Memory and Aging
Current Issues and Future Directions

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8 Memory in context

The impact of age-related goals on performance

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INTRODUCTION

Research has identified many quantitative (e.g., amount of information remembered) and qualitative (e.g., types of information remembered) shifts in memory functioning that appear to characterize normal aging (for review, see McDaniel, Einstein, & Jacoby, 2008). For the most part, it is explicitly or implicitly assumed that memory change is associated with normative alterations in cortical structures associated with basic cognitive processes (e.g., speed, working memory, and inhibitory functions), with change driven by genetically influenced aging processes (McGue & Johnson, 2008), normative neuropathologic processes (Wilson, 2008), or health-related factors that are probabilistically related to aging (Spiro & Brady, 2008).

Although such factors are undoubtedly at work in determining the course of memory change in later life, research is increasingly identifying other causal mechanisms of age-related variability in performance and change in memory functioning. For example, motivational, emotional, and social factors have all been shown to be important influences on memory-related behaviors (for reviews, see Hess, 2005; Kensinger, Chapter 9, this volume; Mather & Carstensen, 2005).

These findings fit well with a general contextual perspective on lifespan development that emphasizes the importance of considering multiple influences and their transactional relationships in determining the course of development (Baltes, 1987). In this chapter, we examine memory and aging from this perspective. We begin by making a case for the importance of a contextual approach and then present a general framework for understanding aging effects on memory performance. We finish by focusing on one particular set of proximal-distal influences representative of a contextual approach. Specifically, we discuss research that addresses the relationship between life circumstances, social context, and personal goals as they relate to memory functioning.
The lifespan contextualist perspective (Baltes, 1987) has been an influential framework used in guiding theoretical and empirical work on adult development and aging. A primary component of this view is the assertion that age-related changes in behavior are multidimensional and multidirectional, which incorporates the corollary assumption that development is characterized at all points of the life span by both gains and losses. For present purposes, an important implication of multidimensionality and multidirectionality is the assumption of multiple determinants of performance and behavior change. The lifespan perspective also emphasizes the adaptive nature of development as individuals adjust their behavior in response to normative and non-normative changes in life events. This adaptive functioning may result not only in gains as new behaviors are acquired or existing behaviors become more efficient to deal with new circumstances, but also in losses as behaviors are replaced or de-emphasized in response to these same circumstances.

When applied to the study of memory and aging, this perspective argues for consideration of multiple factors at multiple levels of analysis (Hess, 2005). For illustrative purposes, we will make a broad distinction between proximal and distal factors that account for age-related variation in memory performance. Proximal factors are those characteristics that have a relatively direct impact on performance at a given point in time. Interindividual variability and intraintividual change in performance over time can be understood in terms of changes in the constellation of both quantitative and qualitative performance-relevant characteristics of the individual. For the most part, the proximal characteristics considered in the research literature relate to basic characteristics of the information-processing system (e.g., working memory, speed of processing, inhibitory functions) or, more recently, to underlying cortical structures.

In contrast, distal influences refer to the broader context in which development takes place. These factors have a more indirect impact on memory through their determination of the level and form of proximal influences. From a contextual perspective, common patterns of intraintividual change both within and across cohorts are based in stable, age-graded distal influences that have relatively systematic effects on the development of proximal mechanisms. A common implicit or explicit assumption is that much of the age-related change in such mechanisms can be accounted for in terms of distal influences (e.g., neuropathologic processes, health, genetics) that have a relatively systematic but negative effect on underlying biological mechanisms.

It can reasonably be argued that the majority of research on memory and aging has proceeded from a conceptual basis that is consistent with the foregoing characterization of distal and proximal influences. That is, normative changes in cortical structures (e.g., neuronal loss, decreased levels of neurotransmitters) associated with cumulative damage or genetically determined change over the life course have a negative impact on basic mechanisms, such as processing speed, which in turn reduces the efficiency of memory functioning in later life. Note that we are not arguing that this is an inappropriate view or an unfruitful manner in which to study memory and aging. On the contrary, it is abundantly clear that this approach has resulted in important insights into the aging mind.

In addition, this view is quite consistent with a contextualist perspective to the extent that there may be individual differences in characteristics that influence proximal mechanisms and thereby account for variations in age-related change in functioning. For example, whereas there may be some inherent aspects of the aging process that lead to normative changes in memory functioning, lifestyle factors may alter the level of ability and rate of change (see Herzog, Kramer, Wilson, & Lindenberger, 2009). Our main point is that (a) normative changes in basic cortical and cognitive mechanisms may represent just one category of distal and proximal influences that determine memory functioning in later life and (b) consideration of a broader array of influences as well as the contexts in which individuals use their memory skills will give us a clearer understanding of the nature of age-related change in memory ability as well as insights into factors promoting optimal changes in functioning.

Age-graded changes in social structures, affective functions, goals, and other factors may also be characterized as normative influences that determine the nature of memory functioning and how we use our memory skills (Hess, 2005). To illustrate, older adults often evince reductions in beliefs about the control they have over memory change and performance in later life (Lachman, 2006), which may be based in Western stereotypes about aging and memory (e.g., Levy & Langer, 1994). This, in turn, may result in decreases in the amount of effort that individuals put into a memory task, potentially exaggerating age differences based in ability.

Importantly, these socially based factors may also affect the course of biologically influenced memory change in later life. To the extent that these beliefs result in reduced involvement in memory activities, normative cortical change could also be accelerated due to disuse, thereby potentially hastening the rate of decline in memory ability. Indeed, research (e.g., Levy, Zonderman, Slade, & Ferucci, 2009) has suggested that individual differences in attitudes about aging have important consequences on health and longevity, presumably through their impact on health-related behaviors. It seems reasonable further to infer that this relationship between attitudes and biological change will also be reflected in individual and age-related patterns of memory functioning.

As a means for illustrating a contextual perspective on memory and aging, Figure 8.1 presents a multidimensional model incorporating multiple distal and proximal influences along with causal linkages between influences. The model incorporates what might be thought of as the biologically based "default" mechanism accounting for changes in performance that
changes and the meaning of differential patterns of activation across individuals of different ages is still open to debate. For example, are the differences that we see in older adults’ patterns of cortical activation relative to those of younger adults reflective of changes in processing efficiency associated with neuronal loss or neurochemical change? Or, alternatively, might the observed age differences also reflect the use of inefficient strategies on the part of older adults, which may be related to contextual factors (e.g., task relevance, practice) that influence cognitive engagement?

