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Emotions, Risk, and Information Processing: A Matter of Distance?

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Jesper Arntzen Engedahl

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Abstract

Emotions play an important role in shaping judgements and decisions involving risk. More recently, researchers have paid more attention to different ways in which people can manage their emotions, and how this in turn affects their decisions. The present thesis examined how reappraisal – a general strategy of emotion regulation – moderates the influence of fear and anger on risk-taking and information processing. The thesis examined a specific tactic of reappraisal known as psychological distancing. Participants were asked to recall and describe an emotional event (fear vs. anger) from either an immersed or distant perspective. Next, participants completed a risky decision-making task (the Iowa Gambling Task). As predicted, anger increased risk-taking behavior, while fear decreased risk-taking. Importantly, this pattern of results was only found among participants who adopted an immersed perspective, while recalling an emotional event. Interestingly, the effects of fear and anger reversed among the participants who adopted distant perspective. Finally, distancing also moderated the effect of emotions on information processing, such that distancing reduced the positive effect of emotion on intuitive processing. The results, implications and limitations are discussed.

1.0 Introduction

How is judgement and decision-making (JDM) in organizations influenced by decision-maker's emotions? Are they able to make decisions based on rational thinking and keep a cool, leveled head at all times, or are they influenced by emotions more than we know? Moreover, how do emotions influence decisions that involve a degree of risk? And can decision-makers control such emotional influences?

Emotions influence peoples' lives at every juncture in their daily existence. Emotions are internalized states, with varying intensity and valence that affect humans as a reaction to different stimulus or people (Nabi, 1999). Discrete emotions, incidental emotions, may be described as certain emotions that are elicited from a previous experienced event or situation that is carried over to a new situation (Lerner et al., 2015). This previously elicited emotion is unrelated to the new situation, however it carries over and might impact the current decision-making process at hand (Lerner et al., 2015). For example, a stock broker being yelled at by her manager and being threatened with being fired might be fearful of losing her job. This elicited fear might in turn have an effect on her when she is considering investing in an important, high-risk stock, and she might make decisions she would not ordinarily make and avoid the risk all together. Unbeknownst to herself, the stock broker has incidentally carried over her fear to a new novel situation that has been amplified in effect by the incidental emotion (Lerner et al., 2015).

The present thesis seeks to investigate the role of emotions in JDM by investigating how anger and fear affect risk-taking behavior. Additionally, this thesis investigates how emotion regulation moderates the influence of anger and fear on risk-taking behavior. Fear and anger are emotions both high in arousal and negative valence, yet differ in terms of appraisals (i.e., cognitive evaluations of event). At the same time results ignore differences between sexes, suggesting an evolutionary basis for certain emotions (Fessler et al., 2004). Both emotions have shown to affect decision-making in opposite ways, which will be discussed in detail later in the thesis.

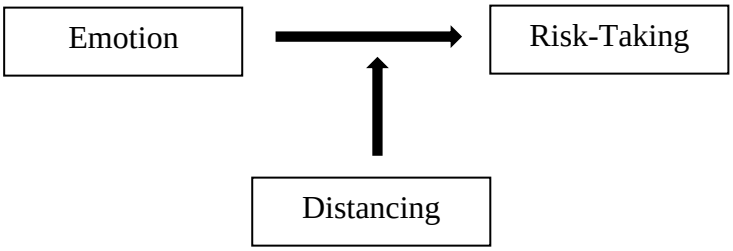
A final aim of this thesis is to investigate how emotions and emotion regulation influence cognitive processing of information. More specifically – will

inducing anger increase intuitive processing and fear induce more analytical processing, or will both emotions induce intuitive processing because they are both high arousal? And does this depend on how emotions are being regulated?

Figure 1. below illustrates the conceptual model of the research question for the thesis – I wish to investigate how emotions, moderated by distancing, affect risk-taking.

Figure 1

Conceptual model.



Note. The effect of emotions (fear vs. anger) on risk-taking, moderated by distancing.

2.0 Theoretical Framework and Hypothesis

A large body of research has examined the role of emotions in JDM (e.g., Hua et al., 2015; Johnson & Tversky, 1983; Tversky & Kahneman, 1981; Zhao et al., 2016). In this section of the paper I review the literature on emotions, emotion regulation, risky decision-making, and cognitive processing.

2.1. Emotions

As opposed to moods, emotions are thought to be "differentiated, transient, targeted, and able to motivate certain distinct adaptive behaviors in reaction to the object that initiated the particular emotional response" (Nabi, 1999, p. 295). Ortony, Clore and Collins (1988, as cited in Nabi, 1999, p. 295) defines emotions as "internal, mental states representing evaluative, valenced reactions to events, agents, or objects that vary in intensity". Emotions might be elicited as a response to external and internal states or stimulus and will influence how we conduct ourself in the world.

Schwarz and Clore (2007, p. 385), that states how emotions are "an identifiable referent, a sharp rise in time, limited duration and often high intensity".

Emotions are thus viewed as short-lived states that are influencing people in their situational experiences, when meeting people or when experiencing an event. Further, emotions can be identified by two dimensions: the valence of the emotional experience – meaning whether the emotion is positively or negatively attributed, and the arousal – meaning the intensity of the emotion (Citron et al., 2014).

