THE AGING CONSUMER

Perspectives from Psychology and Economics

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Introduction

In the movie *Shrek*, the lead character attempts to explain the complexity of ogres to his friend, the donkey. "Ogres are like onions. Onions have layers. Ogres have layers." Blanchard-Fields, Brannan, and Camp (1987) used a similar onion-peeling analogy when discussing the wisdom that develops with age and experience. They argued that wise reasoning and decision making concern the ability to integrate the multiple layers of thoughts and feelings that individuals have. In other words, dual modes of knowing—one that is based on more experiential and affective processing and another based on more deliberative and logical processing of information—are thought important to being wise. This dual-process approach can be fruitfully extended to our understanding of adult age differences in judgment and decision making. Understanding how decision making may change as we age entails more complicated (and interesting) layers than a cursory glance would suggest.

Across the adult life span, aging is associated with robust declines in deliberative processing, examples of which include memory performance, the speed with which information is processed, and comprehension and use of numeric information. Such declines are predictive of a general decline in the quality of decisions as we age. However, people over 65 make many of our nation's most important decisions (think about the White House, the Supreme Court, leading national corporations), implying that deliberative decline does not and cannot fully explain adult age differences in decision making. And, in fact, research demonstrates that
at least three additional processes exist that compensate for age-related declines in deliberative ability: selective use of deliberative capacity, accumulated experience, and an increased focus on emotional information. After reviewing evidence for age-related changes in these processes, I briefly introduce methods based in these lower-level processes that may improve older adult decision making.

Good Decision Making Is Fundamental to Maintenance of Independent Functioning

By the year 2050, the number of people in the world over 60 years of age will surpass the number of children under age 15. As the potential demands of this growing population place increasing strain on already limited supports and resources, understanding the effects of aging on maintenance of independent functioning and facilitating such independent functioning becomes critical. Quality decision making is one key process. For example, because health problems increase with aging, older adults are the nation’s biggest users of (and decision makers about) health care. They make decisions about when to go to the doctor, whether to pay for a medication (because out-of-pocket expenditures rise rapidly with age, health care could be considered a luxury good, especially for the oldest-old; De Nardi, French, & Jones, 2006), which preventative measures to take, what to eat, and whether to exercise. The elderly also make many consequential financial decisions in terms of Social Security and other sources of wealth and retirement income. They have to decide when to stop driving, whether to continue living independently, whether to trust an individual asking for money, and so on. The quality of the decisions they make will determine in part the quality of lives they and their loved ones lead.

Maintenance of independent functioning requires that the individual make good decisions. To make good decisions, Hibbard and Peters (2003) suggested that a number of processes have to take place. First, the decision maker must have appropriate information; it has to be available, accurate, and timely. Policy makers sometimes think that this is all that is needed for good decisions (i.e., provide all of the necessary information and an informed public will always make the choices that are right for them). However, decision makers also have to be able to comprehend the given information and its meaning. They have to be able to determine meaningful differences between options and to weight factors to match their own needs and values. Decision makers also have to be able to make trade-offs that might be big (Would I prefer to pay my electricity bill or fill my
Aging-Related Changes in Decision Making

For elderly individuals, the decision-making process can be affected by factors such as age, experience, and education. For example, older adults may have less access to Internet-based information, which can affect their decision-making abilities. This is because younger adults may have more difficulty making trade-offs that are emotionally uncomfortable (Mather, 2006).

A small but growing body of research exists on age differences in decision making (see Peters, Hess, Vastfjall, & Auman, 2007, for a review). The literature on the impact of dual information processes on judgments and decisions is much larger and provides a framework to understand and predict possible age differences in decision making.

Dual Modes of Thinking and Their Impact on Decision Making

The results of judgment and decision experiments lead us to believe that information in decision making is processed using two different modes of thinking: an experiential/affective system and a deliberative system (Epstein, 1994; Loewenstein, Weber, Hsee, & Welch, 2001; Reyna, 2004; Sloman, 1996; these modes are also called Systems 1 and 2, respectively—see Kahneman, 2003; Stanovich & West, 2002). Both modes of thought are important to forming decisions.

The experiential mode produces thoughts and feelings in a relatively effortless and spontaneous manner. The operations of this mode are implicit, intuitive, automatic, associative, and fast. This system is based on affective (emotional) feelings. As shown in a number of studies, affect provides information about the goodness or badness of an option that might warrant further consideration and can directly motivate a behavioral tendency in choice processes (Damasio, 1994; Osgood, Suci, & Tannenbaum, 1957). Marketers, who well understand the power of affect, typically aim their ads to evoke an experiential mode of information processing.

The deliberative mode, in contrast, is conscious, analytical, reason based, verbal, and relatively slow. It is the deliberative mode of thinking that is more flexible and provides effortful control over more spontaneous experiential processes. Kahneman (2003) suggested that one of the functions of
the deliberative system is to monitor the quality of the information processing emerging from the affective/experiential system and its impact on behavior. Both modes of thinking are important. Some researchers claimed that good choices are most likely to emerge when affective and deliberative modes work in concert, and decision makers think as well as feel their way through judgments and decisions (e.g., Damasio, 1994; Peters & Slovic, 2000).

