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Chapter 8

Self-Efficacy and Adult Development

Daniel Cervone, Daniele Artistico, and Jane M. Berry

Only those who will risk going too far can possibly find out how far one can go.
—T. S. Eliot (1931)

I believe, therefore I can.
—Cavanaugh & Green (1990)

A major theme in the contemporary study of human development across the life span is that people have the capacity for personal agency. Innumerable writers emphasize that individuals can exert intentional influence over their experiences and actions, the circumstances they encounter, the skills they acquire, and thus ultimately the course of their development.

This theme undoubtedly reflects historical trends. Prior to the 1800s, "Wherever he lived, man could only count on a short expectation of life, with a few extra years in the case of the rich" (Braudel, 1981, p. 90). Today, in contrast, life expectancy in some nations exceeds 80 years of age (*The Economist*, 2002). In those parts of the world blessed with key natural resources (Diamond, 1997), economic growth has given rise to socioeconomic systems that provide extensive educational opportunities and foster meritocratic social mobility. It is in this contemporary context—in which opportunities for personal development are vast and the expected life span for realizing one's potentials is lengthy—that questions of personal agency naturally come to the fore (Caprara & Cervone, 2003). Of course, many citizens of the world do not experience these advantageous circumstances; 3 billion of the world's people still live on $2 or less a day (UN Population Fund, 2002) and the life span in some nations remains less than 40 years of age (*The Economist*, 2002). While not losing site of such sobering statistics, one can nonetheless acknowledge that many people today develop in a world in which they have the potential to chart their own life paths, cultivate competencies of their choosing, and thereby contribute to the course of their own development.

These social changes call for analyses of the psychological systems that foster positive development into the later years of life. Scholars and practitioners in the field of aging have responded to this call. Models of successful aging (Rowe & Kahn, 1997) and research on positive aging (Carstensen & Charles, 2003) appear with increasing regularity. In an effort to ensure and enhance quality of life in late adulthood and senescence, investigators aim to enable older

adults to live engaged, purposeful, and meaningful lives as free from mental and physical debilities as possible. Positive attitudes toward aging appear to have health benefits (Levy, Hausdorff, Hencke, & Wei, 2000; Levy, Slade, & Kasl, 2002) and are related to longevity (Levy, Slade, Kunkel, & Kasl, 2002). More people are living to be centenarians than at any other time in history, and thus it is incumbent on researchers in fields of adult development and learning to delineate the modes and mechanisms that will allow older adults to lead dignified, meaningful, engaged lives. A complete understanding of adults' capacity to achieve these life outcomes requires careful attention to mechanisms of personal agency.

The purpose of this chapter is to review the contribution of self-efficacy mechanisms (Bandura, 1977a, 1997) to adults' capacity to learn new skills and contribute to their personal development in an agentic manner. We do so by first taking a broad look at the nature of human agency and the architecture of mental systems that enable people to regulate their experiences and actions.

COGNITIVE COMPONENTS OF PERSONAL AGENCY

What enables members of our species to contribute to a plan for the course of their own development? What are the basic psychological ingredients that enable people—more so than others in the animal kingdom—to act as intentional, causal agents? This question is not only of basic scientific interest. It is also central to the design of interventions that empower people to gain control over their lives.

There are two ways of addressing the question of agentic capabilities. One is a functional analysis. Here, the task is to identify the psychological functions that humans are uniquely able to execute and that enable them to exert intentional control over their actions and development. Both psychologists and philosophers have taken up this problem, and their conclusions converge (e.g., Bandura, 1986; Harré & Secord, 1972; Kagan, 1998). People have the capability to use language; to develop a sense of self (as both a doer and an actor who is observed by others); and to self-regulate their behavior, which entails not only monitoring one's actions but also monitoring the monitoring of one's own performance. This self-monitoring is accompanied by feelings of satisfaction and dissatisfaction with the self that contribute to self-regulatory efforts (Bandura & Cervone, 1983). The study of these self-regulatory functions is central to the contemporary field of adult development (Heckhausen & Dweck, 1998; see also Lang & Heckhausen, chapter 7, this volume) and the field of psychology at large (Baumeister & Vohs, 2004).

A psychological function of particular centrality to personal agency is that of mental "time travel" (Suddendorf & Corballis, 1997). Humans have the capacity to mentally reconstruct past events and generate detailed mental images of hypothetical events that may occur in the future. Evidence suggests that animals, in contrast, "are largely stuck in the present moment . . . aware of only a permanent present" (Roberts, 2002, p. 486). People's ability to deliberate on the past and future, combined with their capacity to form a sense of self and social identity, enables them to select and shape the environments they encounter, develop skills to meet future challenges, pursue personal aims, and thereby function as causal agents.

Goals and Evaluative Standards

The second type of analysis focuses not on mental functions but on psychological structures and processes that enable persons to carry out these functions. Just as in the study of cognition one can distinguish a function that is carried out (e.g., problem solving) from the cognitive components that enable a person to carry out that function (e.g., working memory), in the study of human agency one can distinguish psychological functions (e.g., behavioral self-regulation) from the component of mental architecture that enable persons to execute those functions.

An analysis of cognitive systems that underlie self-regulation indicates that these cognitions can be understood as consisting of qualitatively distinct types; both philosophical (Searle, 1998) and psychological considerations (Cervone, 2004a) suggest a qualitative distinction among classes of thought. A brief consideration of these distinctions yields an intellectual framework within which the psychological variable of central interest to this chapter, perceived self-efficacy, can be understood.

When analyzing those cognitive capacities that underlie human agency, a fundamental distinction is

one that differentiates among three classes of cognition: goals, standards, and beliefs. Some cognitions are mental representations of future states that one is committed to achieve. Such personal goals may serve to organize activities over extended periods of time and bring coherence to internal psychological life, guiding people's interpretations of their experiences and of prospective challenges (Emmons & Kaiser, 1996; Grant & Dweck, 1999). Mental representations of goals are closely linked to mental representations of strategies for goal achievement (Kruglanski et al., 2002). The ability to develop and deploy such strategies is critical to self-control, self-directed motivation, and the realization of individual potentials (Cantor, 2003; Mischel & Mendoza-Denton, 2003).

In the study of adult development, much work indicates that goal structures and processes of goal selection are an aspect of future-oriented cognition that is key to well-being throughout adult development (e.g., Heckhausen, 1999, 2002; Pulkkinen, Nurmi, & Kokko, 2002; Staudinger, Freund, Linden, & Mass, 1999). Findings indicate, for example, that people who set goals in a manner that is congruent with their perceptions of the time available to them in their life span experience social relations that are more satisfactory and less stressful (Lang & Carstensen, 2002).

A second aspect of cognition that is central to personality functioning is evaluative standards. People develop moral, ethical, and performance standards that they employ as criteria for judging the goodness or worth of prospective actions. As has been recognized in both classic and contemporary theories (e.g., Bandura, 1986; Carver & Scheier, 1998; Cervone, 2004a; Higgins, 1987; Mischel, 1973; Rotter, 1954), these standards function as a kind of internal guidance system, enabling individuals to regulate their actions in a coherent manner over significant periods of time and across changing social conditions. Evaluating actions with respect to internalized standards of performance, then, is a basic cognitive capability that contributes to personal agency. Some circumstances cause people to disengage these standards, that is, to fail to regulate their behavior according to their own typical rules of conduct (Bandura & Cervone, 1983). The disengagement of moral standards can cause people who typically conduct themselves in a steadfast manner to engage in antisocial acts (Bandura, 1999a; Bandura, Barbaranelli, Caprara, & Pastorelli, 1996).

Control Beliefs and Self-Efficacy

In addition to possessing goals for action and standards for evaluating the goodness or worth of occurrences, people develop beliefs about what the future may bring. Converging lines of research suggest that the subset of future-oriented beliefs that is most central to personality functioning across adulthood is beliefs in one's capacity to control significant life events (Skinner, 1996).

There are different types of control beliefs. For example, one set of beliefs concerns the degree to which the causes of events are, in principle, under people's control as opposed to being the result of uncontrollable external forces (Rotter, 1966). Research on adult development indicates that higher levels of fatalistic beliefs—that is, beliefs that the nature of significant life events is inevitable and thus uncontrollable (Kohn & Schooler, 1983)—predict higher levels of disability among older adults (Caplan & Schooler, 2003).

A second aspect of control beliefs involves perceptions of one's personal capacity to execute courses of action to cope with events. Confidence in one's own ability to execute actions is, as a psychological construct, distinct from beliefs in the controllability of external events; the different sets of beliefs have, for example, been shown to have distinct effects on cognitive and motor outcome variables in middle and older adulthood (Caplan & Schooler, 2003). Beliefs in one's capacity to execute courses of action have been studied extensively in the literature on perceived self-efficacy (Bandura, 1977a, 1997). We now turn to this literature and its implications for the study of adult development and learning.

PERCEIVED SELF-EFFICACY

The two quotations that opened this chapter invoke the heart of self-efficacy theory (Bandura, 1977a, 1986, 1997). Perceived self-efficacy refers to our judgments of what we think we can and can't do. More formally, self-efficacy refers to our sense of confidence and competence, qualified by specific demands and features of the situation in which self-efficacy judgments are activated. When activated and the assessment is "I can," high self-efficacy will lead to new levels of learning and accomplishment.