It is likely that the effects are due to some combination of these factors. Importantly for the contextual perspective, there is evidence that some aging-related variation observed in memory and cognitive performance is attributable to physical health factors (Waldstein, 2000) that have a probabilistic, not inevitable connection to age. In fact, some have suggested that the majority of age-related variance in cognitive outcomes is based in such health factors (e.g., Spiro & Brady, 2008). Of further interest are findings suggesting that lifestyle factors—for example, physical exercise (Colcombe & Kramer, 2003) or engagement in substantively complex activities (Schooler, Malatu, & Oates, 1999)—are associated with memory skills reflective of efficient controlled processing. In addition there is also evidence that lifestyle factors are related to variations in the brain structures and functions thought to underlie observed age differences in memory (e.g., Colcombe et al., 2003; Lupien et al., 1998). Such observations are consistent with the idea that both the environment and individual exert a certain amount of control over the course of memory change as well as the cortical structures undergirding such change.

Hess (2005) also identified evidence for proximal influences on memory performance that were unrelated to the inherent integrity and efficiency of the information-processing system. Rather, these factors were thought to be associated with engagement and direction of this system. Two general classes of such age-graded proximal influences were identified. First, aging is associated with shifts in goals associated with social-cognitive functioning (e.g., Adams, Smith, Pasupathi, & Vitolo, 2002), perspectives of time (e.g., Carstensen & Turk-Charles, 1994), and cognitive resource conservation (e.g., Hess, Germain, Swaim, & Osowski, 2009), which in turn have an impact on memory performance. A second general category of proximal influences is associated with culturally based stereotypes of aging; these may affect performance either indirectly through belief systems (Hertzig & Hultsch, 2000) or through a more direct route associated with their activation from situational cues (e.g., Bargh, Chen, & Burrows, 1996; Hess, Auman, Colcombe, & Rahhal, 2003; Levy, 1996).

Note that the goal- and stereotype-based processes mentioned here may not necessarily be independent of other aging-related changes (e.g., Freund & Baltes, 2002), including those associated with biologically based aspects of development. For example, some intrinsic goals (e.g., need for cognitive

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**FIGURE 8.1** A contextual perspective on factors associated with age differences in memory performance.
structure) that have been found to be predictive of engagement in complex cognitive activity have also been shown to be associated with variation in health-related resources (Hess, 2001; Hess, Emery, & Neupert, in press), suggesting a possible linkage between changing biological and motivational systems. What is important, however, are the facts that (a) not all developmentally relevant goals are driven by changes in biological structures, (b) goals can determine the encoding and retrieval operations underlying mnemonic functioning, and (c) the effects of aging-related changes in biological processes on memory performance may be mediated by goals associated with those changes. We elaborate on these ideas in the next section.

In sum, an examination of existing research on aging and memory does provide evidence consistent with a contextual perspective. Biological, behavioral, and social factors appear to serve as both proximal and distal influences in determining memory performance and change in adulthood. In addition, there are potential cross-linkages among these three types of factors (e.g., Levy et al., 2009), suggesting that a focus on only one level of analysis may be problematic. Thus, the adoption of a contextual perspective along with the consideration of a variety of influences promotes not only our understanding of memory functioning in adulthood, but also the causal mechanisms determining change. This, in turn, has important implications for optimization of functioning as well as remediation.

GOAL-RELATED INFLUENCES ON MEMORY PERFORMANCE

Proceeding within a contextual perspective, we devote the remainder of this chapter to examining motivational processes and their role in both age differences in ability and intraindividual variation in performance across contexts. One way to think of motivational influences is within the context of goals. One category of goals may be thought of as acute and situation specific, such as those having to do with specific task instructions (e.g., “remember this list of words”). Of greater interest from a contextual perspective are chronic goals that are relatively stable and reflective of an individual’s interests, beliefs, and life circumstances. Within the context of chronic goals, we focus primarily on two factors. First, we are interested in identifying developmentally salient chronic goals—that is, goals that can be meaningfully tied to age-graded normative influences in an individual’s life. Second, we are further interested in specifying the conditions under which these and other types of chronic goals are likely to be operant and whether age-related processes can be meaningfully tied to such conditions.

We argue that chronic goals interact with situational factors (e.g., task demands, information contents) in determining the personal relevance or implications of the task, which influence motivation. Personal relevance is determined by the degree to which chronic goals map onto situational factors that, in turn, will determine the degree of engagement and the direction of processing. Thus, for example, if engaging in the task is somehow tied directly to one’s chronic goals, then personal relevance or meaningfulness would be perceived to be high, with concomitant motivational consequences. Tasks may also be reconstrued in a manner consistent with chronic goals so that, for example, acute goals tied to experimenter instructions may be reinterpreted in a more personally meaningful way. In contrast, if the connection to chronic goals is low, motivation—and performance—are likely to be low.

For present purposes, the impact of chronic goals on motivation can be usefully thought of in terms of selection effects. We conceive of selection being related to the directing and energizing functions associated with motivation. With respect to directing, selection effects may be evident when one has a choice of activities and the individual chooses the one of most interest or the one most likely to promote personal goals. The directing effects of selection may also be seen in information search, with attention disproportionately focused on goal-congruent information. In contrast, energizing functions reflective of selection are associated with degree of engagement with the task and the effort devoted to supporting performance in a given situation.

Several different perspectives within the literature on adult development incorporate this notion of selection. We examine these perspectives next, with a focus on the associated research and the implications of each for the understanding of memory and aging. We begin by discussing some initial work on the impact of social-cognitive goals on memory functioning. We then move to discussions of the more formal goal-related frameworks of the selection, optimization, and compensation (SOC) model (e.g., Baltes, Staudinger, & Lindenberger, 1999) and socioemotional selectivity theory (SST; e.g., Carstensen, 1992). We then follow this with an in-depth discussion of selective engagement (e.g., Hess, 2006a). Finally, we discuss work on the impact on memory performance of a specific social context factor—negative stereotypes of aging—and attempt to interpret such findings within the context of goal-related processes.

