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**MAINTAINING
PROFESSIONAL
COMPETENCE**

*Approaches to
Career Enhancement,
Vitality, and Success
Throughout a Work Life*



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How Adult Development, Intelligence, and Motivation Affect Competence

Chapters One and Two have discussed professional competence and its loss through obsolescence as an interaction between personal and environmental dimensions, with special attention to environmental issues. Chapter One focused on factors in the professional's immediate work environment that are associated with updating. Chapter Two discussed skills obsolescence from a macro-environmental perspective, considering marketplace and organizational factors.

In this chapter, we will consider issues related to the person variables in the interactional model, mental ability and motivation. These two issues are important to maintaining professional competence, and since maintaining competence is of particular concern to midcareer professionals, we will give special attention to developmental changes in cognitive ability and motivation occurring by middle age. Moreover, we will consider generational differences in cognitive ability and motivation. The midcareer professional's skills and abilities are often compared to those of younger, more recently trained professionals; it is necessary, then, to examine the research literature on generational (that is, cohort) differences in mental ability and motivation.

Adult Cognitive Ability

How a professional performs in the workplace is, of course, a product of many factors, of which cognitive ability is only one. Professional competence involves other personal variables, such as interpersonal skills, motivation, and prior education and training. While level of cognitive ability alone does not assure professional competence, it is a necessary condition; it is important, therefore, to consider how cognitive abilities relate to professional competence at various career stages.

One of the dominant approaches to the study of cognitive functioning in adulthood has been the psychometric ability approach, where intelligence is seen as involving a number of different mental abilities (Botwinick, 1977). Although the specific abilities studied vary among the different psychometric models, many are commonly recognized: verbal, mathematical, spatial, inductive reasoning, memory, and perceptual speed abilities (Thurstone and Thurstone, 1941).

Mental ability is a theoretical construct that cannot be directly observed. Individuals' level of ability functioning is assessed by observing their behavior (performance) on tests or measures shown to represent a given ability. An individual may demonstrate a high level on one ability, but average or below-average performance levels on others. These individual differences in ability level are important, since particular abilities appear to be associated with achieving competence in various professions. For example, high levels of spatial ability are critical for pilots and engineers (Hills, 1957), while verbal competence is necessary for journalists.

Abilities and Professional Competence

How do mental abilities contribute to the acquisition and maintenance of competence in a given profession? Think of abilities as mental building blocks used by an individual in developing the knowledge base and proficiencies required by a profession (Willis and Schaie, 1986). The tasks performed by a professional are complex and typically involve multiple abilities. For exam-

ple, computer programming involves inductive reasoning, mathematical abilities, and spatial abilities; if the programmer writes the documentation for a program, verbal abilities are also required. A manager developing a budget needs mathematical ability; however, making budgetary projections also involves other abilities, such as inductive reasoning, the ability to see patterns of logical relationships, and the ability to use these patterns in predicting future trends.

Schaie's stage model of cognitive development (1977-1978) is useful in considering how cognitive abilities relate to professional competence at various stages—career entry, mid-career, and late career. Schaie argues that acquiring basic mental abilities (verbal, mathematical, reasoning) required for effective functioning in our society is a major developmental task of childhood and adolescence. Much of the acquisition process occurs as a function of schooling. Then, beginning in young adulthood, there is a shift from acquiring abilities to applying them to adult roles and responsibilities. In early adulthood, many individuals are particularly concerned with achieving a work role and a family role. Thus, much of the young adult's cognitive efforts are applied to developing job-related knowledge and proficiencies.

In middle age, many individuals find that their professional and familial responsibilities expand. They may assume supervisory and mentoring responsibilities, such that intellectual abilities are directed not only to their own career development, but also to that of subordinates and colleagues. Some professionals assume more extensive responsibilities at the executive level, involving the management of work groups, departments, or entire organizations. These responsibilities require applying cognitive abilities and skills to increasingly complex problems and situations. The executive must be able to think hierarchically and consider a problem from multiple levels of the organization.

Midcareer professionals are also required to apply their cognitive abilities to the maintenance of their own professional competence, as well as to the training of apprentices and subordinates. Thus, many of the basic mental abilities and skills

acquired in childhood are used throughout adulthood. These basic abilities are applied to increasingly complex problems and tasks at work. As one's career progresses, these abilities are used first in developing complex job proficiencies in one's professional specialties, and then in modifying these proficiencies as new information and technologies become available.

