is, the degree of unused potential for learning that exists at any given time. Studies of reaction time in training also show that the speed of information processing definitely declines with age. Older adults,

Exhibit 2  Changes in Intelligence With Age

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SOURCE: MPI for Human Development: Library and Research Information (www.mpib-berlin.mpg.de)
for instance, do not reach the same peak of performance in reaction time as do younger adults (Salthouse, 2010), nor do older people achieve comparable performance when trained in memory skills (Baltes & Baltes, 1990). Still other psychologists distinguish between maintained and vulnerable cognitive function, once again underscoring the importance of the concept of reserve capacity (Kaufman, 2001).

Optimists counter that, although fluid intelligence abilities decline with age, crystallized abilities tend to increase. In addition, declines in cognitive ability among older people can often be compensated for by the expertise acquired with aging, a phenomenon that has been called decrement with compensation. In other words, wisdom and pragmatic knowledge compensate for declines in speed or fluid intelligence. For instance, despite declines in typing speed, some older typists demonstrate superior typing productivity. They apparently compensate for loss of speed by reading farther ahead in the manuscript they are typing, which is a pragmatic response demonstrating knowledge of how to type more effectively (Salthouse, 1984). As well, research suggests there may be a positive relationship between engagement in leisure activities starting in midlife and later-life cognitive functioning (Kareholt et al., 2010).

**Correlates of Cognitive Stability**

The debate about the causes and meaning of the measurable decline in IQ scores with age comes down to a difference between those who think of themselves as “realists” and those who take a more optimistic view. On the optimistic side, some psychologists speak of the “myth of
Do Intelligence and Creativity Decline With Age?

They suggest that intelligence actually need not decline in later life at all (Baltes & Schaie, 1974). But other, equally expert psychologists bitterly reject this conclusion (Horn & Donaldson, 1977). These realists contend that declines in fluid intelligence in the classic aging pattern are replicated empirical facts to be accepted, no matter how unpleasant. Although we might find individuals who do not exhibit the pattern, the realists insist, such cases do not refute an overall decline in average performance.

Taking another tack, the optimists have explanations other than chronological age for the classic aging pattern. One possible factor could be ill health, which does become more frequent with aging, although not universally so. Studies reveal consistent differences in IQ test performance depending on even modest declines in health status. Poor health and disability also tend to cause exit from paid work and therefore probably weaken learning opportunities. Note, then, that both biological changes, such as health status, and social changes, such as retirement, may be responsible for changing cognitive abilities. It may be possible to change these biosocial factors to such a degree that the classic aging pattern no longer holds true.

The ability to adapt or compensate for decrements in cognitive function is probably related to cognitive style or personality. According to some psychologists studying personality, basic personality dispositions include traits such as being neurotic, extroverted, open to experience, and conscientious. These dispositions predict how people adapt to changing life circumstances. Surprisingly, according to this model, basic personality and temperament change little after the age of 30 (McCrae & Costa, 1990). Longitudinal studies show that personality is stable throughout adulthood, even in response to health problems, economic setbacks, and bereavement (Costa, Metter, & McCrae, 1994). But again, we might want to ask questions about how personality is being defined and measured.

Psychological characteristics over the life span do not emerge entirely from the isolated individual. Behavior often reflects social conditions and socially structured transitions in the life course (Schooler & Schaie, 1987; Vaillant, 2012). For example, retirement may boost the cognitive performance of people who retire from routine or boring jobs, but accelerate cognitive decline for those who have held complex jobs. In addition, some psychological traits can be intensified by life course transitions. For instance, middle-aged people with flexible attitudes are less likely as they grow older to experience a decline in psychological competence than are those who could be described as cognitively rigid (Schaie, 1984).

We should thus be skeptical of any broad generalizations or unqualified claims about either the decline or the stability of intelligence with aging. Experiments in training have shown that declines in intellectual functioning among older people can be reversed. In the Seattle Longitudinal Study, investigators found that 40% of participants who showed a decline in mental abilities benefited from training; following training, they achieved intelligence scores at least as high as those measured at the beginning of the 14-year study (Cunningham & Torner, 1990). Critics question, however, whether the reversal reflects practice or a genuine reversal of changes induced by aging.

Despite the criticism, psychological studies with older people have demonstrated that intelligence, defined as the ability to think and learn new things, has a great measure of plasticity or potential for growth even at advanced ages. Results from studies of groups of healthy people between ages 60 and 80 demonstrate that they benefit from practice and show performance gains just as younger people do. One series of studies showed that older adults could even be trained to become much more skilled than before at short-term memory tasks: In effect, they could become memory experts (Baltes & Baltes, 1990). When older
Basic Concepts

A Life Course Perspective on Aging

**URBAN LEGENDS OF AGING**

“We lose a million neurons every day.”

This familiar nugget of ageism is now long disproven by neuroscience. It’s true that we’re always losing, and gaining, neural connections each day, and it’s also true that the brain shrinks with age. But research by scientists such as Marian Diamond and others demonstrated the remarkable neuroplasticity of the human brain into advanced age. Even if you were losing a million neurons a day, it would take centuries to lose your mind.

people are stimulated and intellectually challenged, this capacity for learning and remembering is impressive.

Our thinking about intelligence and creativity in later life has been much influenced by recent research on neuroscience and the brain (Horstman, 2012). Contrary to earlier beliefs, the brain forms new neurons throughout adulthood, a capacity known as neuroplasticity (Doidge, 2016; Schaie & Willis, 2015). Neuroscience research points to new ways of enhancing the capacity of the healthy aging brain when we view the aging brain in an evolutionary systems perspective (Csikszentmihalyi & Nakamura, 2015).

**CREATIVITY IN AN AGING POPULATION**

The research discussed suggests that the debate about the effect of aging on creativity and intelligence is by no means settled. The readings that follow represent the classic positions in this debate. The selection by Harvey Lehman gives some of the data from his public consensus studies and provides Lehman’s major conclusions. Wayne Dennis, one of Lehman’s strongest critics, attacks the claim that creativity declines with age. More recent and perhaps more balanced perspectives on aging and creativity are provided by the readings from Laura L. Carstensen and Gene Cohen, as well as Becca Levy and Ellen Langer.

These discussions of wisdom and aging should remind us of how little we know about what is possible in old age (Hall, 2010). It was during the 20th century that we first saw gains in longevity on a massive scale. Only in recent decades have substantial numbers of people experienced old age in relatively good health and with high levels of education. Therefore, studies of older people in previous decades may not be a good basis for judging what older people are capable of today or in the future.

We are left to take hope from examples of individual achievement in the past. For example, a number of well-known creative artists have made outstanding contributions...
in their old age. At age 71, Michelangelo was named chief architect of St. Peter’s in Rome. Titian painted some of his greatest works in his 80s, and Picasso produced drawings and paintings into his 90s. Martha Graham continued her choreography into her 80s, and Jessica Tandy won an Oscar at age 80. These are not isolated examples. In fact, recent research has confirmed that creativity can continue into the later years, and that, for some at least, higher-order mental abilities such as creativity and wisdom can flourish late into life (Lindauer, 2003).

With improving opportunities to practice the arts and pursue lifelong learning, tomorrow’s elders could take up the challenge of creativity and wisdom in the later years in ways unimaginable today. The old age once reserved for elites could become an opportunity for all to grow in later life. As art critic Ananda Coomaraswamy put it, it is not that the artist is a special kind of person, but rather that each person is a special kind of artist. Viewed in those terms, the real debate about age and creativity has barely begun.

FOCUS ON PRACTICE

Older-Adult Education

Increasingly, education is not limited to the first stage of life, but is instead extended over the life course. One obstacle to late-life education, however, is a stereotype that, by later life, people are too old to learn. Sometimes older people accept the stereotype, but we have seen that continued involvement in learning helps to maintain the ability to learn.