Affective and deliberative processes in decision making are interdependent—our thoughts and our feelings influence each other. The two systems also appear to be somewhat separable (e.g., Epstein, 1994; Petty & Wegener, 1999; Zajonc, 1980). The implicit assumption that good decision making is a conscious, deliberative process has been one of the field's most enduring themes, but in some contexts deliberation about reasons for choice appears to distract decision makers from fully considering their feelings and to have a negative effect on decision processes (e.g., Wilson, Dunn, Kraft, & Lisle, 1989). Research has also demonstrated that affect may have a relatively greater influence when deliberative capacity is lower, suggesting that, at least in some cases, these two modes are not separate but instead exist on a single continuum (Hammond, 1996; Kruglanski et al., 2003; Peters & Slovic, 2007). Shiv and Fedorikhin (1999), for example, demonstrated that decision makers were more likely to choose an affect-rich option (and make a decision of the heart) when deliberative capacity was diminished by cognitive load. Finucane, Alhakami, Slovic, and Johnson (2000) also found that the inverse relation between risks and benefits (linked to affect by Alhakami & Slovic, 1994) was enhanced under time pressure. Reducing the time for deliberation appeared to increase the use of affect and the affect heuristic. In subsequent sections, we link this balance between affect and deliberation to age differences in information processing and decision making.

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Age Declines in Deliberative Processes, Including Numeracy

Traditional decision research relies on the assumption that we deliberate in order to make our best decisions. Decision research developed from economic theory and, as a result of this rationalistic origin, has concentrated mostly on consequentialist explanations for how people make decisions and form judgments. The problem with this view, however, is that we have limited capacity to represent information, process it, and manipulate it; we are boundedly rational (Simon, 1955). In addition, aging is accompanied by declines in the efficiency of controlled processing mechanisms associated with deliberation (e.g., explicit learning and memory; Salthouse,
2006). Park et al. (2002), for example, demonstrated that beginning in the 20s a decline occurs in processes related to deliberation (e.g., speed of processing, working memory, and long-term memory).

Many choices also involve numeric information that generally requires deliberative capacity to process; comprehension and use of such information appears to decline with age. For example, results from health plan choice studies support these age declines in comprehension of numeric information and suggest that elderly decision makers do not always comprehend even fairly simple information. Hibbard, Peters, Slovic, Finucane, and Tusler (2001) presented employed-aged adults (18–64 years old; n = 239) and older adults (65–94 years old; n = 253) with 33 decision tasks that involved interpretation of numbers from tables and graphs. For example, participants were asked to identify the health insurance plan with the lowest copayment from a table that included four plans with information about monthly premiums and copayments. A comprehension index reflected the total number of errors made across the 33 tasks. The youngest participants (aged 18–35) averaged 8% errors; the oldest participants (aged 85–94) averaged 40% errors; the correlation between age and the number of errors was .31 (p < .001). Higher education was somewhat protective of these age declines.

Numeracy refers to the ability to understand and use mathematical and probabilistic concepts. Based on the National Adult Literacy Survey, almost half of the general population has difficulty with relatively simple numeric tasks such as calculating the difference between a regular price and sales price using a calculator or estimating the cost per ounce of a grocery item; scores on these tasks decline with age (Kirsch, Jungeblut, Jenkins, & Kolstad, 2002). Lipkus, Samsa, and Rimer (2001) found that 16% of highly educated individuals incorrectly answered straightforward questions about risk magnitudes (e.g., Which represents the larger risk: 1%, 5%, or 10%?). In our studies, people varied considerably in their scores on the simple 11-item numeracy test from Lipkus et al. (2001), and scores decreased significantly with age and education (Peters, 2008). Age declines in numeric ability have also been demonstrated longitudinally (Schaie & Zanjani, 2006). Controlling for age and education, women also tend to score lower than men (see also Frederick, 2005, and Peters, Slovic, Västfjäll, & Mertz, 2008).

Less-numerate individuals, whether young or old, do not necessarily perceive themselves as “at risk” in their lives due to limited skills; however, research showed that having inadequate numeric skills is associated with lower comprehension and use of numeric information. In particular, inadequate numeracy may be an important barrier to individuals’ understanding and use of health, financial, and other risks. Peters, Borberg, and Slovic (2007), for example, examined evidence for theorized age differences in the processing of numeric versus nonnumeric information about
prescription drugs. Using a convenience sample of 301 adults (aged 18–88 years), participants were asked to imagine that they were prescribed a drug for high cholesterol, were provided information about drug risks in either numeric or nonnumeric terms, and were asked their likelihood of taking the drug. The results revealed that individuals higher in numeracy were more likely to use the drug when given numeric rather than nonnumeric risk information, whereas those low in numeracy showed the opposite results. In addition, however, less-numerate older adults were significantly less likely than any other group to take the drug when given numeric rather than nonnumeric information. These results are potentially consistent with age-related declines in deliberative ability and suggest that less-numerate older adults, in particular, may have difficulty using numeric information about drugs, at least in the formats in which it was provided. Further study is required, however, to discover formats to provide numeric information that will facilitate processing even in less-numerate elderly adults (Peters, Hibbard, Slovic, & Dieckmann, 2007).