Developmental Changes in Abilities

It is important to consider how intellectual abilities change from early to middle adulthood, and the implications of these changes for maintaining professional competence. Findings from a number of longitudinal studies (Bray and Howard, 1983a; Schaie, 1983; Siegler, 1983) indicate that reliable decline on most of the abilities is not observed until the early sixties. In a twenty-one-year study of managers at AT&T, Bray and Howard (1983a) found no normative decline in intellectual performance from the early to the midcareer phase. Moreover, some longitudinal studies have found that for abilities that are routinely employed in daily living, such as verbal skills, peak performance levels are reached only in midlife, on average (Schaie, 1983). The ability to make quick and accurate perceptual discriminations is one of the few abilities to exhibit significant age-related decline beginning in early middle age. However, there is some evidence that the average magnitude of decline in the speed at which behavior can be performed reaches a critical threshold for only a limited number of job demands (Schaie, 1986). There are, of course, wide individual differences in the rate and timing of decline. Some people show significant decline at a relatively early age, while for a few individuals no reliable decline on certain abilities is found even in old age.

It is well known that level of ability is a significant predictor of successful entry into a given profession (Hills, 1957). That is, individuals entering a field demonstrate, on average, a higher level of performance on certain abilities than for population norms. Moreover, ability level at early career stages is also a significant predictor of professional competence at *midcareer*. In their longitudinal study of AT&T managers, Bray and Howard

found that intellectual ability at career entry predicted career achievement in midlife (Howard, 1984). Likewise, Kaufman (1972) found that cognitive ability at the beginning of engineers' careers significantly predicted both professional productivity and professional updatedness in midcareer; early ability level was related to the number of patents disclosed and the number of articles published. Because there is considerable stability in level of cognitive ability across much of adulthood, individuals who were more able at career entry are also likely to be more able in midcareer. Also, high levels of cognitive functioning may be particularly advantageous at midcareer in facilitating the professional's ability to engage in updating activities that require the acquisition of new knowledge and proficiencies and adapt to technological advances.

Generational Differences

Although adults, as we have seen, do not show significant age-related cognitive decline until the sixties, the midcareer professional may still appear less competent in some areas than a younger colleague. There are generational differences in level of performance on many mental abilities. When different generations (such as, adults born in 1900 as opposed to those born in 1950) are compared at the same chronological age (for instance, age 25), significant generational differences are found. The nature of these generational differences varies for different abilities. There is a strong positive cohort trend for inductive-reasoning ability, with more recent cohorts showing higher levels of performance when assessed at the same chronological age. In contrast, there is a curvilinear cohort trend for numerical ability, with cohorts born in the 1920s performing at a higher level than either earlier or later generations.

As a result of positive cohort trends, the midcareer professional may appear at a disadvantage compared with younger colleagues even though the middle-aged professional has suffered no age-related decline in competence. As we saw in Chapter Two, the middle-aged professional may be disadvantaged when the level of ability demanded in a field increases as a result

of new technologies; this is likely to occur when the abilities required are those exhibiting positive cohort trends. However, on the other hand, curvilinear or negative cohort trends can be advantageous to middle-aged or older professionals, since their ability level may be higher than that of more recent cohorts.

Creativity, Expertise, and Professional Competence

The relationship between cognitive functioning and professional competence has also been examined in terms of creativity and expertise. One index of creativity is the unique or significant contributions that professionals make to their field. Expertise refers to extensive and advanced knowledge and proficiencies in a profession.

Creativity. Recent research on age-related changes in creativity (Simonton, 1988) indicates that the *proportion* of significant contributions to total contributions made by a professional remains constant across the career. That is, the proportion of "hits" to total attempts does not differ significantly across age periods or career stages. This finding has been demonstrated across a variety of disciplines (Simonton, 1977; 1985). If quantity (total contributions) rather than quality (significant works) is considered, productivity has been found to peak in the forties and fifties for many fields that emphasize scholarship, including fields as diverse as medicine and history (Simonton, 1975). In fact, the first ten years in a professional's work life is the *least* productive decade of the entire career. Thus, many professionals in their sixties, who have been active throughout their career, can be expected to be somewhat more productive than in their twenties even though modest decline from peak productivity in midlife may have occurred.