Today’s opportunities for late-life learning are more plentiful than ever before (Findsen, 2005). Along with organized educational programs, many informal opportunities for older people also abound. One example of a successful program is Road Scholar, founded in 1975 as Elderhostel, a summer residential college program for people over age 55. It offers noncredit courses in the liberal arts and now attracts more than 200,000 participants each year at 1,000 campuses around the United States and in 70 countries overseas. Road Scholar programs involve no homework, papers, or grades. But it does offer an opportunity for low-cost travel and an intellectual challenge for those interested in learning.

For those who do not want to travel to another community, tuition-free space-available courses are offered at most public universities. In addition, a national survey of community colleges showed that up to a quarter of two-year institutions provide some offerings for older adults, mostly in the areas of personal financial planning, health, and life enrichment (e.g., arts and humanities, exercise, and nutrition) and contemporary civic or political issues (Ventura-Merkel & Doucette, 1993).

Still another approach is the local Institute for Learning in Retirement, where retired people with special skills or knowledge teach courses to one another. This mutual-aid model has been replicated in more than 300 communities around the United States and is now sponsored by Road Scholar. In the Scandinavian countries, France, Spain, and other countries, older people have created similar “Universities of the Third Age” affiliated with institutions of higher education. Along with education, there has been a recent expansion of interest in the arts as a vehicle for lifelong learning for older people (Hanna, Noelker, & Bienvenue, 2015).

In the future, we can expect that lifelong learning will increase substantially. One reason is the rising level of prior education among successive cohorts of older people. Previous education is the best predictor of interest in lifelong learning. The median level of education for people ages 65 and older in the year 1900 was only 8 years, whereas by the 1980s it had risen to 12 years. Between (Continued)
Global Perspective

Universities of the Third Age

Universities of the Third Age are local mutual-aid learning groups where retired people pursue lifelong learning activities. The University of the Third Age (U3A) idea was originally based at the University of Toulouse in France, but the original academic model has since spread to many countries in Europe and beyond. By the early 1980s, the U3A model appeared in Britain, where it operates more in the spirit of mutual self-help. U3As have now appeared in countries as distant as Canada, New Zealand, and India. In the United States, a comparable program exists in the form of Institutes for Learning in Retirement and Osher Lifelong Learning Institutes.

Since its beginning, the U3A has become a global phenomenon and comprises, literally, thousands of locally developed educational programs of remarkable variety. Following the British approach, learning groups in the U3A are conducted by leaders drawn from the ranks of retirees with a lifetime of experience and specialized expertise. Learning groups are largely run by volunteers and may have only a loose affiliation with a local university. Groups may focus on liberal arts subjects but are also organized around leisure-time activities such as travel and the creative arts.

At one level, U3As may appear to be simply clubs for culturally oriented older people, but others have seen the U3A as a distinctive contribution to our idea of later-life learning: in particular, the idea of learning from life experience in contrast to what some have termed a “banking model” of education as the transfer of skills or information. The renowned British historian Peter Laslett in his own later years became a leader of the U3A movement and presented some of these ideas in the book *A Fresh Map of Life: The Emergence of the Third Age* (1991).

What are man’s most creative years? At what ages are men likely to do their most outstanding work? In 1921, Professor Robert S. Woodworth, of Columbia University, published this statement in his book, *Psychology: A Study of Mental Life*: “Seldom does a very old person get outside the limits of his previous habits. Few great inventions, artistic or practical, have emanated from really old persons, and comparatively few even from the middle-aged. . . . The period from twenty years up to forty seems to be the most favorable for inventiveness” (p. 519). . . .

Assuming that the method by which one arrives at a conclusion is no less important than is the conclusion itself, let us see what is found when the inductive method is employed in the study of man’s most creative years. Let us first examine the field of creative chemistry and attempt to answer the question whether chemists display more creative thinking at some chronological age levels than at others.

In his book, *A Concise History of Chemistry*. . . ., Professor T. P. Hilditch, of the University of Liverpool, presents the names of several hundred noted chemists and the dates on which these chemists made their outstanding contributions to the science of chemistry. . . .

When the birth dates of the chemists listed by Hilditch were ascertained, insofar as data were available, it was possible to determine the ages at which the world’s most renowned chemists made their most significant contributions, both theoretical and experimental, to the science of chemistry. A sample of the findings is set forth graphically in Figure 1.

Figure 1 presents, by five-year intervals, the chronological ages at which 244 chemists (now deceased) made 993 significant contributions to the science of chemistry. In studying Figure 1 it should be borne in mind that it sets forth the average number of chemical contributions per five-year intervals. Full and adequate allowance is thus made for the larger number of youthful workers. . . .

Figure 2 presents the ages at which 554 notable inventions were made by 402 well-known inventors. . . . When Figure 2 was displayed to interested friends and colleagues, several persons immediately said, “What about Edison?” It is, of course, well-known that Thomas A. Edison was very active as an inventor throughout his entire life. Figure 3 reveals, however, that 35 was Mr. Edison’s most productive age. Moreover, during the four-year interval from 33 to 36, Edison took out a total of 312 United States patents. This was more than a fourth (28 per cent) of all the United States patents taken out by him during an inventive career that lasted for more than 60 years. . . .

The shape of a performance age-curve varies with a number of things: (1) the type of performance, (2) the excellence of the performance, and (3) the kind of measurement employed. This last fact can perhaps best be illustrated by use of an analogy. Thus, one might construct an age-curve setting forth the average ability of individuals within each of the several age-groups to do the ordinary high jump. At almost every age level some persons would be found who are more or less able to perform this feat.

One might, therefore, test out large numbers at each age level and with the resultant data it would be quite possible to construct age-curves disclosing the average height that could be attained by the members of each age group.

But there are several other possible procedures which might be employed for comparing the several age groups. Thus, within each of the age groups, one might ascertain the per cent of individuals able to high-jump six feet, the per cent able to high-jump five feet, etc. With the obtained data it would then be possible to construct one curve that would show for each age group the per cent of individuals able to do six feet, another curve showing the per cent able to do five feet, and so on. If a number of these curves were to be constructed, it seems obvious that that curve which set forth age differences in the ability to do six feet would start its rise later and would fall off both earlier and much more rapidly than would another curve showing age differences in the ability to do, say, two feet. It is evident that very superior high jumping is likely to occur during a narrower age-range than would be found for a much lower degree of ability.

If we think in terms of actual performance, the foregoing situation seems to exist in such diverse fields of endeavor as athletics, mathematics, invention, science, chess, the composition of enduring music, and the writing of great books. For each of these types of behavior, very superior achievement seems most likely to occur during a relatively narrow age-range, and the more noteworthy the performance, the more rapidly does the resultant age-curve descend after it has attained its peak. The findings with reference to sculptured works, oil paintings, and etchings suggest similarly that there is an optimal chronological age level for superlatively great success within these particular fields also.

The work of the genius in his old age may still be far superior to the best work that the average man is able to do in his prime. Therefore, for the study of age differences in creativity, it is not valid merely to compare the achievements of the aged genius with the more youthful accomplishments of the average person. If one wishes to ascertain when men of genius have done their very best work, it is necessary to compare the earlier works of men of genius with their own later works.

Sculpture. Effort was made to ascertain the ages at which the most noted sculptors of early

Figure 1  Average Number of Contributions by Chemists During Each Five-Year Interval of Their Lives

![Graph](https://via.placeholder.com/150)

**NOTE:** Based on 993 significant contributions by 244 chemists now deceased.

Figure 2  Average Number of Practical Inventions During Each Five-Year Interval of the Inventors’ Lives

![Graph](https://via.placeholder.com/150)

**NOTE:** Based on 554 inventions from 402 inventors now deceased.
By means of statistical distributions and graphs [we] show the ages (1) at which outstanding thinkers have most frequently made (or first published) their momentous creative contributions, [and] (2) at which leaders have most often attained important positions of leadership. . . .