Because the elderly, as a cohort, tend to be less numerate, they are likely to understand and use numeric information less well in health, financial, and other consumer products. In the United States and other developed nations, low numeracy has been associated with a host of undesirable health outcomes, including self-reported poor health, health disparities, poor health knowledge and disease self-management skills, and choosing lower-quality health options (Baker, Parker, Williams, Clark, & Nurss, 1997; DeWalt, Berkman, Sheridan, Lohr, & Pignone, 2004; Hibbard, Peters, Dixon, & Tusler, 2007; Sentell & Halpin, 2006; Williams, Baker, Parker, & Nurss, 1998). For example, in a prospective cohort study of patients taking warfarin, low numeracy was significantly associated with poorer anticoagulation control (Estrada, Martin-Hryniewicz, Peek, Collins, & Byrd, 2004). In a study of asthma patients prescribed inhaled steroids, low numeracy was linked with a history of hospitalizations and emergency room visits for asthma (Apter et al., 2006). Rothman and colleagues (Rothman et al., 2006) found that lower comprehension of nutrition labels (thought to be important for health and health management) was significantly associated with lower numeracy skills, even after adjusting for education and income. The lower numeracy associated with older adulthood may exacerbate health and wealth disparities and potentially reduce the quality of older adults’ lives.

Innumeracy also appears to have an effect on decisions beyond simple comprehension of numbers. Research has begun to examine numeracy’s role in risk perception and decision processes. For example, Peters, Västfjäll, et al. (2006) pitted intuition against rational analysis by making an objectively worse choice more tempting. Subjects were offered a prize if they drew a colored jellybean from a bowl. Bowl A contained 9 colored and 91 white beans, and Bowl B contained 1 colored and 9 white beans.
Consequently, the chance of picking a colored jellybean was objectively better if the subject picked from Bowl B (10% chance of winning) than if he or she picked from Bowl A (9% chance of winning). Despite this, 33% of low-numerate subjects and 5% of high-numerate subjects picked from Bowl A, which was clearly not the rational choice if one wanted to win a prize. Whereas highly numerate subjects appeared to perceive the probability of winning more clearly and selected Bowl B, the less numerate were drawn more to the number of winning beans than by the objective probability. These results combined with those of other studies imply that, compared to high-numerate decision makers, the preferences expressed by the less numerate are likely to be more labile and influenced by extraneous cues, such as irrelevant sources of affect and emotion, and to be less influenced by objective numbers like probabilities.

Because of its link with risk perceptions and decision processes, numeracy may aid our understanding of the oft-cited link between greater educational attainment and improved health and wealth (Goel & Baker, 2008; Goldman & Smith, 2002). A pilot study was conducted in four remote villages in the eastern region of Ghana with a high prevalence of HIV infection (Peters, Baker, Dieckmann, Leon, & Collins, 2010). The villages ranged in size from 200 inhabitants to 4,000 inhabitants, and all interviews were conducted in Twi, the local language. In a sample of 190 adults aged 30–65 whose highest education ranged from no schooling to completion of secondary school, we tested numeracy abilities (measured with the Woodcock-Johnson III test of calculation; McGrew, Wood, & Mather, 2001), executive-functioning capacities, decision-making tasks, health knowledge and attitudes, and healthy behaviors. Participants also reported levels of schooling, reasons for discontinuing or failing to attend school, socioeconomic status (SES; as measured by type of house, available amenities such as electricity and running water, and agricultural assets), religion, occupation, and access to information.

Numeracy and executive functioning were studied as mechanisms by which schooling may affect development of decision-making skills and thus facilitation of good decisions about one's health (we call this the Schooling–Decision-Making model). We modified the jellybean task into a stickman task in which participants were presented with a series of scenarios. In each scenario, participants chose between two images. The participant was informed that each image represented a different family or group; the red stickmen were individuals with HIV, and the black stickmen were individuals who did not have HIV. In each image, the number of red and black stickmen varied. The participant was asked if they were to visit each family or group, in which option, A or B, would it be most likely that the first person they met had HIV. Four of the scenarios provided congruent information in which the higher probability had numerically more (a greater frequency of) red stickmen. The other
four scenarios presented incongruent information in which the option with a larger numerical number of red stickmen was actually a lower probability of the total group. The Ghana pilot data revealed robust and statistically significant correlations between accurate decision making in the incongruent choices and schooling, numeracy, and executive functioning. Further, regressing this indicator of decision-making skill on either numeracy or executive functioning demonstrated that each has a significant mediating effect of the schooling effects controlling for age, gender, SES, and general intelligence. Finally, more accurate decisions in the incongruent choices were associated with a greater likelihood of behaviors protective of HIV in this African nation with high rates of HIV infection. Greater education as a child or adolescent may lead to greater numeracy and executive functioning, improved decision skills in situations that involve an understanding of numbers, and ultimately better choices about health and financial risks (see also Bruine de Bruin, Parker, & Fischhoff, 2007; Goldman & Smith, 2002). It is not clear whether continued adult education may have similar effects among middle-aged and older adults to those hypothesized here.