When the activated assessment is low—"I can't"—then self-efficacy will inhibit engagement in challenging situations, precluding skill development. The individual who has high expectations for learning and development— who sets and attempts challenging goals—will be likely to encounter both success and failure in goal acquisition, both of which shape and inform behavior. Successes provide encouragement and help reinforce facilitative, goal-directed behaviors. Failures provide information about mistaken steps toward goals and help narrow down and hone the behavioral repertoire. If opportunities for new experiences are avoided and deemed too risky, neither successes nor failures ensue, and windows to learn close.

As reviewed in more detail elsewhere (Caprara & Cervone, 2000), self-efficacy beliefs are of particular importance to intentional action for three reasons. First, self-efficacy perceptions directly contribute to decisions, actions, and experiences. People commonly reflect on their capabilities when deciding whether to undertake activities or to persist on tasks when faced with setbacks. People who judge themselves highly efficacious tend to be more willing to pursue challenges, to be more persistent on tasks, and to experience lesser performance-related anxiety (Bandura, 1997).

Second, self-efficacy perceptions may moderate the impact of other psychological mechanisms on developmental outcomes. For example, as a general rule individuals who acquire skills on a task achieve greater success; but if people still doubt their capabilities despite adequate instruction, they may fail to put their knowledge into practice.

Third, self-efficacy beliefs influence other cognitive and emotional factors that in turn contribute to performance. Of particular importance are links from self-efficacy processes to goal setting (Berry & West, 1993; Locke & Latham, 1990). People with higher efficacy beliefs tend to set more challenging goals and remain committed to their goals; these goal mechanisms, in turn, contribute to motivation and achievement (Bandura & Locke, 2003).

These links from self-efficacy beliefs to goal processes are particularly important to adult development and learning. One of the developmental tasks of adulthood is appraisal and reappraisal of life goals. Research shows that individuals who set learning or performance goals acquire higher skills and self-efficacy than those who set no goals (Bandalos, Finney, & Geske, 2003) or who are told to merely do their best (Brown & Latham, 2002). The effects of goal setting on self-efficacy have been demonstrated both empirically and in questionnaire studies of goal setting and loss of control. Over an 8-year interval, adults aged 30–59 years old who experienced loss in important domains to self and who subsequently downgraded the importance of goal attainment in those domains experienced less loss of perceived control overall than if goals in the failing domain were maintained at initial levels (Brandtstädter & Rothermund, 1994). In other words, rescaled or down-scaled goals in domains of personal importance can buffer the sense of perceived loss of control in that domain. Prudent, careful judgment in many matters becomes more necessary in older adulthood, when choices are fewer and starting over in any number of domains (education, vocation, living arrangements) is more difficult than at younger ages. Recognition and acceptance of limits (the worldview of T. S. Eliot notwithstanding) is essential, yet remaining open to possibilities and opportunities is an equally compelling life span task. Reasoned risk taking in older adults may contribute to continued and new growth in broad domains of functioning.

CHAPTER OVERVIEW

We begin with an overview of basic self-efficacy processes. It is important to recognize that Bandura's self-efficacy theory is just one aspect of his much broader social-cognitive theory of personality (Bandura, 1986). In this overview, then, we consider the contribution of self-efficacy processes to adult development and learning within a broader perspective on social-cognitive mechanisms in personal functioning (e.g., Bandura, 1999b; Cervone, 2004a). We subsequently address the assessment of self-efficacy beliefs in a similar manner; we tackle the issue within a broader analysis of cognitive structure, process, organization, and its assessment (Cervone, 2004b; Cervone, Shadel, & Jencius, 2001). A subtext of this coverage is that the study of people's agentic capacities requires for its foundation an understanding of the functioning of the whole person—that is, a comprehensive understanding of personality systems and their development (Caprara & Cervone, 2003).

We then consider a number of domains that are critical to adult development and learning and in which self-efficacy processes contribute to success.

These include domains such as performance on intellectual and memory tasks, participation in training programs, and the solving of everyday problems that can interfere with one's pursuits. In this review, our overall purpose is to position self-efficacy at the intersection of learning and development in adulthood. We focus on the formation, calibration, and refinement of self-efficacy beliefs across the life span as related to new learning and development. In pursuing these goals, we are cognizant that there exist a number of highly related literatures that also shed light on the role of control beliefs in adult development (e.g., Heckhausen & Schulz, 1995; Little et al., 2003; Skinner, 1996).

PERCEIVED SELF-EFFICACY, SOCIAL-COGNITIVE PERSONALITY SYSTEMS, AND ADULT DEVELOPMENT

The psychological construct perceived self-efficacy often is considered in isolation. In empirical work, researchers may inquire solely into the link between a self-efficacy measure and an outcome of interest. In literature reviews, writers may analyze the causes and effects of self-efficacy processes while devoting little attention to other psychological mechanisms. Few writers have put self-efficacy into developmental contexts, although the promise of such analyses has been articulated and demonstrated previously (Berry, 1999; Berry & West, 1993; Cavanaugh, Feldman, & Hertzog, 1998; Cavanaugh & Green, 1990). A narrow approach to the review of self-efficacy theory and research fails to represent both the broader theoretical framework within which the self-efficacy construct was developed and the range of psychological dynamics that are critical to understanding the nature of self-efficacy processes.

Social-Cognitive Perspectives on Individual Development

As noted, Bandura proposed his self-efficacy theory (1977a) within a broader framework on personality development and functioning (Bandura, 1977b) that itself was grounded in the seminal social learning theory of Bandura and Walters (1963). In more recent years, this conceptual framework has been developed considerably, both through the efforts of Bandura (1986, 1999b) and in the work of other investigators who analyze the development and functioning of social-cognitive systems (reviewed in Caprara & Cervone, 2000; Cervone & Shoda, 1999; Mischel, 2004). These combined efforts yield a family of social-cognitive theories that possess three defining features.

Interactionism

The first of these features is that individual development and functioning are analyzed in a style that is fully interactionist. Bandura (1986) expresses this interactionist perspective in his principle of reciprocal determinism, which posits that personality, environmental influences, and behavior should be analyzed as factors that mutually influence one another—that is, that interact reciprocally in the causal dynamics that underlie expressions of personality.

It is important to note that this interactionist view goes far beyond the banal assertion that "people and situations influence one another." Instead, it speaks to deeply significant questions about human nature and the best way to construe human psychological qualities in a scientific analysis. All serious psychologists realize that people and situations influence one another. Yet one can find in the contemporary field well-known theoretical positions whose basic variables—that is, whose core units of analysis—are distinctly noninteractionist. Five-factor theory (McCrae & Costa, 1996) posits that personality traits are a product of genetic endowment, with people's standing on trait dimensions being uninfluenced by environmental experience. Popular forms of evolutionary psychology (e.g., Buss, 1991) contend that the genome functions as a kind of program that primarily determines the course of individual development. In recent years, both of these theoretical positions have been weakened in two ways. Theoretical analyses have made clear that persons—even at the level of the biology of the individual—develop through environmental interactions (e.g., Gottlieb, 1998; Lickliter & Honeycutt, 2003a, 2003b). Empirical data have provided evidence of variations across the life span in personality trait scores that are unanticipated by five-factor theory (e.g., Helson, Kwan, John, & Jones, 2002; Srivastava, John, Gosling, & Potter, 2003; Twenge, 2002). Investigators have failed to replicate results that originally had provided the core support for theoretical analyses of social behavior based on evolutionary psychology (DeSteno, Bartlett, Braverman, &

Salovey, 2002; Miller, Putcha-Bhagavatula, & Pederson, 2002). Research reviews indicate a larger role for person—situation interactions in the development of the individual than was anticipated in prominent evolutionary-psychological perspectives (Bussey & Bandura, 1999; Wood & Eagly, 2002). In light of these developments, interactionist positions on development that were developed years ago (Endler & Magnusson, 1976) appear prescient.

A Systems View

A second defining feature of social-cognitive theory is that it is a systems viewpoint on human development and functioning. Social-cognitive and affective mechanisms are construed as a complex system of interacting elements (Mischel & Shoda, 1995, 1998). This systems thinking has significant implications for explaining the development of stable personality styles and individual differences (Cervone, 1997, 1999; Nowak, Vallacher, & Zochowski, 2002). The development of a dynamic system is not prefigured; instead, development occurs gradually via reciprocal interactions between the system and the environment that it encounters. The full development of personality, then, is not encoded in the genome but results from dynamic person–environment transactions. These transactions include agentic processes in which people contribute to the development of their own behavioral and affective tendencies (Caprara, Barbaranelli, Pastorelli, & Cervone, 2004; Caprara, Steca, Cervone, & Artistico, 2003).

