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INTRODUCTION

The ability to make decisions is a fundamental skill at any age, and it is especially crucial in our current society, which emphasizes independence throughout the life span. Older adults face decisions that can have a huge impact on the remaining years of their lives. Often, their life circumstances are changing. A decision to retire is likely to be followed by the need to make many other decisions about how to structure everyday life. In addition, many everyday decisions—in order to maintain one’s finances, relationships, and household—continue to be important throughout life. The physical toll of aging forces older adults to face difficult health care decisions, such as which medical procedure to try, what to do for a sick spouse, what type of health insurance to pay for, which medications to take, or how much effort to put into maintaining a healthy life-style. Within many older adults’ lifetime, the health care system has shifted from a model in which the family doctor’s advice was never challenged to one in which patients expect to be equal partners with their doctor in decision making. And those who are willing and able to tackle such decisions are more likely to get successful health care.

Despite growing interest and obvious practical implications, there are still relatively few studies investigating aging and decision making (for reviews see Peters, Finucane, MacGregor, and Slovic, 2000; Sanfey and Hastie, 2000; Yates and Patalano, 1999). It seems likely that the primary reason for this neglect is that older adults do not typically show obvious problems in making decisions. Certainly most older adults feel pretty confi-
dent about their ability to make decisions, a confidence that contrasts with their concerns about other cognitive abilities such as memory (Hertog, Lineweaver, and McGuire, 1999; Princeton Survey Research, 1998). Another potential reason for the relative neglect of this topic is that decision making involves so many different subprocesses. For example, being able to keep multiple pieces of information in mind may be important for a decision between options. Thinking more than one step beyond the decision itself should help people examine the consequences of various possibilities and make the best decisions. An ability to deal with the emotional aspects of a decision is necessary in many cases. Based on the research reviewed in this paper, some of the processes involved with decision making show decline with age, whereas others remain stable or improve. To date, however, there has been very little research connecting age-related changes in the cognitive and emotional capabilities thought to underlie decision making with changes in decision making itself.

In this paper, I discuss two aspects of aging that seem particularly relevant for decision making. The first is older adults’ increased effectiveness of emotion regulation. Both self-reports and actual emotional experience indicate that older adults are better at avoiding negative affect and maintaining positive affect (Carstensen, Pasupathi, Mayr, and Nesselroade, 2000; Gross et al., 1997). A desire to regulate emotions may influence decisions. For instance, avoiding regret and maximizing satisfaction are motivations behind many decisions (Loewenstein, Weber, Hsee, and Welch, 2001; Mellers and McGraw, 2001). In addition, the degree to which younger adults focus on emotion regulation influences their decision processes (Luce, 1998; Luce, Bettman, and Payne, 1997). Thus age-related changes in emotion may predict or help explain some age-related differences seen in decision making.

The second aspect I focus on is the cognitive neuroscience of aging. Certain regions of the brain deteriorate more with age than others, and thus the way that people make decisions may change as processes that rely on certain brain structures become less effective. In particular, aging tends to affect the frontal areas more than other regions of the brain. Frontal regions are essential for many of the more complex cognitive and emotional processes and are implicated in decision making. Understanding the impact of aging on the frontal regions of the brain may therefore help scientists predict and understand age differences in decision making.

After I review these two aspects of aging and their implications for decision making, I review several themes that emerge from the literature on aging and decision making. The first is a surprising lack of age differences in dealing with risky decisions, contrary to general stereotypes about increased cautiousness with age. Next, I review what seem to be the most frequently replicated age differences in decision making: older adults are more likely to avoid making decisions and to seek less information when faced with a decision. I also discuss age differences in memories of past decisions and how such differences might affect learning or future decisions. The causes of each of these age differences (or lack thereof) have not yet been identified, but I suggest ways in which they may be related to emotional and prefrontal functioning.

EMOTION AND OLDER ADULTS’ DECISIONS

Emotions play a central role in many decisions (Damasio, 1994; Loewenstein and Lerner, 2000; Mellers and McGraw, 2001). On an intentional level, decision makers can take into account potential emotional reactions to the outcomes of their decisions (e.g., Bell, 1982; Josephs, Larrick, Steele, and Nisbett, 1992; Ritov, 1996). For example, people often attempt to choose options that minimize the chance that they will experience regret later (Mellers, Schwartz, and Ritov, 1999). But perhaps even more important are the unintentional influences of emotions on decisions. Affective judgments of objects and events are easily accessible and frequently serve as a cue to guide judgments and decisions (Finucane, Alhakami, Slovic, and Johnson, 2000; Slovic, Finucane, Peters, and MacGregor, 2002). And emotions that have nothing to do with the decision at hand can influence it (e.g., Isen, 2001; Lerner, Small, and Loewenstein, 2004). When experiencing a negative emotion because of a decision conflict, people change the way they examine and weigh features of choice alternatives in ways that help them feel better (e.g., Luce et al., 1997; Luce, Payne, and Bettman, 2000).