If good decisions depend on deliberation, the robust age-related declines in executive functioning and numeracy suggest that the quality of judgments and decisions will suffer inevitably as we age. Several studies have identified biases in judgment processes that increase with age and were linked with deliberative processes such as working memory. For example, Mutter (2000) and Mutter and Pliske (1994) examined the impact of illusory correlation on performance. (In an illusory correlation, people perceive that two variables covary consistently with their prior expectations even though no actual relation exists.) They found that older adults’ judgments were more influenced by prior expectancies than were those of younger adults, particularly under distraction conditions. Older adults were also less likely to correct their judgments when accurate information regarding the co-occurrence of events was made salient. Interestingly, Mutter found that age differences were more evident for memory-based judgments than for online judgments, suggesting that age differences in illusory-correlation biases may be based in part on the declining ability to encode and retrieve veridical information from episodic memory.

Such a conclusion was bolstered by other research (Mutter & Pliske, 1996; Mutter & Williams, 2004) that examined age differences in the ability to detect covariation between two events when there were no strong prior expectancies regarding contingencies between the events. In this research, aging-related declines in the ability to accurately judge covariation were eliminated when performance was adjusted to take into account memory errors. The researchers also found that older adults tended to use simpler strategies in constructing judgments than did younger adults, and that younger adults used simpler strategies when the task demands were
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increased relative to situations with fewer cognitive demands. In another
example, Chasseigne and colleagues found that older adults performed
as well as young adults in probability-learning tasks when the cues had
a direct relation with the criterion but performed less well when the cues
had a more complex inverse or multiplicative relation with the criterion
(Chasseigne, Grau, Mullet, & Camari, 1999; Chasseigne, Lafor, & Mullet,
2002; Chasseigne, Mullet, & Stewart, 1997). Such findings suggest that
some declines in judgments and decisions in later adulthood may be tied
to reductions in cognitive resources.

Research by Chen (2002, 2004; Chen & Blanchard-Fields, 2000) has
also suggested that aging-related declines in deliberative processes have
a negative impact on judgment processes. In these studies, participants
were presented with information about an individual, some of which was
identified as true and some as false (and thus to be ignored); then they
were asked to make judgments based on this information. Chen found
that the judgments of older adults were more likely to be influenced by the
false information than were those of younger adults. In addition, younger
adults in a divided-attention condition performed similarly to older adults
under full attention. These findings suggested that older adults may have
more difficulty controlling attention and monitoring the accuracy of inform-
ation in memory, which in turn makes judgments more prone to error
based on irrelevant information. In a related study, Skurnik, Yoon, Park,
and Schwarz (2005) found that repeatedly identifying a (false) consumer
claim as false assisted older adults short term in remembering that it was
false. Longer term, however, the repetition caused them to misremember
it as true. A pragmatic implication of these studies is that information pro-
viders need to take care not to provide older adults with a “fact” and then
state that it is a myth. This and similar tactics are surprisingly common
(e.g., the U.S. Food and Drug Administration’s (2009) “Facts About Generic
Drugs” poses a question such as “Are brand-name drugs made in better
factories than generic drugs?” and then answers “No.”).

In general, evidence exists that, when making decisions, older adults
use less-complex strategies and consider fewer pieces of information than
younger adults do. For example, Johnson and her colleagues (Johnson,
1990, 1993; Johnson & Drungle, 2000; Riggle & Johnson, 1996) examined
decision-making strategies by different-aged adults using an informa-
tion matrix that contained specific features (shown in columns) for different
product choices (shown in rows). Participants were allowed to view
only one cell of the matrix at a time, but they could view as many cells as
they wished for as long as necessary before making a product decision.
A relatively consistent finding in this research, across different types of
products (e.g., cars, apartments, over-the-counter drugs), was that older
adults spent a longer time studying each cell but sampled fewer pieces
of information than did younger adults before making their decisions.
Similar results were obtained by Streufert, Pogash, Piasecki, and Post (1990) in a study of decision making in managers and by Hershey, Walsh, Read, and Chulef (1990) in a financial-planning task.

In sum, the pattern of observed performance in these studies appears to be consistent with what might be expected with a decline in deliberative processes with aging. In fact, research has demonstrated that younger adults adopt a strategy similar to that observed in older adults when task demands are increased. It may be that information load interacting with limited cognitive resources in later adulthood results in the adoption of strategies that minimize demands on deliberative processes. For example, to conserve resources, older adults may adopt a strategy of eliminating alternatives as soon as possible (Riggle & Johnson, 1996). Thus, as soon as an undesirable piece of information about a product is encountered, the alternative is eliminated from further consideration. Alternatively, a satisficing strategy, in which information about a specific product is examined until a sufficient amount of information has been deemed acceptable, might be employed. Consistent with such an explanation, Chen and Sun (2003) found that both older and younger adults adopted satisficing strategies in a simulated real-world task (i.e., maximizing profit at a yard sale), but the strategy adopted by older adults was less memory demanding than that adopted by younger adults. Sorce (1995) recommended that marketing strategies should attempt to segment older consumers to customize products and information to compensate for their cognitive decline.