Anger is an emotional response varying from mild irritation to extreme rage – this response is a reaction to situational and/or environmental circumstances that occurs when an individual experiences irritation, annoyance or frustration (Gambetti & Giusberti, 2009). Anger is an emotion that people experience often, and according to Averill (1982, as cited in Gambetti & Giusberti, 2009), is an emotion that most people will experience several times a week, even several times a day. Anger has been shown to affect JDM (Lerner & Keltner, 2000) and it affects peoples' experience of certainty and control when considering decision-making tasks. Anger is also an emotion that can be noticed on other people quite easily, and combined with being a frequent emotion in our daily lives, it is interesting to further investigate the emotion's effect on JDM.

Fear is an emotional response that can be described as a state of arousal elicited by stimulus that is perceived as threatening, dangerous or anxiety inducing (Steimer, 2002). Fear is an adaptive response mechanism in animals that can be learned after having been exposed to situations that has previously caused stress or pain, leading to avoidance of this type of stimulus or situations. Similar to anger, fear is an emotion that is high in arousal and negative valence. Fear has also been found to affect JDM, however with oppositive certainty and control appraisals than anger (Lerner & Keltner, 2001). Fear has been linked to appraisals of uncertainty and situational control.

The circumplex model developed by Russell (1980) proposes that the two different and independent neurophysiological dimensions, arousal and valence, produces cognitive interpretations that are the basis for all the affective states that people experiences (Posner et al., 2005). One of the dimensions is *arousal*, where the emotional state is an assessment of the intensity of the experience. The second dimension, *valence,* refers to the positivity or negativity related to the experience of the emotion (Posner et al., 2005). The Circumplex Model (presented visually on a Y and a X-axis) posits that different affective states are not necessarily

independent of each other, but rather connected (Darbyshire et al., 2006). For example, feelings of delight and satisfaction – two different specific emotions – needs to be seen in relation to their opposite and related emotions and functions as a combined product of both the experienced arousal and valence.

However the Circumplex Model has received criticism (Remington et al., 2000). The model proposes that different affective states are a function of their distance to one another – meaning that emotions should decrease in their positive correlation to each other as the closer they get to 90° degrees separation on the model. The two dimensions of the Circumplex Model does not necessarily reflect differences between certain emotions that match reality. The emotions anger and fear are both high in arousal and negative valenced emotions, according to the Circumplex Model – however, these two specific emotions are different from one another and are most often experienced at different situations (Remington et al., 2000). These similarities between anger and fear contrasted by the differences of how they are appraised in different situations will be further investigated and creates an important basis for the thesis.

2.1.1. Valence

As discussed above, in the circumplex model by Russell (1980), valence refers to the positivity or negativity related to the affect of the emotion (displeasure-pleasure). Bless et al. (1996) found that different moods might influence the cognitive processing of an individual. The researchers found that people with sad mood-states relied less on their general knowledge structures (schemes or scripts) as compared to people with a happy mood. Whereas happy individuals were more prone to accept irregularities as if they were part of the script, sad individuals were less likely to simply accept irregularities or atypical traits of the scripts. It might seem that a more pleasantly valence state, or happy mood, may cause people to show more intuitive cognitive processing as they are more likely to let their mood guide them.

Schwarz and Clore (1983) found evidence for how different moods and affective states might influence how a person judges their current state of life satisfaction and general happiness. Schwarz and Clore (1983) discusses how they discovered that people experiencing unpleasant moods might cause them to be more likely to seek explanation for their moods, compared to people experiencing happy

moods. Sad moods might thus cause more analytical cognitive processing to uncover *why* they are experiencing negative moods – thus viewing happy moods as the default.

2.1.2. Arousal

According to the Circumplex model proposed by Russell (1980), arousal is a second component of emotions, next to valence. As mentioned above, arousal refers to the intensity of the affect (deactivation-activation) that is experienced by the individual. Certain emotions and situations are typically associated with high arousal, such as being scared when seeing a dangerous animal when hiking in the forest or becoming angry when numerous people are cutting in the queue at the super market.

Arousal have been found to influence individuals preference for risk (Galentino et al., 2017). There is evidence that suggest experiencing high levels of arousal will lead to a higher probability of choosing the more risky outcome when faced with a decision involving risk assessment. Evidently, the higher levels of arousal will increase the risk-taking behavior when the outcomes are more ambiguous (FeldmanHall et al., 2016).

2.1.3 Appraisals

There are several ways we as humans evaluate different situations and experiences – winning a running competition is generally seen as a positive and fun thing to experience while losing the competition will likely be seen as unpleasant and a negative experience. Unbeknownst to us, humans evaluate and implicitly appraise everything we encounter, whether it be people or situations (Clore & Ortony, 2008). These evaluation and appraisal are immediate and will be present whenever we encounter a new situation or when we revisit a familiar situation.

According to the Appraisal-Tendency Framework (Lerner & Keltner, 2001), emotions might predispose people to make assumptions, cognitions and actions that are attuned to certain specific situations that elicited the emotions. These emotional responses often persists beyond where it originated and may carry over to other situations.

As Lerner et al. (2007) discusses, different appraisals might lead to different assessments of risk due to the different evaluations that arise from the emotions. For instance, the emotions anger and fear have different appraisals when it comes

to certainty and control and will thus influence the perception people have on risk assessment (Lerner & Keltner, 2001).