The most notable creative works of scientists and mathematicians were identified by experts in the various specialized fields of endeavor. For such fields as oil painting, education, philosophy, and literature, a consensus of the experts was obtained by a study of their published writings. In each field listed below the maximum average rate of highly superior production was found to occur not later than during the specified range of ages. For example, item 1 of this list, chemistry, 26–30, is to be interpreted as follows: in proportion to the number of chemists that were alive at each successive age level, very superior contributions to the field of chemistry were made at the greatest average rate when the chemists were not more than 26–30. The remaining items here and those in the tabular lists that follow are to be interpreted in similar manner.

Physical Sciences, Mathematics, and Inventions:

1. Chemistry, 26–30
2. Mathematics, 30–34
3. Physics, 30–34
4. Electronics, 30–34
5. Practical Inventions, 30–34
6. Surgical Techniques, 30–39
7. Geology, 35–39
8. Astronomy, 35–39

Biological Sciences:

9. Botany, 30–34
10. Classical Descriptions of Disease, 30–34
11. Genetics, 30–39
12. Entomology, 30–39
Although the maximum average rate of output of the most important philosophical books occurred at 35–39, the total range for best production extended from 22 to 80, and for mere quantity of output—good, bad, and indifferent—the production rate was almost constant from 30 to 70.

A very large proportion of the most renowned men of science and the humanities did their first important work before 25, and in general the earlier starters contributed better work and were more prolific than were the slow starters.

For most types of creative work the following generalizations have been derived. Within any given field of creative endeavor: (1) the maximum production rate for output of highest quality usually occurs at an earlier age than the maximum rate for less distinguished works by the same individuals; (2) the rate of good production usually does not change much in the middle years and the decline, when it comes, is gradual at all the older ages—much more gradual than its onset in the late teens or early twenties; (3) production of highest quality tends to fall off not only at an earlier age but also at a more rapid rate than does output of lesser merit.

For the study of literary creativity, fifty well-known histories of English literature were canvassed. The works most often cited by the fifty literary historians were assumed to be superior to those cited infrequently. Best-liked short stories were identified similarly by use of 102 source books, and “best books” were ascertained by study of a collation of fifty “best book” lists. As is revealed by the following tabulation, literary works that are good and permanently great are produced at the highest average rate by persons who are not over 45 years old. It is clear also that most types of poetry show maxima 10 to 15 years earlier than most prose writings other than short stories.
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in the modal ages of creative thinkers, leaders, and athletes all evidence the fact that these modal ages are not due solely to genetic factors. Whether the modal ages will continue to change and whether they can be subjected to some kind of human control are quite different questions.

A mere increase in man's longevity should not change greatly the modal ages at which man exhibits his greatest creative proficiency since, both for long-lived and for short-lived groups, the modal age occurs in the thirties.

POSSIBLE CAUSES FOR THE EARLY MAXIMA IN CREATIVITY

At present we are in no position to explain these curves of creativity that rise rapidly in early maturity and then decline slowly after attaining an earlier maximum. Undoubtedly multiple causation operates in these complex behaviors and no discovered contributing condition is likely to be of itself a sufficient or necessary cause. Nevertheless, it is profitable here to list sixteen of the factors which have been suggested as contributing to these representative functions with their early maxima, for such factors indicate possible lines for further research. Here is the list.

1. A decline occurs prior to 40 in physical vigor, energy, and resistance to fatigue. This decline is probably far more important than such normal age changes as may occur in adult intelligence prior to outright senility.

2. A diminution in sensory capacity and motor precision also takes place with advance in age. For example, impaired vision and hearing handicap the older individual in many cumulative ways, and writing by hand also becomes more difficult with advance in age.

3. Serious illness, poor health, and various bodily infirmities more often influence adversely the production rates of older than of younger age groups.
4. Glandular changes continue throughout life. It is conceivable that hormone research may some day reveal a partial explanation for the changes and especially for the early maxima.

5. In some instances unhappy marriages and maladjustment in the sex life, growing worse with advance in age, may have interfered with creative work.

6. The older age groups, more often than the younger, may have become indifferent toward creativity because of the death of a child, a mate, or some other dear one.

7. As compared with younger persons, older ones are apt to be more preoccupied with the practical concerns of life, with earning a living, and with getting ahead.

8. Less favorable conditions for concentrated work sometimes come with success, promotion, enhanced prestige, and responsibility.

9. In some cases the youthful worker’s primary ambition may not have been to discover the unknown or to create something new but to get renown. Having acquired prestige and recognition, such workers may try less hard for achievement.

10. Too easy, too great, or too early fame may conceivably breed complacency and induce one to rest on his previously won laurels before he has done his best possible creative work.

11. Some older persons may have become apathetic because they have experienced more often the deadening effect of non-recognition and of destructive criticism.

12. As a result of negative transfer, the old generally are more inflexible than the young. This inflexibility may be a handicap to creative thinking, even though it is dependent on erudition.

13. Perhaps in part because of the foregoing factors, some older persons experience a decrease in motivation which leads to a weaker intellectual interest and curiosity.

14. Younger persons tend to have had a better formal education than their elders, they have grown to maturity in a more stimulating social and cultural milieu, and they have had less time to forget what they have learned.

15. In some few cases outright psychosis has clouded what was previously a brilliant mind. Psychoses occur more often in the latter half of the normal life span.

16. In other extreme cases, the individual’s normal productive powers may have been sapped by alcohol, narcotics, and other kinds of dissipation. Here, as elsewhere, it is difficult to separate cause from effect . . .

Upon the basis of all these statistics what is one to conclude? Whatever the causes of growth and decline, it remains clear that the genius does not function equally well throughout the years of adulthood. Superior creativity rises relatively rapidly to a maximum which occurs usually in the thirties and then falls off slowly. Almost as soon as he becomes fully mature, man is confronted with a gerontic paradox that may be expressed in terms of positive and negative transfer. Old people probably have more transfer, both positive and negative, than do young ones. As a result of positive transfer the old usually possess greater wisdom and erudition. These are invaluable assets. But when a situation requires a new way of looking at things, the acquisition of new techniques or even new vocabularies, the old seem stereotyped and rigid. To learn the new they often have to unlearn the old and that is twice as hard as learning without unlearning. But when a situation requires a store of past knowledge then the old find their advantage over the young.

Possibly every human behavior has its period of prime. No behavior can develop before the groundwork for it has been prepared, but in general it appears that the conditions essential for creativity and originality, which can be displayed in private achievement, come earlier than those social skills which contribute to leadership and eminence and which inevitably must wait, not upon the insight of the leader himself, but upon the insight of society about him.
The recent book by Lehman, *Age and Achievement*, seems to indicate that in many fields relatively little creative work of importance is done by persons past 45 or 50 years of age. This generalization does not hold in all fields of creativity, but the preceding sentence expresses Lehman’s most striking finding.

That the production of first-rate work in poetry, art, science, and other creative areas decreases markedly with age is a matter of prime importance. If correct, it suggests that the creative worker in many fields should plan for early superannuation. If the conclusion drawn by Lehman is erroneous, the impression which it has created should be corrected with dispatch, for a conviction that early deterioration is inevitable may itself have deleterious consequences. Clearly the relationship of age to achievement is a topic in regard to which conclusions should be drawn with extreme care.

It is the thesis of this essay that much of the apparent decline in creative achievement revealed by Lehman’s tables and graphs is due to factors other than age. We believe Lehman’s data give a spurious appearance of age decrement in creativity.

Let us note first that the studies presented by Lehman are so numerous and so varied that it is difficult to do justice to them in a brief recapitulation. However, it is not incorrect to say that Lehman has been interested primarily in determining the 5 or 10 year age-period in which important creative works have most often been produced. The first step in this procedure, typically, consists in identifying important works in some field. To avoid introducing a bias of his own, he always uses a list of works drawn up by some other person. Lehman then determines the age at which each item was produced. He has done this for many creative fields, including mathematical discoveries, contributions to chemistry, lyric poems, and operas, to mention only a few. The first six chapters of his book are devoted to presenting the results of these analyses.