A further implication of a systems perspective concerns the explanation of the individual's behavior. Stable patterns of action often can be well described by using trait terms found in the natural language (e.g., a person may act in a manner that can be described as conscientious or agreeable). In a systems perspective, however, one would not explain those action patterns by positing internal psychology constructs that are isomorphic to the behavior one is trying to explain (e.g., conscientious*ness*, agreeable*ness*). Instead, in a systems perspective such as social-cognitive theory, one seeks to specify systems of interacting cognitive and affective processes that jointly give rise to the observed patterns of behavior (Cervone, 2004a). A critical implication in this work is that a given individual's personality system may contribute to stable patterns of variability in social behavior (Mischel, 2004). In other words, two people who show the same average tendency to exhibit, for example, conscientious behavior may differ in the social contexts in which they do and do not exhibit conscientiousness; the patterns of variability thus function as a "behavioral signature" of the individual's personality (Mischel & Shoda, 1995). Both the patterns of variability and the social contexts within which one observes meaningful patterns of coherence in personality functioning may vary idiosyncratically from one person to the next (Cervone, 2004a). When turned to questions of adult development, the natural implication is that any given adult may display distinctly different patterns of learning and performance in different social contexts.

Before turning to the third feature of social-cognitive approaches, we note that the combination of interactionism and systems thinking inherently has an implication that is quite significant. It shifts one's attention away from the charting of individual differences in the population and toward the careful analysis of personality structure and organization at the level of the individual (Cervone, 2005). The view that the individual is a coherent psychological system who develops in interaction with his or her environment naturally raises questions about the internal organization of psychological structures and dynamics, the nature of the person–situation interactions at the level of the individual case, and the possibility of individual idiosyncrasy in personality structure and development. These themes are not new. In the study of personality development, they have been developed with particular clarity by Magnusson and colleagues (Magnusson & Mahoney, 2003; Magnusson & Törestad, 1993). Their holistic interactionist perspective posits that development cannot be understood by reference to the action of single factors; it must be analyzed through person-centered methods that illuminate constellations of factors at the level of the coherent, unique individual (e.g., Bergman, 2002). Highly related ideas about conducting analyses at the level of the individual are found in theoretical work on intraindividual versus interindividual measurement strategies (Borsboom, Mellenberg, and van Heerden, 2003; Molenaar, Huizenga, & Nesselroade, 2002) and empirical research that uses growth curve modeling to chart developmental trajectories at the level of the individual (e.g., Young & Mroczek, 2003). The importance of a holistic perspective in which the actions of a person are explained by reference to the person as a whole, rather than to independent "parts"

of the individual, is elucidated with exceptional clarity by Harré (1998, 2002) and Bennett and Hacker (2003). The fact that developmentalists increasingly have turned their attention to the psychological functioning of the potentially unique individual in the past decade (e.g., Magnusson, 1996) is an encouraging sign for the field.

This systems-level perspective highlights the limitations of considering self-efficacy processes "in isolation." In the flow of thinking, thoughts about self-efficacy inherently are associated with other classes of cognition. In explaining the actions of a person, it is best to attribute actions to the person as a whole rather than to the isolated variable "self-efficacy."

Personality Variables and the Architecture of Personality

The third defining feature of the social-cognitive approach within which self-efficacy theory is formulated involves the units of analyses through which individuals and their development are analyzed. The question here is: How can one model the psychological mechanisms that underlie the coherence of personal functioning (Cervone & Shoda, 1999)? In other words, what are the basic personality variables in social-cognitive theory? Such questions are fundamental to the study of personal development; as noted elsewhere, "one cannot advance a science of personality and its development without having a conception of what is developing" (Caprara et al., 2003, p. 945).

Before taking up this question, a point of clarification is in order. The term *personality* has taken on two distinct meanings in the scientific literature (see Cervone, 2005), and the failure to recognize this fact has bred confusion. Some investigators in the field of personality psychology are interested in summarizing major dimensions of variation in behavioral tendencies in the population at large. Five interindividual difference factors do a good job of summarizing these variations (McCrae & Costa, 2003). Other investigators address an entirely different task: modeling the within-person structure of cognitive and affective systems that contribute to individual's distinctive psychological tendencies. When Bandura embeds his self-efficacy theory (1997) in a broader social cognitive theory of personality (Bandura, 1986, 1999b), the personality theory he provides is of this latter sort. Social cognitive theory is concerned with intraindividual psychological systems that causally contribute to people's development, not with summaries of individual differences in the population. An intraindividual focus, then, raises the question of how one can comprehensively model within-person psychological systems.

This question has been addressed in a recent theoretical model of the architecture of personality, that is, a model of the overall design and operating characteristics of those within-person psychological systems that contribute to the uniqueness and coherence of the individual (Cervone, 2004a). Briefly, this model rests on three distinctions. One differentiates feeling states (see Russell, 2003) from intentional cognitions—where that word *intentional* is used as in the philosophy of mind (Searle, 1998) to reference cognitive contents that are directed beyond themselves to the representation of objects in the world. (To illustrate, feelings of hunger do not represent—that is, symbolically "stand for"—an object or event in the world and thus do not have the quality of intentionality, whereas thoughts about a particular restaurant do.) A second distinction (already noted) is one that differentiates among those cognitive contents that we usually refer to as beliefs, evaluative standards, and goals. The third distinction was developed by Lazarus (1991) in the study of cognition and emotion: a distinction between knowledge and appraisal. This distinction is so central to the overall model that it is referred to as a knowledge-and-appraisal personality architecture (KAPA). *Knowledge* refers to enduring mental representations of a typical attribute or attributes of an entity (e.g., one self, other persons, objects in the physical or social world). Appraisals, in contrast, are dynamically shifting evaluations of the personal meaning of events, that is, "continuing evaluation[s] of the significance of what is happening for one's personal well-being" (Lazarus, 1991, p. 144). Such evaluations generally are conducted by relating features of the self to features of the world. The distinctions (a) between knowledge and appraisal, and (b) among goals, evaluative standards, and beliefs are cross-cutting, yielding a taxonomy of six classes of social-cognitive personality variables (see figure 8.1). (In the KAPA variable system, the cognitive construct "strategies" [as used, e.g., in the SOC model of P. B. Baltes & M. M. Baltes, 1990, discussed later] is viewed as a more molar psychological construct than are individual KAPA variables; strategies commonly consist of integrated systems of goals and subgoals, as well as beliefs and evaluative standards regarding alternative paths to goal achievement.)

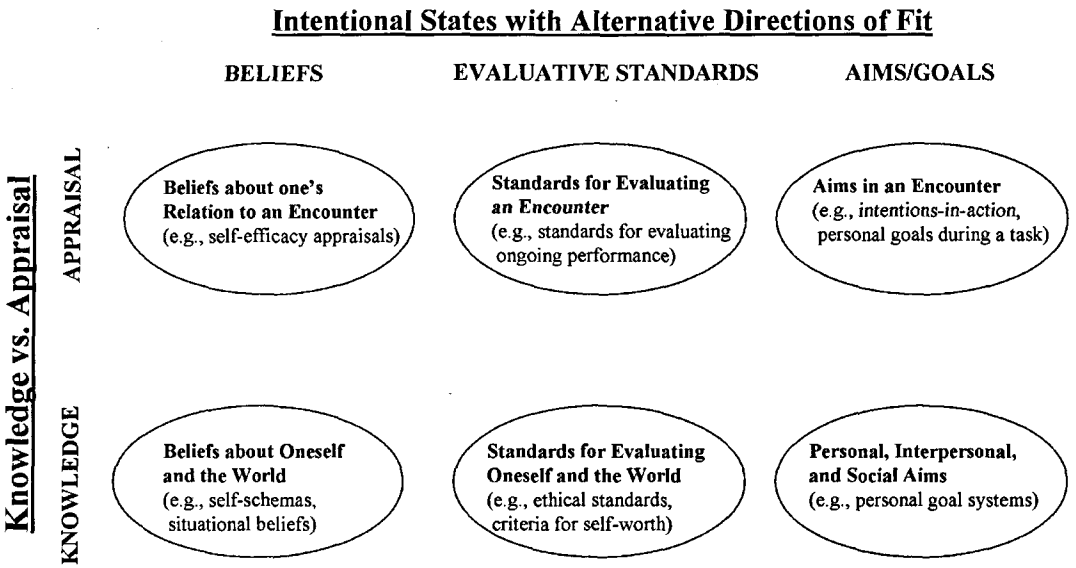

FIGURE 8.1 The KAPA system of social-cognitive personality variables. In the variable system, the distinction among beliefs, evaluative standards, and aims holds at both the knowledge and the appraisal levels of the personality architecture, yielding six classes of social-cognitive variables.

Self-Efficacy Appraisals

Within this model of social-cognitive systems (Cervone, 2004a), the class of thinking that generally is referred to as "perceived self-efficacy" can be classified according to both dimensions of this taxonomy (figure 8.1). *Perceived self-efficacy* refers to beliefs—specifically, beliefs regarding one's own capabilities for performance. Self-efficacy perceptions also are appraisals, that is, they are evaluations of whether one can cope with ongoing or prospective encounters, where those evaluations directly bear on the meaning of the encounter for the self. Self-efficacy appraisals, then, are akin to appraisals of coping potential in Lazarus's (1991) model. The class of cognitions identified by Bandura (1977a) in his self-efficacy theory, then, are appraisals of one's capabilities to handle prospective encounters (e.g., "Can I learn the skills required to get a new job as a Web page designer?" "Can I overcome shyness and reenter the world of dating after a divorce?"), not abstract knowledge about the attributes of oneself or the social world (e.g., "Is Web page design hard?" "Am I attractive?"). Such knowledge, however, may come to mind as individuals appraise their efficacy for performance, and systematically influence those appraisals (Cervone, 1997, 2004a).

