

# Affective Processes in Decision Making by Older Adults

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The rate of increase in the older adult population is "unprecedented, without parallel in human history—and the twenty-first century will witness even more rapid aging than did the century just past" (United Nations, 2005). By 2050 the number of older persons (60 years and older) will surpass the number of younger persons (under age 15) for the first time in history. The fastest growing age group in the world is the oldest old (age 80 and older). Given the growth of the older adult population and the importance of judgment and decision processes to independent functioning in everyday life, understanding the mechanisms that underlie the judgments and decisions of older adults can help us to identify decision situations where they may be vulnerable and ways in which their decisions may be helped. Although early research pointed towards improvements in everyday problem solving with age (Cornelius & Caspi, 1987), a recent meta-analytic review suggests that, in general, decision quality declines from early/middle adulthood (these groups showed equivalent problem solving) to late adulthood (Thornton & Dumke, 2005). This age difference was substantially less in interpersonal compared to instrumental domains and for highly educated older adults.

Historically, judgment and decision making research focused primarily on explanations that involved conscious, deliberative processing of information (e.g., reason-based choice, Shafir, Simonson, & Tversky, 1993). More recent research (conducted primarily with younger adults) has highlighted the importance of affective and emotional processes in decision making. In both historical and more recent research, studies involving older-adult subjects are quite sparse, with researchers focusing their efforts on how younger adults (and usually college sophomores) judge and decide. Some recent reviews have started to examine this sparse literature (Mather, in press; Peters et al., 2000; Peters, Hess, Auman, & Västfjäll, in preparation; Yates et al., 1999).

In this paper we review evidence for the role of affect in younger-adult decision making, review two representative life-span theories with relevant predictions for older adult decisions, and then review available evidence (guided by predictions from life-span theories) of how older adults make decisions by experience and decisions by description.

## Affect and Emotion in Decision Making By Younger Adults

Information in decision making appears to be processed using two different modes of thinking: affective/experiential and deliberative (Epstein, 1994; Loewenstein et al., 2001; Reyna, 2004; Sloman, 1996; also called System 1 and 2, respectively, Stanovich & West, 2002; Kahneman, 2003). 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, and one of its primary functions is to highlight information important enough to warrant further consideration. As shown in a number of studies, these affective feelings provide both meaning and motivation to choice processes (Damasio, 1994).

The deliberative mode 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) suggests that one of the functions of this system is to monitor the quality of information processing and its impact on behavior (e.g., from the experiential mode). Both modes of thinking are important and 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 (Damasio, 1994).

In the present paper we focus mostly on the role of affect, but we consider deliberative (System 2) influences as well because of the interdependence of the two systems. Affect can help or hurt the quality of decisions, depending on the situation. It can be relevant to the decision at hand (e.g., your feelings about circuses have been learned through repeated experiences), in which case it is termed integral affect. Integral affect is defined as positive and negative feelings towards an external stimulus (e.g., a consumer product). These feelings can become associated with an object 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). Affect can also be irrelevant to a decision (e.g., a temporary mood state), but influence the decision nonetheless; this affect is termed incidental affect.

## Integral Affect

In research with brain-damaged patients (Bechara, Damasio, Damasio, & Anderson, 1994; Bechara, Damasio, Tranel, & Damasio, 1997; Bechara, Tranel, Damasio, & Damasio, 1996; Damasio, 1994), Bechara and his colleagues linked the learning of integral affect to better 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. However, unlike the normal controls, the patients were unable to use these affective experiences to learn an integral affective response linked to each deck (Bechara and colleagues call the integral affective response “somatic markers”). 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 demonstrated abnormal affective anticipatory reactions but normal cognitive capabilities. Peters and Slovic (2000) demonstrated that college students high in negative reactivity learned to choose fewer high-loss options in a modified Iowa Gambling Task while those high in positive reactivity learned to choose more high-gain options, thus supporting the notion that affective reactions are used in the decision-making process. Damasio (1994) argued that anticipatory affective responses increase the accuracy and efficiency of the decision process, and their absence (e.g., in the brain-damaged patients) degrades decision performance.

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

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 mental resources are limited as with time pressure (Finucane, Alhakami, Slovic, & Johnson, 2000).

Integral affect has at least four functions in the decision-making process (Peters, in press; Peters, Lipkus, & Diefenbach, in press). First, it can act as *information* (as a substitute for other, more relevant information; Kahneman, 2003) in judgments such as life satisfaction (Schwarz & Clore, 1983). Second, it can act as a *common currency* allowing us to integrate multiple pieces of information more effectively than when it is absent. Third, it can act as a *spotlight* focusing us on different information — numerical cues, for example; this new information is then used in judgments rather than the affect itself. Finally, affect can *motivate* us to take some action or process information.

Affect can be a "direct hit" when the decision maker is familiar with the object (e.g., a somatic marker learned through experience, a reaction to a snake or a familiar smell from childhood, a picture of an old friend). According to Zajonc (1980), all perceptions contain some affect. "We do not just see 'a house': We see a handsome house, an ugly house, or a pretentious house" (p. 154). He later adds, "We sometimes delude ourselves that we proceed in a rational manner and weight all the pros and cons of the various alternatives. But this is probably seldom the actual case. Quite often 'I decided in favor of X' is no more than 'I liked X' . . . We buy the cars we 'like,' choose the jobs and houses we find 'attractive,' and then justify these choices by various reasons . . ." (p. 155).

Affect also, however, can be calculated through deliberation. In a series of studies with younger adults, Peters, Västfjäll, et al. (in press) examined the role of numeracy or number ability in decision making. They found that highly numerate individuals were able to draw more and more precise affective meaning from numbers and numerical comparisons. While generally helpful, this sometimes leads to worse judgments. The less numerate were influenced more by competing, irrelevant affective considerations (they were more influenced by affect as a direct hit). Even after controlling for a measure of intelligence, actual numerical ability appeared to matter to judgments and decisions in important ways. The high numerate were able to transform numbers from a given numerical format to an equivalent one; they were also able to "calculate"

affective reactions from numbers in ways that influenced their decisions. The low numerate appeared to be left with information that was less complete and less understood, lacking in the complexity and richness available to the more numerate. Older adults have less numerical ability in pilot studies we have conducted thus far. If Paulos (1988) is correct, then older adults' greater innumeracy may result in confused personal decisions and an increased susceptibility to pseudoscience. This is an open research question, however.

Affective meaning can also be drawn from how information is represented. Hsee (1998) found that an overfilled ice cream container with 7 oz. of ice cream was valued more highly (measured by willingness to pay) than an underfilled container with 8 oz. of ice cream when the options were evaluated separately. This “less is better effect” reversed when the options were juxtaposed and evaluated together. Thus, the proportion of the serving cup that was filled appeared to be more evaluable (in separate judgments) than the absolute amount of ice cream. Using the “evaluability” principle, Peters, Västfjäll, Slovic, and Hibbard (in preparation) examined whether highlighting the affective significance of information would influence the health-plan choices of older adults more than younger adults. In an initial study, younger and older adults were presented with identical 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. The information for half of the subjects in each group was supplemented by the addition of affective categories (i.e., the health plans could be categorized as poor, fair, good, or excellent on the basis of these categories). 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. It was found that affective categories influenced the choices of older adults but not younger adults. Specifically, older adults preferred health plan A more often when the categories were present (plan A was always in the good affective category when the categories were present). Affective categories did not significantly impact choices among younger adults. It appeared that younger adults (and older adults higher in speed of processing) could “calculate” affective meaning from the numbers on their own so that the affective-categories manipulation impacted their choices very little.

## **Incidental Affect Including Mood**

A substantial body of research suggests that affect which is incidental or unrelated to the target or option under consideration (e.g., a positive or negative mood or an affective prime) can have systematic effects on many everyday judgments and decisions that are similar to three of the four functions of integral affect reviewed above (Forgas, 1995; Schwarz, 2001). In general, three broad categories concerning how mood influences decision making have been identified in younger-adult populations (Raghunathan & Pham, 1999). First, current mood may influence the content of people's thoughts in a mood-congruent manner (Bower, 1981; Wright & Bower, 1992). For instance, participants in a positive mood may more easily recall positive memories, while negative-mood participants more easily recall negative memories (Forgas, 1995); this is similar to integral affect's role as a spotlight that shows different moods will highlight different information. Second and similar to integral affect's role as a motivator, research has shown that positive and negative moods may influence behavioral predispositions and motives for action (Raghunathan & Pham, 1999) or processing capabilities (Luce, Bettman, & Payne, 1997). For instance, happy individuals often tend to process information in a less elaborated and systematic manner than do people in a negative mood (Isen, 2000). Happy people also tend to be more creative and efficient in their decisions (Isen, 2000; Mano, 1992; Forgas, 1995). In general, happy individuals may avoid negative events and outcomes in order to maintain their positive mood state (Isen, 2000). Other research suggests that positive mood may be used as a resource or psychological buffer to cope with self-relevant negative information (Raghunathan & Trope, 2002). This appears to be a specific variant of the function of affect as a motivator proposed by Peters (in press), in which positive affect may motivate approaching a specific goal such as a necessary but difficult task or a tough choice. Finally, the mood-as-information view assumes that when people make evaluative judgments they do not consult all available information but, instead, rely on their affective reaction to the object (Clore et al., 2001; Schwarz, 2001). People ask themselves "how do I like the object?" and, while doing so, monitor their own feelings. Current mood may then be misattributed as integral affect to the target and used as information in evaluative judgment.

Affect, whether integral or incidental to the decision target, appears to have a profound effect—both deep and subtle—on judgments and choices. Decision makers are not necessarily aware of, nor able to control, its influence on thoughts or behaviors.

Although affective and deliberative processes in decision making are interdependent as can be seen in the functions of affect and the work on numeracy and decision making, they also appear to be separable (e.g., Epstein, 1994; Petty & Wegener, 1999; Zajonc, 1980). While the hallmark of good decision making is generally believed to be one of increasing deliberation (if I can only think for longer or better, then I could make a better decision), deliberation in some contexts 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, Chun, Erb, Pierro, Mannetti, & Spiegel, 2003). 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 et al. (2000) also found that the inverse relation between risks and benefits (linked to affect by Alhakami and Slovic, 1994) was enhanced under time pressure. Reducing the time for deliberation appeared to increase the use of affect and the affect heuristic. We link this balance between affect and deliberation to age differences in information processing and decision making in the next sections.