These links between emotion and decisions are relevant for aging research because emotional experience changes with age and these changes may influence decisions. For example, in a study in which participants were paged at random times throughout a week to indicate what emotions they were experiencing, older adults were more likely to maintain positive emotions over time (Carstensen et al., 2000). Their negative affect also lasted for a shorter time than that of younger adults. Older adults generally experience less negative affect than younger adults (Carstensen et al., 2000; Charles, Reynolds, and Gatz, 2001; Gross et al., 1997; Lawton, Kleban, and Dean, 1993; Lawton, Kleban, Rajagopal, and Dean, 1992). According to Carstensen’s socioemotional selectivity theory (e.g., Carstensen, Isaacowitz, and Charles, 1999), this reduction in negative affect occurs because people change their goals as they approach the end of life and perceive limitations on their time. Specifically, when time is perceived as limited, such as when facing a terminal illness or a move to a new location, people focus more on achieving emotional satisfaction and meaning than on acquiring new information. Because of this shift in goals, older adults
focus more on regulating emotion than younger adults do, which improves older adults’ everyday emotional experience.

Recent studies suggest that this increased focus on regulating current emotion as people age influences attention and memory (for a review see Mather, 2004). In an attention task, older adults respond faster to dots that appear behind positive or neutral faces than those that appear behind negative faces, indicating they avoid attending to negative stimuli (Mather and Carstensen, 2003). When watching a slide show of emotional pictures, older adults show less activation in the amygdala (a region of the brain associated with emotional attention) in response to the negative pictures than to the positive pictures, whereas younger adults show similar amygdala activation levels for both types of emotional pictures (Mather et al., 2004).

A positivity effect is also evident in older adults’ memory. Compared with younger or middle-aged adults, older adults show disproportionately poorer memory for negative pictures than for positive or neutral pictures (Charles, Mather, and Carstensen, 2003), are more likely to distort their autobiographical memories in a positive direction (Kennedy, Mather, and Carstensen, 2004), and are more likely to show memory distortion that favors chosen options over rejected options (Mather and Johnson, 2000). Remembering the past in a more positive light should help people feel better, and indeed older adults’ mood improves after autobiographical recall (Kennedy et al., 2004). Younger or middle-aged adults exhibit just as much of a positivity bias as older adults if they are asked to think about how they feel about their choices (Mather and Johnson, 2000) or to fill out a brief mood scale every so often while filling out the memory questionnaire (Kennedy et al., 2004). This suggests that when emotional goals are more salient for younger adults, their memory biases resemble those of older adults.

Changes in the importance of emotional goals may also influence the way that decisions are made. In fact, some of the research inspired by socioemotional selectivity theory suggests changes across the life span in decisions about interpersonal relationships. Older adults are more likely than younger adults to choose to spend time with emotionally meaningful social partners (Fredrickson and Carstensen, 1990; Fung, Carstensen, and Lutz, 1999; Fung, Lai, and Ng, 2001). These familiar social partners are presumably the ones most likely to fulfill emotional needs. In contrast, younger adults do not show this preference unless they are told to imagine that their time is limited due to an upcoming geographical move (Fung et al., 1999). Imagining a different time frame also affects the older adults’ preferences: when asked to imagine that their lives have been extended by 20 years, they no longer have a preference for familiar social partners (Fung et al., 1999). Consistent with these lab findings, cross-sectional studies of social networks indicate that while the number of peripheral social partners decreases with age, the size of the “inner circle” of emotionally close friends or family members remains constant with age (Lang and Carstensen, 1994).

An increased focus on emotional goals should have an impact on non-social decisions as well. Yet an increased role for emotion in decision making does not mean that decision quality will deteriorate. Despite our societal bias that rational and systematic processes lead to the best decisions, the quality of some decisions can suffer when people think systematically about them (Wilson and Schooler, 1991). Positive affect, in particular, can enhance decision making, leading to more creativity and efficiency, although it also increases risk aversion (Isen, 2001). In addition, as outlined in the next section, case studies of people with certain types of brain damage suggest that emotion plays an essential role in making good decisions.

THE PREFRONTAL CORTEX AND OLDER ADULTS’ DECISIONS

Neural Substrates of Decision Making

Phineas Gage, one of the most famous neurological patients in history, was a railway worker whose frontal lobes were partially destroyed in an accident in 1848 (Damasio, Grabowski, Frank, Galaburda, and Damasio, 1994). A responsible, intelligent, and likable man before the accident, Gage lost control of his life after the accident. Though apparently not cognitively impaired, he became offensive and unreliable. Since this famous case, many physicians have noted that frontal lesions can be associated with deficits in rational decision making, emotional control, and social behavior. For example, patients with prefrontal lesions often show deficits in financial decision making (Goel, Grafman, Tajik, Gana, and Danto, 1998; Schindler, Ramchandani, Matthews, and Podell, 1995), which can be so extreme as to result in bankruptcy (Eslinger and Damasio, 1985). Yet not all frontal patients show obvious deficits in making decisions. Whether they will have difficulties can be predicted by the location of their brain lesions (Bechara, Damasio, Tranel, and Anderson, 1998). Two distinct regions within the prefrontal cortex contribute in different ways to decision processes: the orbitofrontal cortex and the dorsolateral prefrontal cortex (Krawczyk, 2002).

Case studies with patients clearly implicate the orbitofrontal cortex in both decision making and the processing of emotion. A reconstruction of Phineas Gage’s brain, based on the damaged skull that was preserved by his doctor, revealed that the lesion damaged his orbitofrontal cortex (and other regions within the ventromedial prefrontal cortex) while sparing his dorsolateral prefrontal cortex (Damasio et al., 1994). Like Phineas Gage, modern-day patients with damage to the inner portion of the orbitofrontal cortex often make impulsive decisions that do not take into account long-
term consequences. In a laboratory setting, this has been observed in studies using a gambling card game (Bechara, Damasio, Damasio, and Anderson, 1994).