We note that some investigators use the term *self-efficacy* to reference psychological phenomena that differ from those identified by Bandura (1977a, 1997). Specifically, some investigators study "generalized self-efficacy," that is, a generalized belief regarding one's overall competence (Sherer et al., 1982). The generalized construct has been criticized on empirical grounds; it sacrifices predictive utility (Bandura, 1997; Cervone, 1997; Stajkovic & Luthans, 1998; Weitlauf, Cervone, Smith, & Wright, 2001) and correlates so highly with other constructs, such as optimism and self-esteem, that it appears to lack discriminant validity (Judge, Erez, Bono, & Thoresen, 2002). It has also been criticized on theoretical grounds (Bandura, 1997; Cervone, 1999). Of necessity, meaningful social actions occur in social contexts. The self-efficacy construct is meant to capture people's thoughts about their capabilities for executing such actions in context, not in contextual vacuums. These thoughts are inherently contextualized. When facing challenges, people rarely ask themselves, "Can I do things, in general?" They instead ask themselves whether they can cope successfully with the challenges that the world presents.

Assessing Perceived Self-Efficacy

This analysis of self-efficacy processes has natural implications for the question of self-efficacy assessment. The approach to self-efficacy assessment devised by Bandura (1977a) can be understood as part of a general social-cognitive strategy for the assessment of personality structures and processes through which people contribute to the course of their development (Cervone, 2004b; Cervone et al., 2001). We briefly review this strategy, then turn specifically to the assessment of self-efficacy beliefs.

The social-cognitive strategy of assessment can best be understood by contrast to other approaches. Much assessment involves individual differences strategies. For example, people may be described in terms of scores on a small set of universal individual difference dimensions. The scores usually represent people's overall average tendency to exhibit a given type of experience or action. In computing this average, the test scorer inherently throws away information about contextual variability in action; the test score, for example, tells one about people's overall tendency to be anxious or motivated while revealing nothing about the social contexts in which a given individual experiences greater or lesser anxiety or is more or less prone to act in a manner that we call motivated.

A social-cognitive analysis suggests two limitations to this strategy (Cervone, 2004b, 2005; Cervone et al., 2001). First, the decision to throw out information about variability in action from one context to another has enormous costs. It sacrifices critical knowledge about the individual, namely, how the individual systematically and distinctively varies his or her behavior from one life circumstance to another (Mischel, 2004). The second limitation is more subtle. It concerns the nature of psychological constructs. In individual-differences strategies (e.g., Costa & McCrae, 1992), individual persons are described according to psychological constructs that are latent variables derived from analyzing the population at large. Such population-level analyses speak forcefully to the challenge of summarizing variations in the group. But they are mute with respect to the question of within-person psychological dynamics at the level of the individual case (see Borsboom et al., 2003). Analyses of individual differences in a population yield variables that serve a descriptive taxonomic function. But to understand the dynamics of individual development, one needs more than merely taxonomic descriptions. One must identify psychological systems that are possessed by a given individual and contribute to his or her development. Social-cognitive theory is fundamentally concerned with identifying these causal dynamics (Bandura, 1999a; Cervone, 1999). It thus calls for assessment strategies that go beyond the mere description of individual differences in the population and that instead identify psychological mechanisms that causally contribute to the development of the individual (Caprara et al., 2003).

Strategies for assessing self-efficacy beliefs, then, reflect social-cognitive theory's dual concern with (a) identifying psychological systems that causally contribute to behavior and personal development while (b) remaining sensitive to the possibility that individuals' thoughts about themselves may vary markedly from one life domain to another. To assess perceived self-efficacy, investigators inquire into people's appraisals of the level or type of performance they believe they can achieve when facing designated challenges. This most commonly is accomplished via structured self-report measures (Bandura, 1977a). People indicate either the level of performance they believe they can achieve on an activity (level of self-efficacy), their confidence in attaining designated levels of achievement (strength of self-efficacy), or both.

The test items that make up such scales are tailored to tap efficacy beliefs in the particular domain of interest. In other words, self-efficacy scales are designed to tap people's confidence in their capabilities for performance in specified circumstances. To determine the content of test items, investigators commonly analyze the particular challenges that individuals face in a domain of interest (Berry, West, & Dennehey, 1989); this could be done either through a theory-based analysis of the domain or, as in research on everyday problem solving among older adults reviewed shortly (Artistico, Cervone, & Pezzuti, 2003), through diary procedures in which research participants themselves report on significant life challenges. After this task analysis, items are written to gauge people's confidence in executing specified behaviors to cope with each of a variety of challenges. In the microanalytic research strategy of self-efficacy theory (Bandura, 1977a; Cervone, 1985), self-efficacy assessments are used to gauge not only between-person differences but also within-person variations in efficacy beliefs across contexts.

Structured self-efficacy scales are not the only means of assessing self-efficacy appraisals. For example, some work employs think-aloud methods in which research participants' spontaneous self-statements regarding their efficacy for performance are analyzed (e.g., Haaga & Stewart, 1992). However, questionnaire methods have been the most common method of assessment by far.

With this background on the nature and assessment of self-efficacy beliefs, we turn to the question of the development of self-efficacy beliefs and the capacity for personal agency.

THE DEVELOPMENT OF SELF-EFFICACY BELIEFS

Personal agency is shaped by the following developmental forces: biological, psychological, sociocultural, and life cycle (Cavanaugh & Blanchard-Fields, 2002). We propose that these developmental forces operate continuously during life to propel individuals forward through multiple domains and contexts, promoting (or preventing) growth in each. In early infancy, the human organism begins to learn cause-and-effect relationships, including the reciprocal effects of self in the world. These early experiences shape the child's general sense of personal agency and contribute to personal agency in specific behavioral developmental contexts. We identify or label such context-specific agentic beliefs as self-efficacy beliefs, and we argue that as behavioral strengths and weaknesses develop in context, so do the performance-based beliefs associated with these behaviors.

The importance of self-efficacy mechanisms to adult development becomes apparent from a review of recent theoretical and empirical work. Maurer (2001) examined factors in the workplace and organization that contributed to midlife and older workers' low sense of self-efficacy for career-relevant learning and skill development in the workplace. Maurer believes that low efficacy mediates the relationship between age of worker and participation in career development and learning opportunities (also see Maurer, Weiss, Barbeite, 2003). Sahu and Sangeeta (2004) recently examined perceptions of self-efficacy among women in the workplace and nonworking women, with results indicating positive relations between workplace experience and efficacy beliefs and between efficacy beliefs and a sense of personal well-being.

Aging brings changes to internal processes and abilities that bear on new learning and development and, in theory, on appraisal and evaluation of behavioral limitations and possibilities. Changes occur in multiple domains in adulthood, including sensory and perceptual levels (Anstey, Hofer, & Luszcz, 2003; P. B. Baltes, Lindenberger, & Staudinger, 1997), attentional capacities (McDowd & Birren, 1990; McDowd, Filion, Pohl, Richards, & Stiers, 2003), personality traits (Helson et al., 2002; Srivastava et al., 2003), memory (Park et al., 2002; Verhaegen, Marcoen, & Goossens, 1993), processing speed (Salthouse, 1991), problem solving (Allaire & Marsiske, 1999, 2002; Berg & Klaczynski, 1996), and intelligence (Schaie, 1996). Effective functioning requires adaptation to changing ability levels and shifts in resources with recognition of what is available and what is not. Several writers have emphasized the need in old age to conserve resources for use in domains of significance, importance, and relevance to effective functioning. For example, Rybash, Hoyer, and Roodin's (1986) "encapsulation model" of cognitive aging draws upon post-formal views of cognitive development (Labouvie-Vief, 1980; Sinnott, 1998) and describes the development of encapsulated modules of knowledge and expertise, which draw processing resources away from more generalized cognitive-behavioral tasks in the service of these highly schematized and complex expert modules. This model is consistent with the general pattern of intellectual change that occurs in adulthood, the so-called classic aging pattern (P. B. Baltes, 1993; Botwinick, 1987), wherein fluid abilities (mechanics) decline and crystallized abilities (pragmatics) maintain or increase into late life.

What do older adults want or need to learn? What are the learning tasks of midlife and old age? One of the tasks of adulthood is learning and accommodating the limits of energy, strength, and speed resources. New adaptations are needed for changes in cognitive abilities, personality variables, and roles such as grandparenting, retirement, and widowhood. Sociocultural changes, such as technology, urban/suburban/rural development, and medical advances may force new learning and development. Beyond adaptations and adjustment to the inevitable changes associated with aging, there are changes that are controllable and can be willfully selected and pursued.