### The Construction Of Preferences

The construction of preferences occurs with input from both the affective and deliberative systems. How individuals make decisions (what decision strategies they select to use) and what they choose is highly contingent on the properties of the decision problem and on characteristics of the individual decision maker at the moment of the decision (cognitive and affective abilities, stable personality traits, more ephemeral moods). In the next section, we will briefly review two life span theories that are related to how older versus younger adults might process information in decisions.

### Processing of Affective and Emotional Information across the Life Span

Prominent life-span theories associate adult aging with the continued development of cognitive and motivational processes relevant to the processing of affective information in judgments and decisions. There appears to be a complex interplay between cognitive development, motivational changes, and aspects of the situation such as the extent of arousal and cognitive resources required. We review two life-span theories, socioemotional selection theory

(SST; Carstensen, 1993) and dynamic integration theory (DIT; Labouvie-Vief, 2005) that represent theories based on motivational changes (SST) and cognitive decline (DIT).

### **Is Affect Resilient to or Enhanced by Aging?**

It is generally accepted that aspects of deliberative processing (e.g., speed of processing, performance on explicit tasks) decline with age just as the green color fades from the leaves of trees in autumn. As a result, age differences should appear in judgments and decisions requiring deliberation. The role of affect is somewhat less clear. Affect may be like the orange and yellow colors of fall leaves. These colors “appear” strongly as the green fades; in actuality, the orange and yellow colors are mostly unchanged from earlier in the season but are no longer hidden by the green. Just as orange and yellow colors are resilient to the changing season, affect may be resilient to the aging process such that no age differences will emerge on tasks that primarily involve affect. Older adult decisions would be influenced more than those of younger adults, however, on tasks involving both affect and deliberation because affect may become relatively more influential as deliberative abilities decline. This hypothesis is consistent with Labouvie-Vief's dynamic integration theory. See the upper half of Figure 1 for a simplified illustration of this resiliency hypothesis.

A second possibility, consistent with an age-related increase in the importance of and attention paid to affective information (SST; Carstensen, Isaacowitz, & Charles, 1999), is that affect's influence on judgments and decisions may increase with age (this simplified enhancement hypothesis is shown in the lower half of Figure 1). Socioemotional selectivity theory predicts that aging leads to motivational shifts that direct attention to emotional goals and thus to a greater monitoring of emotional information. The hypothesized enhancement process is analogous to the red color that develops from the glucose in autumn tree leaves.

Both theories leave open the possibility that the processing of positive information may be relatively more enhanced while that of negative information remains stable or declines with age.

This analysis assumes affect as a direct hit. In other words, affect is associated with an object based on previous learning. Then, when considering the object, the affective reaction is elicited (e.g., a somatic marker) and influences judgments and decisions in a relatively direct



way. As pointed out in the earlier discussion on numeracy, affect can also be calculated, for example, through a comparison of numbers. No published studies exist, to the best of our knowledge, about this aspect of affective processing across the life span. As a result, we will focus on the role of affect and emotions as a direct hit in judgments and decisions in this paper.

## **Socioemotional Selectivity Theory**

Carstensen (1993) posits in her socioemotional selectivity theory (SST) that emotional goals become increasingly important as the end of life nears due to motivational shifts that direct attention to these emotional goals and thus to a greater monitoring of affective information. Because older adults are, by virtue of age, closer to the end of life, then age should be associated with an increased importance of emotional goals, increased attention to emotional content, and an increased focus on positive information that can be used to optimize emotional experience. These latter two predictions potentially have great relevance to the impact of affect and emotions in judgment and decision making.

Recent empirical work has shown that aging is associated with an increase in attention to emotional content. For example, Carstensen and Turk-Charles (1994) had adults in four different age groups (20-29, 35-45, 53-67, and 70-83) read and recall stories containing both neutral and emotion-laden content. Examination of the data revealed a linear decline across the four age groups in recall of neutral content with age, but stability in recall of emotional content. Thus, older adults recalled relatively more emotional content than neutral content, supporting their contention that there was a shift in the nature of the memory representation toward disproportionate retention of emotional information. Fung and Carstensen (2003) examined memory for advertisements and found that older adults exhibited greater preference for the emotional advertisements than did younger adults. In addition, memory for advertisements with emotional appeals comprised a greater proportion of the total information remembered in older adults compared to younger adults.

SST, however, also predicts a specific focus on positive information in later life as older adults seek to optimize emotional experience. A recent fMRI study by Mather et al. (2004) obtained findings consistent with this prediction. Specifically, older adults (compared to younger adults) had disproportionately greater activation in the amygdala in response to positive versus negative information, suggesting an age-related shift in processing styles. Several behavioral

studies of memory are also consistent with this expectation. For example, Charles, Mather, and Carstensen (2003) found overall picture recall to decline with age, but older adults recalled a greater proportion of positive images than negative images, while young and middle-aged adults recalled similar amounts of each. Mather and Carstensen (2003) found that, relative to younger adults, older adults exhibited a disproportionate attentional bias in favor of faces depicting positive emotions over those depicting negative emotions. This attentional bias was also reflected in their superior memory for positive faces over neutral or negative faces; no such effect was observed for younger adults. Mather and Johnson (2000) also examined source memory for positive and negative features of selected and unselected options in a decision-making task (e.g., choosing between job candidates). They found that older adults were more likely than young adults to have accurate memory for positive over negative features of the selected options and negative over positive features of the unselected options. Importantly, this aging-related bias was present when overall level of memory performance was controlled, and younger adults exhibited a similar bias when asked to focus on the emotional content of their choices. These findings suggest a motivational shift in processing rather than a deficiency in deliberative processes. Similar age differences appear in incidental mood states. Older adults tend to be in more positive and less negative mood states compared to younger adults (Mroczek, 2001).<sup>1</sup>

## Dynamic Integration Theory

According to Labouvie-Vief's (2003) dynamic integration theory of adult development, these same effects are explained by age changes in a dynamic balance between processes of affect optimization (of happiness) and affect differentiation (the ability to tolerate negativity in order to maintain objective representations). The positivity bias is explained as a reflection of an age-related limitation in cognitive resources with an adaptive shift to less resource-demanding positive affect rather than a motivational change as Carstensen suggests. The focus on positive

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<sup>1</sup> It may be, however, that the effects found by Carstensen and colleagues are based in controlled processing of affective information rather than qualitative changes in cortical structures associated with aging. For example, the positivity biases in memory observed in older adults tend to occur only in situations where participants are not required to attend to all stimuli. In such cases, older adults appear to focus on positive and ignore negative information. When participants are required to process each piece of information presented to them, no age differences emerge in the impact of valence on memory (e.g., Comblain, D'Argembeau, Van der Linden, & Aldenhoff, 2004; Denburg, Buchanan, Tranel, & Adolphs, 2003; Kensinger, Brierly, Medford, Growdon, & Corkin, 2002). Mather et al. (2004), however, reported reduced amygdala activation in older adults while viewing negative images, implicating early attentional processes that require few resources.

emotional information may minimize demands on resources (Gross et al., 1997). Negative emotions (e.g., anger, frustration) are energy and resource consuming (Mroczek & Kolarz, 1998) and older adults' declining cognitive resources may lead to a gating out of negative information and other sources of negative emotion. This same cognitive decline is also used to explain an age-related increase in the disruptive influence of emotionally arousing stimuli and thus the increased attention to emotional content and other automated processes and the degradation of complex representations. Wurm, Labouvie-Vief, Aycock, Rebucal, and Koch (2004), for example, found that the higher the emotional arousal of words, the longer it took older adults to indicate the color of the words; no such effect was found for younger adults.

### **Application and Ambiguities of Life-Span Theories to Decision Making**

Given what we know about changes in information processing across the life span, what predictions can we make and what ambiguities remain? The first prediction would be that emotional information in some form will matter more in the judgments and decisions of older adults compared to those of younger adults. The second prediction is that, if an age-related effect exists, it will be due either to a motivational shift or to cognitive decline. The similarities and differences between these lifespan theories leave us with two ambiguities, however.

First, under what conditions will a positivity effect emerge with age as opposed to a greater general influence of affect? Wurm et al. (2004) suggest that valence and a positivity effect may emerge in tasks that are less resource demanding so that attention can be directed to valence.<sup>2</sup> In their studies, older adults (but not younger adults) showed a larger Stroop effect for emotion words that were higher in arousal. In other words, older adults took longer to name the color of high arousal emotion words compared to low arousal emotion words; younger adults showed no such arousal effect. The age effect was similar for both positive and negative words, and they suggested that this may be due to a task design that required significantly more cognitive resources compared to previous studies that did find a valence effect (but LeClerc & Hess, 2004, found no age differences in a similar Stroop task). Wurm et al. also suggested, however, that the positivity bias found in previous studies (e.g., Charles et al., 2003) may be due to the negative stimuli being higher in arousal compared to the positive stimuli so that older

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<sup>2</sup> Mather et al. (2004), however, reported reduced amygdala activation in older adults while viewing negative images, implicating early attentional processes that require few resources.

adults gated out the negative stimuli. More empirical tests are needed to identify conditions consistent with a positivity bias versus a more general influence of affect arousal.

The second ambiguity concerns whether these effects are due to improved emotional regulation with age and an increased focus on emotional goals or to cognitive decline with aging and a disintegration of emotion regulation that results in a dampening of negative affect and a maximization of positive affect. According to SST, it is the perception of time left in life that causes future concerns to decline in importance while goals concerning emotional satisfaction and meaning become more important. These goals then are linked to greater emphasis on emotional dimensions and a positivity bias in older adults, younger adults under experimental conditions in which time is limited, and younger adults who are facing the end of their lives. The emotional focus disappeared in older adults asked to imagine an expansive future (Mather & Carstensen, 2003; Fung, Carstensen, & Lutz, 1999; Carstensen & Fredrickson, 1998).