The graphs in these chapters almost all indicate that the production of outstanding works rises to a peak relatively early in the adult years and then declines. The age at which the peak of productivity is reached varies from field to field. It is as early as ages 22–26 for lyrics, ballads, and odes, and as late as 40–45 for novels, metaphysics, and miscellaneous prose writings. However, for a considerable number of fields the top rates for the production of outstanding works occur between ages 30 and 39.

Many aspects of these curves are worthy of attention, but we are concerned chiefly with the decrements which follow the peaks. In most instances, as presented by Lehman, the decrements are very striking. For example, . . . at ages 40–45 chemists produce, per man [sic], 331–333, 1956. Copyright © 1956 The Gerontological Society of America. Reprinted by permission. Publication of this article was supported by a grant from the Forest Park Foundation to the Journal of Gerontology.
only one half as many significant contributions as they produce between ages 30–35. By ages 60–65 their rate of production is only 20 per cent of their peak rate. Other graphs give very similar data for other sciences. The fine arts also show a severe decrement. For example, by ages 45–50 the production of orchestral music judged to be of highest merit is only about 10 per cent as great as it was 10 years earlier. By ages 55–60 the composition of orchestral music of high quality decreases to 20 per cent of the maximum rate.

Examination of such findings, page after page, creates an impression of inevitable decline. If these charts are taken at their face value, we must conclude that in most kinds of creative work the output of work of first-rate quality is greatly reduced after the thirties.

But should these charts be taken at their face value? Let us consider this question.

A major methodologic weakness in Lehman’s treatment of data lies in the fact that in most instances a table or graph combines information pertaining to men of different degrees of longevity. Thus a table usually presents data for men nearly all of whom reached age 30, but only part of whom attained age 40, and still fewer of whom completed half a century of life. To equate for differences in numbers of subjects at different ages, Lehman found the mean number of important contributions per person for persons surviving each decade. We shall attempt to show that this method of treating data acts in part to produce the productivity differentials which Lehman discovers.

Let it be noted that each man whose record is used by Lehman is required to produce only one important work in order to qualify for inclusion. In most lists of outstanding works used by Lehman, each individual contributes one, or only a few items. In his collections of data, the mean number of contributions per man is often only two or three. Furthermore, the mean number of “significant” contributions per man is only slightly greater for the men who lived to age 70 than it is for the men who died relatively early.

In order to be included the short-lived man must have produced a significant work at an early age. To qualify for inclusions, a long-lived man was required to produce one significant work but this could have been done either early or late. In other words, in order to achieve a certain degree of eminence, the short-lived man must have fulfilled in a few years what the longer-lived achieved in a more leisurely fashion. We shall show that the consequence of combining data for men of different longevities is a higher average productivity in the early decades.

In this connection Lehman says, “Adequate allowance for the unequal numbers of individuals alive at successive age levels was made. . . .” It seems to us that no adequate allowance can be made for the fact that all of the significant contributions of short-lived people occur in the early decades, whereas the long-lived can contribute both early and late. In tabulating entries for different decades, the twenties or thirties receive a score for each short-lived person. On the other hand, the later decades, such as the sixties, contain no entries for short-lived persons and only part of the entries for the septuagenarians. When data from men of different degrees of longevity are included in the same table, the early decades have an inevitable loading which is not shared by the later decades. To give the later decades a similar loading, it would be necessary to adopt the rule of including a long-lived person only if he made a significant contribution in his later years, because, conversely, the short-lived person is included only if he made a significant contribution in the early decades of life. This is a somewhat subtle point, but one which is essential to the correct evaluation of Lehman’s data.

From the point of view of the consideration presented above, a very interesting table is presented by Lehman in his penultimate chapter. . . . This table represents 1,540 notable contributions to various sciences. In this case, the data for persons of different longevities are treated separately. For this reason, the criticism presented above does not apply.
The table shows that for each group the decade...of the thirties is most productive but the differences between the thirties and the forties are not large. The largest difference between the thirties and forties occurs among those dying in the forties. In this group ill-health may have contributed to the decrement. For longer-lived groups, even the decrements in the fifties, compared to the thirties, are not dramatic. No group in the fifties drops to the extent which is found when persons are not segregated according to longevity. In other words, this table shows that the combining of data for men of unequal longevity in other tables seems to have exaggerated the apparent age decrement. Nevertheless, even when data refer to men of equal life-spans some age decrement is still found.

This table is so significant in regard to age decrement that it is surprising that Lehman makes no reference to it when discussing the striking decrements reported in his earlier chapters. Nor are its findings adequately reflected in the summary chapter of his book. For these reasons it seems necessary here to emphasize the importance of the data which it contains.

We believe that much of this residual decrement is the product of other deficiencies in methodology. For one thing, it seems likely that the very high peaks of productivity which Lehman reports in his early chapters may be due to errors in sampling and to choosing age-intervals in such a way as to maximize the effects of sampling errors.

Many, but not all, of the curves presented by Lehman are based upon a relatively small number of entries. Thus figure 14 is the result of only 52 entries, figure 16, 30, figure 51, 53, figure 53, 67, and figure 56, 40. These entries are divided among age-intervals, usually 5-year periods, extending from age 20 to age 70 and beyond. With small numbers of entries divided among 10 or more age intervals, one would expect that, even though no true age differences are present, high values in some age-intervals would frequently be obtained through the operation of sampling errors. This fact is important because the highest age score in any body of data is taken as the peak from which decrement is measured. Therefore any exaggeration of the peak naturally results in finding exaggerated decrements.

This factor is further aggravated by the fact that Lehman did not limit himself to a fixed set of age-intervals, but apparently altered them in order to determine the particular “peak years” which seem to characterize a particular set of data. Thus, as the final chapter indicates, the step-intervals for peak years for different activities are variously reported as 22–26, 24–28, 25–29, 26–31, 30–34, 32–36, etc. The modification of age-intervals in order to find “ages of maximum productivity” would be legitimate if the findings were cross-validated against new data, but this was seldom done. Hence the extent to which “peak years” are affected by random errors of sampling is unknown.

There can be little doubt that some part of the decrements reported by Lehman are to be explained by the considerations just presented. The reader of Lehman’s book will note that decrements are less precipitous in the graphs which are based upon numerous data and in the construction of which the step intervals follow the decimal system instead of being varied to maximize the peaks.

The preceding arguments have been of a mathematical or statistical sort. Those which follow are of a different kind, but, we think, no less cogent.

Lehman used as a criterion for inclusion of a work as a “significant contribution” the appearance of the work in histories of the appropriate area, or its appearance in lists of “best” books, “best” operas, etc. Perhaps, no better indices of importance are available, but it should be pointed out that these criteria may have certain weaknesses from the point of view of the study of age differences. It is possible that biographies, histories, and lists of best works contain systematic errors somewhat favoring a man’s early work at the expense of his later products, and Lehman’s findings may reflect these biases. For example, the art historian may be more likely to mention a painter’s first significant contribution than he is to mention his last important piece of work. Likewise, an historian of science may be more likely to mention a
Standards for the judgment of quality are further complicated by the great increase in the number of creative workers in most fields which has taken place in recent times. Thus the best psychologist in America in 1900 was the best in a group of approximately 100. The best psychologist today, if he were ascertained, would have to be judged the best among 13,000. A psychologist living in 1900 and still living today, had 99 competitors for distinction in his youth and has 12,999 rivals (or thereabouts) in his later years. Similar, if perhaps less striking, increases in personnel have taken place in other fields. Curves for age changes in number of significant contributions do not, and probably cannot, correct for changes in standards of evaluation which occur during a lifetime.

In summary, we have presented several reasons for skepticism in regard to accepting the view that there is a decrement with age in the production of creative works of high level. We have not attempted to be exhaustive in this treatment. We submit, however, that there is a reasonable doubt that the curves presented by Lehman depict an age decline. Quality of creative work may decrease with age, but data presently available do not offer satisfactory evidence.