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**Age-Related Compensatory Processes, Including Selectivity, Increased Experience, and Affective Processes**

The vast majority of older adults appear to function effectively and independently in everyday life, however, and many of the most influential and demanding positions in our society are held by late-middle-aged and older adults, suggesting that their ability to make decisions remains intact despite other declines (Carstensen, 2001; Salthouse, 1990). Deliberative decline appears to be too simple an explanation of age differences in decision making.

At least three reasons exist for why deliberative decline is too simple an explanation these age differences. First, older adults appear to use their deliberative capacity selectively. Older adults appear to adapt to real or perceived declines in cognitive resources by becoming increasingly selective about where they spend effort (Hess, 2000). That is, the costs associated with resource-demanding deliberative processing result in older adults being more judicious than younger adults in their allocation of resources. Hess has further hypothesized that this aging-related resource
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conclusion should be most apparent in situations of low relevance or meaningfulness to the individual, with fewer age differences as relevance and meaningfulness increase. The impact of this heightened selectivity on the involvement of deliberative and affective processes can be seen, for example, in a study that examined the extent to which attitudes toward proposed legislation were influenced by irrelevant affective information (i.e., the likeability of the lawmaker proposing the legislation; Hess, Germain, Rosenberg, Leclerc, & Hodges, 2005). When the personal relevance of the legislation was low, older adults exhibited attitudes that were consistent with how much they liked the lawmaker, whereas younger adults' attitudes were unaffected by this information. In contrast, when the legislation was rated high in personal relevance, neither the younger nor older adults were influenced by the irrelevant affective information. Related findings were reported by Chen (2004), who observed that increasing personal accountability benefited older adults' source memory relatively more than it did that of younger adults.

A second reason for why deliberative decline is too simple an explanation is that the experience individuals gain in life can compensate for some of the age-related declines in deliberative processes. One way of operationalizing experience is through measures of crystallized knowledge. Simultaneous to finding age declines in processes associated with deliberation, Park et al. (2002) demonstrated robust increases across the adult life span for scores on vocabulary tests, a measure of crystallized intelligence, suggesting a role for increased experience. In that vein, Meyer, Russo, and Talbot (1995) found that older women behaved more like experts by seeking out less information, making decisions faster, and arriving at decision outcomes equivalent to younger women. Compared to the younger women, older individuals appeared to compensate for reductions in information seeking and bottom-up processing with a greater reliance on top-down processing, arriving at equivalent decisions.

A third reason for why deliberative decline cannot fully account for age differences in decision making concerns the role of affect and emotion in decisions. In research with brain-damaged patients, Bechara, Damasio, and colleagues (Bechara, Damasio, Damasio, & Anderson, 1994; Bechara, Damasio, Tranel, & Damasio, 1997; Bechara, Tranel, Damasio, & Damasio, 1996; Damasio, 1994) linked the learning of integral affect* to better

* Integral affect is defined as positive and negative feelings toward an external stimulus (e.g., a consumer product). Integral affect may become associated with an object not only through careful thought but also through experiential processes such as conditioning (Staats & Staats, 1958), familiarity (Zajonc, 1980), priming (Murphy & Zajonc, 1993), and mood misattribution (Schwarz & Clore, 1983). It is generally relevant to the decisions at hand. Affect can also be irrelevant to a decision but influence the decision nonetheless (e.g., the effect of a temporary mood state or the likeability of a lawmaker on a decision about a proposed law); this affect is termed incidental affect.
decision making. Patients with bilateral damage to the ventromedial prefrontal cortices experienced normal affective reactions to gains and losses they received from decks of cards in a task called the Iowa gambling task. In this task, subjects choose among decks of cards about which they initially know nothing; the decks vary in the amounts and frequencies of gains and losses and in overall expected value, and subjects learn about the decks as they choose cards and receive feedback after each choice. Unlike normal controls, however, patients with ventromedial prefrontal cortex damage were unable to use their otherwise normal affective reactions to learn an integral affective response linked to each deck (Bechara and colleagues called such an integral affective response a “somatic marker”). Among non-brain-damaged control subjects, affective reactions to actual gains and losses in each deck appeared to drive the learning of an anticipatory affective response (an integral affective response or somatic marker) that subsequently guided choices. Bechara and colleagues concluded that this anticipatory affective response must drive choice because the patients had abnormal anticipatory affective capabilities but normal cognitive capabilities. Peters and Slovic (2000) demonstrated, using a modified Iowa gambling task, that college students high in negative reactivity learned to choose fewer high-loss options, whereas those high in positive reactivity learned to choose more high-gain options—supporting the idea that affective reactions are used in the decision-making process.