Lerner and Keltner (2000) evaluated risk assessment of subjects that were asked to consider the estimated annual amount of certain causes of death and then to consider the chance that certain negative and positive events would happen to themselves compared to the likelihood of it happening to their peers. It was apparent that individuals that experienced fear were more likely to experience uncertainty compared to angry individuals – angry people made more optimistic risk assessments. While the angry individuals were thus more likely to experience control for new situations, fearful individuals where more likely to perceive higher risk for new situations (Lerner & Keltner, 2000). It is expected that the *immersed anger* condition will have a higher sense of individual control and certainty after the emotional manipulation, compared to the *immersed fear* condition who is expected to experience more situational control and uncertainty, and less individual control and certainty.

Emotions might arise from specific appraisals, or evaluations, of situations that predisposes people to experience this emotion the next time they appraise a similar situation (Lerner et al., 2015). Thus, each emotions activates a predisposition to appraise future events in line with the central appraisal dimensions that triggered the emotion in the first place. A key component of the Appraisal-Tendency Framework is the prevalence of discrete, or incidental, emotions. These emotions originate in one situation and carry over to another, unrelated situation that would not necessarily elicit that emotional response (i.e., the example of the stock broker from earlier) (Lerner et al., 2015).

2.1.4. Anger and Fear

As mentioned, both *Anger* and *Fear* are emotions that are noted to be high in arousal and high in negative valence (Lerner et al., 2015). It is specifically interesting to investigate *anger,* as this is an emotion that is commonly experienced at several times a week and it is often elicited by irritations or as a reaction to infuriating stimulus – this of course might vary from person to person. Irritations and anger-frustrations may come easy to people in daily situations and might be induced by low blood sugar and hunger that can trigger irritations. Comparably, fear is a common emotion as well, yet it is not as prevalent in people's everyday

lives as anger. Feelings of fear and anxiousness are usually not so easily triggered as anger and irritations. Because anger is so prevalent in people's lives, as well as its relationship to JDM, it makes the emotion a prime target emotion to investigate in relation to risk-taking.

Anger has been linked to appraisals of certainty and control and individuals who are experiencing anger often perceives a sense of individual control of situation and certainty (Goldberg et al., 1999; Kligyte et al., 2013; Lerner & Keltner, 2001; Lerner et al., 2015; Polyportis et al., 2020). People experiencing anger often show a disposition to perceive individual control and view situations as predictable (Gambetti & Giusberti, 2009). These differences may be observed in different JDM-behaviors, as anger will influence people's behaviors, regardless of whether the decisions have anything to do with the source of the anger.

In their research, Ferrer et al. (2016) found that angry participants were more likely to engage in risk-taking behavior. Having incidental anger carry over from previous events was a likely driver of risk-seeking decision-making, and male participants were more likely to respond to this emotion compared to women. While male participants are not experiencing more anger than women, they are more likely to be acting on the anger and letting it influence their risk-taking under uncertainty (Ferrer et al., 2016).

Interestingly, while certain emotions are similar in arousal and valence, they might produce differences in certainty and control, as discussed in the previous section. She et al. (2017) found that when participants were induced with anger they acted in more risk-taking behavior and preferred the option that was more risky. Compared to participants who had been induced with fear, who preferred the options that were more risk-averse. While anger have been associated with high sense of individual control and high levels of certainty, fear is associated with much less individual control, and rather more situational control as well as uncertainty (Inbar & Gilovich, 2011; Lerner & Keltner, 2001; Polyportis et al., 2020). While these emotions are both high in arousal and negative valence, it is interesting that anger causes participants to engage more risk-taking behavior, and fear does not.

2.2. Risk-Taking in Iowa Gabling Task

Developed by Bechara et al. (1994), the Iowa Gambling Task (IGT) was originally designed as a decision-making task where participants are presented with

four decks of cards (A, B, C & D) and are told to then have to choose one of these every round for 100 trials. For each time they pick a deck, they have the chance to both win and lose money. After each pick they receive feedback of the resulting choice. Participants start out with a base loan of $2000 and are told that their goal should be to make a profit. Deck A and Deck B always yield $100 reward with a 50% chance of a $250 fine each time, Deck C and Deck D always yield $50 reward with a 50% chance of a $50 fine each time. Participants are unaware of what each of the card decks yield before choosing and are not told before the task, they are only instructed to pick one of four options for each 100 trials.

In their experiment, Bechara et al. (1994) tested subjects that had impairments in the ventromedial sector of prefrontal cortices, which leads to "severe impairments in real-life decision-making" (p. 7). Subjects with this impairment show a pattern of being unable to learn from their mistakes and often act against their best interests. As the authors discuss, choosing decks C and D will in the long run be more advantageous as these two decks will provide and overall gain on the long-term, while choosing decks A and B will in the long run be more disadvantageous because these two options have a much higher fine at the same risk, compared to decks C and D. From the results, Bechara et al. (1994) found that the unimpaired participants selected decks C and D more frequently and avoided the bad disadvantageous decks A and B. The target groups with the cognitive impairment showed an inability to form a pattern and to assess the risks of the IGT.