We would like to be able to suggest a method by which valid conclusions concerning changes in the quality of creative contributions with age could be reached, but we are unable to do so. All sources of data, and all methods of evaluation which we have considered seem to suffer from one or more of the difficulties discussed above. Nevertheless, it has been noted that as the methodologic difficulties in Lehman’s work are reduced, the apparent decline with age becomes smaller. Whether ideal data would show no decline prior to extreme old age it is at present impossible to say, but this possibility should not be ignored.

**Note**

In psychology, as in most of the biological and social sciences, research on aging has focused mostly on decline. And it has found it. The aging mind is slower and more prone to error when processing information. It is less adept at considering old information in novel ways. Memory suffers. In particular, working memory—the ability to keep multiple pieces of information in mind while acting on them—declines with age.

These changes begin in a person’s 20’s and 30’s and continue at a steady rate across the adult years. They occur in virtually everyone, regardless of sex, race, or educational background. In all likelihood, these effects are accounted for by age-related changes in the efficiency of neurotransmission.

Despite these changes in cognitive processing, the subjective experience of normal aging is largely positive. By experiential and objective measures, most older people remain active and involved in families and communities. The majority of people over 90 live independently. Research shows that in areas of expertise, age-related decline is minimal until very advanced ages.

Arguably even more interesting and important is growing evidence that performance—even on basic processes such as semantic or general memory—improves under certain conditions. One of the first such studies was reported by Paul Baltes and Reinhold Kliegl in 1992. They demonstrated rather striking improvement in memory with practice. Baltes and Kliegl first enlisted younger and older people’s participation in a study of memory training. They assessed the participants’ baseline performance and, as expected, younger participants outperformed older participants. However, after this initial assessment, participants attended a series of training sessions in which they were taught memory strategies such as mnemonics. They found that older people’s memory performance benefited from practice so much that after only a few practice sessions, older people performed as well as younger people had before they had practiced. Younger people’s performance also improved with training, of course, so at no point in the study did older people outperform younger people at the same point in training. But the fact that older people improved to the equivalent of untrained younger people speaks to the potential for improvement.

More recently, scientists have begun to investigate social conditions that also may affect performance. Tammy Rahhal and her colleagues reasoned that because there are widespread beliefs in the culture that memory declines with age, tests that explicitly feature memory may
invoke performance deficits in older people. They compared memory performance in younger and older people under two experimental conditions. In one, the instructions stressed the fact that memory was the focus of the study. The experimenter repeatedly stated that participants were to “remember” as many statements from a list as they could and the “memory” was the key. In the second condition, experimental instructions were identical except that the instructions emphasized learning instead of memory. Participants were instructed to “learn” as many statements as they could. Once again, rather remarkable effects were observed. Age differences in memory were found when the instructions emphasized memory, but no age differences were observed in the condition that instead emphasized learning.

Thus, although there is ample evidence for cognitive deficits with age, the story about aging is not a simple story of decline. Rather, it is a qualified and more nuanced story than the one often told. Even in areas where there is decline, there is also growing evidence that performance can be improved in relatively simple ways. This poses a challenge to psychology to identify conditions where learning is well maintained, to find ways to frame information in ways best absorbed, and ultimately to improve cognitive and behavioral functioning by drawing on strengths and minimizing weaknesses.

My students, colleagues, and I had been studying age-related changes in motivation for several years. We began to wonder whether changes in motivation would affect performance on cognitive tasks, and we set out to explore what we call socioemotional selectivity theory (SST), a life-span theory of motivation.

**Motivation Matters**

SST was initially developed to address an apparent paradox in the aging literature. Despite losses in many areas, emotional well-being is as good if not better in older people as in their younger counterparts. . . . Older people are more satisfied with their social relationships than are younger people, especially regarding relationships with their children and younger relatives. Fredda Blanchard-Fields and her colleagues find that older people solve heated interpersonal problems more effectively than do younger adults. Many social scientists refer to such findings as “paradox of aging.” How could it be that aging, given inherent losses in critical capabilities, is associated with an improved sense of well-being? . . .

When time is perceived as open-ended, as it typically is in youth, people are strongly motivated to pursue information. They attempt to expand their horizons, gain knowledge, and pursue new relationships. Information is gathered relentlessly. In the face of a long and nebulous future, even information that is not immediately relevant may become so somewhere down the line.

In contrast, when time is perceived as constrained, as it typically is in later life, people are motivated to pursue emotional satisfaction. They are more likely to invest in sure things, deepen existing relationships, and savor life. Under these conditions, people are less interested in banking information and instead invest personal resources in the regulation of emotion. . . .

One key tenet of SST is that perceived time horizons, not chronological age, account for age differences in goals preferences. Our research team has examined this theoretical postulate in a variety of ways in a number of studies. We hypothesized that older people would prefer emotionally meaningful goals over informational goals but that these preferences would change systematically when time horizons were manipulated experimentally. In several studies, we showed that younger people display preferences similar to those of the old when their time horizons are shortened, and older people show preferences similar to
those of the young when their time horizons are expanded. Importantly, similar changes occur when natural events, such as personal illnesses, epidemics, political upheavals, or terrorism, create a sense of shortened time horizons. Under such circumstances, the preferences of the young resemble those of older people. In other words, when conditions create a sense of the fragility of life, younger as well as older people prefer to pursue emotionally meaningful experiences and goals. 

The human brain does not operate like a computer. It does not process all information evenly. Rather, motivation directs our attention to goal-relevant information and away from irrelevant information. We see what matters to us. Imagine walking around a city block with the goal of finding a friend. You see very different things than you would see if you took the same walk while trying to find a particular species of bird. Indeed, in the latter scenario you might walk right by your friend without notice. In the former, you would surely miss the bird.

In an initial study, my former student Helene Fung and I reasoned that because older people prefer emotional goals, they may remember emotional information better than emotionally neutral information. This was an important idea to test because the standard practice in psychological science is to avoid emotional stimuli in tests of memory in order to minimize contamination of “pure” cognitive processes. We wondered if by doing so, experimenters were inadvertently handicapping the performance of older adults. A substantial literature on memory and persuasion shows that people are more likely to remember and be persuaded by messages that are relevant to their goals. Thus, we reasoned that marketing messages that promised emotionally meaningful rewards may be more effective with older people than those that promise to increase knowledge or expand horizons.

In one study, older people remembered the emotional slogans and the products they touted better than did younger people.

**THE POSITIVITY EFFECT**

Findings from this initial study suggested that in older people, memory of emotional information was superior to memory of other types of information. A substantial literature in social psychology, albeit based exclusively on young adults, shows superior memory of negative information. Negative information is also widely believed to be weighted more heavily than positive information in impression formation and in decision making. The burning question was whether such findings, long presumed to represent “human” preferences, actually represented preferences of young people.

We conducted a study in which young, middle-aged, and older adults viewed positive, negative, and neutral images on a computer screen and were then tested for their memory of the images. We found an age-related pattern in which the ratio of positive to negative material recalled increased with age. Younger people recalled equal numbers of positive and negative images. Middle-aged people showed a small but significant preference in memory for positive images. In older people, the preference for positive was striking. Older people remembered nearly twice as many positive images as negative or neutral images.

At that point, we began to think that attention and memory can operate in the service of emotion regulation. That is, focusing on positive memories and images makes people feel good.

To summarize, whereas younger adults favor negative information as much or more than positive information, by middle age this preference appears to have shifted to a preference for positive information. Older adults show a decided preference in memory and attention for positive information. Although longitudinal studies are needed before conclusions about change over time can be drawn, cross-sectional comparisons suggest that the effect may emerge across adulthood. This “positivity effect” has been demonstrated in a range of experimental
Human need is the basis for virtually all of science. If we rise to the challenge of an aging population by systematically applying science and technology to questions that improve quality of life in adulthood and old age, longer-lived populations will inspire breakthroughs in the social, physical, and biological sciences that will improve the quality of life at all ages. Longevity science will reveal ways to improve learning from birth to advanced ages and to deter age-related slowing in cognitive processing.
The latest research findings are encouraging and important. Denying or trivializing the positive potential of aging prevents people from realizing the full spectrum of their talents, intelligence, and emotions. But when we come instead to expect positive growth with age, such growth can be nurtured. We are still a long way from fully realizing this shift in perspective, but I hope this book will be a forceful catalyst for change in that direction.