Expertise. So we see that there is little normative decline in ability level in midlife. Are there other types of change in cognitive functioning that are relevant to maintaining professional competence? Here, recent research on expertise is of interest, since many experts are midcareer professionals. Differences

between novices and experts in their understanding of a body of knowledge have been examined (Anderson, 1982; Brown, 1982). A major difference is the structure of their knowledge base. The novice's knowledge base tends to be fractionated, not well integrated, with few connections between various knowledge domains. The expert's knowledge base is highly organized and integrated. When the expert's knowledge system is diagrammed, the knowledge base is hierarchically organized, and there is a rich system of pathways and connections relating various parts of the knowledge base (see also Chapter Four). Moreover, experts have developed a repertoire of cognitive strategies specific to the knowledge domain. It is the richly integrated knowledge base of the expert and the availability of domain-specific strategies that enable the experts to solve problems in their field very quickly and efficiently.

How might the expertise that has been achieved by mid-career professionals affect their efforts to maintain professional competence? When professionals acquire new information via updating that can be integrated within their existing knowledge base, then experts would seem to be at a definite advantage. The richly connected structure of their existing knowledge base should facilitate identifying possible relationships between new and old knowledge and integrating the new information (Brown, 1982). Previously acquired domain-specific strategies should also "work" with the new data. Thus, in most updating endeavors, the expert should be at an advantage, unless there is some psychological commitment to previously held ideas that are no longer valid.

When updating involves acquiring information or skills that are novel or largely *unrelated* to the expert's domain of knowledge, then expertise may be of less advantage. Take, for example, the case of a distinguished physician, with no previous computer experience, who needs to acquire a certain level of computer literacy to take advantage of new advances in the medical field. In this case, the expert may be no more advantaged than less distinguished colleagues. Current evidence suggests that there is relatively little transfer across disparate domains of expertise (Chi, Glaser, and Rees, 1982). Expertise in

one domain does not automatically lead to competence in another domain.

When a person seeks to acquire new knowledge or skill, largely unrelated to previously acquired competencies, basic mental abilities previously discussed are of particular importance. Since most midcareer professionals will have suffered little decline in these abilities, the cognitive aptitude for acquiring new knowledge and skills should be intact. Individuals functioning at a high level on the relevant basic abilities should be particularly advantaged. This position is supported by recent research that examined the relationship between basic abilities and middle-aged adults' proficiency in learning computer software for spreadsheet designs (Garfein, Schaie, and Willis, 1988); the adults studied had little or no previous computer literacy. Acquisition of computer skills was significantly related to the adults' level of inductive reasoning and spatial abilities.

Environmental Factors and Cognitive Ability

Complexity of the Work Environment. Since basic mental abilities continue to be important to maintenance of professional competence in midcareer, what environmental factors are related to the maintenance of these abilities? The reciprocal relationship between the work environment and intellectual functioning has been examined in a ten-year longitudinal study by Kohn and Schooler (1983). Three dimensions of the work environment were examined: routinization, closeness of supervision, and substantive complexity of work. Substantively complex work requires initiative and independent judgment, and often involves dealing with people or ideas. In contrast, less complex work is often repetitive (routinized), requires little independent judgment, and tends to be closely supervised. Kohn and Schooler found that men who had jobs that required independent decision making and working with complex environmental demands became more intellectually flexible across time, even when prior levels of intellectual flexibility were controlled for. The work we do influences our cognitive functioning, and vice versa.

Related findings have been reported for the older worker, when the relationship between timing of retirement and ability performance was examined. Schaie and associates examined the relationship between early and late retirement from substantively complex work and changes in inductive reasoning performance over the retirement period (Dutta, Schulenberg, and Lair, 1986). Older workers who were involved in substantively complex work and delayed retirement showed maintenance of reasoning ability. In contrast, early retirees from complex jobs suffered some loss in reasoning performance.