Control groups are shown to choose decks A and B in the beginning of the 100 trials, while slowly and gradually moving to predominately choosing decks C and D (Bechara et al., 1994). The subjects must rely on their own estimations of risk and determine which decks are risky and which decks that are profitable over time. "Normal" people are shown to assess the risk and predominately choose the less risky options of the IGT (Decks C & D).

Pathological gamblers have been found to exhibit worse performance on the IGT compared to control subjects (Brevers et al., 2013; Linnet, 2013). The pathological gamblers show an avoidance of the "safe" options and instead show a persistent preference towards immediate, high and uncertain rewards (decks A and B), even though these options gave participants a greater loss over time. Similar results were found by Linnet et al. (2006), where pathological gamblers showed

significantly worse decision-making skills than non-pathological gamblers, and these effects were especially noticeable in male participants.

van den Bos et al. (2013) looked at differences between sexes when participants conducted the IGT and found that men had a higher focus on long-term pay-off decks while women focus on both the win-loss frequencies in addition to the long-term pay-offs while also being more sensitive to occasional losses compared to men. These differences were argued to be – in part – linked to behavioral differences between the sexes that occur when conducting emotion regulation.

Few studies have investigated the role of discrete emotions in the IGT. It is worth noting that even in this small set of studies described below, findings are not entirely consistent. Specifically, the literature reveals mixed findings regarding the effects of fear and anger on risk-taking. As discussed in the previous section, most studies seem to suggest that anger increases risk-taking whereas fear decreases risk-taking. However, a small number of studies have found that the predicted effects of fear and anger go in to the opposite directions in the IGT (Arıkan İyilikci & Amado, 2018; Bagneux et al., 2013; Bollon & Bagneux, 2013). For instance, Bollon and Bagneux (2013) investigated the role of appraisals of certainty and control in relation to the IGT. Authors utilized emotions typically associated with certainty, such as the *disgust*, and compared it to emotions typically associated with both certainty and uncertainty, such as *sadness*. Here they induced sadness-participants with certainty appraisal and another group with uncertainty appraisals. It was found that the certainty-induced participants sadness group did make equal choices uncertainty-induced participants sadness group in the beginning, however about a third-way through of the IGT it was apparent that certainty-induced sadness participants made more advantageous choices that remained stable across the task trials (Bollon & Bagneux, 2013). The behavior of these certainty-induced sadness participants matched the pattern of the disgust-group (an emotion associated with high certainty).

Similar to Bollon and Bagneux (2013), Bagneux et al. (2013) found that certainty-associated emotions would lead to participants conduct decisions that were more beneficial in the long-term. Here they tested the emotions anger, happiness, fear, to name few, because these emotions are associated with varying

degrees of certainty-uncertainty. Participants that were induced with emotions that are typically associated with certainty, such as anger, disgust and happiness, made choices that were more advantageous compared to participants that were induced with emotions typically associated with uncertainty, such as sadness and fear.

Notwithstanding the mixed finding in the small set of studies examining discrete emotions in the IGT, this thesis draws on the Appraisal-Tendency Framework (ATF) (Lerner & Keltner, 2001) to predict that anger will increase risk-taking (i.e., selecting risky decks in the IGT) and fear will decrease risk-taking (i.e., selecting safe decks in the IGT). Although few studies seem to have investigated the influence of discrete incidental emotions on risk-taking in the IGT, some of these studies are inconsistent with predictions by the AFT (Lerner et al., 2015). According to the ATF, uncertainty-related emotions like fear should reduce risk-taking whereas certainty-related emotions like anger should increase risk-taking. As already shown, some studies have found that emotions associated with certainty can lead to decisions that are less risky and therefore more advantageous.

The IGT is an experience-based task, meaning it is possible to objectively measure the performance of the subjects participating in the task. Choosing decks A and B does indeed provide a higher reward for each trial ($100) compared to decks C and D ($50), however choosing decks A and B yield a much higher fine ($250) compared to the fine received from decks C and D ($50). Choosing decks C and D is thus seen as inherently more beneficial choices in the long run compared to the disadvantageous decks A and B. Choosing decks C and D provides a steady climb towards a higher end result, while A and B provides a steady decline towards a negative, low end result.

Risk-taking behavior refers to when individuals are making certain choices that has the potential of having either a positive desired outcome, or negative undesired outcome (Gambetti & Giusberti, 2009). As Gambetti and Giusberti (2009, p. 7) notes, there is a common definition of risk that refers to the event as “the possibility of loss”, which is an important factor to consider when assessing risk-taking behavior. In the Asian Disease Problem by Tversky and Kahneman (1981) the authors explore framing effects and their corresponding effect on JDM. Here subjects are tasked to select either Program A or Program B that will be implemented in order to prepare for a disease outbreak that will kill 600 people.

Subjects are presented with a gain frame option (Program A will save 200 people) and a loss frame (Program B has a 1/3 chance of saving 600, but a 2/3 of saving no one). Tversky and Kahneman (1981) found that people are more risk averse when they have something to gain and they are willing to take more risks when the decisions involve losing.

Assessing how emotions influence risk-taking behavior, Johnson and Tversky (1983) found that incidental positive affect produced a decrease in assessment of risk when subjects were assessing different conditions of risk. When exposed to time pressure, people experiencing high levels of negative emotions engage in more risk-taking behavior (Zhao et al., 2016).