What does lifelong learning really mean for older adults? Does new learning cease when resources

become so scarce that they are used solely to preserve and maintain essential abilities and avoid further loss? Are the oldest old realistically in a position for new learning, or does their reality instead revolve around maintenance of essential behaviors and avoidance of further loss? Self-efficacy appraisals across domains of functioning will begin to fluctuate as the contingencies of behavior change with age. What was once a sufficient length of time and set of abilities to master new learning may no longer suffice when hearing and vision begin to fail and new tasks take greater time and effort. In the classic environmental press model of Lawton and Nahemow (1973), adaptive (and maladaptive) behaviors emerge as a function of the interaction between personal resources (weak–strong) and environmental press (weak–strong). If an individual's skill level surpasses the level of challenge in the environment, the person–environment fit is poor, leading to maladaptive outcomes. Likewise, poor fit and lack of adaptive behavior result when the environmental press exceeds the capabilities and resources of the individual. Ideally, the environment presents levels of challenge within and just beyond the individual's capabilities, which yields the best fit and maximizes development and sense of competence and mastery (Lawton & Nahemow, 1973).

Children, adolescents, and adults learn by example and feedback. Competencies in various domains are shaped by performance successes and failures, effort and effort attributions, persistence and choice, and self- and other-provided feedback. For example, Zimmerman (2002) argues that academic excellence is as much a function of motivational factors (e.g., self-efficacy) as it is of ability and instruction, and points to the critical role of practice among high achievers. High achievers seem to know what they have to do to learn and may be more knowledgeable of task demands and person characteristics (Jenkins, 1979) than low achievers. In research on meta-cognition in the domain of problem solving, Kruger and Dunning (1999) found that competent problem solvers appear to be high in self-awareness, as shown by their more accurate predictions of their performance outcomes compared to incompetent problem solvers, who grossly overestimated their abilities. Thus, experts in a domain appear to be expert also at knowing their abilities; although not tested directly by Kruger and Dunning, it is likely that competent problem solvers have high self-efficacy related to task monitoring, meta-cognitive, and performance variables (Schmidt & Ford, 2003). Clearly, competency development is informed in large part by self-regulatory and self-feedback mechanisms.

The most widely studied domains of self-efficacy functioning in the elderly are health, intelligence, and memory. The losses and changes in cognitive functioning in old age force reappraisals of abilities in these domains, leading to new limits on performance. Older adults should set goals that accurately represent their competencies, being mindful to avoid injurious, demoralizing, and even dehumanizing situations. Sources of efficacy information in older adulthood include the same categories of information used by younger adults (mastery, modeling, persuasion, arousal), but the nature of self-efficacy source information probably changes with age to include greater proportions of failure experiences relative to success experiences—a proposition that is consistent with the shift in the ratio of gains to losses in P. B. Baltes's (1987) life span model of development. To the extent that peers serve as salient points of comparison, the aging individual will have more opportunities in social contexts to observe memory failures, intellectual slowing, and physical fragility and stiffness (e.g., perhaps witnessing walking with the aid of canes after a fall, painful attempts to use arthritic feet and hands, etc.). Sources of efficacy information abound—peers, family, media, stereotypes, doctors, neighbors, confidantes—and older adults might optimize their sense of well-being by attending specifically to positive, efficacy-building feedback from these environmental sources (Welch & West, 1995).

Health

Research examining health outcomes among middle-age and older adults documents the importance of family members and health care professionals to self-efficacy processes. Family factors are so important that when one is predicting psychological outcomes for a given family member, the efficacy perceptions of a different family member may be the most predictive. Rohrbauch et al. (2004) conducted a study of health management self-efficacy beliefs among cardiac patients and their spouses (i.e., where the spouse measures tapped beliefs in the patient's efficacy). Both patient and spouse efficacy perceptions predicted survival, but when one versus the other index was controlled statistically, only the spouse ratings were significant predictors. Research on cardiac rehabilitation also highlights

patients' subjective beliefs in their caretakers' health provision efficacy. Patients who exhibit higher confidence in health care professionals' capabilities have been found subsequently to have higher beliefs in their personal efficacy for physical performance and stronger exercise intentions (Bray & Cowan, 2004).

Research on exercise, physical fitness, and disability self-efficacy is burgeoning in the aging literature. Studies show that self-efficacy is inversely related to pain perception (Clark & Nothwehr, 1999; Leveille, Cohen-Mansfield, & Guralnik, 2003; Reid, Williams, & Gill, 2003). Moreover, self-efficacy and knee pain taken together mediate the effects of membership in an exercise group on time to climb stairs as an outcome measure following treatment (Rejeski, Ettinger, Martin, & Morgan, 1998). Empirical tests of predictions derived directly from self-efficacy theory show that verbal persuasion sources of efficacy information influence exercise outcome efficacy ratings among older adults through doctors, family, and friends (Clark & Nothwehr, 1999). Other research on exercise self-efficacy among elderly adults demonstrates or suggests the importance of self-efficacy expectations on commencement, adherence, and maintenance of exercise regimens (Lachman et al., 1997; Li, McAuley, Harmer, Duncan, & Chaumeton, 2001; Litt, Kleppinger, & Judge, 2002; Seeman, Unger, McAvay, & Mendes de Leon, 1999). Together, these studies provide support for the guiding principle that self-efficacy acts as a change mechanism in various physical and health behavioral domains. Older adults who are highly efficacious appear to exert the necessary effort required for maintenance and adherence, with important positive health outcomes.

Intelligence

Lachman was among the first to demonstrate the relationship of control perceptions, including intellectual efficacy beliefs, to intellectual functioning in adults (Lachman, 1983). Her longitudinal studies showed that intellectual efficacy is both an antecedent as well as an outcome of intellectual change across short longitudinal waves. Lachman found that changes in fluid intelligence and internal locus of control predicted changes in intellectual self-efficacy over a 2-year period in older adults. In related research, Cornelius and Caspi (1986) found that intellectual self-efficacy declined cross-sectionally from midlife to old age in a sample of adults aged 35–79 years old, a finding replicated by Lachman and Leff (1989) in a 5-year longitudinal study of elderly adults.

Because older adults' intellectual abilities in the basic mechanics of intelligence change more than their abilities in pragmatic, crystallized domains (P. B. Baltes, 1993; Botwinick, 1987; Cornelius & Caspi, 1986;), it might be expected that self-efficacy in these domains would vary accordingly. This developmental change has important implications for learning in adulthood: If the intellectual skills that are used to learn and manipulate novel information (the mechanics) are not as sharp in the later years as they were in youth, older adults may need to alter their learning goals and styles to optimize their learning. For example, detection of abstract relationships among component parts requires fluid intelligence, which occurs less quickly among older learners than younger learners. Different pedagogical tools and novel approaches to learning thus may be required when older adults encounter new learning experiences of this sort.

The acquisition of computer skills represents a domain of learning that is particularly challenging for current cohorts of older adults because they were not immersed in the information age to the same extent as cohorts of younger adults. Learning to use computer technology is increasingly necessary for successful navigation through the business, financial, health, education, and leisure markets of the twenty-first century. Self-efficacy beliefs may be important in this domain; people lacking in computer use efficacy may fail to persist in learning experiences and thus may acquire only limited knowledge and skills. Studies show that older adults possess lower self-efficacy for computer learning than do younger adults (Laguna & Babcock, 2000). Laguna and Babcock found that computer experience, computer-self-efficacy, and anxiety about computer use mediated the relationship between age and working memory.

Memory

Cavanaugh et al. (1998) have argued eloquently for the self as memory schematic and have outlined a social cognitive research agenda for studying memory beliefs and behavior across the life span. This model is quite consistent with self-efficacy approaches to studying memory and aging, especially in its emphasis

on the dynamic nature of memory processing by a "self in context." Their theory proposes that when individuals confront memory tasks, they analyze features of the task and environment concurrently with retrieved and known information about self-as-memorizer. Memory processing as such is an online, constructive process, and just as self-efficacy theory dictates, past and current memory experiences and outcomes shape efficacy and performance in context

Berry (1999) expanded on the Cavanaugh et al. framework, placing greater emphasis on personality variables, including a personological—whole person—approach to memory self-efficacy. Berry also argued that memory self-efficacy is probably a significant and meaningful concept for most older adults, fueled by declining memory abilities and prevalent societal stereotypes of negative memory aging.

Empirical work by Lineweaver and Hertzog (1998) focused on memory self-efficacy measurement issues, echoing and refining earlier distinctions by West and Berry (1994) on the domain specificity of self-efficacy. Lineweaver and Hertzog differentiated personal from general memory self-efficacy beliefs using an innovative graphing technique in a sample of adults ranging in age from 18 to 93 years. Their data showed that negative beliefs about memory aging begin to accelerate in midlife and that older adults have significantly poorer memory self-efficacy beliefs than younger and middle-aged adults.

West and colleagues have conducted a series of memory self-efficacy studies that demonstrate the interdependent relationship of goals and self-efficacy (West, Thorn, & Bagwell, 2003; West, Welch, & Knabb, 2002; West, Welch, & Thorn, 2001). Collectively, this line of work has shown that older adults have poorer memory self-efficacy than younger adults. Moreover, experimentally induced goal setting led to increases in self-efficacy and performance in both younger and older adults, and across multiple memory trials, initial memory baseline scores and memory self-efficacy predicted higher self-set goals. West and colleagues have also obtained sex differences on measures of object location memory self-efficacy. Although women had higher performance scores than men overall, they had lower memory self-efficacy scores on these performance tests. Older adults and men overestimated their location recall abilities. In other research, self-efficacy is related to performance outcomes for men but not women. In the MacArthur studies of successful aging among men and women aged 70–79 years, efficacy beliefs predicted better performance on verbal memory and abstract reasoning tests for men but not for women (Seeman, McAvay, Merrill, & Albert, 1996; Seeman, Rodin, & Albert, 1993). Although aging is not the gloomy picture it was once made out to be (Hall, 1922; Rowe & Kahn, 1987), characterized primarily by multiple losses in most domains of functioning (Botwinick, 1973; Busse, 1969), the ratio of losses to gains does indeed increase across the life span (P. B. Baltes, 1987). How do individuals cope with this shifting balance? How are losses minimized or at least managed and gains optimized and even exploited? One explanation is offered in the compelling theory of selective optimization with compensation (SOC; P. B. Baltes & M. M. Baltes, 1990), which we review in a later section. Considered in tandem with Bandura's now classic theory of personal agency captured by its central construct—self-efficacy—a powerful model for understanding development and learning in adulthood and old age may be forged.