Active Lifestyle and Enriched Environment. In a similar vein, research findings indicate that an active, involved lifestyle—that is, living and working within an enriched, stimulating environment—fosters maintenance of both basic cognitive abilities and professional competence. Healthy individuals who were living very active lifestyles that included involvement in a number of different stimulating and challenging pursuits showed an increase in level of ability over the prior seven-year period (Gribbin, Schaie, and Parham, 1980). In contrast, individuals who reported increasing withdrawal or disengagement from previous activities and a rather passive life-style exhibited significant declines in functioning over the same time period. In particular, older women who had experienced family disruptions, such as death of a spouse, and had subsequently withdrawn from previous pursuits appeared to be vulnerable to cognitive decline. An enriched, challenging work environment also is important in maintaining professional knowledge and skills. Reinhart and Keefe (Chapter Five) report that an enriched work environment is a significant predictor of maintenance of professional competence for midcareer emergency room medical personnel.

Self-assessment of Cognitive Performance

For the most part, maintenance of professional competence is self-directed (see also Chapter Thirteen). The individual engages in a self-assessment of the current level of professional

competence and then determines the knowledge and proficiencies to be enhanced and the procedure (workshop, self-directed readings, and so on). While this is not always the optimal procedure for maintaining professional competence, it is a very common approach. Therefore, it is important to examine how accurate professionals are in assessing their work-related competencies and in evaluating the success of their efforts to maintain competence (see Green, Grosswald, Suter, and Walthall, 1984).

There appears to be very little empirical data on accuracy of self-assessments in professional competence. However, there has been research on adults' competence to judge the level of their performance on various abilities, and to assess whether their abilities have declined over time. Several studies have shown that adults are fairly accurate in self-assessment; research of their performance on various abilities by Lachman (1983) and MaloneBeach (1987) found significant relationships between actual ability performance and self-assessment on the ability.

Likewise, adults appear to be sensitive to decline in their level of intellectual functioning (Willis, 1988). When asked to rate on a five-point scale whether their own level of ability performance had improved, remained stable, or declined over a seven-year period, adults who had suffered reliable ability decline rated themselves as having experienced greater decline than did individuals who had not declined. Finally, it appears that adults possess some self-knowledge of whether their performance has improved as a function of educational training. Adults who had demonstrated significant gain after a cognitive training intervention rated themselves as having improved more than adults who had not shown reliable improvement after training.

Motivation

Motivation is considered to be the most salient personal variable in models of professional competence that emphasize personal and environmental interactions (see Chapters One and Two).

Expectancy theory (see Chapters One and Eight) is based on the premise that the professional's level of motivation to engage in some activity (in this case, updating) is influenced by the individual's beliefs about whether a certain level of performance can be attained, and whether that level of performance will result in desired outcomes (Vroom, 1964). Expectancy theory has typically been concerned with the relationship between certain beliefs and expectancies and outcomes within a specific context; for example, the relationship between a professional's willingness to enroll in a continuing education class and beliefs about his or her ability to perform in the course, or expectancies about the relationship between taking the class and receiving a merit pay increase. In each case, the beliefs, expectancies, and outcomes are specific and are typically associated with a particular context (work context). In contrast, much of the research on personality in adulthood and old age has studied more general motivational factors that are less closely related to a specific context.

In this section, we briefly consider some of these other motivational dimensions. Our analysis of this literature will focus on three issues:

1. Are there changes with age in these motivational variables?
2. Are there generational differences in level for some motivational dimensions?
3. What motivational dimensions are significant predictors of professional productivity and competence?

On the first question, there has been considerable debate in the study of adult personality on whether and to what extent there is stability or change in personality and motivational dimensions across the adult years (McCrae and Costa, 1984; Neugarten, 1977). Do adults exhibit the same level of achievement motivation or desire for autonomy in young adulthood and middle age? Is the rank ordering of individuals on a personality trait stable from middle age into old age? There is evidence for *both* change and stability in personality dimensions related to the workplace.

With regard to the second question, it is important to examine cohort trends to determine whether some of the motivational differences observed between young and midcareer professionals reflect generational differences rather than age-related changes. For example, differences in level of achievement motivation between early and midcareer managers may be associated with age-related changes in motivation for middle-aged managers. On the other hand, perhaps the two generations had different levels of motivation even when compared at the same chronological age.