While studying the effects emotion on risk-taking behavior, Hua et al. (2015) explored the effects of negative and positive emotions on risk-taking behavior as well as how time pressure might have an impact on the decision-making. It was discovered that when participants were under time constraints, the individuals that had high levels of negative emotions behaved in more risk-taking behavior compared to people with high levels of positive emotions.

2.3. Cognitive processing

Emotions not only shape people's willingness to take risks, but they also shape how people process information during the decision-making process. Dual-process models of cognitive processing differentiate between two distinct types of processing: intuitive and analytical processing (Durning et al., 2015; Gawronski & Creighton, 2013; Kahneman, 2003, 2011; Sloman, 1996). The intuitive processing style is associated with effortless, quick and unconscious processing style, while analytical processing style is associated with more effortful, slow, conscious and well-thought through information processing. According to some researchers, intuitive processing is the default mode of processing, but can be overridden by engaging in analytical processing (Epstein, 2010; Gronchi & Giovannelli, 2018; Salas et al., 2010; Vatansever et al., 2017).

Emotions play an important role in whether decision-makers rely on intuitive or analytical processing to make decision. For instance, it has been found that people with high levels of arousal are restricted in the amount of information processing they take in and will rely less on analytical processing style (Hanoch & Vitouch, 2004). This is in line with Arnsten (2009) who argues that emotions,

especially those that are high on arousal, interrupt functioning of the prefrontal cortex and activate the amygdala. These processes are known to activate more intuitive processing (Hodgkinson & Sadler-Smith, 2017).

It is worth noting that theories make diverging predictions regarding the influence of emotions on information processing. Appraisal theories (e.g., Lerner et al., 2015) predicts that emotions that are associated with uncertainty appraisals, such as fear, trigger analytical processing style (Coget et al., 2011; Tiedens & Linton, 2001), whereas comparably, emotions that are associated with certainty and control appraisals, such as anger, trigger intuitive processing style. Nevertheless, in this thesis, the hypothesis is that both fear and anger will increase intuitive processing since both are associated with high arousal.

Cognitive processing style has been found to have an effect on JDM. Ayal et al. (2015) investigated different cognitive processing styles and its corresponding effect on decision-making. In one of their experiment, the authors found that the benefits of using an intuitive processing style and analytical style was largely dependent on the type of decision-making task that was used. While analytical processing led to better performance on an analytical decision-making task, it impeded the performance on intuitive decision-making tasks, and vice versa. It may seem that certain processing styles can have beneficial outcomes depending on the task at hand, and that certain tasks are more compatible with certain types of cognitive processing.

2.4. Emotion Regulation

Emotion regulation refers to the controlled regulation of ones' experienced affect, motivation and drive (Magar et al., 2008). Emotion regulation can be seen as a sub-category of self-regulation, which refers to a person's ability to control, adapt and modify as well as coping with ones' desires, impulses and emotions (Murtagh & Todd, 2004). A second sub-category of self-regulation is cognitive regulation, mainly focusing on control for ones' thoughts and the actions that lead to the planning and fulfillment of behavior (Magar et al., 2008).

Magar et al. (2008) assessed the role of emotion regulation in risk-taking behavior by testing two control strategies for emotion regulation. Authors tested inhibiting or reduction of the behavioral expressions often associated with a particular emotion (expressive suppression), and having people change their views

in a particular situation in order to modify the emotions (cognitive reappraisal). The cognitive reappraisal strategy has been found to be an effective strategy for improving psychological well-being and for effective regulating ones' emotions (Gross & John, 2003; John & Gross, 2004). Magar et al. (2008) found that participants with poor levels of emotion regulation were more likely to engage in risk-taking behavior. Similarly, Braunstein et al. (2013) found that using cognitive reappraisal by either emphasizing or de-emphasizing would have an effect on risk-taking, such that depending on the desired outcome and expected value – risk taking could be either beneficial or disadvantageous.

Cognitive reappraisal of negative emotions has been found to increase risk-taking behavior in people (Heilman et al., 2010). It was discovered by Heilman et al. (2010) that by reappraising emotions, such as fear and disgust, it reduced the negative and unpleasant experienced associated with these emotions. These reappraisals of the emotions had a significant effect on promoting risk-taking behavior and decreased risk-aversion. Miu and Crisan (2011) found that cognitive reappraisal did indeed reduce the effects of framing in that participants showed increased positive affect during the framing task. Park and Jang-Han (2011) found that angry participants who were instructed to reappraise their anger to a positive mood were less likely to engage in risk-taking behavior compared to participants who were instructed to reappraise their anger to a more negative mood.

The reappraisal technique of *distancing* has been found to be a particularly effective tactic in regulating emotions. Distancing refers to simulating a new perspective of a situation which will change the perceived distance to the emotional stimulus which in turn might reduce the initial effect of the stimulus (Powers & LaBar, 2019). Chu and Yang (2019) found that reduced levels of psychological distancing actually increased in the emotions such as anger, sadness and fear. Meaning that when people are not taking a distant approach to the emotion, the emotion will have a stronger effect and bigger presence. Bruehlman-Senecal and Ayduk (2015) found that emotional distress could be reduced if people imagined how they would feel about emotional stressors in the future, thus perceiving these stressors in a distant view. By imagining the stressor from a perceived distance, it might be viewed as a less threatening and intimidating stressor, thus making the stressor less impactful that it normally would be. There is also evidence that

supports that by adopting a self-distanced perspective of possible future stressors, it could lower the intensity of anxiety and reduce its effect (White et al., 2019). There does indeed seem that using distancing as an emotion regulation technique affects the perceived psychological distance from the emotion (Ochsner & Gross, 2008) and can reduce the impact of an emotion and that distancing can make a person more reflective of their emotion thereby reducing its initial effect (Gruber et al., 2009). The emotion regulating technique of psychological distancing will be used in this thesis to examine its effectiveness as a moderator on the effects of anger and fear.