Social-cognitive goals

One approach to understanding the impact of goals on memory is to consider changes in the social-cognitive context associated with processing information across the adult life span. In other words, what are the dominant tasks associated with different stages of adulthood and how do they affect our cognitive functioning? One theoretical perspective suggests that information-processing goals shift from a focus on information acquisition in early adulthood to an emphasis on interpretation, integration of past
and present knowledge, and cross-generation transmission of information in later adulthood (e.g., Greve & Bjorklund, 2009; Labouvie-Vief, 1990; Mergler & Goldstein, 1983). This results in less emphasis on veridical reproduction and greater emphasis on establishment of meaning and sharing of knowledge in later life. Given that many studies focus on verbatim reproduction as a means for assessing memory ability, age differences in memory functioning may be overestimated or misinterpreted due to the mismatch between the demands of the task and the processing goals of the individual.

These ideas were explored in a series of studies by Adams and colleagues that examined age differences in performance as a function of type of memory output and performance context. In two initial studies (Adams, 1991; Adams, Labouvie-Vief, Hobart, & Dorosz, 1990), recall of text material was examined as a means of investigating age differences in memory representations. It was found that the recall of younger adults was dominated by verbatim reproduction of the text. In contrast, middle-aged and older adults exhibited greater evidence of interpretation-based processing in that their recall protocols contained more elaborations and metaphorical propositions. Importantly, these age differences were most evident in unstructured situations, where little guidance was given regarding how to process the information and thus stylistic differences would be most likely to emerge. In addition, older adults’ use of more gist-based processes did not appear to be a compensatory response to losses in memory for details. In a subsequent study, Adams, Smith, Nyquist, and Perlmuter (1997) also found that the strength and direction of age differences in memory performance were dependent upon the task. Specifically, young adults were superior to older adults when the task emphasized verbatim recall, whereas older adults outperformed younger adults when the focus was on interpretation.

Adams et al. (2002) also found social context to moderate age differences in recall. They had young and older women learn a story either to retell to the experimenter or to a young child. In the former case, which is analogous to the typical laboratory testing situation, the younger adults outperformed the older adults. In contrast, the performance of older adults was boosted and age differences were nonexistent when they retold the story to a child. Older adults were also more likely than younger adults to adjust the complexity of their output to the characteristics of the audience. These findings are consistent with the idea that knowledge transmission is an important social goal in later life. A recent study examining prospective memory (Altgassen, Kliegel, Brandimonte, & Filippello, 2010) obtained similar results.

Taken together, these results emphasize the importance of social-cognitive goals in determining memory performance. In particular, the match between such goals and the task demands is an important determinant of age differences in memory performance. In addition, these studies suggest that both quantitative and qualitative age differences in memory performance can be understood in part through reference to age-related shifts in the meaning assigned to the contexts in which memory is used.

SOC Model

The SOC model (e.g., Baltes et al., 1999) is a more formal framework of goal-related processes that describes self-regulatory behavior in terms of three inter-related mechanisms. Selection occurs as individuals choose environments, tasks, and social partners that will promote achievement of personally relevant goals. Selectivity may increase as resources having to do with, for example, time and energy become more constrained. Optimization may occur along with selection as individuals focus on specific behavioral domains and devote resources to optimizing functioning therein. For example, middle-aged adults may devote more time and energy to family and profession and less to leisure-time interests as the demands and importance of the former increase. Finally, compensation may occur as individuals adjust to changes in resources or ability by altering aspirations, changing modes of achievement, or de-emphasizing once-valued domains.

An important aspect of the model reflects a shift in chronic developmental goals from early to late adulthood. In young adulthood, growth-based goals are dominant as individuals seek to develop skills and optimize functioning within a context of relatively abundant resources. In old age, as losses come to dominate gains, there is an increased focus on loss-based goals associated with maintenance of functioning and prevention of loss in valued domains. Perceptions of situations in terms of these goals have been shown to have differential effects on motivation in young and older adults. For example, Freund (2006) assessed task persistence as a measure of motivation and found that younger adults expended more effort in tasks focusing on optimizing performance versus those in which maintenance of previous levels of performance was the goal. In contrast, older adults exhibited the opposite pattern of effort, consistent with the enhanced salience of loss-based goals in later life.

There has not been much systematic research examining memory functioning from an SOC perspective, but several findings are supportive of changing life circumstances influencing goals and the motivation to engage in specific behaviors. For example, Li, Lindenberger, Freund, and Baltes (2001) demonstrated that older adults were more likely to shift resources away from memory-related behaviors in order to support sensorimotor functioning (balance while walking), whereas younger adults did the opposite. This type of selection suggests that, as physical resources become more limited, older adults devalue memory behaviors relative to other important life tasks. An interesting further implication of this finding is that this may then negatively affect memory ability due to decreased frequency of exercising associated skills.

The role of changing life circumstances in selection processes can also be seen in the degree to which individuals engage in compensatory behaviors associated with memory. Longitudinal research has found significant changes in self-reported use of compensatory strategies in older adults; the nature of change is moderated by characteristics of the individual. Thus,
for example, poor health is associated with declines in the effort associated with compensation, whereas good health is associated with increases in self-reported effort (Dixon & de Frias, 2004). This may reflect changing goals associated with health, with individuals in poor health shifting resources away from cognitive activities and those in good health working to maintain cognitive functioning.

A similar effect was obtained by Dixon and de Frias (2007) when they compared older individuals who had experienced mild memory loss with those exhibiting no impairment. Participants in the latter group reported increasing their use of external and effort-based compensation activities over time, perhaps again indicating a focus on maintenance in relatively high-functioning older adults. In contrast, those experiencing cognitive difficulties may be withdrawing effort from this domain as they adjust goals to be consistent with changing life circumstances. Thus, consistent with SOC, there is evidence that individuals exhibit memory-related compensation and selection behaviors that appear to be tied to changes in personal resources.

Socioemotional selectivity theory

The chronic goals associated with SOC are rooted in changes in the resources available to support behavior. Whereas declining physical and cognitive capabilities are one source of shifting goals and increased selectivity, it is also reasonable to conceive of resources unrelated to these factors. Thus, as young adults transition into midlife, establish careers, and form families, time as a resource becomes limited, and choices are made based upon personal relevance. Similarly, SST (Carstensen, 1993) posits changes in chronic goals that are not necessarily related to physical and cognitive ability. This theory argues that knowledge-based social goals dominate in young adulthood, where an expansive future time perspective is associated with the formulation of long-term goals. A primary function of social exchanges is thus oriented toward gaining knowledge to achieve these goals. In later life or in other cases where the future time perspective becomes compressed (e.g., terminal illness), affective goals become salient as individuals seek to regulate emotions and maintain positive affect.