In this game, participants are presented with four decks of cards and must choose one card at a time. Two decks contain many cards granting large gains in play money but also some cards that lead to a large penalty. These decks are disadvantageous in the long run. The other decks offer smaller immediate gains but also smaller losses and ends up being advantageous in the long run. Participants are not told about the characteristics of the decks, but instead must learn about them through the process of sampling cards from each deck. Patients with medial orbitofrontal damage choose more cards from the risky decks even after they experience the large penalties. Control participants, in contrast, soon choose more cards from the more conservative, advantageous decks and begin to produce anticipatory skin conductance responses before they select a card from the risky decks (Bechara, Tranel, Damasio, and Damasio, 1996). The patients do not show any anticipatory arousal when selecting from the risky decks. This insensitivity to future consequences among the patients with medial orbitofrontal damage is also evident when the nature of the decks is changed so that the advantageous deck offers high immediate punishment but even higher future reward (Bechara, Tranel, and Damasio, 2000b) and is particularly striking when juxtaposed with their well-maintained performance on most other cognitive tasks (e.g., Bechara et al., 1998; Bechara, Tranel, and Damasio, 2000a).

In situations in which the reward system changes, patients with orbitofrontal lesions are unable to choose the correct action behaviorally, despite being able to describe what they should do (Rolls, Hornak, Wade, and McGrath, 1994), consistent with observations of their impulsive behaviors in real-world choices. More generally, the orbitofrontal cortex appears to monitor abstract rewards such as money or winning a competition, an important component of effective decision making (Breiter, Aharon, Kahneman, Dale, and Shizgal, 2001; Elliott, Dolan, and Frith, 2000; Elliott, Friston, and Dolan, 2000; Elliott, Newman, Longe, and Deakin, 2003; O’Doherty, Kringlebach, Rolls, Hornak, and Andrews, 2001; Thut et al., 1997; Zalla et al., 2000).

The dorsolateral prefrontal cortex also contributes to decision making, but not in ways that are as striking as those of the orbitofrontal cortex. In contrast to orbitofrontal lesion patients, dorsolateral prefrontal lesion patients are not impaired on the gambling task (Bechara et al., 1998) and are able to respond to changing reward contingencies (Rolls et al., 1994). Thus, the dorsolateral prefrontal cortex does not play a critical role in monitoring the longer-term future emotional outcome of events, or in associating pleasure or pain with abstract events. However, the dorsolateral prefrontal cortex plays a key role in the ability to maintain and manipulate information in working memory (Cohen et al., 1997; D’Esposito et al., 1995). This ability contributes to many aspects of decision making, such as tracking and integrating various features in order to make an overall evaluation. Working memory abilities may also be important for speculating about possible future outcomes, since such speculation often involves considering and integrating many different pieces of information.

Aging and Prefrontal Decline

With age, the volume of the brain declines at a rate of about 2 percent per decade (Raz, 2000). This decline in volume appears to be mostly the result of cell shrinkage and reductions in neural connections (Uylings, West, Coleman, De Brabander, and Flood, 2000). The neuron loss that does occur is selective, affecting some regions of the brain but not others. The region hardest hit by aging is the prefrontal cortex (Coffey et al., 1992; Cowell et al., 1994; DeCarli et al., 1994; Raz, 2000; Raz et al., 1997; Tisserand and Jolles, 2003; West, 1996). Although researchers do not yet fully understand why aging affects the prefrontal cortex more than other regions, it seems related to the later development of this region (Raz, 2000). Frontal regions continue to change and develop long after childhood is over (Bartzokis et al., 2003). But the benefits of such plasticity appear to come with a cost. In particular, myelination in the frontal regions has properties that allow it to continue developing into middle age but that may also make it more vulnerable to aging (Bartzokis et al., 2003). In addition, vascular disorders associated with aging, such as hypertension, appear to have more negative consequences for frontal regions than for other brain areas (Raz, Rodrigue, and Acker, 2003). Researchers have attributed many of the cognitive changes seen in normal aging to changes in the prefrontal cortex (Dagnenault and Braun, 1993; Moscovich and Winocur, 1995; West, 1996). Given the marked deficits in decision making seen in patients who have prefrontal (specifically orbitofrontal) lesions, like Phineas Gage, we might also expect to see changes in decision processes with age.

However, behaviorally, older adults could hardly look more different from patients with lesions in orbitofrontal regions. Unlike such patients, older adults in general do not have problems regulating their emotions or social behavior. In fact, as previously noted, older adults are generally better at avoiding negative affect and emotional outbursts than younger adults (Carstensen et al., 2000; Gross et al., 1997; Lawton et al., 1992). This suggests that not all functions subserved by prefrontal regions decline with age.

Although most studies investigating how aging affects prefrontal brain regions have not distinguished its subregions, behavioral data suggest that
there is a dissociation. There are dramatic age-related declines in processes associated with the dorsolateral prefrontal cortex, such as working memory, but only minimal age-related declines in processes associated with the orbitofrontal cortex (MacPherson, Phillips, and Della Sala, 2002; Phillips and Della Sala, 1998). MacPherson et al. (2002) gave younger, middle-aged, and older adults two sets of tests: one associated with dorsolateral prefrontal function and the other associated with medial orbitofrontal function, based on prior patient and neuroimaging data. Performance declined with age for the dorsolateral measures but not for most of the orbitofrontal measures, suggesting that the two regions differ in their susceptibility to age-related changes. If this is the case, older adults should be as effective as younger adults at the emotional and social judgment aspects of decision making. In contrast, they should be less effective in aspects of decision making that require maintaining and manipulating multiple pieces of information.