Affect optimization and differentiation in older adults (e.g., Labouvie-Vief & Márquez González, 2004), however, predicts that the increased focus on emotional information and positivity bias emerges instead from compensatory processes of cognitive decline. Wurm et al. (2004), for example, found that more arousing information disrupted older adults' performance in Stroop tasks more than that of younger adults. Labouvie-Vief (2005) frames an important hypothesis, specifically that "older adults should have difficulty dealing with highly arousing information, especially if such information has not yet been integrated into well-established schemas" (p. 200). In some decision situations stronger intensity affect and emotions may act more like a cognitive load on older versus younger adults. In addition, declines in cognitive-affective complexity in older adults were associated with increases in optimization strategies, lending support to the compensatory explanation (Labouvie-Vief, Zhang, & Jain, 2003 as cited in Labouvie-Vief & Márquez González, 2004). To adequately test this explanation though, one would need to demonstrate that declines in the experience or processing of negative affect and increases in that of positive affect were associated with declines in cognitive resources among the elderly. Studies in neither tradition, however, have reported such a finding.

In sum, research suggests that aging is associated with a greater focus on emotional content and (under some conditions) on positive over negative information. These processes are consistent with SST and dynamic integration theory. They are also consistent with the selective

optimization with compensation (SOC) model of P.B. Baltes and colleagues (e.g., Baltes & Baltes, 1990) that 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. The responsible mechanism, however, is not clear.

#### Implications Of Age-Related Changes In The Role Of Affect And Emotions On Decisions

A preference for positive information or increased use of affective information has marked implications for judgments and decision making. Older adults who focus relatively more on positive emotional information may process gain versus loss information in decisions differently than their younger counterparts who do not have this positive focus. As a result, losses may not loom as large for older adults as has been demonstrated for younger adults (Kahneman & Tversky, 1979). Older adults may be 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).

Alternatively, older adults may focus relatively more on emotional 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 younger adults as 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 (Strange & Leung, 1999; Dhar & Wertenbroch, 2000). Consistent with this, Blanchard-Fields finds that older adults focus more than younger adults on emotional aspects of everyday problems (Blanchard-Fields, Chen, & Norris, 1997). 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 (in press) demonstrated that merely considering one's feelings impacts 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 younger adults' feelings, which leads 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.

In the present paper we categorize types of judgment and decision tasks, analyze the results of available age-difference studies with respect to whether the studies demonstrated increases, decreases, or no changes in the relative weights of positive, negative, or emotional information (both positive and negative) in judgments and decisions. Finally, we examine whether the available evidence was more consistent with cognitive decline (Labouvie-Vief's hypothesis), motivational changes (socioemotional selectivity theory), or neither. In many cases, we find that interesting hypotheses exist concerning age differences in specific types of decisions and decision processes without any relevant published studies.

## **Decisions By Experience**

Aging-related changes might be different in choices learned from experience than in choices that are merely described. Fisk and Rogers (2000), for example, reviewed evidence that decisions in well-learned environments (e.g., driving) are preserved with age. Other studies have demonstrated more consistent decisions for older compared to younger adults, particularly in domains where both groups have expertise (Tentari, Osherson, Hasher, & May, 2001; Kim, Goldstein, Hasher, & Zacks, in press). In an experiment with younger adults, Weber, Shafir, and Blais (2004) hypothesized and found that the encoding and use of outcome and likelihood information was different when decision options were merely described (as is common in most studies of judgment and decision making) versus when option characteristics were learned through experience. Decisions by experience have been linked to affective processes. One of a large number of “dual-process” theorists, Seymour Epstein (1994) has observed:

“The experiential system is assumed to be intimately associated with the experience of affect, . . . which refer[s] to subtle feelings of which people are often unaware. When a person responds to an emotionally significant event . . . the experiential system automatically searches its memory banks for related events, including their emotional accompaniments . . . If the activated feelings are pleasant, they motivate actions and thoughts anticipated to reproduce the feelings. If the feelings are unpleasant, they motivate actions and thoughts anticipated to avoid the feelings.” (p. 716)

We should expect, therefore, to find larger age differences in decisions by experience, either for positive events or for both positive and negative events. There is some evidence against this prediction, however. A second finding supported in numerous studies with younger

adults is that less frequent events (e.g., a 10% chance of an event occurring) are overweighted relative to their objective probability of occurrence and more frequent events are under-weighted (Kahneman & Tversky, 1979). Hertwig, Barron, Weber, and Erev (2004) demonstrated that younger adults did overweight less frequent events as expected in decisions by description; however, they underweighted less frequent events in decisions by experience. This difference was explained by chance fluctuations in encountering rare events in experience. Hertwig et al. speculated that this may be due to working memory limitations and the forgetting of less frequent events. Therefore, we expect that, compared to younger adults, older adults will overweight affective events in decisions by description, but in decisions by experience the presence of infrequent events will create alternative effects.

In the absence of infrequent events, life-span theories predict either a relative overweighting of positive information (in which case positive options will be learned faster and negative options will be learned slower and therefore both types will be chosen more often) or an overweighting of emotional information in general, leading to superior learning and decisions among affectively-charged stimuli. In a related study, Hess, Pullen, and McGee (1996) examined adult age differences in the ability to learn about a prototypical group member from descriptions of group members and nonmembers. Despite claims that “it is well established that older people tend to learn more slowly than do younger ones” (Fisk & Warr, 1998, p.112), older adults performed better than younger adults in abstracting a prototype based on affective information, providing support for an overweighting of emotional information. The authors argued that the greater controlled processing abilities of younger adults interfered with their ability to abstract the affective information.

These findings suggest that in choice tasks that involve learning through experience, emotional information should be more salient to older adults, thus improving their ability to abstract and use it in choice despite cognitive declines. Evidence in favor of such an explanation comes from studies examining performance using tasks such as the Iowa Gambling Task (IGT) and other similar tasks (Damasio, 1994), where age differences are often observed to be absent (e.g., MacPherson, Phillips, & Sala, 2002; Kovalchik, Camerer, Grether, Plott, & Allman, 2005; however in Denberg, Tranel, & Bechara, 2005, a subset of older adults performed significantly worse). 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; subjects learn about the decks as they choose and receive feedback after each choice. Performance in this task appears to be based more on implicit processes because normal adults could make good choices prior to conscious awareness of what good and bad choices were. Denberg et al. (2005) found that a subset of older adults made particularly poor choices, but none of their cognitive measures could explain the difference between older adults who made good and bad choices. In addition, individuals with superior memory and IQ did not show better knowledge of the task constituents (Damasio, 1994). Peters (1998; Peters & Slovic, 2000) also showed that performance on this task was based in part on affective processes by showing that scores on self-report measures of affective reactivity were associated with choices made by college-student participants in the original and modified versions of the task. Wood, Busemeyer, Kolling, Cox, and Davis (2005) found that older and younger adults performed equally well on the original version of the gambling task but, using a theoretical decomposition of the task, that younger adults relied more on memory processes while older adults relied more on an accurate representation of gains and losses in the task. This suggests that the relative preservation of affective processes in older adults enabled them to compensate for losses in deliberative processes. In preliminary analyses Peters (in preparation) also found that older adults performed at least as well as younger adults on her modified version of the task. Of great interest, in the older adult group a positive correlation emerged between age and the number of selections from the good (high expected value) decks. Specifically, the older of the old adults made more good choices than the younger of the old adults overall and in the first 20 card selections, providing some of the first evidence that an increased focus on affective information may improve choices in some situations. Finally, older adults, once they have learned a payoff structure, appear to perform less well than younger adults if that payoff structure changes unexpectedly, at least when abstract gains and losses are used (Mell, Heakeren, Marschner, Wartenburg, Villringer, & Reischies, 2005).

This same IGT-type task can be used to examine the negativity bias. Wood et al. (2005) examined model parameters from their theoretical decomposition and concluded that older adults, unlike the younger college students, did not show a negativity bias. Because gains and losses are confounded in the original IGT, they could not base their conclusion on actual choices. Using Peters and Slovic's (2000) modified IGT that unconfounded gains from losses, Peters (in



preparation) found no age difference (between college students and older adults) in choices among gains versus losses.

## **Decisions By Description**

*Probability.* Recent decision research has demonstrated a neglect of probabilities for affective outcomes (Rottenstreich & Hsee, 2001). If age differences exist such that older adults weigh positive outcomes more, negative outcomes less, or all affective outcomes more, then we may observe greater probability neglect for positive outcomes, less probability neglect for negative outcomes, or more probability neglect for all affective outcomes, respectively.

Research on cautiousness and stereotypy that have involved actual rewards for behaviors have shown no significant age differences in cautiousness (i.e., younger and older adults showed similar risk taking throughout the task) or in overall performance (i.e., rewards gained; Okun & Elias, 1977). For example, Okun and Elias (1977) had older and younger adults participate in a vocabulary task that involved varying degrees of risk with a payoff structure that varied either directly or inversely with risk. In contrast to prior research using constant payoff structures, the results did not indicate that older adults were more cautious than young adults. Both age groups were equally sensitive to the payoff structure and overall expected value. Similar results were found in a more recent study in which both older and younger adults took fewer risks as the level of risk increased in a card game of “21” (Dror, Katona, & Mungur, 1998). In decisions by description (each deck is described to participants but no feedback is provided), older and younger adults also learn probabilistic information equally well (Sanford, Griew, & O’Donnell, 1972; Chasseigne, Grau, Mullet, & Cama, 1999). Deakin, Aitken, Robbins, and Sahakian (2004) found that older adults (compared to younger adults) bet less and showed less of a tendency to bet more when the likelihood of winning was higher and the likelihood of losing was lower in the Decision-Gamble Task (Rogers et al., 1999). While the Deakin et al. results are consistent with greater probability neglect of affective outcomes among older adults, it was unclear whether older adults’ slower processing speed may have played a role in creating this result. The bulk of the research points towards no age differences in reactions to probability as the result of gains and losses. However, with the exception of Okun and Elias (1977), real rewards and losses were not used, and thus the experienced outcomes may have all been relatively nonaffective.