**NEW SCIENCE, NEW HORIZONS**

Some of the most exciting research supporting the concept of positive aging comes from recent studies of the brain and mind. Much of aging research conducted during the twentieth century emphasized improving the health of the aging body. As a result of this research, life expectancy and overall health did in fact improve dramatically. Aging research at the beginning of the twenty-first century, in contrast, has expanded with a strong focus on improving the health of the aging mind. Dozens of new findings are overturning the notion that “you can’t teach old dogs new tricks.” It turns out that not only can old dogs learn well, they are actually better at many types of intellectual tasks than young dogs.

The big news is that the brain is far more flexible and adaptable than once thought. Not only does the brain retain its capacity to form new memories, which entails making new connections between brain cells, but it can grow entirely new brain cells—a stunning finding filled with potential. We’ve also learned that older brains can process information in a dramatically different way than younger brains. Older people can use both sides of their brains for tasks that younger people use only one side to accomplish. A great deal of scientific work has also confirmed the “use it or lose it” adage: the mind grows stronger from use and from being challenged in the same way that muscles grow stronger from exercise.

But the brain isn’t the only part of ourselves with more potential than we thought. Our personalities, creativity, and psychological “selves” continue to develop throughout life. This might sound obvious, but for many decades scientists who study human behavior did not share this view. In fact, until late in the twentieth century, psychological development in the second half of life attracted little scientific attention, and when attention was paid, often the wrong conclusions were drawn. For example, Sigmund Freud, whose influence on psychological theory was profound, had this to say about older adults: “About the age of fifty, the elasticity of the mental processes on which treatment depends is, as a rule, lacking. Old people are no longer educable.”

Ironically Freud wrote this statement in 1907, when he was fifty-one, and he wrote some of his greatest works after the age of sixty-five. Furthermore, Sophocles’s *Oedipus Rex*, the masterpiece on which Freud based his pioneering psychoanalytic theory, was written when the Greek playwright was seventy-one years old.

Freud wasn’t the only pioneer to get things wrong when it came to aging. Jean Piaget, who made an extraordinary contribution to our understanding of cognitive development, ended his description of intellectual development with what he called “formal operations,” the kind of abstract thinking that matures during the teenage years. As far as Piaget was concerned, development stopped in young adulthood and then began a slow erosion.

**DEVELOPMENTAL INTELLIGENCE**

In this book I introduce a novel concept, developmental intelligence, which I see as the greatest benefit of the aging brain/mind. Developmental intelligence is the degree to which a person has manifested his or her unique neurological, emotional, intellectual, and psychological capacities. It is also the process by which these elements become optimally integrated in the mature brain.
More specifically, developmental intelligence reflects the maturing synergy of cognition, emotional intelligence, judgment, social skills, life experience, and consciousness. We are all developmentally intelligent to one degree or another, and, as with all intelligence, we can actively promote its growth. As we mature, developmental intelligence is expressed in deepening wisdom, judgment, perspective, and vision. Advanced developmental intelligence is characterized by three types of thinking and reasoning that develop later than Piaget’s “formal operations” and hence are referred to as “postformal operations”: relativistic thinking (recognizing that knowledge may be relative and not absolute); dualistic thinking (the ability to uncover and resolve contradictions in opposing and seemingly incompatible views); and systematic thinking (being able to see the large picture, to distinguish between the forest and the trees).

These three types of thinking are “advanced” in the sense that they do not come naturally in youth; we prefer our answers black or white, right or wrong. And we usually prefer any answer to none at all. It takes time, experience, and effort to develop more flexible and subtle thinking. Our capacity to accept uncertainty, to admit that answers are often relative, and to suspend judgment for a more careful evaluation of opposing claims is a true measure of our developmental intelligence.

Contrary to societal myths, creativity is hardly the exclusive province of youth. It can blossom at any age—and in fact it can bloom with more depth and richness in older adults because it is informed by their vast stores of knowledge and experience.

It’s been said that the mind is what the brain does. The mind is often described as “software” running on the “hardware” of the brain. But this analogy is too simple. The brain is far more malleable and flexible than any computer chip. And the mind, although it seems almost ghost-like, can powerfully influence the brain and, by extension, the body. Mind and brain are really two sides of a single coin—mind/brain.

You may have learned the following “facts” about the brain:

The brain cannot grow new brain cells.
Older adults can’t learn as well as young people.
Connections between neurons are relatively fixed throughout life.
Intelligence is a matter of how many neurons you have and how fast those neurons work.

All these “facts” are wrong, as we will see. And that’s good news for all of us. The brain is more resilient, adaptable, and capable than we long thought. Research in the past two decades has established four key attributes of the brain that lay the foundation for an optimistic view of human potential in the second half of life.

The brain is continually resculpting itself in response to experience and learning.
New brain cells do form throughout life.
The brain’s emotional circuitry matures and becomes more balanced with age.
The brain’s two hemispheres are more equally used by older adults.

Now let’s be clear. I am not suggesting that the brain is immune to age-related changes. The brain is made of cells, like every other part of the body, and cells can and do “wear out” with age. Certain aspects of brain function do decline with age, such as the raw speed with which complicated math problems are solved, reaction times, and the efficiency of short-term memory storage. But these “negatives” are by no means the whole—or even the most important—story about the aging brain. Unfortunately because much brain research
has focused on age-related problems, negative aspects of aging have been emphasized and the positive implications of research have been overlooked. . . . Healthy older brains are often as good as or better than younger brains in a wide variety of tasks. . . .

Developmental intelligence is defined as the maturing of cognition, emotional intelligence, judgment, social skills, life experience, and consciousness and their integration and synergy. With aging, each of these individual components of developmental intelligence continues to mature, as does the process of integrating each with the others. This is why many older adults continue functioning at very high intellectual levels and display the age-dependent quality of wisdom.

As I have emphasized from the start, there is no denying that problems can accompany aging—and research to date has focused mostly on such problems, typically in individual components of our total mental superstructure. Less attention has been paid to how gains and losses can occur at the same time. For example, older adults often experience more trouble with word finding—the “tip-of-the-tongue” experience—but at the same time, the total number of words they use—their vocabulary—continues to increase. If you look only at selected functions, such as certain aspects of memory or mathematical ability, you miss the larger picture of how functions become more integrated, often improving overall performance. This is the heart of developmental intelligence. . . .

It takes time, experience, and learning to develop the capacities for relativistic, dualistic, and systematic thinking. It can be difficult to challenge existing beliefs that offer comforting, but dubious, answers to life’s problems. It’s sometimes hard to say, “I don’t know” instead of, “The answer is . . .” But our capacity to accept some uncertainty, to admit that answers are often relative, and to suspend quick judgment for a more measured evaluation of opposing claims is a real measure of postformal thought and developmental intelligence. In fact, “wisdom” is in some ways a synonym for “developmental intelligence.” Wisdom is how developmental intelligence reveals itself. . . .

**Wisdom and Postformal Thinking**

What exactly is wisdom, and how does it develop? One standard definition is that wisdom consists of “making the best use of available knowledge.” This rather utilitarian approach implies that wisdom requires specific knowledge as well as a broad understanding of the context in which that knowledge can be put to use. But this definition isn’t completely satisfying. For most people, wisdom also connotes a perspective that supports the long-term common good over the short-term good for an individual. Insights and acts that many people agree are wise tend to be grounded in past experience or history and yet can anticipate likely future consequences. Wise acts, in other words, look both backward and forward. Wisdom is also generally understood to be informed by multiple forms of intelligence—reason, intuition, heart, and spirit. It is fundamentally the manifestation of developmental intelligence—a mature integration of thinking skills, emotional intelligence, judgment, social skills, and life experience. . . .