Tamir et al. (2015) investigated expectancy-value models of self-regulation that stipulates that people engage in emotion regulation depending on their perceived useful of an emotion. Specifically, people will either down-regulate or up-regulate their emotions in manners that are thought to be beneficial and useful for them – such as increasing their anger when preparing for a fight (Tamir et al., 2015).

In investigating biases that arise from emotional responses, Lench et al. (2016) assessed the usefulness of utilizing emotion regulation strategies that would distract people from well-known biases (e.g., risk aversion, loss aversion, desirability bias) in judgements that usually arise due to emotional responses. The authors found that by using distractions (being told to divert their attention away from their emotional responses), people were able to improve the choices they made that would normally be affected by emotional responses (Lench et al., 2016).

Autobiographical Recall Tasks (ART) can be used in order to utilize participants' own past experiences of situations where they self-induce specific emotions that they have personally experienced in the past (Bhanot et al., 2020). ARTs have been used in experiments that target specific emotions (see Levine et al., 2008; Murray et al., 2008; Szasz et al., 2016; Todd et al., 2015; van der Schalk et al., 2012).

Szasz et al. (2016) asked participants to recall a situation (an autobiographical experience) where they experienced feeling an intense sensation of anger or sadness. The authors found that reappraisal strategy of emotion regulation was effective in decreasing emotional responses of anger – here participants were asked to revisit the situation and relive it and think about it in a

more positive and objective way. Most importantly, Szasz et al. (2016) found that when angry participants utilized reappraisal, they learned to make decisions that were the most adaptive in the IGT – improving advantageous results.

Based on the reviewed literature, I propose the following hypotheses:

H1: *Anger will increase risk-taking (i.e., selecting risky decks in the IGT).*

H2: *Fear will decrease risk-taking (i.e., selecting safe decks in the IGT).*

H3: *Distancing will moderate the influence of fear and anger on risk-taking, such that the predicted effects of fear and anger in H1 and H2 will only emerge at low levels of distancing.*

H4: *Distancing will moderate the influence of emotions on cognitive processing such that emotions will have a positive effect on intuitive processing, but only in the immersed condition.*

3.0 Methodology

3.1. Sample

A total of 559 subjects participated in this study. In order to incentivize participation, all subjects had the chance to win a 1000 NOK gift card. Subjects were predominantly recruited from large academic institutions in Norway, as well as shared through personal networks (LinkedIn, Facebook, email), handing out fliers and Facebook advertisement. To ensure high quality data, I removed subjects who did not meet pre-specified criteria. Participants who met any of the following criteria were excluded: those who spent less than 120 seconds on the study, reported lower than 4 on the comprehension of the English language used in the study (this was on a 7-point Likert scale ranging from 1 (Very Bad) to 7 (Very Good)), reported lower than 3 on how serious they were when they completed the study (this was on a 5-point Likert scale ranging from 1 (Not At All*)* to 5 (Very Much)), and subjects who failed an attention check where they were asked to identify what the previous task involved.

The final sample consisted of data from 170 participants (*N* = 170). The subjects of the study were 47.6% female (*N* = 81), 50.6% male (*N* = 86), three participants did not select any options. The age range was from 17-62 years with a mean age of 26.56 years old (*SD* = 7.55) and with an average of 6.83 years of work experience (*SD* = 8.42).

3.2. Data Collection

There was more than one factor that was important to consider when conducting the experiment in this thesis. The research had to consider health restrictions put in place by the Norwegian authorities due to the current ongoing pandemic of COVID-19 that reached an all-time high during the spring of 2021 – incidentally during the same timeframe for when the research for this thesis was going to be conducted. These restrictions made it important to take serious precautions when gathering subjects for the experiment that ultimately slowed down the data collection process considerably. Due to the inability to conduct the experiment in a laboratory setting, the experiment was carried out virtually instead of having participants physically present in an experimental room where external factors and distractions could be better controlled for.

The experiment was not reported to NSD (Norsk Senter For Forskningsdata) prior to the start of the data collection. No personal information was collected during the study, meaning there were no discernable identifying characteristics that could be connected to the participants. It was therefore determined that it would not be necessary to report the experiment to NSD because the only information collected was recalled subjective memories related to specific emotions, manipulation checks and demographics (age, gender, work experience). After the completion of the study, the participants had the option to submit their email address through a separate online form if they wanted to enter the contest of winning 1000NOK gift card. This email submission was voluntary and not connected to the main experiment.