*Value.* Prospect Theory (Kahneman & Tversky, 1979) predicts that the processing of information about probabilities and consequences does not follow normative economic theory but is driven by perceptual and attentional mechanisms common to all individuals. It predicts that decision options (or prospects) are evaluated in terms of subjective values and likelihoods. The value function is used to describe behaviors ranging from diminishing marginal consequences to the negativity bias or loss aversion (losses loom larger than the equivalent gains) to framing effects. These predictions are illustrated in the S-shaped value function that is concave in the domain of gains and convex (and steeper) in the domain of losses. Robust findings with younger adults (illustrated by the S-shaped value function of Prospect Theory) indicate that losses tend to loom larger than gains, a negativity bias. As a result, decision makers tend to be more risk-seeking in choices among possible losses and risk averse when choosing among possible gains. Findings consistent with lifespan theories suggest that the negativity bias in older adults may be different from younger adults in any of three ways (Peters, Hess, et al., in preparation).

First, the bias may be enhanced as emotional information in general becomes more salient. In this case, Prospect Theory's value function for older adults should reflect a steeper curve near the origin for both gains and losses that reflects more feeling-based processing. This modification to the parameters of Prospect Theory would predict that older adults would be more risk seeking in losses and more risk averse in gains. Alternatively, if positive information only is weighed more then only more risk aversion in gains would be predicted. If negative information is gated out (and not experienced in order to maintain positive moods), then the shape of the value function in the domain of losses should be more linear and less risk seeking in losses compared to younger adults. We call these three alternatives an emotion bias, a positivity bias, and a lack of negativity bias. Three relevant studies have been conducted and show inconsistent age results. Lauriola and Levin (2001) found results consistent with an emotion bias. Specifically, older adults demonstrated both greater risk aversion in gains and greater risk seeking in losses. Weber et al. (2004) did a meta-analysis of decisions described to study participants (no feedback was experienced) and found that increasing age (age ranges were not specified in their paper) was associated with greater risk seeking (more choices of a gamble over a sure thing) in losses; they did not, however, find a link between increasing age and risk aversion (more choices of a sure thing over a gamble) in gains (suggesting no age-related

changes in the domain of gains). Holliday (1988), however, found no age differences from 20-76 years old in choices between gambles and sure things for gains or losses.

Loss aversion is also used to explain the “endowment effect”. In these studies, subjects are either endowed with a good and asked the minimum amount for which they would sell it, or they are asked the maximum amount for which they would be willing to buy it. Sellers tend to require much more money than buyers are willing to pay (Thaler, 1980). The effect appears to be larger when real money is involved, and it has been linked to affective processes (Peters, Slovic, & Gregory, 2003; Lerner, Small, & Loewenstein, 2004). Older adults, if they generally rely more on feelings, should exhibit a stronger endowment effect and their prices may be influenced more by incidental affect such as moods. Kovalchik et al. (2005) found no endowment effect for older or younger adults. Their methodology, however, appeared to maximize the amount of deliberation in this task and therefore may have minimized the role of feelings that have been found to be important to this effect (Peters et al., 2003). No other age-difference studies of the endowment effect could be located.

These predictions can also be tested within the domain of framing effects in which the same decision problem is “framed” or described in a positive or negative format. In a famous example, McNeil, Pauker, Sox, and Tversky (1982) elicited different medical treatment choices by describing the likelihood of the outcome in terms of survival (a positive frame) or mortality (a negative frame). Presumably because 90% survival is less threatening than a 10% chance of death, patients *and* experienced physicians chose the surgery option substantially more often in the positive survival than the negative mortality frame.

If a general emotion bias is evident, then the negativity bias should be enhanced and older adults should produce stronger framing effects relative to younger adults, leaving them more vulnerable to possible manipulation through intentional or nonintentional framing. In support of this interpretation, framing effects were larger for undergraduate participants low in deliberative thinking (Smith & Levin, 1997). In addition, Bennett (2001) linked larger framing effects to the addition of emotion-laden visual portrayals. Three studies concerning age differences in framing effects showed opposing results with one finding that older adults demonstrated significantly stronger framing effects while the other two found no age difference in the effect of frames (Kim et al., in press; Mayhorn, Fisk, & Whittle, 2002; Rönnlund, Karlsson, Laggnäs, Larsson, &

Lindström, 2005). This issue deserves further attention. While the Rönnlund et al. study had a small sample size ( $N = 32$  per condition), sample sizes provided adequate power in the other two studies, and opposing results were found nonetheless.

*Time Preferences.* Decisions made in the present have outcomes that occur in the future. Several lines of research have hypothesized that time preferences change over the life span. For instance, Trostel and Taylor (2001) suggested that the pleasure of consumption declines over the lifespan, resulting in a devaluation of future experiences. In contrast, Sozou and Seymour (2003) suggested that older adults may discount less than younger adults<sup>3</sup> since they learned through experience that the environment is safe enough to allow fewer immediate small rewards in favor of distant larger gains. At the same time, Sozou and Seymour acknowledge that older adults' time preferences may shift as health and perceived time decline. They suggest that the net effect of these two processes over the life span is that discounting decreases until middle age after which it increases markedly. This effect is consistent with SST in that it suggests that in old age, when time is perceived as limited, short-term benefits become relatively more important (Lang & Carstensen, 2002).

Read and Read (2004) found that older adults (75-89 years old) discounted more and were less likely to choose a larger sum later and instead preferred a smaller sum sooner compared to middle-aged and younger adults in tasks involving choices between monetary outcomes. The effect was especially strong for outcomes with longer delays suggesting that as people age they view the prospect of attaining pleasure from future consumption to be increasingly less likely. A simpler explanation, though, is that they may perceive the likelihood of cashing in later as lower due to shorter expected life span or shorter expected healthy life span. If steeper discounts were shown by older adults for affective options over less affective options, then we could say with more assurance that the effect was due to emotional goals. Tests of these hypotheses are in process.

Time preferences may also be more directly related to the relative weight of affective processes versus deliberative capacities. Temporal construal theory (Trope & Liberman, 2003) suggests that temporal distance to the outcome influences how people construct mental

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<sup>3</sup> Discounting refers to how much less future money is worth now. If an individual discounts less, then they value future money relatively more and, thus, would show a relative preference for a larger later reward over a smaller immediate reward.

representations of the outcome. Distant outcomes are typically associated with more abstract, simple and decontextualized representations, while near outcomes are represented by concrete, complex and contextualized features. Thus, near outcomes are more likely to be affect-rich and experiential (thus activating the experiential system/system 1) while distant outcomes may be more affect poor and based on description (thus activating the deliberative system/system 2). We are not aware, however, of any published studies that directly relate level of construal to age differences in time preferences (but for a younger adult sample see Trope & Liberman, 2003).

*Expected emotions and affective forecasting.* Expected emotions concern predictions about the emotional consequences of outcomes without any actual experience of emotion. In decision making it is assumed that people predict the emotional outcomes of different alternatives and act in order to maximize expected positive emotions and minimize expected negative emotions (Loewenstein & Lerner, 2003). Affective forecasting can be defined as “*people’s predictions about how they will feel in a particular situation or toward a specific stimulus*” (Wilson & Klareen, 1992, p. 3). The anticipation of future happiness or sorrow is assumed to be a motivator for efficient decision making. In agreement with this view, March (1978) pointed out that all decisions concern predictions about future affect.

Research using younger adult populations has shown that people tend to overestimate the intensity and duration of their feelings caused by a single event or outcome (they called this effect an impact bias). For instance, Schkade and Kahneman (1998) found no differences in self-reported well-being between students living in California and students living in the Midwest of the United States. However, when the students were asked to rate the well-being of other students living in different parts of the country, large differences were obtained. Californian students believed that they would be less happy in the Midwest, and Midwest students predicted that they would be happier living in California. A possible explanation for these findings is that people focus on a single focal event failing to take into account other factors or non-focal events that will contribute to, and ameliorate, their general well-being and feelings (Loewenstein & Schkade, 1999).

Wilson, Gilbert and Salthouse (as cited in Wilson & Gilbert, 2003) asked to what extent this impact bias may change over the life span. Wilson and Gilbert (2003) argued that it is possible that the impact bias may be less pronounced with increasing experience and age. To test

this prediction, Wilson et al. asked a sample of participants aged 20-91 to rate how long it would take to recover from an event (twelve different events ranging from a pleasant telephone chat to death of a relative were used). They found a slight increase of duration between ages 20 to 60, but at 60 a marked decrease in duration with increasing age was found ( $r = -.32$ ). No age differences existed between positive and negative events. Similar results were found when looking at only one month (from the prediction), thus minimizing the possibility that expected life span influenced the results. Wilson and Gilbert suggested that these results may be evidence that older adults have learned that emotional events tend to dissipate quickly. If this is the case, older adults will be more accurate than younger adults when future feelings are relevant to the decision.

Affective forecasts may be based either on actual experiences (as in the example above) or on cognitive derivations of the hypothesized affective impact of situations. In both situations, imagining one's reaction to changed circumstances is a key ingredient. Ligneu-Hervé and Mullet (2005) found that perspective taking, the ability to take into account the point of view of another person, was impaired among older adults. This suggests, however, that perspective taking in this specific context was a highly cognitive task (considering relevant information and giving advice to another individual).

Research on affective forecasts in younger adult populations has often focused on specific emotions such as regret and disappointment that occur when the actual outcome is compared to counterfactual outcomes (Zeelenberg et al., 1999). Since these emotions depend crucially on cognitive processing (comparing information or alternative states of the world), it may be predicted that such decision-related emotions (i.e. regret) are less prevalent in older adult populations with declining deliberative capacities. While no research has tested this hypothesis, other research has found that older and younger adults differ in what they regret (Jokisaari, 2004). In line with SST, older adults tended to report regrets associated with family and close relationships, whereas younger adults regretted events linked to leisure time activities and socially more distant relationships. Mather and Johnson (2003) also found that older adults tended to attribute more positive and less negative attributes to a chosen alternative than younger participants did. They suggest that such choice-supportive monitoring minimizes experienced regret and maximizes satisfaction with the choice. Taken together, these studies suggest that older and younger decision makers experience different decision-related emotions and perhaps

experience them in different domains of life (social decision vs. monetary decisions). This hypothesis remains to be tested.