In recent years, a substantial body of research has been focused on linking the chronic, emotion-regulation goals proposed by SST with age differences in situational information processing of emotional material. For example, the focus on emotion goals may suggest that aging should be associated with a greater increase in attention to emotional information. Indeed, evidence in support of this assertion was obtained by Carstensen and Turk-Charles (1994), who found that age differences in memory were greater for the neutral content of a prose passage than for the emotional content. Proponents of SST further posit that older adults direct their attention either toward positively valenced information or away from negatively valenced information in an effort to maintain a positive emotional state (Mather & Carstensen, 2005). This redirecting of attention is then thought to cause older adults to remember more positive or less negative information than their younger counterparts, a phenomenon typically known as the "positivity effect."

Some of the most compelling evidence for the positivity effect in attention comes from Isaacowitz and colleagues' eye-tracking studies (e.g., Isaacowitz, Wadlinger, Goren, & Wilson, 2006). A typical study presents older and younger adults with pairs of synthetic faces: one neutral face paired with one emotional face. Gaze pattern comparisons between young and old have suggested that older adults tend to orient away from negative faces and toward positive faces, but that young adults do not (Isaacowitz et al., 2006). Most importantly, subsequent research has demonstrated that older adults are more likely to show this positivity bias in attention when they are in a negative mood—in stark contrast to young adults who tend to show a mood-congruent attentional bias toward negative faces when they are personally unhappy (Isaacowitz, Toner, Goren, & Wilson, 2008). This suggests that older adults truly are using their attentional gaze as a mood regulation technique.

The positivity bias that was found in attention to faces has in some cases been found in memory for emotional material. For example, in one of the first aging studies to examine emotional memory (Charles, Mather, & Carstensen, 2003), older adults showed dampened memory for negative images, resulting in a larger age difference for negative than for positive photographs. It should be noted, however, that the positivity effect in memory is somewhat unreliable across studies; some researchers failed to find a positivity effect (e.g., Grünn, Smith, & Baltes, 2005) and others found the effect only under certain conditions (Emery & Hess, 2008; Kinsinger, 2008) or only in older adults with certain characteristics (Mather & Knight, 2005).

Further complicating the issue, a recent meta-analysis (Murphy & Isaacowitz, 2008) found little consistent evidence for age differences in memory for emotional content. The reasons for this inconsistency in the positivity effect for memory may arise from several possible sources. For example, the great variety of materials used across memory studies may be one source of the discrepancy. In particular, some research has found that positivity effects may be dependent on the personal relevance of the material to older adults (Tomaszczyk, Fernandes, & MacLeod, 2008), with a positivity bias only found for materials that were less personally relevant to the older adults.

Another factor that has been found to influence the positivity effect in both attention and memory is executive functioning. Older adults with better executive function have been found to show a greater positivity bias in memory (Mather & Knight, 2005), and they are able to maintain their positive mood better when orienting toward positive faces in the eye-tracking tasks (Isaacowitz, Toner, & Neupert, 2009). These studies are particularly relevant in light of our overarching message: When older adults' personal
goals match their current situation, they will be more likely to engage the resources necessary for supporting performance. The SST research suggests a tentative corollary to this thesis: Older adults with the resources to spare may be more effective at engagement.

An interesting perspective relevant to this work comes from recent research suggesting that, in some cases, the positivity effect may reflect age differences in response biases. For example, Wertheid et al. (2010) found that both young and older adults exhibited a retrieval bias for emotional content in a study examining face memory, but that this bias was significantly stronger for positive items in older adults. They argued that emotional content may serve as gist information that individuals rely upon when item-specific information is poor, with positive items seeming especially familiar to older adults. Spaniol, Voss, and Grady (2008) obtained similar results in examining recognition memory for words, with older adults exhibiting a familiarity bias for positive information in making memory judgments.

In contrast, younger adults were more likely to exhibit a novelty bias for positive information (e.g., interpreting positive items as “new”). (For related findings, see Kapucu, Rotello, Ready, & Seidl, 2008.) Whereas this work may be somewhat inconsistent with the idea that older adults differentially represent positive versus negative information in memory, it is consistent with the SST notion that aging is associated with preferential processing of positive information.

One major limitation to the SST account of positivity effects should be noted, however. Unlike previous SST research into social preferences and network composition (see Carstensen, Isaacowitz, & Charles, 1999, for a review), there has been a relative dearth of data showing that the positivity effect in memory is a result of a limited time perspective. The one exception of which we are aware is a study that showed that first-year college students (e.g., those for whom there was no approaching “ending”) paid more attention to sad faces in the eye-tracking paradigm than did college seniors (e.g., those for whom the end of their college years was approaching; Pruzan & Isaacowitz, 2006).

**Selective engagement**

An alternative approach to understanding goal-related influences suggests that age differences in memory performance are in part related to older adults being more selective in engaging their cognitive resources in support of performance (Hess, 2006a). This selective engagement hypothesis is based in three simple assumptions. First, individuals across the life span are generally more motivated to engage cognitive resources in those situations that have personal implications (e.g., high in relevance or meaningfulness) relative to those low in such implications (e.g., Petty & Cacioppo, 1984).

Second, sustained cognitive activity is effortful in nature, with consequences to both performance and the individual. The most obvious indicator of such costs is that performance deteriorates over time (e.g., Smit, Eling, & Coenen, 2004). There is also evidence, however, that engagement in effortful activity “depletes” resources, which has an effect on both performance (e.g., Schmeichel, Vohs, & Baumeister, 2003) and the effort exerted in subsequent tasks (e.g., Wright et al., 2007). The physiological consequences of effort can also be seen at the cortical level. Specifically, executive functions require a disproportionate supply of blood glucose to support their operation, resulting in quick depletion relative to other types of cognitive operations (for review, see Galil, 2008).

The third and most critical assumption is that the costs of sustained cognitive activity are relatively greater in older adults than at earlier points in adulthood due to changes in physical capacities. This assumption can be seen as consistent with Craik’s (1986) seminal conceptual framework for understanding the effects of aging and memory. Specifically, he argued that aging was associated with a decline in cognitive resources, which in turn had a negative impact on older adults’ performance in situations that required the use of self-initiated memory operations. Thus, for example, age differences were expected to be more prevalent in free-recall tasks than in recognition tasks due to the strategic requirements of the former. This notion of self-initiated processing implies that the relative effort (i.e., costs) associated with memory processing increases with age. A similar notion, but from a somewhat different perspective, suggests that the increased effort required by older adults to process sensory information negatively affects the resources available for subsequent encoding and retrieval operations (e.g., Murphy, Craik, Li, & Schneider, 2000; Tun, McCoy, & Wingfield, 2009).