SELF-EFFICACY AND SKILL ACQUISITION IN ADULTHOOD

In this section, we explore closely the role of perceived self-efficacy in activities that require sustained effort over prolonged periods. Circumstances in which the adult wishes to learn new skills are the prototypical case.

The adult who wishes to develop new capabilities through new learning experiences faces challenges that can be understood as consisting of distinct components. These include becoming aware of social resources (educational programs, social services) that are available to promote skill development; devising personal plans for taking advantage of these resources; and removing psychological or social barriers (e.g., shyness, daily life routines that may interfere) to partaking in educational opportunities. Consider, for example, those who want to enhance their physical well-being through participation in an exercise program. Systematic research indicates that older adults who wish to participate commonly confront psychological challenges, such as a lack of motivation, to attend exercise sessions on a regular basis as well as pragmatic barriers, such as a lack of transportation to centers that conduct exercise programs (Prohaska,

Peters, & Warren, 2000). A self-efficacy analysis highlights the fact that the older adult may reflect on his or her capabilities to cope with each of these distinct challenges. As a result, if one wants to assess control beliefs in a manner that captures the psychological life of the individual, it may be necessary to attend closely to issues of social context. Any given person may have a high sense of efficacy for meeting some challenges that arise in some contexts (e.g., doing the exercises) and a low sense of self-efficacy in others (e.g., getting to the exercise center).

Across the life span, learning might occur in two or more distinct periods of one's lifetime. People learn not only while in school but also later in life in the workplace. Retirement may provide time and opportunities for learning new activities that were not available in previous phases of life. Concordantly, for any given learning task, there might be differences in the sense of commitment and perceived challenge among individuals of different age cohorts. Even subtle variations in the perceived relevance of a task to one's age group can influence younger and older adults' perceived abilities to solve the task and their actual task performance (Cervone, Artistico, & Orom, 2005).

As an illustration of how variations in one's approach to cognitive tasks can influence courses of action that require sustained effort, we consider research on expertise. An interesting feature of expertise gained through first-hand mastery in a given context is that expertise confers different types of benefits. On the one hand, of course, people become better able to execute well-practiced routines. Yet experts also differ in their approach to tasks, specifically in that they are more able to generate novel strategies when well-practiced routines no longer work or can no longer be executed, perhaps because of age-related declines. Research by Salthouse (1984) provides a clear example. This work compared the performance of younger and older typists. Older typists (experts), although their typing speed had declined, were found to be more likely than younger typists to implement task strategies that enabled their overall productivity to remain unaltered. These strategies consisted of looking ahead in the text one or two lines and memorizing the upcoming text. As a result of this strategy implementation, their overall performance did not differ from that of younger typists. The behavior of expert older typists is well described by the model of SOC processes that has been proposed by P. B. Baltes and M. M. Baltes (1990), discussed in greater detail later.

Skill Development Through Training Programs

The contemporary industrialized world puts a premium on learning. New technologies infiltrate professions, forcing people at midcareer to acquire new skills. Many people retire from their primary profession 15–20 years before the expected end of their life span and have the opportunity to partake in learning programs of value to their personal development. Learning new skills may become far more important than in the past. Questions about the design of training programs to confer new skills and the role of self-referent beliefs in the skill acquisition process are thus important both to society's demands and to the needs of the individual. Psychological science has the capacity to illuminate psychological factors that contribute to success in training programs aimed in a vast array of cognitive domains (Maurer et al., 2003) over the life span (Poon, Rubin, & Wilson, 1989).

Training programs aimed at improving knowledge are precisely the sort of settings in which questions of personal efficacy arise (Bandura, 1997). Learning is associated with a sense of perceived challenge. There is much uncertainty at the beginning of new learning, which reflects the degree to which skills are lacking in initial phases. Moreover, it is sometimes difficult to gauge how quickly one is acquiring a new skill or the skill level that one will ultimately reach. In such settings, people naturally ask themselves questions about their performance efficacy (i.e., Am I capable of doing this?). Subjective beliefs about one's capacity to engage and sustain engagement in learning programs thus contribute directly to the learning process (Bandura & Schunk, 1981; Schunk & Gunn, 1986).

One means through which self-efficacy processes influence learning involves the initial decision to enroll in a training program. Adult education commonly is a proactive choice. People with a strong sense of self-efficacy for learning are more likely to make the positive choice to engage the challenge of a training program, as suggested by much research documenting the impact of perceived self-efficacy on academic motivation (Schunk & Pajares, 2002). This effect of self-efficacy on choice processes has been analyzed in detail by Lent, Brown, and Hackett (1994) in their social cognitive theory of career choice. In this model, self-efficacy is viewed as having both direct and indirect effects on career choices. In a direct path, people with high efficacy perceptions are more likely to take

up challenging careers of interest to them. In an indirect path, self-efficacy beliefs influence the interests themselves; in other words, feelings of efficacy spur feelings of interest in an activity (see Bandura & Schunk, 1981). A recent meta-analysis of self-efficacy and interests supports this idea (Rottinghaus, Larson, & Borgen, 2003). Rottinghaus et al. found that perceived self-efficacy predicts a substantial portion of the variance in career interests. An interesting possibility in this area is that the relation between self-efficacy and interest in an activity may be nonlinear; empirical results suggest that activities are relatively uninteresting when self-efficacy for performance is either extremely high or extremely low (Silvia, 2003).

Once in a training program, a strong sense of self-efficacy for performance in the given context enhances achievement (Bandura, 1997). For example, in studies of adults in workplace literacy programs (Mikulecky, Lloyd, Siemental, & Masker, 1998), learners who were confident in their writing and reading abilities (literacy self-efficacy) had higher text comprehension outcomes than those who did not have high levels of literacy self-efficacy. Research by Vinokur, van Ryn, Gramlich, and Price, R. H. (1991) provides another illustration. Large numbers of unemployed American adults took part in a brief (eight-session) training program that conveyed skills for identifying and pursuing new employment. Compared to a control condition, this training program fostered higher levels of employment and higher earnings at a follow-up assessment 2.5 years later (Vinokur et al., 1991). Mediational analyses indicated that training had its effects largely through its influence on perceived self-efficacy (van Ryn & Vinokur, 1992), which had both a direct and an indirect (though job-search attitudes) influence on the behaviors involved in seeking reemployment. This work demonstrates how a relatively brief intervention can enhance learning and developmental outcomes through the mediating mechanism of perceived self-efficacy.

Similar training procedures to those targeted to younger adults, enhanced performance among older adults as well. Older people trained at evaluating improvement from their self-paced performance were more likely to succeed on intellectual tasks (Dittman-Kohli, Lachman, Kiegel, Baltes, 1991), and on memory tasks even when their work was to go through a plan of several intervention sections (McDougall, 1998). A recent study from our lab addressed learning experiences in everyday problem solving associated with self-efficacy perceptions among older adults (Artistico & Pezzuti, 2003). Subjects trained in solving everyday problems performed better on a second problem-solving task compared to subjects in the control group. Importantly, however, variations in performance were paralleled by variations in perceived self-efficacy; these variations partially mediated the relationship between training and performance on everyday problem-solving tasks.

One normally associates the idea of training with the acquisition of professional skills. However, adults also face interpersonal and family systems challenges for which they may feel inefficacious and may benefit from systematic training experiences in these areas. One example of this is parenting. Research suggests that there are reciprocal influences between adults' sense of self-efficacy for parenting and the well-being of family members in their care. On one hand, child characteristics influence parental self-referent beliefs; mothers who lack social support and have temperamentally difficult children have lower perceptions of their efficacy for parenting and, in turn, more postpartum depression (Cutrona & Troutman, 1986). Conversely, enhanced parental efficacy beliefs can improve family welfare, and training programs can beneficially bolster these efficacy beliefs. A training program for parents of young children that involved the mastery modeling of parenting skills has been shown to build parental self-efficacy and reduce family stress (Gross, Fogg, & Tucker, 1995). Higher levels of parental self-efficacy have been shown to be important not only to children but also to the mental health of parents (Kwok & Wong, 2000). Parenting is not the only family role in which efficacy beliefs are important. King and Elder (1998) found that grandparents' appraisals of self-efficacy for contributing positively to their grandchildren's lives predicted levels of involvement with the grandchildren's daily activities. The role of parenting self-efficacy in family life and prospects for building these efficacy beliefs through interventions are reviewed by Coleman and Karraker (1997).