As to the third question, motivational variables as predictors of professional competence need to be studied in the context of what is known about normative age-related changes in these variables. Longitudinal data are useful in differentiating between variables that are good predictors of professional competence at all career stages, and those that become particularly useful at early or later stages. Predictor variables for which there is little normative change tend to be useful across career stages; those for which there is reliable normative change are likely to be more useful predictors at specific career stages.

Little research has examined directly the relationship between general motivational variables and efforts to maintain professional competence. Thus we will be examining, for the most part, the relationship between motivational variables and professional productivity and success. There is some evidence that maintenance of professional competence is related to professional productivity and success. For example, in our own research with college faculty, we have found that more up-to-date faculty also publish more (Willis and Tosti-Vasey, 1986). Nevertheless, we acknowledge the limitations in using productivity or success as an indirect index of remaining professionally competent.

Motivational Dimensions Showing Age-related Change and Generational Differences

Career Advancement Expectancies. When professionals are studied longitudinally, there is evidence that their expectations and

motivation for career advancements decline on average. The AT&T study of managers (Bray and Howard, 1980, 1983b; Howard and Bray, 1988) found that managers' expectations about career advancement decreased, on average, within the first five years. Very early in their career, many managers developed more realistic expectations regarding the possibilities for advancement; they became increasingly aware that in a pyramid organization, such as AT&T, the possibility for continued advancement into upper levels of management becomes increasingly unlikely. There was a slight decline across time in motivation or expectation for advancement even among men reaching upper-management levels, although the decline was less steep than for the total sample.

In addition to age-related change, generational differences have been noted in motivation for advancement. Cohorts born in the 1950s and entering careers in the 1970s have lower expectations about career advancement than young professionals in the same fields who were born in the 1930s and entered the job market in the 1950s (Howard and Wilson, 1982; Howard and Bray, 1988). More recent cohorts had lower expectancies.

Work Involvement. Research findings on age changes in level of work involvement—the priority that people give to work within their lives—are somewhat mixed. Longitudinal studies have reported that level of work involvement declined on average slightly from early to midcareer. There was a decline in the self-reported importance and priority of work in the managers' lives (Bray and Howard, 1983a; Howard and Bray, 1980, 1988). While the trend was toward a decrease in work involvement, there were wide individual differences in trajectories, depending on career success. Men who attained only lower levels of management showed a drop in the importance of work within the first five years. Those who reached middle-management levels showed a stable level for the first career decade, with some decline thereafter. However, men who attained upper-management levels actually reported increased involvement in work across time. These findings are striking since there were no differences in

level of work involvement at the beginning of their careers. Thus, work involvement became a significant predictor of career success only in midcareer.

In contrast to longitudinal findings that show a decline in work involvement with age, Rhodes' extensive review of cross-sectional studies (1983) found a positive, but modest, relationship between age and job involvement. This discrepancy in findings may be the result of cohort differences in work saliency. Age and cohort effects are confounded in the cross-sectional studies of work involvement (Yankelovich, 1981). More recent-born cohorts report lower levels of work involvement, on average, than earlier cohorts when assessed at the same chronological age (Howard and Wilson, 1982).

Desire for Autonomy. Several studies have reported that the desire for autonomy or independence in one's life and work increases with age (Bray and Howard, 1983a; Stevens and Truss, 1985; see also Chapter Nine). In fact, autonomy and independence in decision making have been found to be some of the most desired work environment characteristics. If we recall the findings of Kohn and Schooler (1983) that a complex work environment involving independent decision making was related to increased intellectual flexibility, the professional's desire for autonomy would seem to have important developmental implications. However, Bray and Howard did not find desire for autonomy to be a predictor of the managerial level attained (Howard, 1984). Desire for autonomy appears to be related to work satisfaction, but not to career success.

Dominance. Dominance, the disposition to take charge and exert leadership, increases from young to middle adulthood (Stevens and Truss, 1985). Bray and Howard found it a significant predictor of career success at all career stages. Men who scored high on a dominance scale were more likely to reach higher management levels (Howard, 1984). In our research, we have found tenured college faculty who scored higher on dominance were more likely to be up to date in their field (Willis and Tosti-Vasey, 1986).

Moreover, generational differences were found in the AT&T study. More recent cohorts of managers were less desirous of leadership roles than previous cohorts had been at comparable stages in their career (Howard and Wilson, 1982).