Other research examining stress-related responses also suggests increasing costs with age. For example, Neupert, Miller, and Lachman (2006) found that older adults display stronger cortisol responses during tests of cognitive ability than do younger adults. There is also evidence that older adults are slower to recover from such stress-related responses (e.g., Seeman & Robbins, 1994). Finally, glucose utilization during effortful memory activity is less efficient in later life, and restoration of blood glucose levels to original levels is more problematic (for review, see Gold, 2005). Taken together, these findings suggest that the physical costs of engaging in cognitive activity increase in later life.

The notion of selective engagement is built upon these three assumptions. Namely, it is hypothesized that the increased costs associated with cognitive engagement in later life heighten the salience of personal goals in interactions with the environment. This, in turn, is hypothesized to increase the impact of the personal implications of the task on resource engagement and performance in older relative to younger adults. In particular, age differences in performance would be expected to be attenuated under conditions of high personal relevance.

Note that selective engagement due to resource availability or costs is not specific to older adults. Younger adults would be expected to exhibit
Similar trends under conditions associated with resource depletion. Thus, for example, Wright et al. (2007) found that prior engagement in a difficult task resulted in reduced effort in a subsequent, demanding task. Rather, it is assumed that selective engagement reflects a response to a more chronic condition in later life and more situational circumstances in young adulthood. Note also that these selection effects should be exacerbated as task difficulty increases.

Research supportive of selective engagement has proceeded from two perspectives. The first has explored linkages between personal resources and trait-like aspects of motivation, with research supporting the idea that age-related declines in resources negatively affect the motivation to engage in cognitively complex behaviors (Hess, 2001; Hess et al., in press; Hess, Waters, & Bolstad, 2000). For example, Hess et al. (in press) found that declines in physical health were associated with changes in cognitive ability (e.g., working memory) and that the relationship between these two factors was mediated by changes in motivation. In other words, individuals who experienced negative changes in physical health exhibited lower motivation to engage in complex cognitive activity; this in turn influenced the performance on tasks assessing basic cognitive functions. In addition, the strength of the relationship between changing resources and motivation was stronger in later adulthood.

A second line of research focuses on the impact of experimental manipulations of motivation on various aspects of cognitive performance, including memory. Support for selective engagement would be evidenced by motivation being a more powerful determinant of performance with increasing age and age differences in performance being attenuated when motivation is high. One line of research testing these predictions examined person memory (i.e., recall of behaviors performed by others). Previous work on social cognition has demonstrated that behavioral information that is inconsistent with the dominant impression of an individual is recalled better than consistent information (see Stangor & McMillan, 1992). This is thought to reflect the more extensive processing associated with resolving inconsistencies (e.g., why is this honest person taking a wallet from someone’s desk?) (e.g., Srull & Wyer, 1989).

In addition, an initial study examining age effects (Hess & Tate, 1991) revealed that older adults did not exhibit this recall advantage for inconsistent information. Such a finding is easily interpreted within the context of standard views of cognitive aging that suggest that reductions in cognitive resources in later life negatively affect self-initiated memory operations that are dependent upon such resources. Hess and Tate also found, however, that when older adults spontaneously performed the appropriate encoding operations, they also exhibited enhanced recall of inconsistencies. In other words, older adults were generally capable of engaging in the appropriate type of processing, but did so less consistently. The question, then, is why?

Hess, Rosenberg, and Waters (2001) subsequently examined whether this inconsistent engagement in effortful encoding operations by older adults could, in part, be explained by motivational factors. In a task similar to that of Hess and Tate (1991), participants aged from 20 to 83 were presented with information about a fictitious target person and were asked to form an impression of this person under different conditions of accountability. In the low accountability condition, participants were tested under standard conditions in which the anonymity of their responses was preserved. In the high accountability condition, however, participants publicly shared their impressions with other participants, who evaluated their accuracy. All participants were then asked to recall the target information.

Previous research has shown that social accountability boosts cognitive effort and the complexity of thought in situations where people have sufficient capability to perform well (see Lerner & Tetlock, 1999). Given that older adults are quite capable of making sophisticated social judgments (e.g., Hess, Osowski, & Leclerc, 2005)—an ability that is also consistent with the stereotype of increased wisdom in old age—it was thought that public accountability would enhance the salience of the task.

Consistent with expectations, the pattern of age differences observed by Hess and Tate (1991) was replicated under low-accountability conditions. In contrast, individuals of all ages exhibited a similar recall advantage for impression-consistent over—consistent behavioral information when accountability was high. Thus, when sufficiently motivated, older adults appear capable of engaging in the same sorts of effortful memory operations as younger adults. Consistent with the notion of selective engagement, the motivational manipulation also had a stronger impact on older than on younger adults' performance.

One complication in interpreting the results of this study in terms of selective engagement is that motivation is thought to operate at the process level, as reflected in effortful memory operations. Such effects were inferred indirectly by Hess, Osowski, et al. (2005) through reference to performance outcomes (e.g., the strength of the inconsistency effect in memory). To deal with this concern, Hess, Germain, et al. (2009) examined the impact of motivation on specific memory processes using Jacoby’s (1998) process dissociation procedure. Through appropriate structuring of tests, memory performance can be partitioned in terms of the influence of relatively automatic processes (e.g., familiarity) versus more effortful processes (e.g., conscious recollection).

Once again examining person memory within the context of an impression formation task, Hess, Germain, et al. (2009) found minimal effects of age or accountability on automatic processes. In contrast, conscious recollection was greater for younger than for older adults and for inconsistent than for consistent behaviors. Of greatest interest, however, was the fact that increased social accountability resulted in a disproportionately greater increase in estimates of conscious recollection for older adults relative to younger adults. This was
particularly true when memory for impression-inconsistent behaviors was assessed. Thus, in line with the selective engagement idea, motivational factors differentially influenced older adults’ effortful cognitive activities.

In another set of studies, Germain and Hess (2007) also examined process-level effects using a different task and different motivational manipulation. Specifically, they examined how distractibility and reading comprehension were influenced by the personal relevance of the text content. Using a task similar to that employed in Carlson, Hasher, Connelly, and Zacks (1995), young and older adults read text with distracting material interspersed throughout. Reading speed is used as a measure of the efficiency of inhibitory functions, with older adults typically exhibiting greater decrements in speed as a function of the distracting material. Germain and Hess varied the text content so that some passages were more relevant to older adults and others were more relevant to younger adults.