Risky Decisions

A common stereotype of older adults is that they are risk avoidant (Okun, 1976). Because emotions play a central role in risky situations (Loewenstein et al., 2001), it is possible that age-related changes in emotions change the way risky decisions are made by older adults. Yet given the available evidence, it is difficult to make a clear prediction about how age-related changes in emotion will affect the way people deal with risk. Because positive affective experience remains mostly constant across the life span (Carstensen et al., 2000; Charles et al., 2001) or even increases slightly (Mroczek, 2001), the impact of positive affect on risky decisions (Ison, Nygren, and Ashby, 1988; Nygren, Isen, Taylor, and Dulin, 1996) is likely to remain constant with age. The decrease across the life span in negative emotions (such as fear, anger, sadness, and disgust) (Carstensen et al., 2000; Charles et al., 2001; Mroczek, 2001) does not lead to any clear predictions about risky decisions because different types of negative affect (such as fear and anger) affect risky decisions differently. Fear makes people more risk averse whereas anger makes them less risk averse (Lerner, Gonzalez, Small, and Fischhoff, 2003; Lerner and Keitner, 2001). Because both of these emotions decrease with age (Carstensen et al., 2000), their effects may tend to cancel each other out.

Indeed, survey data of financial behavior provide only mixed support for the stereotype of cautious older adults. Economists have noted that when the average age of Americans rises, the risk premiums for assets also rise (Bakshi and Chen, 1994), suggesting that as the population ages, risky investments become less popular. A number of studies have examined individual investors’ risk tolerance by looking at the proportion of their assets invested in risky investments. Some of these studies have found that the proportion actually increases until about age 65, when it begins to decrease (Jianakoplos and Bernasek, 1998; Riley and Chow, 1992; Schooley and Worden, 1999). One study of university employees found that hypothetical asset allocations became more conservative with age (Dulebohn, 2002), whereas another study using a different sample of university employees found that, with age, people described themselves as more tolerant of risk in their financial decisions (Grable, 2000). A survey of high-level managers at Dutch bank and insurance companies revealed that older managers’ business decisions were more aggressive than younger managers’ decisions (Brouthers, Brouthers, and Werner, 2000). Conflicting results such as these may be due to factors confounded with age, such as wealth and the time horizon of the investment goals. Certainly the studies that show an inverse u-shaped function, with risk tolerance increasing in midlife and then decreasing after retirement (Jianakoplos and Bernasek, 1998; Riley and Chow, 1992; Schooley and Worden, 1999), suggest that asset allocation decisions are more influenced by changes in life circumstances than by age-related changes in information-processing strategies. Given the available evidence, we cannot rule out the possibility that younger adults would make similar financial decisions as older adults if they had the same amount of wealth and similar investment time horizons.

Gambling is a popular activity among older adults. A survey of activity directors at residential and assisted-care facilities and other senior centers revealed that bingo is the activity most participated in on-site, and that casino gambling is the most highly attended type of day-trip social activity (McNeilly and Burke, 2001). Playing bingo or the slots every so often is unlikely to cause serious financial or social problems, but gambling has its risks, especially if it becomes an addiction. Nationwide surveys indicate that rates of pathological gambling in the general population are lower for older adults than younger adults (National Opinion Research Center, 1999). However, this age effect is no longer significant when race, socioeconomic status, and gender are accounted for (Welte, Barnes, Wieczorek, Tidwell, and Parker, 2001). This finding suggests that when other factors are taken into account, age in itself does not predict rates of pathological gambling. For example, gender is one confound when looking at age trends, since a lower proportion of the older population is male and proportionately more males are pathological gamblers. Furthermore, the prevalence of gambling among older adults may not accurately reflect risk aversion because the gambling may instead serve as a social activity for older adults.

Evidence from experiments comparing individual decision-making strategies among younger and older adults provides even less support for the stereotype of cautious older adults. Two studies found no significant age differences in whether people selected cards from high-reward/high-risk
A REVIEW OF DECISION-MAKING PROCESSES

MARA MATHER

eyesight becoming progressively worse has near blindness to look forward to at a later date. He has to decide about an eye operation which will result in restored vision if successful, or blindness if not” (Botwinick, 1966). Participants were asked to indicate the probability of success they would require before selecting the desired but risky alternative. Compared with younger adults, older adults were more likely to indicate they would not choose the risky alternative (having an eye operation) no matter what the probabilities (for a review see Okun, 1976). This appears to be the result of decision avoidance, because in a subsequent study in which participants were not given the option of totally avoiding the decisions, there were no age differences in how cautious people said they would be (Botwinick, 1969). A similar questionnaire assessed how people dealt with uncertainty about risk for medical procedures (Curley, Eraker, and Yates, 1984). This questionnaire, administered to patients in hospital waiting rooms, revealed that uncertainty about the chances of success for a treatment affected younger and older adults’ decisions in the same way. Thus, both when gambling and when deciding on a course of action in a hypothetical scenario, there do not appear to be age differences in risk taking. Perceptions of risk also do not seem to change with age. For example, after reading a vignette about a woman facing a decision about estrogen replacement therapy, estimates of the risk of the therapy did not differ for younger and older participants (Zwahr, Park, and Shifren, 1999). There is also a lack of change in perceptions of risk between adolescence and adulthood, despite stereotypes that adolescents see themselves as invulnerable (Beyth-Marom, Laurel, Fischhoff, Palmgren, and Quadrel, 1993; Quadrel, Fischhoff, and Davis, 1993).