Nurturance and Affiliation. Longitudinal studies report some evidence for an age-related decrease in nurturance and affiliation needs from young to middle adulthood (Stevens and Truss, 1985). In midlife, there appears to be some decline in the disposition to seek out friendships or social relationships and also a decline in being nurturant or supportive of others.

Nurturance has shown significant relationships with career success and professional competence. Men who remained at lower management levels showed increases in nurturance across the AT&T study. In contrast, men reaching upper management levels showed a decrease (Howard, 1984). In our own research with tenured college faculty we found analogous trends; nurturance was related to greater professional obsolescence in the faculty member's field. The more up-to-date faculty member was less nurturant.

The issue of nurturance is important for its implications for professional mentoring, a role typically assumed by mid-career professionals. If nurturance is an important element in serving as a mentor, then the data, at first glance, might be interpreted as suggesting that competent, successful professionals are less disposed to mentoring activities. Such professionals do engage in mentoring, but closer scrutiny often indicates that they are very selective in choosing the recipients of their time and attention. Thus, while distinguished professionals may not be high on nurturance as a general personality trait, they do engage in mentoring in highly selected contexts.

In addition, significant cohort differences have been found for nurturance, with recent cohorts scoring higher than earlier cohorts (Howard and Wilson, 1982; Stevens and Truss, 1985). More recent generations give more emphasis to being supportive of others, in general. Some in the business domain have questioned whether nurturance and affiliation, as general personality characteristics, are compatible with an aggressive,

competitive approach to free enterprise, and thus whether business practices will change as a function of generational differences in these personality dimensions (Howard and Wilson, 1982).

Behavioral Flexibility. Longitudinal data indicate normative increases in behavioral rigidity with age. As individuals age they become less flexible in their approach to tasks and less willing to consider alternative viewpoints (Schaie, 1983). However, there are wide individual differences. Studies have shown that behavioral flexibility is an important predictor of later ability performance and of career success. First, adults who exhibit flexible styles in midlife are more likely to perform at high ability levels in their sixties (Schaie, 1983). In a similar vein, behavioral flexibility in midlife has been shown to be a significant predictor of attaining higher levels of management (Howard, 1984). Upper-level managers were found to be more flexible and willing to consider alternative viewpoints.

Motivational Dimensions Showing Stability

Inner Work Standards. Although expectations and desires about career advancement decrease significantly across the career, it does not follow that the professional becomes less committed to maintaining certain work standards or "doing a good job." Inner work standards involve intrinsic motivation to maintain personal standards of excellence, unrelated to the implications for career advancement or supervisor approval. No age-related decline in inner work standards was found in the AT&T study of managers; even those who experienced little career advancement remained committed to performing their current job in a competent manner (Bray and Howard, 1983b; Howard and Bray, 1980). We too found that high inner work standards in college faculty were predictive of remaining professionally up to date (Willis and Tosti-Vasey, 1986). Fortunately, there is also no evidence for cohort differences in inner work standards (Howard and Wilson, 1982).

Job Satisfaction. Both longitudinal and cross-sectional studies suggest no significant age differences in level of job satisfaction. Moreover, while those who are successful in their careers reported high job satisfaction, even managers who did not progress to advanced levels maintained stable levels of job satisfaction into midcareer (Bray and Howard, 1980). In a review of a number of cross-sectional studies, Rhodes (1983) also found little evidence for age differences in job satisfaction. In fact, the trend was toward a positive relationship among age, job satisfaction, and organizational commitment.

Summary

In this chapter, we have presented a selected review of the literature on developmental changes in cognition and motivation and the implications for the midcareer professional. The cognitive literature suggests a very positive view of midcareer professionals' intellectual abilities and their potential for maintaining professional competence. The tasks and responsibilities that the professional assumes become increasingly complex, and require many distinct mental abilities. Longitudinal research indicates that normative age-related decline on most of these abilities is not observed until the sixties. Indeed, some abilities, such as vocabulary, do not reach their peak until middle age. Thus, most midcareer professionals should have intact the mental abilities that are involved in acquiring new information and skills in order to maintain professional competence.

Moreover, findings on creativity indicate that a professional's total output peaks in midlife for many scholarly fields. However, the proportion of notable works to total works is constant across career stages. The research on expertise indicates that as professionals become more experienced in their specific domains, the structure of their knowledge base becomes increasingly organized and interrelated. This not only enables professionals to perform more efficiently, but also should facilitate their ability to integrate into the current knowledge base the new information acquired.