Extant research on training programs, self-efficacy beliefs, and their effects suggests a clear message: Training programs should include information about not only the skill acquisition task but also interventions designed to boost participants' perceptions of their capabilities to handle challenges, because these self-efficacy perceptions have a significant effect on interests, choices, and motivation. Much work in social cognitive theory indicates how this can be done

(Bandura, 1986, 1997). Self-efficacy beliefs are best enhanced by firsthand experiences of personal mastery. Training programs should be structured such that they contain proximal performance goals that participants can reach and clear feedback to participants when they reach them.

COGNITIVE SKILLS IN LEARNING

In many areas of everyday life, people can base their judgments of personal efficacy on past personal experience. Past successes and failures form a basis for appraising one's capabilities for future action. However, past experiences are sometimes lacking. Circumstances may contain features that are so novel that the individual faces the challenge of judging personal efficacy under conditions of substantial uncertainty (Cervone & Peake, 1986).

When perceived self-efficacy cannot be solely based on previous experience, one possibility is to base self-efficacy appraisals on past experiences that seem similar to the new challenge one is facing. Determining what past situations are relevant and how relevant they are involves judgmental processes that are fraught with subjectivity. When older adults face challenges for which they have no direct prior experience—for example, adjusting to retirement, becoming a grandparent, adopting a new medical or exercise regimen to cope with a medical problem—they must appraise their efficacy for performance and formulate goals under conditions of high uncertainty. In such circumstances, stereotypes or other judgmental influences may systematically distort these self-appraisals, in some instances causing individuals to underestimate their capacities for performance. In the language of the KAPA model noted earlier (Cervone, 2004a), the stereotypes would function as enduring knowledge that biases efficacy appraisals.

In addition to assessing past experiences, another cognitive activity that is central to self-efficacy judgment under uncertainty involves future-oriented cognition. People may mentally simulate pathways to goal achievement, and the ease with which they can envision reaching their goals may influence self-efficacy appraisals. Research with older adults indeed indicates that peoples' cognitive capacity to generate strategies for overcoming barriers to participation in programs is important to the learning process (Prohaska et al., 2000). People with adequate skills may fail to participate because they dwell on potential obstacles to participation; qualitative research has indicated that for older people, to start and then maintain a learning program often means more than having the required skills and knowledge to do it, because the real challenge is to begin putting one's knowledge and skills into action (Williamson, 2000).

Moreover, when people are committed to a valued course of action that they believe they can achieve, they may fail to act on their intentions because of situational factors that distract them from intended pursuits. Helping individuals generate strategies for solving daily social, interpersonal, or intrapersonal problems that interfere with planned activities might, then, facilitate daily adherence among older adults and reduce attrition from these programs.

Older adults' participation in learning programs thus may hinge on their ability to solve everyday problems that can interfere with their taking part in valuable learning activities. This raises the challenge of understanding factors that may influence older adults' problem solving abilities—a challenge that has been met by research on everyday problem solving.

Everyday Problem Solving

Historically, in cognitive psychology, the term *problem solving* typically has been applied to the solution of abstract analytical tasks; a problem such as the Tower of Hanoi puzzle (in which the research participant moves geometric shapes of different sizes in accordance with logical constraints on their movement) is an example (Anzai & Simon, 1979). On such tasks, people are confronted with a well-defined problem, and reasoning may lead the individual through a fixed problem space in which there is one well-defined solution (Reitmann, 1964; Simon, 1973). Although the study of such tasks may provide meaningful insight into human cognition, these problem-solving paradigms capture only a limited subset of the cognitive challenges faced by adults, particularly in the later years of life. To illustrate the point, consider a typical everyday problem. Suppose an older adult living in a condominium complex finds that meetings of the local condo association frequently are disrupted by disagreements and arguing among the association members (example derived from Artistico et al., 2003), and the individual wants to improve the tone of the meetings. Here the problem is not defined as sharply as a typical laboratory task; it is hard to know

what options are available to solve the problem or how much improvement in the problem is even possible. In this problem of daily life, there also is no single solution, as there is on a laboratory task. Any given solution may fail or work only temporarily. Many distinct strategies and forms of solution thus may have to be devised to make progress on the problem.

These considerations have given rise to a scientific literature on everyday problem solving or being able to successfully cope with everyday challenges (Denney & Palmer, 1981) that turned out to be of particular relevance to the study of cognitive aging. Especially when cognitive decline becomes substantial (Salthouse, 1991; Salthouse, Berish, & Miles, 2002), skilled use of everyday problem-solving functioning and competence becomes crucial for maintaining an unaltered sense of well-being among older individuals (M. M. Baltes & Lang, 1997; M. M. Baltes, Maas, Wilms, Borchelt, & Little, 1999). Findings reveal that when compared to the declines that are evident on tests of fluid intelligence or abstract reasoning, declines in performance on everyday problem-solving tasks are small, moderate, or nonexistent. This conclusion holds with respect to studies examining problem-solving fluency or the number of safe and effective solutions generated (Denney & Palmer, 1981; Denney & Pearce, 1989; Denney, Pearce, & Palmer, 1982), or with respect to studies examining quality of everyday problem-solving reasoning (Allaire & Marsiske, 1999, 2002; Berg, Meegan, & Klaczynski, 1999, Cornelius & Caspi, 1987).

Everyday Problem Solving Across the Life Span

Denney and her associates studied problem solving trajectories over the life span (Denney & Palmer, 1981; Denney & Pearce, 1989; Denney et al.,1982). They indicated that although performance on traditional laboratory tasks tends to decrease linearly after early adulthood, a different pattern is found on everyday problems. Performance on everyday problem-solving items increases from young adulthood to middle age, but then decreases in the elderly. Older participants were found to perform less well than middle-age persons even when working on items that were nominated by a sample of older persons as being particularly relevant to their age group (Denney & Pearce, 1989). Although exceptions are occasionally found in which older adults outperform younger adults on everyday problems (Cornelius, 1984; Cornelius & Caspi, 1987) or in which some forms of everyday cognition are highly correlated with traditional measures of basic cognitive abilities (Allaire & Marsiske, 1999), many research findings suggest that everyday problem solving is a distinct cognitive domain in which experience-based knowledge that is gained across adulthood may facilitate performance; yet "experience cannot completely nullify the effects of aging" (Denney, 1990, p. 340).

Everyday Problem Solving and Perceived Self-Efficacy

Several factors contribute to everyday problem-solving ability. It has been increasingly reported that in addition to bringing knowledge to bear on tasks, older adults may enhance everyday problem solving performance by engaging effective use of self-regulatory strategies (Sinnott, 1989). Studying regulatory processes in later adulthood is a key factor for understanding how older adults are able to compensate for declines in virtually any cognitive ability (Artistico & Lang, 2002). A key question, therefore, is to understand how older people exert the goal-directed effort required to attain knowledge and develop task strategies about everyday problem solving (Berg & Klaczynski, 1996; Blanchard-Fields, Chen, & Norris, 1997; Hess & Blanchard-Fields, 1999).

Older adults do not always perform optimally on everyday problem solving tasks, but if they do so, it is generally because they have high confidence in their ability to solve everyday problems or perceived self-efficacy (Artistico et al., 2003). Generating solutions requires sustained cognitive effort, and people who possess robust efficacy beliefs are more likely to exert that effort, rather than abandon attempts at problem solving (Bandura, 1989). Variations in perceived self-efficacy predict problem-solving ability, specifically, viable solutions that individuals are able to generate for everyday problems (Artistico et al., 2003). Importantly, it is not merely the case that some people are generally good and others generally poor problem solvers. Instead, we found significant within-person variability in self-efficacy beliefs and problem-solving abilities across contexts. When problems were typical of older persons' daily experiences (e.g., dealing with incompetent medical personnel), they judged themselves as relatively capable of solving the problems and exhibited superior levels of cognitive performance.

In contrast, in domains that were less familiar to them, older adults had lower efficacy beliefs and performance than did younger adults. Moreover, the results from this study suggest that perceived self-efficacy operates as a cognitive mediator of age-related performance differences on problem-solving tasks among young and older adults (Artistico et al., 2003).

Crystallized and Fluid Intelligence

An early and persistent question in the field of psychological aging was to understand what types of intellectual abilities older people use to achieve high levels of performance on cognitive tasks. One answer was found in the distinction made between two orthogonal types of general intellective ability, namely, crystallized and fluid intelligence (Cattell, 1971). Crystallized intelligence normally underlies tasks that test knowledge that is accumulated through experience and years of education (P. B. Baltes, 1997). On the other hand, fluid intelligence is an ability used for spatial and abstract reasoning tasks, such as solving numerical or spatial puzzles. The distinction between crystallized and fluid intelligence is somewhat analogous to the distinction between everyday problem solving and laboratory problem solving. Crystallized intelligence might be conceptually relevant to solving everyday problems, whereas fluid intelligence could be instrumental in solving abstract reasoning tasks.