Decision makers rely on affective meaning to guide judgments and decisions in everyday life (Slovic, Finucane, Peters, & MacGregor, 2002). According to the “affect heuristic,” all of the images in a person’s mind are tagged or marked to varying degrees with affect. The “affect pool” contains all positive and negative markers that are consciously or unconsciously associated with the images. Using this overall, readily available affective impression can be easier and more efficient than weighing the pros and cons of a situation or retrieving relevant examples from memory. This may be especially true when the required judgment or decision is complex or when mental resources are limited, as in conditions of time pressure (Finucane et al., 2000). Decision makers rely on affect in at least four ways in the decision-making process (Peters, 2006; Peters, Lipkus, & Diefenbach, 2006). First, affect can act as information (as a substitute for other, sometimes more relevant, information; Kahneman, 2003) in judgments such as life satisfaction (Schwarz & Clore, 1983). Second, it can act as a common currency that allows people to integrate multiple pieces of information more effectively than when it is absent. Third, it can act as a spotlight to focus people’s attention on different information (e.g., numerical cues), which may then be used in judgments instead of the affect itself. Fourth, affect can motivate people to take some action or process information.

This reliance on affect may be learned over the life span as a particularly effective means of making decisions. Reyna (2004), for example, argued
that information processing in this system is more advanced relative to the deliberative system. In support of this idea, she provided evidence that people process less information and process it more qualitatively as development progresses both from childhood to adulthood and from less expertise to more.

The examination of aging and affective influences on performance in a variety of cognitive domains (e.g., memory, judgment processes, decision making) is still in its infancy. But, two dominant perspectives on this relationship, each focusing on different types of mechanisms, can be identified in this literature. The first is a motivational perspective from socio-emotional selectivity theory (SST; Carstensen, 1993, 2006). It focuses on aging-related chronic activation of emotion regulation goals and an associated motivation to process affective information. The most influential perspective regarding aging, affect, and motivation is SST (Carstensen, 2006). This theory posits that changes in time perspective result in emotional goals becoming increasingly important as the end of life nears, which in turn results in greater monitoring of affective information. Because older adults are, by virtue of age, closer to the end of life, age should be associated with an increased importance of emotional goals; increased attention to emotional content; and either an increased focus on positive information or a decreased focus on negative information to optimize emotional experience. These last predictions have potentially great relevance to the impact of affect and emotions in judgment and decision making. In one study, for example, Fung and Carstensen (2003) found that, relative to younger adults, older adults exhibited greater preference and superior memory for emotional advertisements than for nonemotional ones.

However, SST also predicts a specific focus on positive information in later life as older adults seek to optimize emotional experience. For example, Charles, Mather, and Carstensen (2003) found that overall picture recall declined with age but that older adults recalled a greater proportion of positive images than negative images, whereas young and middle-aged adults recalled similar amounts of each. The motivational basis for SST (and the need to have resources available to attain one’s goals) has received support from a study by Mather and Knight (2005), who found that older adults who had more cognitive resources (due to better performance on tasks requiring cognitive control in one study and due to not being distracted by a divided attention task in a second study) remembered relatively more positive than negative pictures compared to those with fewer cognitive resources; younger adults showed no such effect. This positivity effect in memory may be driven by effortful, resource-demanding regulatory functions and thus may be shown primarily by high-functioning older adults (Mather & Knight, 2005).

The second perspective on the relation between aging and affect in cognitive domains is more cognitive in nature and focuses on the impact
of changing cognitive skills on the relative influence of affective processes on performance. This perspective is typified by theories such as Labouvie-Vief's (2003, 2005) dynamic integration theory and by neuropsychological approaches that focus on the differential impact of aging on normative changes in cortical systems underlying affective and deliberative processes. In this alternative perspective on aging, affective processes take on increased importance as deliberative functions decline in later life. One basis for this perspective is research suggesting that cortical structures associated with processing affect (e.g., the amygdala, the ventromedial prefrontal cortex) undergo less normative change with aging than those areas underlying executive or deliberative functions (e.g., the dorsolateral prefrontal cortex; Bechara, 2005; Chow & Cummings, 2000; Good et al., 2001). This relative preservation view is supported by neuropsychological data demonstrating that adult age differences in performance were minimal on those tasks thought to be supported by affective-processing systems (e.g., Kensinger, Brierley, Medford, Growdon, & Corkin, 2002; MacPherson, Phillips, & Della Sala, 2002). These data contrast with the normative decline consistently observed on tasks associated with executive functions (for a review, see West, 1996).

This relative preservation view would suggest that maintenance of basic mechanisms associated with processing affect should not lead to qualitative age differences (e.g., positivity effects). Thus, for example, researchers have shown that when participants are required to actively attend to emotional and neutral stimuli, younger and older adults exhibit similar patterns of memory for positive, negative, and neutral stimuli (Denburg, Buchanan, Tranel, & Adolphs, 2003; Kensinger et al., 2002). The relative preservation view would not necessarily preclude the possibility of qualitative differences arising in cognitively later stages of processing.

In sum, research suggested that aging is associated with a greater focus on emotional content and on positive over negative information, although the latter effect appears to be moderated by situational goals and available cognitive resources. These processes are consistent with the model of selective optimization with compensation proposed by Baltes and colleagues (e.g., Baltes & Baltes, 1990), which postulates that the developmentally relevant goal of efficient use of processing resources results in older adults optimizing their best skills, in this case the processing of emotional information. A reasonable hypothesis at this point is that basic mechanisms underlying the processing of affect are relatively unchanged with age, but that variations may emerge at later stages of processing as goal-based factors (e.g., time perspective) or availability of cognitive resources influence the manner in which positive versus negative information is handled.
Implications for Judgment and Decision Making

The study of adult age differences in decision making is still in its infancy. Deliberative declines predict that older adults will demonstrate lower comprehension and use of numeric information, less information seeking, and decision avoidance and delegation (to avoid negative emotions; see Mather, 2006).