In support of the selective engagement hypothesis, older adults read relevant passages more quickly than irrelevant passages and also exhibited greater comprehension for the former (see Figure 8.2). In contrast, younger adults’ performance was unaffected by relevance. These results suggest that older adults’ engagement in the task is disproportionately enhanced with an increase in personal relevance, with a concomitant impact on the efficiency of reading and memory for text content. Further evidence that efficiency was enhanced with greater motivation was obtained when memory for distracting information was examined. Younger adults demonstrated similar levels of memory for distractors regardless of whether they appeared in relevant or irrelevant passages. In contrast, older adults exhibited poorer memory for distractors appearing in relevant texts than for those in irrelevant texts. This suggests that the enhanced reading speed associated with increased relevance was in part due to more efficient suppression of distracting text.

In sum, these results are consistent with the selective engagement hypothesis in that older adults’ memory performance is disproportionately influenced by the personal implications of the task (e.g., accountability, relevance), with age differences in performance attenuated when such implications are high. The motivational impact appears to be specific to cognitively demanding processing mechanisms (e.g., conscious recollection). This suggests that, for example, personal relevance results in increased effort and control of operations during processing.

Similar effects have been observed in other cognitive tasks (e.g., social judgments, decision making), where age differences in performance have been observed to be reduced significantly when (a) the task is personally relevant (Hess, Germain, Rosenberg, Leclerc, & Hodges, 2005), (b) accountability is high (Chen, 2004), and (c) participants report high levels of engagement (Hess, Leclerc, Swaim, & Weatherbee, 2009). It is important to note, however, that the effects of motivation do not necessarily eliminate all age differences in performance. For example, although high accountability did result in older adults remembering inconsistent versus consistent information in a manner similar to that of younger adults, increasing age was still negatively associated with overall levels of memory.

**Stereotypes of old age**

The contextual approach is particularly relevant in the examination of how cultural stereotypes might impact older adults’ performance on a memory test. One of the most pervasive stereotypes in Western culture relates to declining cognitive skills, with memory being a prominent example (e.g., Erber & Prager 1999; Hummert, 1999). In addition, there is accumulating research suggesting that such stereotypes may play an important role in determining age differences in memory performance (for reviews, see Hess, 2006b; McDaniel et al., 2008). It is our contention that such effects might also be construed as goal based. In addition, there are two different mechanisms through which stereotypes might influence memory performance, each of which involves a different type of goal mechanism.

**Implicit effects**

One way in which stereotypes’ influences have been studied is through surreptitious exposure to negative and positive information about aging. In an initial study, Levy (1996) gave young and older adults an initial set of memory tests (recall of words, activity-photo pairs, and dots in a spatial
array), subliminally exposed them to words relating to positive or negative age stereotypes, and retested their memory. She found minimal priming effects in younger adults. In contrast, older adults—for whom the stereotype was personally relevant—exhibited stereotype congruent change on several indicators of memory, although the pattern of change was somewhat inconsistent. Stein, Blanchard-Fields, and Hertzog (2002) used a similar procedure, but only partially replicated Levy (1996), with effects being specific to the negative stereotype on one task.

Hess, Hinson, and Statham (2004) examined implicit stereotype effects using a more traditional memory task: free recall of a list of words. Using two different means of implicit priming—a sentence-scramble task (Experiment 1) or a lexical decision task (Experiment 2)—to activate aging stereotypes prior to the free-recall test, they found that older adults exposed to negative stereotypes recalled approximately 13% fewer words than participants exposed to positive stereotypes. Younger adults’ recall was unaffected by the priming manipulation. In addition, age differences in recall in the positive condition were attenuated in Experiment 1 and eliminated in Experiment 2. The results of these experiments suggest that implicit stereotype activation may be an important determinant of age differences in performance in conditions where subtle cues about aging stereotypes are present (e.g., laboratory conditions in the typical study on memory and aging).

Implicit priming effects such as these have been viewed as reflections of ideomotor responses (James, 1890), in which activation of a semantic construct (e.g., aging stereotype) leads to activation of associated behaviors (e.g., slowing) (e.g., Bargh et al., 1996). Similar effects have been observed with goals, with implicit activation leading to engagement in goal-consistent behaviors (e.g., Bargh, Gollwitzer, Lee-Chai, Barndollar, & Troetschel, 2001). These similarities suggest that the implicit priming effects associated with aging stereotypes may be similar to the effects associated with implicit goals. Bargh et al. (2001) argue that the effects are somewhat different in that, for example, stereotype-priming effects dissipate over time, whereas goal-priming effects may be maintained until the goal is fulfilled.

It might be argued, however, that the age specificity observed for priming effects in Levy (1996) and Hess at al. (2001) suggests that there is something more to these effects than simple semantic priming of behavioral responses. Specifically, the self-relevant nature of the stereotypes may lead to greater salience of and sensitivity to situational cues in older adults, leading to higher probability of activation and perhaps longer duration. This may result in more goal-like effects, with older adults motivated to behave in a manner that fulfills the goal of “acting like an older adult.”

Explicit effects

Stereotypes may also influence behavior through more explicit activation processes through a phenomenon known as stereotype threat. Stereotype threat can occur when an individual who is a member of a stereotyped group is performing a task that is thought to be diagnostic of the stereotyped ability (Steele, 1997). This threat can cause an individual to perform below what he or she would otherwise be capable of because the individual may be concerned with potentially confirming that negative stereotype. Much of the general stereotype threat literature focuses on how threat can handicap performance of African Americans and women in academic contexts (for review, see Steele, Spencer, & Aronson, 2002). We argue that stereotype threat also has the potential to handicap older adults’ performance on standard laboratory memory tests, thus exaggerating age differences in memory.

Stereotype threat theory would predict that when older adults are made aware of their status as an “older adult” and when they are aware that the test they are taking is meant to test their memory, these broad cultural stereotypes should have a negative impact on their performance. A common laboratory setup, where older adults are recruited for studies about “memory and aging” and given subsequent memory tests, could unintentionally create ideal conditions for producing stereotype threat. A growing body of research has examined this possibility and attempted to determine what other contextual factors might influence the impact of stereotype threat on older adults’ memory.