*Complexity.* Information complexity may impact decision making. Recent research by Luce and colleagues (e.g., Luce, 1998) has shown that making trade-offs between important decision attributes may impact choice through the elicitation of negative affect. For example, Luce (1998) asked participants to choose one of four available automobiles. The choice task required participants to make trade-offs between conflicting attributes. When the tradeoffs were emotionally difficult (e.g., car A was better on Occupant Survival but worse on Pollution Caused), participants reported experiencing stronger negative affect and chose the status-quo option more than participants faced with low tradeoff difficulty (e.g., between Routine Handling and Sound System). In another study, Drolet and Luce (2004) found that the impact of emotionally difficult trade-offs on choice was minimized with cognitive load. The load manipulation disrupted participants' ability to consider self-relevant goal information and the negative emotional consequences of making the trade off. Building on these findings, we predict that age will influence the extent to which participants experience emotionally difficult trade-offs. Older adults may experience relatively less trade-off difficulty with attributes due to declines in deliberative capacity resulting in lesser negative affect and a greater tendency to choose an alternative to the status quo.

*Time Pressure.* Dual-task paradigms such as time pressure manipulations have been shown in younger adult populations to increase reliance on affective and heuristic processing of information. For example, Shiv and Fedorikhin (2002) asked respondents to make a choice between two snacks, chocolate cake (more favorable affect, less favorable cognitions) or fruit salad (less favorable affect, more favorable cognitions) under time pressure. They found that under high time pressure (and presumably less deliberative capacity) the chocolate cake was selected significantly more than when time pressure was low. To the best of our knowledge no studies have directly examined the impact of time pressure on older adult's decision making. However, Earles, Kersten, Mas, and Miccio (2004), showed that time pressure significantly impacted memory recall among older adults. More important here is the finding that during time-pressured cognitive tasks, older adults become anxious about their performance, and they had trouble inhibiting negative self-evaluative thoughts about their performance.

Consequently, these process-generated or meta-cognitive experiences may hinder older adults' performance in cognitive tasks including decision making.

## **Incidental Affect**

A large body of research findings suggests that incidental affect (mood states, affective primes, or conditioned responses that are normatively irrelevant to the decision) influences people's evaluations, judgments, motivation and information processing (for a review see Forgas, 1995; Västfjäll, Peters, & Slovic, in preparation). Based on SST and DIT we predict that incidental affect may particularly impact older adults' judgments for two reasons; 1) incidental mood states are more frequent, intense and salient among older adults (Lawton, 2001) and 2) older adults may lack the capability of discounting or correcting for the influence of mood in judgments and decisions, a cognitive process that younger adults are capable of performing under normal conditions (Schwarz & Clore, 1983).

*Priming.* Hess, Waters, and Bolstad (2000) had different-aged adults make likeability judgments about a series of Japanese Kanji characters. Presentation of each of these characters was preceded by a positively or negatively valenced word that was presented either above or below the participant's perceptual threshold. Consistent with previous research by Murphy and Zajonc (1993), likeability judgments tended to be consistent with the valence of the prime word when participants were unaware of the prime word. In other words, individuals misattributed the primed affective response to the Kanji characters when they were unaware of the source. In contrast, when participants could consciously perceive the prime, only older adults exhibited priming effects. A similar finding was obtained by Hess, McGee, Woodburn, and Bolstad (1998) using a standard impression formation task. Two potential explanations for such effects are that older adults are unable to control the impact of the primes on their judgments due to deficiencies in deliberative processes or that older adults choose not to expend the effort necessary to control for the impact of the primes. Another explanation, however, is that aging promotes an increased focus on emotional information.

*Mood.* Decision makers look to both internal and external cues in a situation to help them make decisions. How a decision maker feels about an option is one of the cues that is used (Peters & Slovic, 1996; Peters et al., 2003). It is sometimes hard to distinguish, however, between feelings for an object and currently salient feeling states such as moods. Although a



current mood state normatively should not impact longer-term decisions, these irrelevant sources of emotional information have been shown to impact the judgments of younger adults (e.g., mood as information, Schwarz & Clore, 1983). When in a positive mood state, decision makers will sometimes misattribute those feelings to judgments about unrelated objects and find the object more attractive; in a negative mood state, decision makers again can misattribute those feelings and find objects less attractive (e.g., Clore & Tamir, 2002; Sechrist, Swim, & Mark, 2003; Schwarz, 2001). Peters, Västfjäll, and Starmer (in review), for example, found that younger adults paid more in real cash for a lottery ticket when induced to be in a positive versus negative mood. This finding mirrors nonexperimental results of increases in stock prices on sunny days when, presumably, buyer and seller moods are more positive (Hirshleifer & Shumway, 2003). Older adults' increased reliance on affective information may make them more vulnerable to unrelated and irrelevant affective information (e.g., moods).

The effects of incidental affect, or irrelevant positive and negative mood states, on judgment and decision processes have been little examined in older adults. Based on research with younger adults and the finding that older adults tend to be in more positive and less negative mood states relative to younger adults, several effects can be predicted. First, older adults should demonstrate a mood-congruent effect, remembering more positive than negative information relative to younger adults; this prediction is supported by research on Socioemotional Selectivity Theory (e.g., Charles et al., 2003). Knight, Maines, and Robinson (2002), however, showed only partial support of age differences in mood-congruency effects, with both younger and older adults showing mood-congruency effects on some tasks and only older adults showing them on other tasks. Ferraro, King, Ronning, Pekarski, and Risam (2003) found no age differences in mood congruency although both younger and older adults showed the mood-congruency effect (e.g., those individuals induced to feel happy responded faster to happy words than sad words). The Ferraro study, however, had several limitations including a small sample of older adults ( $N = 25$ ).

Second, older adults also might process information less systematically due to their relatively more positive moods (Isen, 2000). Within the older adult group, higher levels of negative affective states were associated with poorer memory. A recent study by Phillips, Smith and Gilhooly (2002) showed that mood leads to greater executive function impairment in older adults than it does in younger adults. Phillips et al. studied executive functioning through

planning in the Tower-of-London task (ToL: the task consists of moving discs to transform a starting arrangement into a goal arrangement). Positive or negative mood was induced in both younger and older adults through a combination of film and music. Following the mood induction, participants completed the ToL task. A significant Age x Mood interaction was found such that both negative and positive mood impaired performance for the older age group, while mood had little effect on the younger adult group. The finding that both negative and positive mood impaired performance was discussed in terms of three possible explanations: 1) mood may act as a cognitive load, 2) positive mood may lead to impaired performance because positive affect signals that goals have been achieved, thus reducing the motivation to engage in systematic processing (Isen, 2000), and 3) emotion regulation: maintaining or attaining a positive mood decreases the attention allocated to other cognitive activities. Finally, based on the tendency for greater positive and less negative mood among older adults, older adults should be more risk seeking in hypothetical decisions and risk averse in real decisions. We are not aware of any published studies on this topic.

*Depression and Anxiety.* While positive affect and moods may be frequent and salient among the elderly (Lawton, 2001), portions of this age group also suffer from various forms of depression. The increasing prevalence of disability and institutionalization with age contributes to the increase in depressive symptoms, but age-associated declines in dopaminergic and noradrenergic reserves may also play a role (Fogel, 1991). Among younger adults, depression and anxiety have been linked to biases in both judgment and information processing including affect-congruent memories, depression biases in judgments of evaluative tasks, and risk estimates (Ciarrochi, 1997; Keller et al., 2001; Gasper & Clore, 1998). Research on mood and recall of autobiographical memory has shown that depressed older adults recalled more sad memories than did older non-depressed adults (mood-congruent effect; Yang & Rehm, 1993). A study by Deptula, Singh, and Pomara (1993) showed that older, but not younger adults, consistently exhibited significant correlations between their performance on verbal recall measures and their ratings of their anxiety, depression, and withdrawal. However, systematic laboratory studies of decision making and depression or anxiety in older adults are largely lacking. Several studies have linked depression to real behavioral outcomes (Blank et al., 2001; Lee & Ganzini, 1992). For instance, Blank et al. (2001) found that depression was highly associated with acceptance of physician-assisted suicide (PAS) and euthanasia in hypothetical

scenarios. Furthermore, compared with nondepressed people, depressed respondents were 13 times as likely to accept PAS when considering their current condition and over twice as likely to accept PAS when facing a hypothetical terminal illness or coma. Depression alone was weakly associated with life-sustaining treatment choices but, when impact of choices on personal finances was made explicit, significantly more depressed subjects refused treatment options they had previously desired than did nondepressed subjects.

Some recent research has investigated how specific incidental emotions impact judgments and decisions in younger adults (Lerner & Keltner, 2001). For instance, Lerner et al. (2004) found that the construction of prices (willingness to pay for a good) was impacted by the mindsets of appraisal themes resulting from experimentally-induced incidental emotion states (such as disgust and sadness). We expect that the impact of specific incidental emotions may differ between age groups. Older adults tend both to have a richer palette of possible emotions and to be more sensitive to emotional goals. As a result, we expect that the effects observed for specific emotions in younger adults may be pronounced in an older age group. At the same time, the more differentiated emotional life of older adults may lead to a sensation of mixed emotions (Larsen, McGraw, Mellers, & Cacioppo, 2004). In one study, mixed integral emotions (anger and fear) towards radiation sources led to a canceling of the cognitive appraisals that were inconsistent across the emotions (Peters, Burraston, & Mertz, 2004). The prevalence and impact of mixed appraisals needs further study in both younger and older adult populations.

## **Summary**

Life-span theories can be interpreted as providing predictions about age differences in judgment and decision making. Two life-span theories were reviewed (socioemotional selectivity theory and dynamic integration theory). These theories predict that affective information generally and positive information specifically will impact older-adult choices more than those of younger adults. The theories offer different mechanistic explanations for these changes (increases in emotional goals versus cognitive decline). We conducted a review of published studies concerning the impact of affect and emotions in the decisions of older adults. One of the main findings is that this literature is sparse and often offered opposing results.