Social intelligence, memory, and wisdom are closely related fruits that age alone can ripen. The aging brain has greater potential than most people think, and development never stops. Our capacity for social involvement and interpersonal relations remains as strong as ever in later years and is a vital wellspring of both physical and mental health. . . .

We can, if we want to, learn, grow, love, and experience profound happiness in our later years. We need not succumb to difficulties, nor need we accept the myths that still exist about growing older.
Aging and Creativity
Becca Levy and Ellen Langer

According to the Peak and Decline Model, creativity increases in adulthood until the late 30’s and then begins to decline. According to the Life Span Developmental Model, creativity does not increase or decline, but rather different types of creativity are expressed in different stages of the life span. We will first define creativity and discuss the conditions which promote it. Then we will outline the two models, and argue that the second model is best supported by existing research on creativity.

A. Openness to New Ideas
One characteristic that helps promote creativity is an openness to new ideas, which includes an ability to question surroundings and a tolerance for uncertainty. Essentially uncertainty leads to choice, and choice fosters mindfulness, which paves the way for creativity. Certainty makes individuals believe they know all there is to know and thus feel complacent. This state is at odds with the motivation to explore the target of uncertainty and to create something new.

B. Assertiveness and Focusing Attention
To generate creative ideas it helps if individuals are open to new ideas. On the other hand, to translate their creative ideas into products, whether it be an elegant mathematical equation or a dramatic sculpture, it is necessary for these individuals to focus their attention. This often requires that individuals be assertive when it comes to guarding their time.

In a study of 91 exceptionally creative people (almost all of whom were over the age of 60 years), Mihaly Csikszentmihalyi found that a majority of the people he studied showed an ability to become single-minded, specialized, and guarded with their time. For example, Albert Einstein insisted that his wife serve him his meals in his home office so he would not be distracted by her or their children.

C. Supportive Environment for Creativity

The third way that creativity can be promoted is through societal expectations and institutions. One needs the proper environment to create. . . .

A stereotype persists that senility increases and creative potential declines in old age. This stereotype may contribute to the decline in creative productivity with age. Research by Becca Levy and Ellen Langer has demonstrated that stereotypes of old age as a time of loss can worsen memory performance and self-efficacy of older adults. A survey found that many older artists doubt their abilities. This may lead to a drop in motivation and an increase in obstacles for creative productivity.

Peak and Decline Model

The Peak and Decline Model fits into the general belief that aging is a time of decline and loss. According to this model, named by Martin Lindauer, creativity increases in early adulthood and then starts to decline starting in one’s 30’s. This assumes that creativity is the same construct across the life span. Any changes that take place are thought to be due to the quantity, not the quality, of creativity. Therefore, studies within this tradition operationalize creativity consistently throughout the life span. The studies supporting this model have operationalized creativity in two ways.

The first way creativity is operationalized is with psychometric tests. These tests were originally given as paper-and-pencil tests. More recently, psychologists have developed computer programs. Psychometric creativity tests are designed to tap divergent thinking, which is defined as the ability to come up with many different associations. An example of a test item that might appear on a creativity test would be to list as many uses for a brick as you can. Divergent thinking is believed to differ from intelligence, which tends to be based on convergent thinking or the ability to come up with one correct response to a question. . . .

The second way that studies supporting this model have operationalized creativity is by productivity measures. According to the reasoning behind these measures, creativity can be assessed by the number of creative products.

The underlying assumption of the Peak and Decline Model can be seen operating in a variety of decisions and policies. For example, the committee that gives the most prestigious mathematical honor, the Field Award, has decided to only consider mathematicians under the age of 40 years. Many of the academic institutions that employ those who make a profession of creative endeavors have traditionally imposed retirement in the late 60’s. Also, Sigmund Freud argued that psychoanalysts should not give therapy to patients over the age of 50 because they tend to lack both personal insight and the ability to make meaningful changes. This was his belief despite the fact that he was over the age of 50 when he made this point and he considered one of the greatest plays to be Oedipus at Colonus, which was written by Sophocles at the age of 89.

A. Critique of the Peak and Decline Model: Psychometric Tests

There are numerous problems with this model. We will divide our comments into the two types of data used as evidence for this model: psychometric test and productivity data. In terms of the psychometric tests the studies that show decline tend to be cross sectional and do not take into account cohort changes, such as the fact that older individuals tended to receive less formal education than those born decades after them. One might argue that declines in tests of divergent thinking are due not to creativity, but to the confound of education with age. Second, although these tests are highly reliable, they tend to have little construct validity. That is, people judged as highly creative by society often perform poorly on tests. Also, people who score highly on creativity tests
tend to not display high degrees of creativity in other areas of their lives.

In youth it may be easier to come up with numerous responses for a question or it just may be more desirable for that age group to do so. As individuals get older, research suggests that often there is a shift to a more mature way of thinking where the benefits come from contrasting and integrated ideas in light of one’s own experiences. Thus, studies which contrast older and younger adults’ scores on psychometric tests may be inappropriately comparing two very different content areas and not creative ability at all.

**B. Critique of the Peak and Decline Model: Productivity Tests**

Although the studies that chart a loss in the productivity of prominent creative individuals avoid many of the validity problems raised by the psychometric measures of creativity, they have their own problems. First, productivity is not equivalent to quality. Although there are individuals, such as Shakespeare and Beethoven, who have managed to be both extremely prolific and creative, these constructs are not equivalent.

Furthermore, productivity may decline with age for a number of reasons not related to the quality of creativity. These reasons are both internal and external to the creator. As individuals get older, their income and social networks frequently decline, which could limit their ability to produce creative works. As careers progress, there is often an increase in professional obligations, such as committee work, teaching, and public lectures. After achieving success in a field, it is not uncommon for some of the initial passion and motivation to lessen.

It is the earlier work that makes us take notice of an artist’s creative ability. After the initial attention the artist receives, it may take a big change in style for the audience to become equally impressed. When artists enter a field it is easy for the public to notice the ways in which their art is distinct since their work is compared to other artists. Subsequently, artists’ later works are compared to their own earlier works. This within person comparison that tends to take place at the end of an artist’s career may also make the young appreciate the work of older artists less. By drawing fewer distinctions they are less likely to notice the subtle ways in which the artists have grown.

**C. Simonton’s Model of Creative Careers**

According to a model developed by Dean K. Simonton, age does not predict one’s creative productivity. Instead, the predictors he uses are when the creative career begins; the process of coming up with creative ideas; the process of transforming one’s ideas into products; and the domain of creativity. In creative domains in which one deals with a finite array of concepts, such as math, creativity tends to peak and decline early, whereas in domains that deal with complex and associative-rich concepts, such as history, the creative productivity tends to peak and decline later. Simonton believes the timing of the creative peak is due to the fact that creative careers tend to be much shorter when there is little delay between coming up with ideas and elaborating them into creative products. This leads to an early consumption of creative potential.

Simonton’s model suggests that those with a later start date should have a career peak later than their peers. His model also suggests that individuals may experience multiple career peaks if they find ways to relaunch their career by taking on a new problem, medium, or discipline.

**Life Span Developmental Model**

The Life Span Developmental Model, in contrast to the Peak and Decline Model, assumes creativity and productivity are not equivalent. It also assumes that creativity changes with
development as a result of the underlying cognitive processes that change with one’s life stage, as well as one’s experiences. The studies that support this model tend to operationalize creativity as the products judged by society to be novel and significant. For example, in painting, researchers have identified the most creative artists by looking for the number of references to their works that appear in major art history books.

It is particularly instructive to track artists who approached the same subject matter at different times in their lives. Thus, they serve as their own controls. For example, Michelangelo sculpted a Pieta at age 22 and then again at age 90. Similarly, Francis Bacon produced a series of paintings in which he tried to depict a cry. He painted the first image when he was 35 and continued to paint cries until the age of 79. As Gene Cohen points out, Bacon believes that it was not until the last painting that he finally got it right.