In order to test the hypotheses proposed, I conducted an experiment using sampling of subjects recruited from the higher education institutions in Norway, as well as subjects recruitment through social media networks and personal networks. The recruitment methods used for data collection included sharing social media posts on student Facebook groups, contacting friends and acquaintances asking for

participation as well as asking them to share it further, publishing a paid call-to-action advertisement boost through Facebook's advertising tool, and handing out fliers across major education institutions in Oslo.

3.2.1. Experimental Design

The study manipulated emotions and distancing in a 2 (emotion: fear vs. anger) x 2 (distance: immersed vs. distanced) between-subjects design. As discussed earlier, the target emotions were *anger* and *fear*. These emotions were selected due to the predicted opposing effects on risk-taking (Lerner & Keltner, 2001). The emotions differ in terms of perceptions of certainty and control, but are believed to be similar on the dimensions of arousal and valence.

In this thesis, I will examine the effect of anger and fear on risk-taking behavior by subjecting participants to experimental conditions where they complete a risky decision-making task (the Iowa Gambling Task) after having been exposed to emotion evoking stimulus through an Autobiographical Recall Task (Szasz et al., 2016). Additionally, in this Autobiographical Recall Task, half of the participants are instructed to regulate their emotions using a strategy known as cognitive reappraisal. Specifically, I look at the role of reappraisal through distancing – a tactic that involves distancing oneself from and emotional stimulus to reduce its emotional impact. Next, I explore how the specific emotions and distancing impact the extent to which participants rely on intuitive vs. analytical processing during the decision-making task.

3.2.2. Experimental Procedure

Subjects entered the online experiment through a link. The experiment was designed and executed on Qualtrics. Participants were randomly assigned to the emotion condition and the distancing condition. Specifically, participants were asked to recall either a fear-inducing event or an anger-inducing event, and to describe it from either an immersed or distanced perspective.

After the emotion and distancing manipulations, subjects were presented with an attention check, which was used to exclude inattentive participants. Before the risky decision-making task (the Iowa Gambling Task) participants were given a unique randomized ID that was entered into PsyToolKit's web based IGT task (Stoet, 2010, 2017). This randomized ID was used in order to match the outputs of Qualtrics and PsyToolKit. After completing the IGT, participants were returned to

Qualtrics where they responded to the remaining survey questions, which included a cognitive processing measure, manipulation checks and demographics.

3.3. Measures

3.3.1. Dependent Variables

Risk-taking behavior. To measure how participants performed in risky decision-making, I used the Iowa Gambling Task (IGT). The task was executed on the PsyToolKit web tool (Stoet, 2010, 2017). The IGT task had the same set up as the original study by Bechara et al. (1994). In this task, participants are presented with four different decks, as shown below.

A = High Reward | High Risk
B = High Reward | High Risk
C = Low Reward | Low Risk
D = Low Reward | Low Risk

Picking either Decks A or B will yield a high reward ($100) but participants have a 50% chance of being given a high fine as well ($250). The high fine represents the high risk of choosing either Decks A or B, and these two decks are thus viewed as disadvantageous in the long run. Decks C and D will yield a low reward ($50) and a 50% chance of being given a comparably low fine ($50). Decks C and D are thus seen as being advantageous in the long run, as they will overall give a higher final sum at the end of the task, compared to choosing all disadvantageous decks. Consistent with prior research using the IGT, the participants completed 100 card selection trials that were subsequently divided into five blocks with 20 trials each (e.g., Bechara et al., 1998; Bechara et al., 2000; Bowman et al., 2005; Damasio, 1996; Fernie & Tunney R., 2006; Li et al., 2010). Frequency of Decks C & D in each blocks was treated as the dependent variable, consistent with prior research (e.g., Pittig et al., 2014). Decks C and D is interesting to use as a dependent variable because not only is it a measure on risk aversion, it is also a measure on of performance in the IGT, in the sense that making more frequent Decks C and D choices will lead to overall better outcome and performance in the long run. The IGT was adapted for digital use, such as the IGT-

Open (Dancy & Ritter, 2017) so it was easily utilized virtually from home through a web browser.

Intuitive and Rational Processing. As a measure of cognitive processing I used the Cognitive Processing Questionnaire (CPQ) by Bakken et al. (2016). This scale consists of 22 items that taps into five different dimensions of cognitive processing: Rational, Knowing, Urgency, Control and Affective. In the study I included the five items for Rational (analytical) processing and the four items for Affective (intuitive) processing. I only included the items of intuitive and rational processing, as these are consistent with previous research on decision-making (see Sinclair & Ashkanasy, 2005). The five items for Rational Processing included statements such as "*I considered carefully all alternatives",* "*I analyzed all available information in detail"* and "*I considered all consequences for my decision."* For four items for Affective Processing included statements such as "*I made the decision because it felt right to me"* and "*I based the decisions on my inner feelings and reactions."* The items were presented on a 5-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree). The average of the of each of these processing perspectives were used to create the variables Analytical and Intuitive processing, respectively.

For the regression analysis for Safe Decks, I included both intuitive and affective processing as predictors to see how it affects selection of Safe Decks for exploratory reasons.

3.3.2. Independent Variables

Emotion and Distancing Manipulations. Participants were presented with an Autobiographical Recall Task adapted from Bruehlman-Senecal and Ayduk (2015) and White et al. (2019). For the procedure, participants were asked to recall an event where they were either told to recall and identify a past experience that made them feel angry, or fearful. In the immersed conditions, participants were told to immerse themselves in the recalled event and imagine the event as if it was happening at the present moment right in front of them. In the distanced group, participants were told to imagine the recalled event through the eyes of an uninvolved observer, through a distant perspective.