An increased focus on affect and emotion (whether a relative preference for positive information or increased use of affective information), however, suggests different age-related changes. Older adults who focus relatively more on positive information may process gain-versus-loss information in decisions differently from their younger counterparts who do not share this same focus. As a result, losses may not loom as large for older adults as they have been demonstrated to do for younger adults (Kahneman & Tversky, 1979). Older adults may be more likely to request and process information presented in a positive frame rather than a negative frame, so older adults may not demonstrate the well-known negativity bias shown by younger adults. Some evidence exists already that is consistent with this expectation (Wood, Busemeyer, Koring, Cox, & Davis, 2005). Strough, Mehta, McFall, and Schuller (2008), for example, demonstrated that older adults were less susceptible to the sunk-cost fallacy, an effect thought to be motivated by negativity biases in younger adults. The age difference remained after controlling for cognitive ability, providing support for the difference being due to emotional changes. Older adults also appear more likely to be in positive moods, states that have been associated with greater engagement in schema-based processing and less-specific, bottom-up processing (e.g., Fiedler, 2001). These age differences in the experience of incidental affect may be misattributed to aging-related deficits in deliberative processes.

Support for a possible positivity effect in decision processes comes from Lockenhoff and Carstensen (2007). In their study, older and younger adults selected information to examine about health choices by clicking on cues indicating information that was positive, negative, or neutral. As predicted, older adults selected and recalled a greater proportion of positive versus negative information compared to younger adults.

Hypotheses based on SST and relatively greater processing of positive than negative information imply that benefit information may be weighed relatively more than risk information in older compared to younger adults. If true, this would have potentially marked implications for consumers’ processing of risk and benefit information about prescription drugs and risky financial choices that contain potential upsides but also marked risks. In one preliminary study, we showed younger and older adults
information about a single prescription drug that had one benefit and two side effects (Peters, Borberg, et al., 2007). Each individual saw one level each of the benefit and side effects (half of the participants were shown high levels of the benefit; half were shown low levels; the same was done for both risks). By using a complete, between-subjects factorial design (2 benefit levels × 2 first-risk levels × 2 second-risk levels), we could then look at age differences in the use of numeric information about the benefit and the two side effects. No age differences existed in sensitivity to either side effect. However, individuals aged 50–88 were more sensitive to the high-versus-low levels of benefits compared to those aged 18–49. In the older age group, individuals shown a prescription with a higher benefit level were more likely to report intentions to use the drug than those shown a lower benefit level; the benefit levels did not influence intentions in the younger age group.

Alternatively, older adults may focus relatively more on affective information overall (both positive and negative information). Several effects on judgments and decisions might be observed if this is the case. First, losses may loom equally large or larger for older adults than for younger adults if both positive and negative information are accentuated. In addition, more affective sources of information such as anecdotal or hedonic (not utilitarian) information may receive greater weight (Dhar & Wertenbroch, 2000; Strange & Leung, 1999). Consistent with this, Blanchard-Fields found that older adults focus more than younger adults on emotional aspects of everyday problems (Blanchard-Fields, Chen, & Norris, 1997). Evidence suggested that less-numerate decision makers use explicit probabilities less and narrative information more than those who are more numerate (Dieckmann, Slovic, & Peters, 2009). Given that older adults are less numerate, it may well be the case that narratives, anecdotes, and other more verbal forms of information will have greater influence on their judgments and decisions.

Finally, incidental sources of affect (positive and negative moods; positive and negative primes) may influence older adults’ judgments and decisions more than those of younger adults. An interesting study by Caruso and Shafir (2006) demonstrated that merely considering one’s feelings has an impact on choices. Younger adult participants asked to consider their mood were more likely to choose a mood-relevant movie (a silly comedy) over a more highly rated dramatic movie compared to participants who had not thought about their feelings. SST suggests that older adults’ feelings are more salient and accessible than are younger adults’ feelings, leading to the prediction that older adults overall may rely more on emotional information when making choices. Thus, older adults should make relatively more choices that are mood relevant. This possibility remains to be tested.
Facilitating Better Decision Making

The science of what age differences in decision making exist and what processes underlie these differences will continue to be developed. Based on what we know today, however, what methods can be used to facilitate better decision making among our nation’s older adults? One obvious possibility that comes directly from Tom Hess’s (2000) work on older adults’ selective use of their deliberative capacity is to increase motivation to use capacity by increasing the relevance and meaningfulness of the decision to the older adult (e.g., increasing personal accountability; Chen, 2004).