A. Why Creativity Changes in Later Life

In this section we will first discuss why creativity may change in later life, and then we will examine the way in which creativity changes. There are a number of theories about late-life development that seek to explain the evolution of creativity within individuals. These include the psychodynamic theories. For example, Erik and Joan Erikson felt that old age is a time of psychodynamic development that could change the quality of creativity in old age; individuals can undergo dramatic changes as they try to resolve conflicts of previous stages as well as new conflicts raised by trying to maintain wisdom despite the factors that can lead to despair, such as trying to come to terms with their approaching death.

Some believe that as individuals approach death they try to find a way to make a lasting mark on the world. This can lead to a surge of creative energy, sometimes called “the swan song.”

There are also cognitive changes in old age that could contribute to a change in creativity style. Whereas some cognitive qualities that may be associated with creativity do not seem to change, such as the ability to use imagery, others seem to change. For example, whereas fluid intelligence or the abstract capacity for problem solving may decline, crystallized intelligence or the acquisition of knowledge from experience, such as vocabulary, may increase.

In addition, changes in physical functioning may lead to a new perspective that can fuel creativity. Paul and Margaret Baltes have developed a theory called Optimization with Compensation which suggests that those elderly who face physical or cognitive decline must find ways to change their style to compensate. For example, when Degas began to lose his eyesight he changed his medium from oil paints to the more tactile wax and oily chalk. In a different creative realm, physicist Hans Bethe explained that although he made more mistakes in old age, he became more alert at catching mistakes.

B. How Creativity Changes in Later Life

Art historians have identified an Old Age Style of creativity that is also referred to as “Altersstil.” Its elements include an increased sense of drama; a more profound interpretation of human nature; a more instinctual, less studied approach; looser, freer brushwork; more amorphous corporeal forms; a compression of space such that figures loom close to the picture plane; a lessening of emphasis on setting and background details; a theme of death; and an emphasis on unity and integration.

In his study of seven creative people that he thinks helped change the direction of this century, Howard Gardner describes late life changes in styles of creativity. Albert Einstein in later life turned from a focus on theoretical formulas to public policy. Sigmund Freud also switched his style in later life from writing about medical case studies to broader ideas about civilization.
and culture. At the end of her life Martha Graham made a dramatic switch. In her younger life she choreographed dances for herself. Then at the age of 73 she reemerged as director of her own troupe, and started to tour the country giving lecture demonstrations to educate the masses about her vision of modern dance. . . .

**Influence of Creativity on Health and Longevity in Old Age**

We have discussed how aging influences creativity. Several studies suggest that the reverse also occurs: creativity influences aging and longevity. For example, Lindauer discovered that many of the great artists lived longer than the general population. Another study found that individuals who attend more creative events (vicarious creativity) have extended longevity. This study conducted in Sweden of over 12,000 individuals found that those who were more culturally active tended to outlive those who were less cultural. The authors measured cultural activity by counting reports of attending events such as plays and concerts, and visiting institutions such as museums and art galleries.

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**FOCUS ON THE FUTURE**

**Late-Life Learning in the Information Society**

*Dateline: May 1, 2025, Washington, DC. Associated Press.*

Today, President Martha Jefferson welcomed 30,000 delegates to the White House Conference on Aging. At the same time, on a specially dedicated website, she announced the beginning of Older Americans Month.

President Jefferson noted that this White House Conference on Aging was the first to be broadly representative of the American people: There were 10 times as many official delegates—far more than any hotel in Washington could accommodate. In fact, conference “delegates” didn’t meet face-to-face at all but “convened” in cyberspace. They used high-speed fiber-optic connections made possible for Internet III CyberSystem.

President Jefferson also took special note of the more than 1,000 older people at the conference who had earned an advanced degree through distance learning under Internet III or its predecessors. She noted that students over the age of 55 are now the fastest growing segment in U.S. higher education.

The likelihood of this scenario all depends on how quickly new computer and telecommunications technologies achieve acceptance and widespread use among the aging population. Technology is advancing rapidly, and signs of late-life learning in an information society have been evident since the dawn of the 21st century. Today, many older people still have anxiety about using a computer. But technophobia is a stereotype, and their anxiety can be overcome.

Studies have shown that computer communication can be an aid to independence for older adults. For instance, one study looked at a sample of women aged 55 to 95 in a Florida community, a group with no prior experience with computers. Participants in the study were at first given a simplified electronic mail and text-editor system, and their software was later upgraded to offer
news, weather, movie reviews, health information, and entertainment news. A follow-up survey showed that participants easily learned to use the system and came to value it as a means of social interaction (Czaja et al., 1993).

One of the early leaders in the “seniors in cyberspace” movement was SeniorNet, a nonprofit organization founded in San Francisco in 1986 to teach computer skills to older persons (Furlong & Lipson, 1996). SeniorNet grew rapidly as a membership organization with more than 70 learning centers around the country supporting up to 15,000 individual members. SeniorNet publishes its own educational materials and has operated its own online network. Through AOL, SeniorNet also offers classes and discussion forums.

A more recent innovator for seniors in cyberspace is Older Adults Technology Services (OATS), which launched a Senior Planet Exploration Center in the Chelsea neighborhood of New York City. The OATS program has encouraged older people to use mobile devices, online banking, and Skype, which is helpful in keeping in touch with grandchildren. With support from the AARP Foundation, the program was replicated in Washington, D.C., and helped reduce isolation of older people. A study by the European Centre for Social Welfare Policy and Research (Lelkes, 2012) found that Internet use among older people could promote stronger social connections, online as well as face to face.

The key to lifelong learning in an information society will be to perceive older adults as active users of new technologies rather than as passive recipients. Two-way interactive TV can address loneliness and isolation among older adults. For instance, a two-way television system in Reading, Pennsylvania, has been programmed, operated, and financed by senior citizens. Laguna Hills Village retirement community in California has long operated its own cable TV station and generated local programming. Interactive and self-directed activities using new technologies can enhance knowledge, skills, and adaptability—a high-tech/high-touch world with great promise for older people in years to come.

Questions for Writing, Reflection, and Debate

1. Harvey Lehman’s data about the peak years of creativity for different fields are derived from creative people who lived in the past. Would it be reasonable to argue that his conclusions don’t apply to older people today because health and life expectancy in recent decades have increased rapidly? Does Wayne Dennis succeed in refuting Lehman’s argument that age generally means
declining creative power? What are Dennis’s strongest points in his criticism of Lehman?

2. Lehman assumes that in judging late-life creativity, we should measure how many “masterpieces” or “breakthroughs” are produced by older people. Do you think this standard is the right one for judging late-life creativity? Would other standards or definitions of creativity be more appropriate?

3. Imagine that you are writing a long obituary for “Louise Bachelard” (an imaginary name), who died recently at age 78. She was a famous painter whose style changed dramatically in her later years. In the obituary, describe the ways in which the painter’s creativity changed as she grew older, and connect this with what you have learned about the psychology of aging.

4. Paul Baltes and his colleagues define wisdom as accumulated expertise, but this definition makes no reference to character or the ethical behavior exhibited by a wise person. Could an infamous bank robber, like Willie Sutton, be judged to have “wisdom” if he showed skillful judgment in crime based on long experience?

5. Pick an example of an older person who seems to you to have developed some of the traits of wisdom, whether in general or in some specific field of activity. Write to a stranger explaining why this wise older person is someone whose advice should be taken seriously.

6. If we were designing classes or educational programs for older adults based on what we know about older adult intelligence and cognition, how should we organize the learning activities? How would such an older adult educational program differ from what is offered in schools and colleges today?

7. Visit three websites: one for Road Scholar (www.roadscholar.org), one for Third Age (www.thirdage.com), and one for SeniorNet (www.seniornet.org). What similarities do you see in these three sites concerning age-appropriate behavior for older adults? What issues do you not see reflected in these sites that seem important for successful living in later life?

Suggested Readings


Student Study Site

Visit the Student Study Site at http://study.sagepub.com/moody9e for these additional learning tools:

- Flash cards
- Web quizzes
- Chapter outlines

- SAGE journal articles
- Web resources
- Video and audio resources