Older adults, however, appear to learn affective information and make choices from experience as well as younger adults despite cognitive declines; one study linked this to a more

accurate representation of gains and losses. No robust age differences existed with respect to reactions to probabilities in decisions by description. Results of studies of choices between gambles and sure things as well as framing effects showed mixed and therefore inconclusive results. Older adults do appear to discount future monetary outcomes more although no studies have yet been published on whether this tendency differs for affective versus less affective stimuli. In many other potential areas for researching the impact of affective and emotional processes on age differences in judgment and decision making, few, if any, published studies that were directly related to the topic could be located. In general, less efficient judgment and decision-making processes in older adults (compared to younger) may be evident mostly in unfamiliar or meaningless situations devoid of affective significance to the decision maker.

## References

- Alhakami, A. S., & Slovic, P. (1994). A psychological study of the inverse relationship between perceived risk and perceived benefit. *Risk Analysis, 14*, 1085-1096.
- Baltes, P. B., & Baltes, M. M. (1990). Psychological perspectives on successful aging: the model of selective optimization with compensation. In M. M. Baltes & P. B. Baltes (Eds.), *Successful aging: Perspectives from the behavioral sciences* (pp. 1-34). Cambridge, UK: Cambridge University Press.
- Bechara, A., Damasio, A. R., Damasio, H., & Anderson, S. W. (1994). Insensitivity to future consequences following damage to human prefrontal cortex. *Cognition, 50*, 7-15.
- Bechara, A., Damasio, H., Tranel, D., & Damasio, A. R. (1997). Decision advantageously before knowing the advantageous strategy. *Science, 275*, 1293-1294.
- Bechara, A., Tranel, D., Damasio, H., & Damasio, A. R. (1996). Failure to respond autonomically to anticipated future outcomes following damage to prefrontal cortex. *Cerebral Cortex, 6*(2), 215-225.
- Bennett, C. A. (2001). Evaluations and emotion: Influencing public health policy preferences via facial affect. *Dissertation Abstracts International, 62*(2-A), 375.
- Blanchard-Fields, F., Chen, Y., & Norris, L. (1997). Everyday problem solving across the adult life span: Influence of domain specificity and cognitive appraisal. *Psychology & Aging, 12*(4), 684-693.
- Blank, K., Robinson, D., Doherty, E., Prigerson, H., Duffy, J., & Schwartz, H. I. (2001). Life-sustaining treatment and assisted death choices in depressed older patients. *Journal of the American Geriatrics Society, 49*, 153-161.
- Bower, G. (1981). Mood and memory. *American Psychologist, 36*, 129-148.
- Caruso, E. M., & Shafir, E. (in press). Now that I think about it, I'm in the mood for laughs: Decisions focused on mood. *Journal of Behavioral Decision Making*.
- Carstensen, L. L. (1993). Motivation for social contact across the life span. In J. E. Jacobs (Ed.) *Nebraska symposium on motivation: 1992, Developmental perspectives on motivation* (Vol. 40, pp. 209-254). Lincoln, NE: University of Nebraska Press.
- Carstensen, L. L., & Fredrickson, B. L. (1998). The influence of HIV-status and age on cognitive representations of others. *Health Psychology, 17*, 494-503.
- Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist, 54*(3), 165-181.
- Carstensen, L. L., & Turk-Charles, S. (1994). The salience of emotion across the adult life span. *Psychology & Aging, 9*(2), 259-264.
- Chasseigne, G., Grau, S., Mullet, E., & Cama, V. (1999). How well do elderly people cope with uncertainty in a learning task? *Acta Psychologica, 103*(1-2), 229-238.
- Ciarrochi, J. V. (1997). The role of state anxiety in judgment depends critically on a person's level of trait anxiety. *Dissertation Abstracts International: Section B: The Sciences & Engineering, 58*(3-B), 1591.
- Comblain, C., D'Argembeau, A., Van der Linden, M., & Aldenhoff, L. (2004). Impact of ageing on the recollection of emotional and neutral pictures. *Memory, 12*, 673-684.

- Charles, S. T., Mather, M., & Carstensen, L. L. (2003). Aging and emotional memory: The forgettable nature of negative images for older adults. *Journal of Experimental Psychology: General*, *132*(2), 310-324.
- Clore, G. L., & Tamir, M. (2002). Affect as embodied information. *Psychological Inquiry*, *13*, 37-45.
- Clore, G. L., Wyer, R. S., Dienes, B., Gasper, K., Gohm, C., & Isbell, L. (2001). Affective feelings as feedback: Some cognitive consequences. In L. L. Martin & G. L. Clore (Eds.), *Theories of mood and cognition: A user's guidebook* (pp. 27-62). Hillsdale, NJ: Lawrence Erlbaum.
- Cornelius, S. W., & Caspi, A. (1987). Everyday problem solving in adulthood and old age. *Psychology & Aging*, *2*(2), 144-153.
- Damasio, A. R. (1994). *Descartes' error: Emotion, reason, and the human brain*. New York: Avon.
- Deakin, J., Aitken, M., Robbins, T., & Sahakian, B. J. (2004). Risk taking during decision-making in normal volunteers: Changes with age. *Journal of the International Neuropsychological Society*, *10*, 590-598.
- Denburg, N. L., Buchanan, T. W., Tranel, D., & Adolphs, R. (2004). Evidence for preserved emotional memory in normal elderly persons. *Emotion*, *3*, 239-253.
- Denburg, N. L., Tranel, D., & Bechara, A. (2005). The ability to decide advantageously declines in some normal older persons. *Neuropsychologia*, *43*, 1099-1106.
- Deptula, D., Singh, R., & Pomara, N. (1993). Aging, emotional states, and memory. *American Journal of Psychiatry*, *150*, 429-434.
- Dhar, R., & Wertenbroch, K. (2000). Consumer choice between hedonic and utilitarian goods. *Journal of Marketing Research*, *27*, 60-71.
- Drolet, A., & Luce, M. F. (2004). The rationalizing effect of cognitive load on emotion-based trade-off avoidance. *Journal of Consumer Research*, *31*, 63-77.
- Dror, I. E., Katona, M., & Mungur, K. (1998). Age differences in decision making: To take a risk or not? *Gerontology*, *44*(2), 67-71.
- Earles, J. L., Kersten, A. W., Mas, B. B., & Miccio, D. M. (2004). Aging and memory for self-performed tasks: Effects of task difficulty and time pressure. *Journal of Gerontology B: Psychological Sciences and Social Sciences*, *59B*, 285-293.
- Epstein, S. (1994). Integration of the cognitive and the psychodynamic unconscious. *American Psychologist*, *49*, 709-724.
- Ferraro, F. R., King, B., Ronning, B., Pekarski, K., & Risam, J. (2003). Effects of induced emotional state on lexical processing in younger and older adults. *Journal of Psychology*, *137*, 262-272.
- Fiedler, K. (2001). Affective influences on social information processing. In J. P. Forgas (Ed.) *Handbook of affect and social cognition* (pp. 163-185). Mahwah, NJ: Lawrence Erlbaum.
- Finucane, M. L., Alhakami, A., Slovic, P., & Johnson, S. M. (2000). The affect heuristic in judgments of risks and benefits. *Journal of Behavioral Decision Making*, *13*, 1-17.
- Fisk, J. E., & Warr, P. B. (1998). Associate learning and short-term forgetting as a function of age, perceptual speed, and central executive functioning. *Journals of Gerontology Series B Psychological Sciences & Social Sciences*, *2*, 112.
- Fogel, B. S. (1991). Depression and aging. *Neuropsychiatry, Neuropsychology, and Behavioral Neurology*, *4*, 24-35.

- Forgas, J. P. (1995). Mood and judgment: The affect infusion model (AIM). *Psychological Bulletin*, *117*, 39-66.
- Fung, H. H., & Carstensen, L. L. (2003). Sending memorable messages to the old: Age differences in preferences and memory for emotionally meaningful advertisements. *Journal of Personality and Social Psychology*, *85*, 163-178.
- Fung, H. H., Carstensen, L. L., & Lutz, A. M. (1999). Influence of time on social preferences: Implications for life-span development. *Psychology & Aging*, *14*(4), 595-604.
- Gasper, K., & Clore, G. L. (1998). The persistent use of negative affect by anxious individuals to estimate risk. *Journal of Personality & Social Psychology*, *74*(5), 1350-1363.
- Gross, J. J., Carstensen, L. L., Pasupathi, M., Tsai, J., Goettestam Skorpen, C., & Hsu, A. Y. C. (1997). Emotion and aging: Experience, expression, and control. *Psychology & Aging*, *12*(4), 590-599.
- Hammond, K. R. (1996b). *Human judgment and social policy: Irreducible uncertainty, inevitable error, unavoidable injustice*. New York: Oxford University Press.
- Hertwig, R., Barron, G., Weber, E. U., & Erev, I. (2004). Decisions from experience and the effect of rare events in risky choices. *Psychological Science*, *15*, 534-539.
- Hess, T. M., McGee, K. A., Woodburn, S. M., & Bolstad, C. A. (1998). Age-related priming effects in social judgments. *Psychology & Aging*, *13*(1), 127-137.
- Hess, T. M., Pullen, S. M., & McGee, K. A. (1996). Acquisition of prototype-based information about social groups in adulthood. *Psychology & Aging*, *11*(1), 179-190.
- Hess, T. M., Waters, S. J., & Bolstad, C. A. (2000). Motivational and cognitive influences on affective priming in adulthood. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *55B*, 193-204.
- Hirschleifer, D., & Shumway, T. (2003). Good day sunshine: Stock returns and the weather. *The Journal of Finance*, *58*(3), 1009-1032.
- Holliday, S. G. (1988). Risky-choice behavior: A life-span analysis. *International Journal of Aging & Human Development*, *27*(1), 25-33.
- Hsee, C. K. (1998). Less is better: When low-value options are valued more highly than high-value options. *Journal of Behavioral Decision Making*, *11*, 107-121.
- Isen, A. M. (2000). Positive affect and decision making. In M. Lewis & J. M. Haviland (Eds.), *Handbook of emotions* (2nd ed., pp. 509-534). London: Guilford Press.
- Jokisaari, M. (2004). Regrets and subjective well being: A life course approach. *Journal of Adult Development*, *11*, 281-288.
- Kahneman, D. (2003). A perspective on judgment and choice: Mapping bounded rationality. *American Psychologist*, *58*, 697-720.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, *47*, 263-291.
- Keller, A. P., Lipkus, I. M., & Rimer, B. K. (2002). Depressive realism and health risk accuracy: The negative consequences of positive mood. *Journal of Consumer Research*, *29*, 57-69.
- Kensinger, E. A., Brierly, B., Medford, N., Growdon, J. H., & Corkin, S. (2002). Effects of normal aging and Alzheimer's disease on emotional memory. *Emotion*, *2*, 118-134.
- Kim, S., Goldstein, D., Hasher, L., & Zacks, R. T. (in press). Framing effects in younger and older adults. *Journal of Gerontology: Psychological Sciences*.