A second possibility, based on older adults’ increased reliance on affective information, is to increase the affective meaning of information through how that information is presented. Peters et al. (2009) were interested in the processes by which decision makers bring meaning to dry, cold facts. We attempted to influence the interpretation and comprehension of information about health plan attributes by providing information in a form that can be used easily to evaluate the overall goodness or badness of a health plan. For example, in one of the studies older adult participants were presented with attribute information (quality of care and member satisfaction) about two health plans. The information was presented in bar chart format with the actual score displayed to the right of the bar chart (see Figure 4.1). The information for half of the subjects in each group was supplemented by the addition of evaluative categories (i.e., the category

**Condition 1: Evaluative categories**

![Evaluative categories](image)

**Condition 2: No evaluative categories**

![No evaluative categories](image)

**FIGURE 4.1**
Example of evaluative categories in health plan choices of older adults.
lines plus labels that placed the health plans into categories of poor, fair, good, or excellent). The attribute information was designed such that Plan A was good on both attributes, while Plan B was good on quality of care but fair on member satisfaction. The specific scores for quality of care and member satisfaction were counterbalanced across subjects such that, for half of the subjects, the average quality-of-care scores were higher; for the other half, average member satisfaction scores were higher. We predicted and found that evaluative categories influenced the choices. Specifically, older adults preferred health Plan A more often when the categories were present (Plan A was always in the good evaluative category when the categories were present; see also Mikels et al., under review).

A third possibility based on the age-related declines in deliberative ability is to reduce the cognitive effort involved in processing information or doing some task. Studies have demonstrated, for example, that how information is presented may matter as much as what information is presented (Peters, Dieckmann, Dixon, Hibbard, & Mertz, 2007; Peters, Hibbard, et al., 2007). Showing only the most important information (or highlighting it), making key points easier to evaluate (order, summarize, interpret information), and generally requiring less cognitive effort and fewer inferences (e.g., do the math for them) can help elderly decision makers better understand and better use information.

Given that older adults demonstrate declines in deliberate efficiency and that comprehension and adherence in medical treatment is of great functional importance to them, efforts to aid their comprehension and decisions have focused in part, therefore, on how to support age-related declines in the efficiency of deliberative processes (Hibbard & Peters, 2003). Medication instructions that were well organized, explicit, and compatible with preexisting schemas about the task improved memory and were preferred over other formats, suggesting that they could improve medication adherence (Park, Willis, Morrow, Diehl, & Gaines, 1994). The use of external memory supports such as organizational charts and medication organizers have also been shown to be beneficial to older adults’ adherence behaviors (Park, Morrell, Frieske, Blackburn, & Birchmore, 1991; Park, Morrell, Frieske, & Kincaid, 1992). Older adults demonstrated effective use of memory aids. They appeared to spontaneously use them to summarize or check information at the end of information search, as if to verify forgotten information, whereas younger adults appeared to use these same aids in the middle of a search, as if for planning rather than memory purposes (Johnson, 1997).

Finally, rather than reducing the cognitive effort involved, some methods may actually increase flexibility in processing information in decisions. Isen (2000) has shown that individuals induced into more positive moods (compared to neutral moods) process information more systematically
if it helps them maintain their positive mood. Positive mood inductions also tend to lead to more creative and efficient decisions (Forgas, 1995; Isen, 2000; Mano, 1992). Such methods have not been tested with older adults, however. As a result, a study was conducted with older adult subjects (Carpenter, Peters, Isen, & Västfjäll, 2010). In the task, subjects were induced into a positive mood with a gift of candy; the rest received no gift. Subjects then completed a computer-based card task in which they won and lost money based on their choices. In the computer background, positive-mood subjects saw smiling suns; neutral-mood subjects saw control circles. Individuals in the positive-mood condition chose better from both gain and loss decks than neutral-mood subjects, suggesting that positive mood facilitated processing overall rather than highlighting positive information only in a mood-congruency effect. Concurrently, the positive-mood manipulation was associated with an increase in cognitive capacity (working memory; see also Yang & Isen, 2006). Understanding how affective processes influence cognitive flexibility and decision making may help researchers and policy makers improve how they present complex health, financial, and other important decisions to older adults.

Conclusion

In conclusion, older adults will process information in ways that are likely to be different from younger adults. Robust declines in deliberative capacity suggest that older adults will make worse decisions than younger adults in some situations. Deliberative decline is likely to be too simple a story, though, for three reasons. First, older adults appear to use their deliberative capacity selectively. Second, accumulated experience can compensate in part for age-related declines. And third, emotional focus appears to increase with age. As a result, older adults will make better decisions than younger adults in some situations.

Older adults, however, are faced with more decisions about vital health, financial, and other personal issues. At the same time, their proportion of the consumer population is growing, but our nation's resources are not necessarily growing with them. As a result, understanding ways to facilitate decisions of those who have attained more advanced ages may not only provide individual advantages for the older adult but also ultimately may prove beneficial to the population at large. At present, however, most research results (and advice) are based primarily on younger adults, and older adults, in all of their complexity, have been largely ignored.
Acknowledgments

This work was supported by grants from the National Science Foundation to the author (0517770 and 0339204). It is based in part on an earlier article (Peters, Hess, Västfjäll, & Auman, 2007). © 2007 John Wiley & Sons. Reprinted with permission.

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