In summary, this pattern of little or no age differences in risky decisions runs counter to popular beliefs that older adults are less likely to make risky decisions. Furthermore, the choice dilemma studies reveal an interesting age difference—older adults appear to be more reluctant than younger adults to make decisions in the first place.

Deciding Whether to Decide

In everyday life, when faced with a decision between two options, people often actually have a third option available to them: they can choose to not make a decision (Anderson, 2003). The choice dilemmas described in the preceding section suggest that older adults are more likely to avoid making a decision than younger adults (Okun, 1976). This tendency toward decision avoidance (or delegation) has been revealed in other studies as well. When faced with medical decisions, older adults are more likely than younger adults to indicate that they would rather not make the decisions themselves, instead leaving them up to the doctor (Cassileth, Zupkus,
Sutton-Smith, and March, 1980; Curley et al., 1984; Ende, Kazis, Ash, and Moskowitz, 1989; Steginga and Occhipinti, 2002). Similarly, older adults were more likely than younger adults to say they preferred not to have the responsibility for choosing a Medicare health plan (Finucane et al., 2002). Because many medical decisions are framed as a choice to take action (have surgery, take medication, etc.) or not, avoiding a decision can have the same result as deciding not to undergo treatment.

Researchers in Canada who were puzzled by the underutilization of total joint arthroplasty (a treatment for arthritis) provided an interesting example of decision avoidance (Hudak et al., 2002). They wondered why only 10 percent of older adults who were willing to consider total joint arthroplasty and were categorized as perfect clinical candidates for the treatment chose to have it. Interviews revealed that, instead of actually deciding against the treatment, the older adults tended to defer the decision until some undetermined later date. Thus, what appeared on the surface to be a decision was actually just an unwillingness to finalize the decision, making older adults appear to be risk avoidant.

This tendency to avoid decisions is somewhat puzzling, given that older adults appear to assess risk in a similar fashion to younger adults. Why is the act of decision making less attractive for older adults? One explanation may be found in the link between decision avoidance and emotion regulation. Among younger adults, the option of not making a decision at all is particularly attractive when the decision is emotion laden. For example, Beattie, Baron, Hershey, and Spranca (1994) asked participants to imagine that they had two children who both have an unusual disease and will die immediately without a bone marrow transplant. Participants rated the scenario in which they had to choose which child to donate their bone marrow to as less desirable than scenarios in which their bone marrow matched that of only one of the children and so they did not have to choose between their children. In general, the desire to avoid making a decision increases as the conflict between various options increases. For example, people are more likely to purchase a compact disc player if they find one attractive option on sale than if they find two attractive options on sale (Tversky and Shafir, 1992).

Does avoiding a decision make people feel upset by the lack of resolution? Quite the contrary—at least in the short run. People feel better after deciding not to make a decision in conflict-laden situations. When faced with a high-conflict decision, people who choose either not to make a decision or to stick with the status quo report less negative affect than people who choose other options (Luce, 1998). In addition, people who experience the most negative affect while considering options are most likely to decide to stick with the status quo (Luce, 1998).

A study examining problem-solving styles across the life span suggests that the emotional nature of problem situations becomes more salient as people age (Blanchard-Fields, Camp, and Casper Jahnke, 1995). In this study, participants read vignettes about problem situations and wrote essays about how they should be resolved. The vignettes varied in their level of emotional salience. For example, the following was a vignette with low emotional salience: “A father has a 16-year-old daughter who keeps taking his car several times a week. The family only has one car. What should he do?” The following was a vignette with high emotional salience: “A woman is married to an alcoholic. She feels no emotional support from the marriage. They lost their house and car. She has three children aged 3, 7, and 10 years. What should she do?” For scenarios with low and medium emotional salience, older adults were less likely than younger adults to suggest problem-focused action, such as self-initiated behaviors that would alter the situation. For such scenarios, older adults were more likely than younger adults to suggest strategies that avoided doing anything directly about the problem. For example, they might propose ways to suppress one’s emotions or attendant to things other than the problem situation. When confronted with problems with high emotional salience, younger adults’ problem-solving strategies became more like those of the older adults, whereas older adults’ strategies did not change much across the various levels of emotional salience. This pattern suggests that emotion is more likely to be a salient aspect of situations for older adults—and therefore their decision strategies are more likely to reflect emotion-focused processes, including attempts to avoid making a decision.

Although avoiding decisions may help regulate emotions in the short run, there are, of course, downsides. Avoiding decisions can lead to negative consequences when action is called for. An interesting point when considering age differences is that the negative consequences of decision avoidance often do not become apparent immediately but instead emerge over time. In the short run, actions are more likely to be regretted than inactions (Gilovich and Medvec, 1995). In contrast, in the long run, it is inactions that generate the most regret. For example, “Why did I choose to have dinner at such an expensive restaurant?” might indicate regret about a recent action, whereas “Why didn’t I decide to buy real estate before the market took off?” is a regret about inaction over the past several decades. In further research, the influence of one’s likely future perspective on the attractiveness of a decision should be examined. It may be that older adults prefer not to make stressful decisions because the possibility of near-term regret weighs more heavily than the possibility of distant-future regret.