In research on intellectual aging and the crystallized/fluid distinction, older people scored significantly higher and perceived themselves as more efficacious to perform on a crystallized intelligence test than did younger people (Lachman & Jelalian, 1984). In contrast, younger people scored higher and perceived themselves as more efficacious to perform on a fluid intelligence test than did older people (Lachman & Jelalian, 1984). Similar results were found in a study in which fluid intelligence was measured with a working memory task, and crystallized intelligence was measured by asking people to offer wisdom with respect to critical interpersonal dilemmas. Older adults were as capable as young adults of generating solutions for critical interpersonal situations and making life decisions and were as fast as younger people. Younger adults were more proficient than older adults on working memory tasks (for an overview of these results, see P. B. Baltes & Staudinger, 2000).

Taken as a whole, research on everyday problem solving and research directed by the distinction between crystallized and fluid intelligence indicate that personal experiences associated with assessment of an individual's perceived efficacy might better explain cognitive performance in later age. Next we turn our attention to a family of factors that might enhance our understanding of people's ability to engage in complex behavior, such as learning. These factors include strategies that are particularly relevant to older adults' everyday functioning and performance and were briefly introduced earlier under the guise of the SOC model.

SOC MODEL AND PERCEIVED SELF-EFFICACY

The ability to maximize one's potentials across the life span rests on two key factors: being able to generate viable solutions to problems of life and having a strong enough sense of efficacy to put these solutions into practice. This combination of factors can help buffer individuals against cognitive declines that occur with age. Converging evidence indicates that age deficits in prefrontal cortical activity in working memory are disruptive to higher order functioning in older adults (e.g., Raz, 2000; Rypma, Prabhakaran, Desmond, & Gabrieli, 2001; Salthouse, 1991). As we saw, solving tasks that are ecologically relevant to older adults and that foster use of crystallized intelligence may prompt better performance and higher self-efficacy perceptions among older people. Studying regulatory processes in older adults could be key for understanding how elderly people are able to compensate for cognitive declines. To illustrate this point, consider once again the example of older typists (Salthouse, 1984) introduced earlier in the chapter. Older typists, regardless of their cognitive decline, were as fast as younger typists in typing a lengthy work assignment. This conclusion held because, as Salthouse (1984) and others noted as well (P. B. Baltes, 1987; P. B. Baltes & M. M. Baltes, 1990), experts in general are able to compensate with their skilled use of strategies for the impact of cognitive declines on performance. We will discuss compensatory strategies to buffer against cognitive declines within a model that is central to discourse in the contemporary field of psychology and aging, the SOC model.

SOC Model

P. B. Baltes and M. M. Baltes (1990) identified "a prototypical strategy of successful aging" (p. 21) that involves managing cognitive declines by focusing on actions through which these can be overcome. Their model identifies patterns of selection, optimization, and compensation that promote successful development. Successful adult development can be achieved by selecting life goals that are manageable within the constraints of biology and sociocultural opportunities; optimizing the use of personal and social resources in the pursuit of one's aims; and by developing strategies to compensate for declines that inevitably arise across the life course. In the domain of learning, the SOC model implies that disengagement is not a necessary result of age-related declines in capabilities. Instead, by focusing (i.e., selection), practicing (i.e., optimization), and invoking the role of experience (i.e., compensation), adults can continue to acquire valuable new experiences across the life course.

Reports of strategy use for managing specific problems ought to refer to everyday problems that are representative of those that are actually encountered by individuals. Consider a well-known example of resilient performance provided by P. B. Baltes and M. M. Baltes (1990). Pianist Arthur Rubinstein maintained extraordinarily high levels of artistic performance in older adulthood through strategies that compensated for age-related losses of motor speed and flexibility. In a television interview he "told that he reduces his repertoire and plays a smaller number of pieces (selection); second, he practices these more often (optimization); and third, he slows down his speed of playing prior to fast movements, thereby producing a contrast that gives the impression of speed in the fast movements (compensation)" (example reported in P. B. Baltes & M. M. Baltes, 1990, p. 26).

Level and Strength of Self-Efficacy and SOC

On logical grounds, it has been theorized that development in later years involves streamlining one's efforts: increasing effort in valued and important domains for which performance can realistically be maintained, while decreasing effort and investment in others (P. B. Baltes, 1987). People who can rely on great levels of perceived self-efficacy to perform optimally in a vast array of domains are more able to persist on challenging tasks compared to those people who perceive of themselves as less efficacious (Bandura, 1997). There are two ways that different aspects of perceived self-efficacy are generally assessed (see Bandura, 1977a; Cervone & Scott, 1995): (1) the absolute type of performance that one is envisioning to achieve (levels of self-efficacy), and (2) personal confidence in being able to attain designed levels of performance (strength of self-efficacy).

Analysis of these two dimensions of self-efficacy would provide several options for identifying the empirical joint between perceived self-efficacy and specific task strategies, such as those in the SOC model. Imagine asking Rubinstein before a piano concert to indicate his level of self-efficacy for his confidence to perform optimally (even pieces that would require fast movements). Presumably, the reply would fall in the upper range of a self-efficacy scale—a number that would express the artist's great confidence in his piano-playing performance ability. Imagine also repeating this assessment many times over several concerts played over several nights. Such an approach would yield measures of self-efficacy level, strength, and generalizability (Bandura, 1977a), which could in turn be combined with the various compensatory, selection, and optimization strategies employed by the artist over the successive nights. These measurements would no doubt yield fluctuations in Rubinstein's own self-efficacy judgments that would covary systematically with the various possible performance outcomes (e.g., length of applause, requests for encores, perceptions of the orchestra, critics' reviews, and so forth). This whimsical scenario illustrates the type of investigation that could be conducted in more realistic musical venues (e.g., music conservatories, choral societies, orchestras) to test hypotheses derived conjointly from self-efficacy theory and the SOC model. In fact, research on music self-efficacy has found that greater confidence in playing piano is related to assessors' evaluations of the quality of students' musical performance during examinations (McCormick & McPherson, 2003).

Rubinstein's piano performance style in later life is an exceptional illustration of selective optimization with compensation and the judicious, effective application of compensatory strategies. Many older adults face accommodative difficulties in far more mundane yet equally salient and personally important domains

(e.g., everyday routines). Choices between tasks are made on a daily basis and at short-term and long-term levels. As at any age, older adults are confronted with the ordinary time management tasks and "to-do" lists of a given day. He or she might select between grocery shopping today, returning library books tomorrow, and doing laundry on Sunday, whereas longer- term tasks such as entering a fitness or community volunteer program are deferred until physical, mental, and even economic resources allow such choice and selectivity. Research paradigms developed in everyday learning contexts could assess how older adults learn to manage trade-offs between physical and cognitive limitations with selections of optimal functioning in their most desired domains.

Research across different adulthood learning domains that integrates personality in context, the self-regulatory components of self-efficacy theory, and the behavioral choices and balance implied by the SOC model would provide a comprehensive understanding of how older adults manage the myriad challenges and opportunities of life. Basic research should aim to explicate both developmental differences at the group level as well as the substantial within-person variability in self-efficacy and learning processes across the life span. When basic research findings translate into beneficial applications, one of the core missions of the field of psychological science is fulfilled.

CONCLUSIONS

This chapter has reviewed diverse programs of theory and research. Yet its primary ideas can be well summarized by two simple themes. The first concerns the nature of human development, and the second concerns the nature of the psychological construct on which we have focused, perceived self-efficacy.

In our contemporary world, in which many citizens experience long life spans and enhanced freedom of choice, the twists and turns of psychological development increasingly are determined by personal decision making. Especially within Western individualistic cultures, the major roles and contexts of one's life—involving profession, family, location of residence, and so on—are not conceived as fixed or inevitable. Instead, people recognize that they can choose among life paths. This increases not only opportunity but uncertainty. Ages ago, individuals may have been relatively secure in the knowledge that they could adopt a lifestyle in which their ancestors had lived successfully for generations. In contrast, rapid changes in social and family life reduce personal feelings of certainty about one's life course; for example, although college-aged Americans today have an abundance of opportunities, they also are more likely to believe that the outcome of important life events may be beyond their personal control, as compared to the beliefs expressed by their cohorts only a few decades earlier (Twenge, Zhang, & Im, 2004). When faced with choice and uncertainty, people naturally reflect on themselves and their capacities to handle the challenges ahead. Thus we live today in a world where reflections on self-efficacy are key to personal development. As we have seen in the research reviewed herein, people with stronger beliefs in their efficacy for performance are more likely to develop the skills and exert the self-control and persistent effort that are required to tackle the challenges that world presents.

Regarding the self-efficacy construct, we have promoted a perspective that is integrative rather than isolationist. In the early days of self-efficacy theory (Bandura, 1977a), it was important to document that self-efficacy was a unique construct, that is, one that captured distinctive aspects of mental life that uniquely contribute to human achievement and well-being. These efforts can be declared a success (see Bandura, 1997). Now, after more than a quarter century of research effort, it is equally important to recognize that self-efficacy beliefs are just one aspect of the overall architecture of human mental systems (Cervone, 2004a). The advantages of this latter perspective are dual. First, as noted herein, it can yield an integrative view of human development in which the insights of different theoretical traditions (e.g., P. B. Baltes, 1987; Bandura, 1986) are seen to be complementary and to yield an overall portrait of development that has much power and scope. Second, it shifts one's attention from a particular variable—self-efficacy—to a target of investigation of greater interest: the whole, coherent, multifaceted individual and his or her development across the course of life.

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