- Knight, B. G., Maines, M. L., & Robinson, G. S. (2002). The effects of sad mood on memory in older adults: A test of the mood congruence effect. *Psychology and Aging, 17*(4), 653-661.
- Kovalchik, S., Camerer, C. F., Grether, D. M., Plott, C. R., & Allman, J. M. (2005). Aging and decision making: A comparison between neurologically healthy elderly and young individuals. *Journal of Economic Behavior & Organization, 58*, 79-94.
- Kruglanski, A. W., Chun, W. Y., Erb, H. P., Pierro, A., Mannetti, L., & Spiegel, S. (2003). A parametric unimodel of human judgment: Integrating dual-process frameworks in social cognition from a single-mode perspective. In J. P. Forgas, K. D. Williams, & W. von Hippel (Eds.), *Social judgments: Implicit and explicit processes* (pp. 137-161). Cambridge, UK: Cambridge University Press.
- Labouvie-Vief, G. (2003). Dynamic integration: Affect, cognition, and the self in adulthood. *Current Directions in Psychological Science, 12*, 201-206.
- Labouvie-Vief, G. (2005). Self-with-other representations and the organization of the self. *Journal of Research in Personality, 39*, 185-205.
- Labouvie-Vief, G., & Márquez González, M. (in press). Dynamic integration: Affect optimization and differentiation in development. In D. Y. Dai & R. J. Sternberg (Eds.), *Motivation, emotion, and cognition: Integrative perspectives on intellectual functioning and development*. Mahwah, NJ: Lawrence Erlbaum.
- Lang, F. R., & Carstensen, L. L. (1994). Close emotional relationships in late life: How personality and social context do (and do not) make a difference. *Psychology and Aging, 9*, 315-324.
- Larsen, J. T., McGraw, A., Mellers, B. A., & Cacioppo, J. T. (2004). The agony of victory and thrill of defeat: Mixed emotional reactions to disappointing wins and relieving losses. *Psychological Science, 15*, 325-330.
- Lauriola, M., & Levin, I. P. (2001). Personality traits and risky decision-making in a controlled experimental task: An exploratory study. *Personality and Individual Differences, 31*, 215-226.
- Lawton, M. P. (2001). Emotion in later life. *Current Directions in Psychological Science, 10*, 120-123.
- LeClerc, C. M., & Hess, T. M. (2004). *Aging and affect-based interference in attention*. Manuscript in preparation.
- Lee, M. A., & Ganzini, L. (1992). Depression in the elderly: Effect of patient attitude towards life-sustaining therapy. *Journal of the American Geriatrics Society, 40*, 983-988.
- Lerner, J. S., & Keltner, D. (2001). Fear, anger, and risk. *Journal of Personality and Social Psychology, 89*, 146-159.
- Lerner, J. S., Small, D. A., & Loewenstein, G. (2004). Heart strings and purse strings: Carryover effects of emotions on economic decisions. *Psychological Science, 15*, 337-341.
- Ligneau-Hervé, C., & Mullet, E. (2005). Perspective-taking judgments among young adults, middle-aged, and elderly people. *Journal of Experimental Psychology: Applied, 11*, 53-60.
- Loewenstein, G., & Lerner, J. S. (2003). The role of affect in decision making. In R. Davidson, H. Goldsmith, & K. Scherer (Eds.), *Handbook of affective science* (pp. 619-642). Oxford, UK: Oxford University Press.
- Loewenstein, G., & Schkade, D. (1999). Wouldn't it be nice? Predicting future feelings. In E. Diener, N. Schwartz, & D. Kahneman (Eds.), *Well-being: The foundations of hedonic psychology* (pp. 85-105). New York: Russell Sage Foundation.



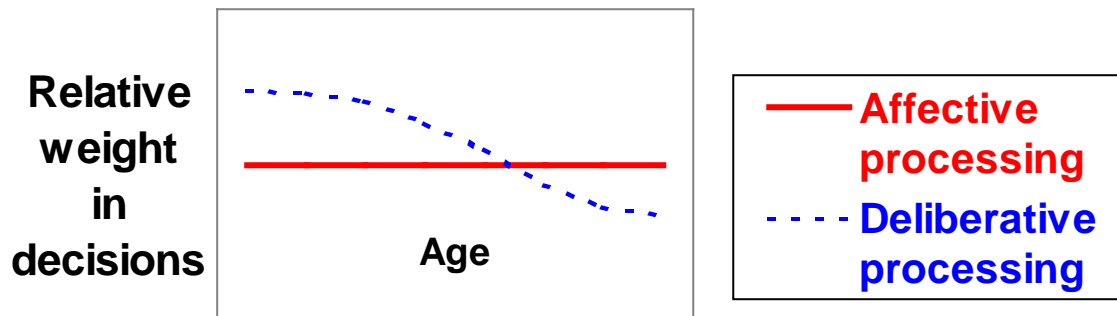
- Loewenstein, G., Weber, E. U., Hsee, C. K., & Welch, E. S. (2001). Risk as feelings. *Psychological Bulletin*, *127*, 267-286.
- Luce, M. F. (1998). Choosing to avoid: Coping with negatively emotion-laden consumer decisions. *Journal of Consumer Research*, *24*, 409-423.
- Luce, M. F., Bettman, J. R., & Payne, J. W. (1997). Choice processing in emotionally difficult decisions. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *23*(2), p.384-405.
- MacPherson, S. E., Phillips, L. H., & Sala, S. D. (2002). Age, executive function, and social decision making: A dorsolateral prefrontal theory of cognitive aging. *Psychology and Aging*, *17*, 598-609.
- Mano, H. (1992). Judgments under duress: Assessing the role of unpleasantness and arousal in judgment formation. *Organizational Behavior and Human Decision Processes*, *52*, 216-245.
- March, J. (1978). Bounded rationality, ambiguity, and the rationality of choice. *Bell Journal of Economics*, *9*, 587-608.
- Mather, M. (in press). Why memories may become more positive as people age. In B. Uttil, H. Ohta, & A. Siegenthaler (Eds.), *Memory and emotion: Interdisciplinary perspectives*. Oxford, UK: Blackwell.
- Mather, M., Canli, T., English, T., Whitfield, S., Wais, P., Ochsner, K. N., et al. (2004). Amygdala responses to emotionally valenced stimuli in older and younger adults. *American Psychological Society*, *15*(4), 259-263.
- Mather, M., & Carstensen, L. L. (2003). Aging and attentional biases for emotional faces. *Psychological Science*, *14*(5), 409-415.
- Mather, M., & Johnson, M. K. (2000). Choice-supportive source monitoring: Do our decisions seem better to us as we age? *Psychology and Aging*, *15*, 596-606.
- Mayhorn, C. B., Fisk, A. D., & Whittle, J. D. (2002). Decisions, decisions: Analysis of age, cohort, and time of testing on framing of risky decision options. *Human Factors*, *44*, 515-521.
- McNeil, B. J., Pauker, S. G., Sox, H. C., Jr., & Tversky, A. (1982). On the elicitation of preferences for alternative therapies. *New England Journal of Medicine*, *306*, 1259-1262.
- Mell, Heakeren, Marschner, Wartenburg, Villringer & Reischies (2005). Effect of aging on stimulus-reward association learning. *Neuropsychologia*, *43*(4), 554-563.
- Mroczek, D. K. (2001). Age and emotion in adulthood. *Current Directions in Psychological Science*, *10*(3), 87-90.
- Mroczek, D. K., & Kolarz, C. M. (1998). The effect of age on positive and negative affect: A developmental perspective on happiness. *Journal of Personality and Social Psychology*, *75*, 1333-1349.
- Murphy, S. T., & Zajonc, R. B. (1993). Affect, cognition, and awareness: Affective priming with optimal and suboptimal stimulus exposures. *Journal of Personality & Social Psychology*, *64*(5), 723-739.
- Okun, M. A., & Elias, C. S. (1977). Cautiousness in adulthood as a function of age and payoff structure. *Journal of Gerontology*, *32*(4), 451-455.
- Paulos, J. A. (1988). *Innumeracy: Mathematical illiteracy and its consequences*. New York: Hill and Wang.
- Peters, E. (1998). *The springs of action: Affective and analytical information processing in choice*. Unpublished doctoral dissertation, University of Oregon, Eugene.