Alternatively, it could be that older adults just don’t trust themselves to make good decisions and therefore avoid making decisions when they can. In one study, older adults rated themselves as less analytical and more intuitive in their decision style (Finucane et al., 2002). This self-perception...
seems to accurately reflect the decline in executive processes mediated by
dorsolateral prefrontal cortex and the increased influence of emotional
processes. In particular, older adults might be less confident than younger
adults about their skills in certain domains. For example, making medical
decisions may be particularly difficult for older adults because their genera-
tion was trained to believe that only doctors had the expertise to make such
decisions. Yet active participation in medical decisions appears to have
beneficial consequences, such as improved treatment effectiveness and lower
postoperative depression (Zwahr, 1999).

Seeking Information

In everyday life, it often takes some effort to learn about the character-
istics of choice options. The degree to which people seek information about
their decision options varies widely. For example, to get a new refrigerator,
some people might go into the nearest store that sells them and buy the least
expensive one that is the right size. Others might seek more information by
reading reviews and visiting several stores. Older adults’ reduced working
memory capacity may make it more difficult for them to hold multiple
pieces of information in mind in order to make comparisons. This reduced
capacity may lead them to seek less information when making a decision.

Consistent with this possibility, a number of studies have found that
older adults seek less information than do younger adults when making
decisions or solving problems. For example, Streufert, Pogash, Piasecki,
and Post (1990) recruited mid-level managers to participate in an all-day
group decision-making simulation and found that teams composed of older
managers made fewer requests for additional information than younger
teams and also made fewer decisions overall. Zwahr et al. (1999) found
that, after reading a vignette about a medical decision, younger adults were
more likely to decide to seek a second opinion or gather more information
than were older adults. Older adults were more likely to select the proposed
treatment or take no action. This suggests that when people do not make an
immediate decision, younger adults might be postponing it to seek out
additional information whereas older adults may simply be avoiding mak-
ing the decision. A similar pattern of older adults requesting less informa-
tion than younger adults while making medical decisions is seen in other
studies (Ende et al., 1999; Leventhal, Leventhal, Schafer, and Easterling,
1993; Meyer, Russo, and Talbot, 1995) and also extends to everyday prob-
lem solving (Berg, Meegan, and Klaczynski, 1999). Two studies examining
decision information search patterns using a decision grid found that older
adults examined less information in hypothetical decisions about purchas-
ing a car and renting an apartment (Johnson, 1990, 1993).

One exception to the general pattern of reduced information seeking
with age is a study in which tape recordings were made of patients interact-
ing with their physicians (Beisecker and Beisecker, 1990). Hierarchical
regression analyses revealed that older adults were more likely to make
information-seeking comments than younger adults. Scores from scales
measuring locus of authority and desire for information were entered first in
the regression analysis, however, and so it is not clear whether a similar pattern
would be seen without first accounting for these variables.

Although decreased working memory capacity may be an explanation
for older adults’ reduced information seeking, it remains to be tested fully.
For example, do younger adults under divided attention conditions seek
less information while making decisions? Would older adults seek more
information if they had some sort of external memory aid so that they did
not have to hold it all in mind at once? Johnson (1997) investigated the
impact of a memory aid on information seeking during decision making
but, since the control condition in her experiment did not replicate previous
findings of age differences in information seeking, the findings are difficult
to interpret. Further investigation is needed to understand whether reduced
working memory capacity might be the cause of seeking less information.

Are age-related changes in emotional processes likely to have an impact
on information seeking as well? There are some intriguing indications that
they might. Older adults examining information in a decision grid in order
to make a hypothetical choice among various cars spent a greater propor-
tion of their time viewing positive features and a smaller proportion of their
time viewing negative features than did younger adults (Mather, Knight,
and McCaffrey, 2005). This finding suggests that some of older adults’
reduced information-seeking tendencies might occur in contexts where
most of the available information is negative.

Age differences in emotional goals might also influence the strategies
that people use to compare the various options in choices. There are a
number of different strategies for comparing all of the various pieces of
information involved in a choice. One possibility is the weighted additive
strategy, which involves considering each alternative sequentially, multipli-
ating each feature value (e.g., health plan A’s value for location, cost, etc.) by
the importance weight for that feature and then summing all the weighted
values to compute an overall value for each alternative. The alternative
with the highest overall value should be chosen. In this alternative-based
strategy, an alternative’s poor value for one feature can be compensated for
by its good value for another feature. Other, often simpler, strategies in-
volve making comparisons of features across alternatives. For example, one
might choose the option with the best value on the most important feature
(Tversky, 1969). That is, one might take the health plan with the lowest
cost, regardless of how much coverage it promises or where its nearest
clinic is located. Another feature-based strategy is to eliminate options that
asked to make the same choice among cars that Johnson (1990) used. The older adults who did best on the executive function tasks (and therefore those best equipped to implement goals, including emotion regulation goals) were more likely to use feature-based decision comparison strategies. These findings suggest that older adults with the least decline in higher-order cognitive abilities may be the ones most likely to engage in strategies that help regulate emotion, such as feature-based comparison to decrease decision conflict. (For further discussion of the link between cognitive control and emotional regulation, see Mather and Carstensen, 2005.)