Finally, several characteristics of the professional's work

environment have been shown to enhance cognitive functioning. These include work complexity and environmental richness. Work that required independent decision making in complex tasks involving people and ideas was found to enhance intellectual flexibility.

Age-related changes have been found for several dimensions of motivation, while other dimensions, such as job satisfaction and inner work standards, appear to be stable. Age-related declines have been reported for work involvement, flexibility, and nurturance. Dominance and desire for autonomy have been found to increase from young to middle adulthood.

These changes in motivational dimensions must be differentiated from their significance as useful predictors of job productivity or success. Desire for career advancement and dominance have been found to be important early predictors of career success. In contrast, work involvement and flexibility became significant predictors only at later career stages. Although desire for autonomy increases with age and is perceived to be important to worker satisfaction, it is not a significant predictor of career success.

Finally, important cohort differences have been noted for variables such as work involvement, dominance, and nurturance; these generational differences must be carefully monitored as recent cohorts progress through advanced career stages.

In summary, research literature suggests that the professional has the intellectual potential to remain professionally competent and that important motivational predictors of productivity have been identified and must be given careful consideration in career development and enhancement programs.

References

- Anderson, J. R. "Acquisition of Cognitive Skill." *Psychological Review*, 1982, 89, 369-401.
- Botwinick, J. "Intellectual Abilities." In J. E. Birren and K. W. Schaie (eds.), *Handbook of the Psychology of Aging*. New York: Van Nostrand Reinhold, 1977.

- Bray, D. W., and Howard, A. "Career Success and Life Satisfaction of Middle-aged Managers." In L. A. Bond and J. C. Rosen (eds.), *Coping and Competence During Adulthood*. Hanover, N. H.: University Press of New England, 1980.
- Bray, D. W., and Howard, A. "The AT&T Longitudinal Studies of Managers." In K. W. Schaie (ed.), *Longitudinal Studies of Adult Psychological Development*. New York: Guilford Press, 1983a.
- Bray, D. W., and Howard, A. "Personality and the Assessment Center Method." In C. D. Spielberger and J. N. Butcher (eds.), *Advances in Personality Assessment*. Hillsdale, N.J.: Erlbaum, 1983b.
- Brown, A. L. "Learning and Development: The Problem of Compatibility, Access, and Induction." *Human Development*, 1982, 25, 89-115.
- Chi, M.T.H., Glaser, R., and Rees, E. "Expertise in Problem Solving." In R. J. Sternberg (ed.), *Advances in the Psychology of Human Intelligence*. Vol. 7. Hillsdale, N.J.: Erlbaum, 1982.
- Dutta, R., Schulenberg, J., and Lair, T. J. "The Effect of Job Characteristics on Cognitive Abilities and Intellectual Flexibility." Paper presented at the annual meeting of the Eastern Psychological Association, New York, Apr. 1986.
- Garfein, A. J., Schaie, K. W., and Willis, S. L. "Microcomputer Proficiency in Later-middle-aged and Older Adults: Teaching Old Dogs New Tricks." *Social Behavior*, 1988, 3, 131-148.
- Green, J., Grosswald, S., Suter, E., and Walthall, D. (eds.). *Continuing Education for the Health Professions: Developing, Managing, and Evaluating Programs for Maximum Impact on Patient Care*. San Francisco: Jossey-Bass, 1984.
- Gribbin, K., Schaie, K. W., and Parham, I. "Complexities of Life Style and Maintenance of Intellectual Abilities." *Journal of Social Issues*, 1980, 36, 47-61.
- Hills, J. "Factor Analyzed Abilities and Success in College Mathematics." *Educational Psychological Measurement*, 1957, 17, 615-622.
- Howard, A. "Cool at the Top: Personality Characteristics of Successful Executives." Paper presented at the annual meeting of the American Psychological Association, Montreal, Canada, Aug. 1984.