- Peters, E. (in press). The functions of affect in the construction of preferences. In S. Lichtenstein & P. Slovic (Eds.), *The construction of preference*. New York: Cambridge University Press.
- Peters, E. (In preparation). *Age differences in a modified Iowa gambling task*.
- Peters, E., Burraston, B., & Mertz, C. K. (2004). An emotion-based model of risk perception and stigma susceptibility: Cognitive appraisals of emotion, affective reactivity, worldviews, and risk perceptions in the generation of technological stigma. *Risk Analysis*, *24*, 1349-1367.
- Peters, E., Lipkus, I. M., & Diefenbach, M. A. (in press). The functions of affect in health communications and in the construction of health preferences. *Journal of Communication*.
- Peters, E., Finucane, M. L., MacGregor, D. G., & Slovic, P. (2000). The bearable lightness of aging: Judgment and decision processes in older adults. In National Research Council. Committee on Future Directions for Cognitive Research on Aging. P. C. Stern & L. L. Carstensen (Ed.) *The aging mind: Opportunities in cognitive research* (pp. Appendix C, pp. 144-165). Washington, DC: National Academy Press.
- Peters, E., Hess, T., Auman, C., & Västfjäll, D. (in preparation). *Adult age differences in dual information processes and their influence on judgments and decisions: A review*.
- Peters, E., & Slovic, P. (1996). The role of affect and worldviews as orienting dispositions in the perception and acceptance of nuclear power. *Journal of Applied Social Psychology*, *26*, 1427-1453.
- Peters, E., & Slovic, P. (2000). The springs of action: Affective and analytical information processing in choice. *Personality and Social Psychology Bulletin*, *26*, 1465-1475.
- Peters, E., Slovic, P., & Gregory, R. (2003). The role of affect in the WTA/WTP disparity. *Journal of Behavioral Decision Making*, *16*, 309-330.
- Peters, E., Västfjäll, D., Slovic, P., & Hibbard, J. (in preparation). *Bringing meaning to numbers: The functions of affect in choice*.
- Peters, E., Västfjäll, D., Slovic, P., Mertz, C. K., Mazzocco, K., & Dickert, S. (in press). Numeracy and decision making. *Psychological Science*.
- Peters, E., Västfjäll, D., & Starmer, C. (in review). *Feeling your way to the right price*.
- Petty, R. E., & Wegener, D. T. (1999). The elaboration likelihood model: Current status and controversies. In S. Chaiken & Y. Trope (Eds.), *Dual-process theories in social psychology* (pp. 37-72). New York: The Guilford Press.
- Phillips, L. H., Smith, L., & Gilhooly, K. J. (2002). The effects of adult aging and induced positive and negative mood on planning. *Emotion*, *2*(3), 263-272.
- Raghunathan, R., & Pham, M. T. (1999). All negative moods are not equal: Motivational influence of anxiety and sadness on decision making. *Organizational Behavior and Human Decision Processes*, *79*, 56-77.
- Raghunathan, R., & Trope, Y. (2002). Walking the tightrope between feeling good and being accurate: Mood as a resource in processing persuasive messages. *Journal of Personality and Social Psychology*, *83*, 510-525.
- Read, D., & Read, N. L. (2004). Time discounting over the lifespan. *Organizational Behavior & Human Decision Processes*, *94*(1), 22-32.
- Reyna, V. F. (2004). How people make decisions that involve risk: A dual-processes approach. *Current Directions in Psychological Science*, *13*, 60-66.

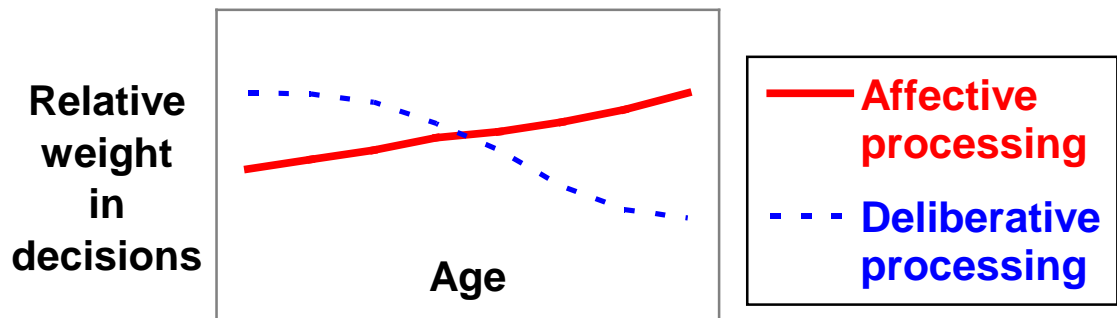
- Rogers, R. D., Owen, A. M., Middleton, H. C., Williams, E. J., Pickard, J. D., Sahakian, B. J., et al. (1999). Choosing between small, likely rewards and large, unlikely rewards activates inferior and orbital prefrontal cortex. *Journal of Neuroscience*, *19*(20), 9029-9038.
- Rönnlund, M., Karlsson, E., Lagnäs, E., Larsson, L., & Lindström, T. (2005). Risky decision making across three arenas of choice: Are younger and older adults differently susceptible to framing effects? *The Journal of General Psychology*, *132*, 81-92.
- Rottenstreich, Y., & Hsee, C. K. (2001). Money, kisses, and electric shocks: On the affective psychology of risk. *Psychological Science*, *12*, 185-190.
- Sanford, A., Griew, S., & O'Donnell, L. (1972). Age effects in simple prediction behavior. *Journal of Gerontology*, *27*(2), 259-264.
- Schkade, D. A., & Kahneman, D. (1998). Does living in California make people happy? A focusing illusion in judgments of life satisfaction. *Psychological Science*, *9*, 340-346.
- Schwarz, N. (2001). Feelings as information: Implications for affective influences on information processing. In L. L. Martin & G. L. Clore (Eds.), *Theories of mood and cognition: A user's guidebook* (pp. 159-176). Mahway, NJ: Lawrence Erlbaum.
- Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Information and directive functions of affective states. *Journal of Personality and Social Psychology*, *45*, 513-523.
- Sechrist, G. B., Swim, J. K., & Mark, M. M. (2003). Mood as information in making attributions to discrimination. *Personality & Social Psychology Bulletin*, *29*(4), 524-531.
- Shafir, E., Simonson, I., & Tversky, A. (1993). Reason-based choice. *Cognition*, *49*, 11-36.
- Shiv, B., & Fedorikhin, A. (1999). Heart and mind in conflict: Interplay of affect and cognition in consumer decision making. *Journal of Consumer Research*, *26*, 278-282.
- Shiv, B., & Fedorikhin, A. (2002). Spontaneous versus controlled influences of stimulus-based affect on choice behavior. *Organizational Behavior & Human Decision Processes*, *87*(2), 342-370.
- Sloman, S. A. (1996). The empirical case for two systems of reasoning. *Psychological Bulletin*, *119*, 3-22.
- Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2002). The affect heuristic. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 397-420). New York: Cambridge University Press.
- Smith, S. M., & Levin, I. (1997). Need for cognition and choice framing effects. *Journal of Behavioral Decision Making*, *9*(4), 283-290.
- Stanovich, K. E., & West, R. F. (2002). Individual differences in reasoning: Implications for the rationality debate? In T. Gilovich, D. W. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 421-444-). New York: Cambridge University Press.
- Staats, A. W., & Staats, C. K. (1958). Attitudes established by classical conditioning. *Journal of Abnormal & Social Psychology*, *57*, 37-40.
- Strange, J. J., & Leung, C. C. (1999). How anecdotal accounts in news and in fiction can influence judgments of a social problem's urgency, causes, and cures. *Personality and Social Psychology Bulletin*, *25*, 436-449.
- Thaler, R. H. (1980). Toward a positive theory of consumer choice. *Journal of Economic Behavior & Organization*, *1*, 39-60.
- Thornton, W. J. L., & Dumke, H. A. (2005). Age differences in everyday problem-solving and decision-making effectiveness: A meta-analytic review. *Psychology and Aging*, *20*, 85-99.

- Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review*, *110*, 403-421.
- Trostel, P. A., & Taylor, G. A. (2001). A theory of time preference. *Economic Inquiry*, *39*, 379-395.
- United Nations Population Division. (2002). *World population ageing: 1950-2050*. Author. Retrieved September 24, 2005, from <http://www.un.org/esa/population/publications/worldageing19502050/index.htm>
- Västfjäll, D., Peters, E., & Slovic, P. (In preparation). *Incidental and integral affect in judgment and choice*.
- Weber, E. U., Shafir, S., & Blaise, A.-R. (2004). Predicting risk sensitivity in humans and lower animals: Risk as variance or coefficient of variation. *Psychological Review*, *111*.
- Wilson, T. D., Dunn, D. S., Kraft, D., & Lisle, D. J. (1989). Introspection, attitude change, and attitude-behavior consistency: The disruptive effects of explaining why we feel the way we do. *Advances in Experimental Social Psychology*, *22*, 287-343.
- Wilson, T. D., & Gilbert, D. T. (2003). Affective forecasting. In M. Zanna (Ed.) *Advances in experimental social psychology* (pp. 345-411). New York: Elsevier.
- Wilson, T. D., & Klaaren, K. J. (1992). "Expectation whirls me round": The role of affective expectations of affective experiences. In M. S. Clark (Ed.) *Review of personality and social psychology: Emotion and social behavior* (Vol. 14, pp. 1-31). Newbury Park, CA: Sage.
- Wood, S., Busemeyer, J. R., Kolling, A., Cox, C. R., & Davis, H. (2005). Older adults as adaptive decision makers: Evidence from the Iowa gambling task. *Psychology and Aging*, *20*, 220-225.
- Wright, W., & Bower, G. H. (1992). Mood effects on subjective probability assessment. *Organizational Behavior and Human Decision Processes*, *52*, 276-291.
- Wurm, L. H., Labouvie-Vief, G., Aycock, J., Rebucal, K. A., & Koch, H. E. (2004). Performance in auditory and emotional Stroop tasks: A comparison of older and younger adults. *Psychology and Aging*, *19*, 523-535.
- Yang, J. A., & Rehm, L. P. (1993). A study of autobiographical memories in depressed and nondepressed elderly individuals. *International Journal of Aging and Human Development*, *36*, 39-55.
- Yates, J. F., & Patalano, A. L. (1999). Decision making and aging. In D. C. Park & R. W. Morrell (Eds.), *Processing of medical information in aging patients* (pp. 31-54). Mahwah, NJ: Lawrence Erlbaum Associates.
- Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, *35*, 151-175.
- Zeelenberg, M. (1999). Anticipated regret, expected feedback and behavioral decision making. *Journal of Behavioral Decision Making*, *12*(2), 93-106.

Affective resiliency – relative affective change



Affective enhancement – absolute affective change



*Figure 1.* Resiliency and enhancement in the weight of affective and deliberative processing in decisions across the lifespan.