In an initial study, Rahhal, Hasher, and Colcombe (2001) found that age differences in performance on a memory test were significantly reduced when the diagnostic value of the test with respect to the negative aging stereotype was deemphasized through relabeling of the task. A potential concern with interpretation of their results, however, had to do with the fact that attenuation of the age effect appeared to be in part due to a reduction in younger adults’ performance in the nondiagnostic test condition rather than to enhanced performance in older adults.

In a more direct test of stereotype threat effects, Hess, Auman, Colcombe, and Rahhal (2003) examined whether explicitly activating negative cultural stereotypes in older adults would indeed impair performance on a subsequent free-recall test. Older and younger adults were randomly assigned to one of three conditions: negative aging stereotype, positive aging stereotype, and a control condition. Before taking the free-recall test, participants in the experimental conditions read a newspaper article that summarized research on aging and memory in a negative way (e.g., “in order to maintain adequate levels of functioning, older adults may have to increasingly depend upon the help of memory tools as well as friends and family”) or a positive way (e.g., “these findings suggest that the degree of memory loss is to a certain extent under control of the environment and the individual”). Participants in the control condition were not exposed to either article before the memory test.

As predicted, the results of the free-recall memory test indicated the presence of stereotype threat effects in the older adults (see Figure 8.3).
is, although the memory performance of young adults did not vary across conditions, older adults in the negative condition recalled fewer words than older adults in the positive condition. Moreover, statistically significant age differences in memory were found only in the negative condition.

Having established that stereotype threat effects can be found in older adults’ memory performance, we now turn to the questions of how stereotype threat might impair older adults’ memory, and what factors might moderate stereotype threat effects.

Mediators of threat

In the broader stereotype threat literature, a variety of possible mechanisms have been proposed as possible mediators of threat effects. These have included (in part) the possibility that threat decreases working memory capacity (e.g., Schmader & Johns, 2003), increases anxiety (e.g., Osbome, 2001), and/or increases intrusive negative thoughts (e.g., Cadini, Maass, Rosabianca, & Kiesner, 2005). In the case of older adults’ memory performance, Hess and colleagues have found evidence that threat may cause less effective strategy use (Hess et al., 2003) and may also result in changes in people’s beliefs and concerns about memory (Hess & Hinson, 2006).

For example, Hess et al. (2003) found that the impact of threat condition on recall was partially mediated by the amount of semantic clustering older adults’ used. This suggests that threat disrupts effective strategy use in older adults. Consistent with this conclusion, Kang and Chastain (2009) found that threat effects were evident in free recall of a prose passage, but not when memory was tested via cued recall or recognition. Hess and Hinson (2006) found that participants exposed to negative aging stereotypes showed reduced scores on the memory controllability index and increased scores on the aging concerns scale (Lachman, Bandura, Weaver, & Elliot, 1995); participants exposed to positive aging stereotypes showed the opposite pattern. Interestingly, threat does not seem to be mediated by more general anxiety or affective responses: Several studies have failed to find evidence of differences in broad affective responses across threat conditions (Hess, Emery, & Queen, 2009; Hess & Hinson, 2006). Threat so far appears to have a relatively specific effect on task-relevant outcomes.

These effects appear to be consistent with the view that threat may operate through reductions in working memory (Schmader, Johns, & Forbes, 2008) as, for example, self-evaluative concerns (e.g., beliefs about one’s memory ability) and associated regulatory processes consume resources that interfere with effective strategy use (e.g., clustering). Consistent with this notion, research has also shown that subjective feelings of threat mediate the effects of age on memory performance (Chastain, Bhattacharyya, Horhota, Tam, & Hasher, 2005) and that feelings of threat are associated with stronger threat-based effects on memory (Kang & Chastain, 2009). An alternative perspective is that threat effects may be a motivated response to the test situation. We elaborate on this possibility later.

Moderators of threat

Threat effects in older adults have also been found to vary depending on both personal characteristics (e.g., memory achievement motivation, age) and task demands (e.g., type of stereotype activation, time pressure). For example, consistent with the hypothesis that threat effects should be particularly strong in people who identify with the stereotyped ability (Steele, 1997), Hess et al. (2003) found that threat effects were greatest in older adults who placed high value on their memory ability. Thus, those most vulnerable to threat effects may be the people most vested in their memory performance. The finding by Hess, Hinson, and Hodges (2009) that threat effects were greatest in older adults with higher levels of education may represent a similar phenomenon: High education is associated with placing greater value on one’s cognitive ability.

One interesting aspect of age-based stereotypes is that age, unlike race or sex, is a characteristic that changes over time. Because of this, being "old" may be more salient at certain times than others as the identification with the stereotyped group changes. In a study examining threat effects
on memory across the adult life span, Hess and Hinson (2006) found that threat effects were greater in the young-old than in the old-old. This may occur because being a “new” member of the stereotyped group makes the stereotype more salient as one learns to cope with this new part of the identity. In contrast, middle-aged adults experienced less of an effect of threat on performance than did the young-old. This may reflect a stereotype lift effect (Walton & Cohen, 2003), in which middle-aged adults benefited from contrasting themselves with those who are “old.”

Finally, characteristics of the particular task may moderate threat effects as well. We have recently found that imposing an additional constraint on responding may exacerbate threat effects (Hess, Emery, & Queen, 2009). This study examined threat effects on recognition accuracy under time pressure. Threat effects were only found when participants had to respond under deadline pressure, with those in the threat condition showing reduced corrected recognition and reduced “remember” responses (see Tulving, 1985) relative to those in the nonthreat condition. Because age differences in recognition are generally smaller than those found for recall, an additional task constraint may have been necessary to find a negative impact of threat on memory.

In sum, threat may be more “threatening” to old adults (a) who place high value on their memory, (b) who are under demanding and highly constrained task conditions, and (c) for whom identity as an older adult is relatively novel and salient.

**Motivational consequences of threat**

As mentioned previously, an alternative interpretation of threat effects is a motivational one that draws from ideas about selective engagement and regulatory focus. Specifically, one characteristic of threat is that it is most evident in individuals who value their memory (Hess et al., 2003) or are high in education (Hess, Hinson, & Hodges, 2009). These effects are analogous to the previously discussed findings that older adults will be more engaged in situations that are personally meaningful. In contrast to those situations, however, engagement in this case leads to poorer performance.