Repeated Decisions

It is hard to learn from past decisions unless one can gauge how effective they were. People tend to be overconfident when judging the quality of their own decisions (Lichtenstein and Fischhoff, 1977), but little is known about whether there are age differences in confidence about decisions. Several studies provide some initial evidence but it is somewhat contradictory. In a study in which participants were asked to come up with solutions for legal and financial problems, most of the older adults overestimated how many problems they had solved correctly (Devolder, 1993). In contrast, most younger adults underestimated how many problems they had solved correctly, a surprising finding given people’s general tendency to be overconfident about their decisions. In another study, participants were asked to determine how much money a hypothetical person should contribute to his or her retirement savings plan, based on information about that person’s financial situation (Hershey and Wilson, 1997). Younger adults appeared to be overconfident about their solutions unless they had completed a financial planning workshop, in which case they were underconfident. As a group, older adults did not appear to be overconfident or underconfident, either with or without the knowledge gained from the workshop. However, the results from this study are hard to interpret because participants each made only one rating on a scale of 1-7 to indicate how poor or good they thought the overall quality of their six solutions was. It would be interesting to repeat the study and then have participants estimate the dollar value of the discrepancy between their solution and the optimal solution.

Two studies that did not directly examine decision making also provide contradictory findings about people’s confidence in their decision making. In both studies, participants were asked to rate their confidence in answers to general knowledge or trivia questions such as “Which city is farther north: (a) London or (b) New York?” In one study, older adults were just as overconfident in their responses as younger adults (Piske and Mutter, 1996). However, in a second study, older adults made more extreme responses of “don’t know” or “I’m sure” rather than intermediate confidence
ratings (Kovalchik et al., 2005). In this study, older adults were also less overconfident than younger adults when they did give an intermediate confidence rating.

Two studies investigating age differences in memory for choices suggest that older adults may be more likely to repeatedly choose the same options because their memories are biased in favor of their past choices (Mather and Carstensen, 2004; Mather and Johnson, 2000). In these studies, participants made a series of two-option hypothetical choices, for example, between two job candidates or between two treatments for an illness. Each option was described with both positive and negative features. Later, participants were asked to make memory attributions about features from the previously considered choice options (e.g., does “easily discouraged” describe the first job candidate, the second job candidate, or is it a new feature?). In both studies, older adults were more likely than younger adults to have choice-supportive biases in their memory attributions. That is, they were more likely to attribute (and misattribute) positive features to chosen options than to rejected options—and more likely to attribute (and misattribute) negative features to rejected options than to chosen options.

This age difference in how much memory favors chosen options is not simply due to poorer memory among older adults; when older adults are tested after a shorter delay than younger adults to equate their overall accuracy, their memories are still more choice supportive than those of younger adults. In addition, when given a free recall test, older adults were more likely than younger adults to selectively remember the good things about chosen options and the bad things about rejected options (Mather and Carstensen, 2004). In everyday life, choices quite often involve options that have previously been chosen or rejected, such as entrees on a restaurant menu or items in a grocery store. Thus, because they are more likely to remember their choices favorably relative to forgone options, it is possible that older adults will be more likely than younger adults to repeatedly choose the same options. Remembering past choices in a favorable light should help people feel good. Thus, it may be older adults’ greater focus on regulating emotion that leads to their choice supportive biases. Consistent with this possibility, if younger adults are asked to think about their feelings and reactions after making a choice, their later memories are as choice supportive as those of older adults who are not explicitly focused on emotion (Mather and Johnson, 2000).

Susceptibility to Scams

Although so far in this paper I have discussed decision making on an individual level, quite often there is social pressure to make certain decisions. It is particularly important to be able to identify and resist such pressure when it comes from someone attempting a scam. Older adults are frequently the target of scams, especially over the phone. One estimate is that over half of the targets for telemarketing scams were 50 or older (American Association of Retired Persons Foundation, 2003). Declines in memory and other cognitive abilities may increase older adults’ susceptibility to such scams. For example, Jacoby (1999) describes a scam in which the perpetrator phones an older adult and elicits as much personal information as possible. Then in a callback the scammer asks questions based on the first phone call and, if the older adult fails to remember the previous conversation, the perpetrator makes a false claim about an earlier event. For example, he or she might claim to have received a check that was an overpayment and request a check for a lower amount. Because older adults appear to be more likely to be misled by false information in eyewitness testimony paradigms (Cohen and Faulkner, 1989; Mitchell, Johnson, and Mather, 2003), it seems possible that they are also more susceptible than younger adults to scams that make false suggestions about their past actions, although this possibility has not been tested.

The American Association of Retired Persons (AARP) recently conducted several studies to try to understand the personality and demographic characteristics associated with susceptibility to phone scams and to test various interventions to decrease susceptibility (AARP Foundation, 2003). Several hundred victims of one of two types of phone scams (a Canadian lottery scam in which victims were told they had won the Canadian lottery but needed to pay taxes to collect their winnings, or a movie investment scam involving the “next box office hit”) were identified from lists seized by the Federal Bureau of Investigation and the California Department of Corporations. A nationally representative sample of adults aged 45 or older served as a control group.