- Howard, A., and Bray, D. "Continuities and Discontinuities Between Two Generations of Bell Managers." Paper presented at the annual meeting of the American Psychological Association, Montreal, Canada, Aug. 1980.
- Howard, A., and Bray, D. *Managerial Lives in Transition: Advancing Age and Changing Times*. New York: Guilford Press, 1988.
- Howard, A., and Wilson, J. A. "Leadership in a Declining Work Ethic." *California Management Review*, 1982, 24, 33-46.
- Kaufman, H. G. "Relations of Ability and Interest to Currency of Professional Knowledge Among Engineers." *Journal of Applied Psychology*, 1972, 56, 495-499.
- Kohn, M. L., and Schooler, C. *Work and Personality: An Inquiry into the Impact of Social Stratification*. Norwood, N.J.: Ablex, 1983.
- Lachman, M. "Perceptions of Intellectual Aging: Antecedent or Consequent of Intellectual Functioning?" *Developmental Psychology*, 1983, 19, 482-498.
- McCrae, R. R., and Costa, P. T., Jr. *Emerging Lives, Enduring Dispositions: Personality in Adulthood*. Boston: Little, Brown, 1984.
- MaloneBeach, E. "Cognitive Ability, Depression, and Performance Perception." Paper presented at the annual meeting of the American Psychological Association, New York, Aug. 1987.
- Neugarten, B. L. "Personality and Aging." In J. E. Birren and K. W. Schaie (eds.), *Handbook of the Psychology of Aging*. New York: Van Nostrand Reinhold, 1977.
- Rhodes, S. R. "Age-related Differences in Work Attitudes and Behavior: A Review and Conceptual Analysis." *Psychological Review*, 1983, 93, 328-367.
- Schaie, K. W. "Toward a Stage Theory of Adult Cognitive Development." *Aging and Human Development*, 1977-78, 8, 129-138.
- Schaie, K. W. "The Seattle Longitudinal Study: A Twenty-one Year Exploration of Psychometric Intelligence in Adulthood." In K. W. Schaie (ed.), *Longitudinal Studies of Adult Psychological Development*. New York: Guilford Press, 1983.
- Schaie, K. W. "Relating Age Change and Behavior to Job Requirements." Paper presented at the annual meeting of the Gerontological Society of America, Chicago, Nov. 1986.

- Siegler, I. "Psychological Aspects of the Duke Longitudinal Studies." In K. W. Schaie (ed.), *Longitudinal Studies of Adult Psychological Development*. New York: Guilford Press, 1983.
- Simonton, D. K. "Age and Literary Creativity: A Cross-cultural and Transhistorical Survey." *Journal of Cross-Cultural Psychology*, 1975, 6, 259-277.
- Simonton, D. K. "Creative Productivity, Age, and Stress: A Biographical Time-series Analysis of Ten Classical Composers." *Journal of Personality and Social Psychology*, 1977, 35, 791-804.
- Simonton, D. K. "Quality, Quantity, and Age: The Careers of Ten Distinguished Psychologists." *International Journal of Aging and Human Development*, 1985, 21, 241-254.
- Simonton, D. K. "Does Creativity Decline in the Later Years? Definition, Data, and Theory." In M. Perlmutter (ed.), *Late Life Potential*. Washington: Gerontological Society of America, 1988.
- Stevens, D. P., and Truss, C. V. "Stability and Change in Adult Personality over Twelve and Twenty Years." *Developmental Psychology*, 1985, 21, 568-584.
- Thurstone, L. L., and Thurstone, T. G. "Factorial Studies of Intelligence." *Psychometric Monographs*, 1941, no. 2.
- Vroom, V. H. *Work and Motivation*. New York: Wiley, 1964.
- Willis, S. L. "Contributions of Cognitive Training Research to Understanding Late Life Potential." In M. Perlmutter (ed.), *Late Life Potential*. Washington: Gerontological Society of America, 1988.
- Willis, S. L., and Schaie, K. W. "Practical Intelligence in Later Adulthood." In R. J. Sternberg and R. Wagner (eds.), *Practical Intelligence: Origins of Competence in the Everyday World*. New York: Cambridge University Press, 1986.
- Willis, S. L., and Tosti-Vasey, J. "Professional Obsolescence Among Senior College Faculty." Paper presented at the annual meeting of the American Educational Research Association, San Francisco, Apr. 1986.
- Yankelovich, D. *New Rules: Searching for Self-fulfillment in a World Turned Upside Down*. New York: Random House, 1981.