It might be argued that engagement in certain situations will lead to performance deficits when evaluation concerns are heightened. It may also be the case, however, that older adults respond to threat-based situations by changing their approach to the task. For example, Seibt and Förster (2004) found that threat was associated with adoption of a prevention regulatory focus. In contrast to a promotion focus, where the motivation is on maximizing success, prevention focus is concerned with avoiding failure. This may be accomplished by adopting more conservative response criteria in a memory task, which could reduce overall level of performance while reducing memory errors.

At present, there are no studies specifically investigating this possibility. However, our finding that older adults perform more poorly and have reduced “remember” responses in a speeded recognition task (Hess, Emery, & Queen, 2009) could be interpreted as consistent with this, with the reduction in remember responses suggesting greater caution. Our main point here is that it may be possible to interpret so-called stereotype threat effects within the selective engagement framework as the self-implications of the situation determine the degree of engagement. The nature and consequences of this motivated response have yet to be understood clearly.

**CONCLUSIONS**

This chapter adopted an approach to understanding aging effects on memory somewhat different from what is typically found in the literature. Consistent with a lifespan contextualist approach, age differences in memory performance were examined in light of changing life circumstances and individuals’ adaptive—and occasionally maladaptive—responses to these circumstances. We attempted to conceptualize such responses in terms of age-related goals and associated selection effects that determine both level of engagement and direction of processing. In doing so, we found clear support for the importance of motivational factors in determining age differences in memory performance.

Four different goal-based conceptual frameworks were used to explore the literature, and each provided a means for understanding various aspects of memory functioning in later life. Thus, for example, age differences in differential focus on content varying in emotional qualities and self-relevance can be explained in terms of changes in shifting importance of socio-emotional goals associated with future time perspective and changes in the salience of personal goals with changes in resources in later life. Changes in involvement in specific types of memory tasks, including engagement in compensatory activities, may also be understood in terms of adjustments in the priority that individuals assign to memory functioning and correspondence of activities with growth versus maintenance of functioning. Reference to goals also helps to explain situational variability in the strength of age differences in performance by considering the degree to which the task either meshes with age-related social roles or has personal implications. Goal-related processes might even help us to understand some apparently negative memory outcomes. Thus, although speculative at this point, the negative impact of stereotype threat in older adults might be related to the increased salience of personal goals associated with memory functioning.

The contextual focus in the study of memory and aging can be beneficial in several ways. First, the consideration of multiple distal and proximal influences provides a more complete picture of memory functioning in later life. This may be crucial to the extent that it helps to highlight factors
associated with poor memory functioning, which in turn helps inform us about avenues of intervention. Of particular interest is the possibility that certain social factors might prove to be relatively productive targets for remediation attempts.

The work discussed in this chapter also emphasizes the importance of considering memory as part of a broader constellation of abilities and behaviors that contribute to and are reflective of adaptive functions. Thus, for example, instead of just focusing on ability, the SOC model provides a framework for understanding the circumstances under which older adults might choose not to exercise memory skills or to engage in efforts at compensation, both of which have implications for maintenance of functioning.

Likewise, the selective engagement perspective helps to explain the apparent increase in cross-situational variability in memory performance in older adults as a mechanism of resource conservation. In fact, the explanation of variability in older adults' memory performance across different situations may be one of the most important aspects of a contextual perspective. Older adults appear to be more sensitive than younger adults to the contexts in which they are functioning, altering their level of engagement and specificity of behavior in a manner that is specific not only to their available resources and personal interests, but also to the social roles played by members of the older generation.

This situational variability also highlights the important role that a contextual perspective takes when assessment issues are considered. Studies examining age differences in ability typically assess skills using tasks that are relatively devoid of meaning and that are assumed to be equally motivating for young and older adults. The research discussed in this chapter suggests that the social context and the interaction with personal goals are going to be important determinants of both older adults' levels of performance and the strength of any observed age effects. Research on stereotype threat has indicated that activation of positive versus negative aging stereotypes in a typical laboratory testing context can alter older adults' free-recall performance by as much as 15% (e.g., Hess et al., 2003). If recruitment methods and instructions in studies of aging activate such stereotypes (e.g., "the purpose of this study is to examine the effects of aging on memory"), our estimates of age effects may be exaggerated and not reflective of true abilities.

Similar effects may be present in tasks that are not personally meaningful. Note that we are not arguing that age differences in performance can be accounted for solely by factors such as interactions between personal goals and testing context. Even in studies where age differences are significantly attenuated by controlling for such effects, younger adults still typically outperform older adults. Rather, the point is that we may not get an accurate understanding of older adults' competencies when context is not taken into account.

The research presented in this chapter was primarily of the behavioral variety. More recent neuroscience approaches, however, might provide some important insights into the processes described herein. Neuroimaging work relevant to the study of motivational processes in later life is relatively rare. Some work has been done with reactions to emotional stimuli, with a pattern emerging of age differences in responses of the amygdala and prefrontal cortex that appear to reflect an increase in controlled processing of emotional information in later life (St. Jacques, Bessette-Symons, & Cabeza, 2009). Such a pattern is consistent with SST in suggesting that there is an increased emphasis on emotion regulation in later life.

There is also work suggestive of compensatory processes in older adults, who appear to recruit additional processing resources to support high levels of performance when compared with younger adults (e.g., Cabeza, 2002). Such a finding could illustrate the types of compensatory processes discussed in the SOC model, but the interpretation of these effects is still somewhat in doubt. It would be interesting to see if such compensatory processing was more likely in those who were concerned with maintaining current levels of memory functioning.

We were unable to identify any neuroscience research on aging and motivation. Research with younger adults, however, has indicated that high levels of motivation are associated with increased levels of activation in cortical areas associated with working memory and executive functions (Gilbert & Fiez, 2004; Locke & Braver, 2008; Pochon et al., 2002). In addition, several studies have also identified increased activation of areas associated with motivation and self-reflection (Bengtsson, Lau, & Passingham, 2009; Szatrowska, Bogorodzki, Wolak, Marchewka, & Szeszkowski, 2008), suggesting that these areas may be involved in recalibrating available resources to increase levels of performance (Pessoa, 2009). Studies linking behavioral changes in performance to changes in patterns of cortical activation such as these would be valuable in validating the sort of goal-based phenomena discussed in the chapter.

Taking a more global perspective, understanding of aging effects on memory might also be facilitated by examining interactions between the social context and performance. For example, cross-cultural research focusing on societies with more positive versus negative views of aging might foster a better understanding of the role played by aging stereotypes. The main point here is that an incomplete picture of memory and aging is provided by a limited focus on a single set of distal or proximal influences.

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