The study revealed very different demographic characteristics for the lottery and the investment victims. Lottery victims averaged 74.5 years of age, were predominantly female, and typically had an income under $30,000. In contrast, investment victims tended to be under the age of 65 and male with incomes over $75,000. In addition, the investment victims’ level of Internet use and level of education were greater than those of the general population. Thus, the first striking finding from this study is that there is no single demographic profile for older victims of phone scams; the profile varies widely depending on the type of scam. The report points out that “good con artists invest a lot of time figuring out which kinds of people are most vulnerable to which kinds of scams” (AARP Foundation, 2003, p. A-22). Personality questionnaires also revealed no defining characteristics of fraud victims in general. In fact, in some cases the two victim groups differed from the general population in opposite ways. For example, the lottery victims were more conforming and willing to go along with the
crowd than the control group, whereas investment victims were less conforming.

In a separate series of studies conducted in collaboration with Anthony Pratkanis, an expert on persuasion, the AARP group used a “reverse boiler room” technique to try to reduce susceptibility to fraud. Trained volunteers called victims and potential victims from telemarketers’ call lists and gave them information about telemarketing fraud. Control participants from the same sample population were called and simply asked about their favorite television program. A few days later, participants received a telephone solicitation and the response rate to this mock phone scam was measured. The results indicated that warning people about phone scams, getting them to generate advice for others about avoiding it, and demonstrating how easily they could fall prey to a scam were all effective techniques. On average, these techniques reduced susceptibility to mock telemarketing scams by about half.

The AARP research did not examine any cognitive variables and so does not provide any information about how cognitive decline might contribute to susceptibility to fraud. But the finding that some scams are actually more likely to work on middle-aged people with above-average education than on older adults in general indicates that cognitive decline cannot be a global explanation for why people become victims of fraud. Although the fact that the risk factors vary widely depending on the type of fraud makes addressing the problem more complex, it is good news for older adults that they are not necessarily the group most likely to fall for a scam.

CONCLUSION

When it comes to making decisions, older adults feel relatively confident about their abilities. When asked whether they expected to have problems making decisions as they got older, 37 percent of respondents between the ages of 35 and 49 said yes, whereas only 6 percent of the older adults said they have problems making decisions (Princeton Survey Research, 1998). Older adults’ confidence in their decisions is mostly supported by the existing literature. With age, there are a number of things that change about the way people make decisions, but these changes often either lead to the same decisions (Johnson, 1990; Meyer et al., 1995; Stanley, Guido, Stanley, and Shortell, 1984; Walker, Fain, Fisk, and McGuire, 1997) or result in only subtle differences in the decisions made (Finucane et al., 2002). Under some experimental conditions, older adults make objectively better decisions than younger adults (Tentori, Osherson, Hasher, and May, 2001). Many studies have examined the decision-making competence of older adults to complete informed consent in medical contexts. While patients with dementia show impairments (for a review see Fitten, 1999), healthy older adults’ decisions tend to be as reasonable as those made by younger adults (Fitten, Lusky, and Hamann, 1990; Marson, Ingram, Schmitt, and Harrell, 1994; Stanley et al., 1984). The most notable age difference is that older adults have poorer comprehension of medical treatments (Christensen, Haroun, Schneiderman, and Jeste, 1995; Sugarman, McCrory, and Hubal, 1998).

At the outset of this paper, I suggested that the pattern of changes in emotional processes and changes in the prefrontal brain region might explain why some aspects of decision making change with age while others do not. The evidence I reviewed suggests that when older adults do make decisions, they evaluate risk just as well as younger adults. The ability to weigh future consequences appropriately and not be driven solely by present gain requires an intact orbitofrontal cortex. Further research should help resolve whether the sparing of this particular region of the prefrontal cortex in aging can explain why the way that people deal with risky decisions does not change much with age. Instead, many of the changes in the way people make decisions appear to be subtle and may be related to changes in executive functioning and emotional processing.

Although older adults tend to evaluate risk in the same way as younger adults when they make decisions, they nevertheless appear to be risk avoidant because they avoid making decisions. Not taking risks that one should take, such as undergoing a potentially useful medical procedure that has some risks, can cause serious problems. Older adults’ reluctance to make decisions may mean that they do not take appropriate risks. Among the decision processes discussed in this paper, this reluctance to make decisions is probably the age difference with the most significant consequences. Not making decisions can help people avoid conflict and negative emotions in the present, but it can also lead to missed opportunities as well as a greater risk of untreated disease. Of interest for future research is whether older adults’ reluctance to make decisions stems from reduced confidence in their decision-making abilities, from reduced executive functioning that makes planning and executing decisions more difficult, or from a desire to avoid the negative emotions associated with making decisions.

Another age-related change that consistently appears across many studies is reduced information seeking when making a decision. It should be noted that there is no clear correlation between the amount of information sought and the quality of decisions. In some cases, seeking less information is simply an indication that one has more knowledge about the domain and so needs less input in order to decide. A question for future research is whether older adults seek less information because they have reduced working memory capacity or because they have different goals than younger adults do. Research has also revealed age differences in the way that people remember past decisions. These age-related patterns of memory bias may
lead to consequences for choices that involve previously experienced options.

Although the field of aging and decision making has advanced to the point where it is possible to identify patterns of age differences that consistently appear across various studies, it is clear that more work is needed in order to explain these differences and to investigate their consequences. Particularly promising avenues for future research are the hypotheses that, compared with younger adults, older adults (1) rely more on emotional than on analytical processing to make decisions and (2) try to avoid negative affect when making decisions.

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MARA MATHER


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