3.3.3. Manipulation Checks

Self-reported emotions. To determine if the participants experienced fear and anger after the manipulation, participants were asked to indicate on a 7-point Likert scale ranging from 1 (Not At All) to 7 (Very Much), on how much they felt fearful, worried, anxious, angry, outraged, and irritated. The scores for *fearful, worried* and *anxious* were grouped together and the average made up the score for *self-reported fear*, and the scores from *angry*, *outraged* and *irritated* were grouped together and the average made up the score for *self-reported anger*.

Certainty and control. To assess the certainty and control appraisals, the study included six items of certainty and control from Lerner and Keltner (2001). The three items for *control* were: "*In the events that you described on the previous pages, to what extent did you typically feel that someone other than yourself had the ability to influence what was happening?", "In the events that you described on the previous pages, to what extent did you typically feel that someone else was to blame for what was happening in the situation?"* and *"In the events that you described on the previous pages, to what extent were the events beyond anyone's control?"*(this item was reversed scored). These three items were presented on a 6-point Likert scale ranging from 1 (Not At All) to 6 (Very Much). Scoring high on these items indicate a high sense of having individual control of the situation, while a low score indicate a high situational control, meaning the individual had little control of what was happening. The average of these three items made up the score for the variable *control*. The three items that measured *certainty* were: "*In the events that that you described on the previous pages, how well did you understand what was happening in the situation?", "In the event that you described on the previous pages, how well could you typically predict what was going to happen next?"* and *"In the events that you described on the previous pages, how uncertain were you about what would happen in various situations?"* (this item was reversed scored). These items were also presented on the same Likert scale as the *control* appraisal. Scoring high on these items indicate high certainty while low scores indicate low certainty, or higher uncertainty. The average of these three items made up the score for the variable *certainty*.

Perceived distance. In order to measure the effectiveness for the perceived psychological distance manipulation, participants responded on a single item scale

that asked "*How far did you feel from the event you wrote about*". The item was measured on a 7-point Likert scale ranging from 1 (Very Near) to 7 (Very Distant).

Arousal and Valence. To investigate whether fear and anger have similar levels of valence and arousal, the Self-Assessment Manikin was used (Bradley et al., 1992; Bradley & Lang, 1994; Bynion & Feldner, 2017). For *arousal*, participants were presented with five visuals (illustrating increasing activation/arousal) and asked to indicate on a nine-point Likert scale ranging from 1 (Calm) to 9 (Aroused/Activated) on how they felt after reflecting on the emotional event they recalled in the Autobiographical Recall Task (ART). For *valence*, participants were presented with five visuals (illustrating a sad face turning increasingly happy and smiling) and asked to indicate on a nine-point Likert scale ranging from 1 (Unhappy) to 9 (Happy) on how they felt after the ART.

3.3.4. Control Variables

In all the regression models age, gender, arousal and valence were included as control variables.

Risk-taking has been found to decrease with age (Deakin et al., 2004) and that older people have been found to make less risky decisions. In a modified IGT, Cauffman et al. (2010) found that avoidance from disadvantageous decks increased with age on a linear scale and that the older adults chose less risky decks compared to adolescents. Vroom and Pahl (1971) found evidence that age was negatively related with risk-taking.

It has been found that women are more risk averse compared to men (Charness & Gneezy, 2012; Dwyer et al., 2002) and in their meta-analysis Byrnes et al. (1999) found that men are significantly more likely to engage in risky decision-making. Finally, both arousal and valence have been found to impact risk-taking (for a review, see Lerner et al., 2015). Although it is expected in this thesis that fear and anger will elicit similar levels of valence and arousal, it is important to control for their potential effect on risk-taking.

4.0 Results

4.1. Descriptive Statistics

4.1.1. Manipulation Checks

Self-reported emotions, arousal and valence. To investigate whether the manipulations were successful, a series of one-way ANOVAs were used. Unexpectedly, the emotion manipulation yielded a significant difference in arousal, $F(1, 848) = 5.62$, $p = .018$. The anger condition reported higher levels of arousal ($M = 4.33$, $SD = 1.97$) compared to the fear condition ($M = 4.00$, $SD = 2.08$)

Likewise, and unexpectedly, results show that there was a significant difference in valence between the two emotions conditions, $F(1, 848) = 39.48$, $p < .001$. The fear condition reported higher levels of negative valence ($M = 4.53$, $SD = 1.58$) compared to the anger condition ($M = 3.89$, $SD = 1.39$)

For self-reported *fear*, there were significant differences between the groups, $F(1, 848) = 59.50$, $p < .001$. The participants in the fear condition reported higher levels of self-reported fear ($M = 3.34$, $SD = 1.60$) compared the anger participants ($M = 2.54$, $SD = 1.40$). Furthermore, there were also significant differences between the groups for self-reported *anger*, $F(1, 848) = 248.80$, $p < .001$. The anger group reported higher levels of self-reported anger ($M = 4.21$, $SD = 1.47$) compared to the fear group ($M = 2.57$, $SD = 1.58$).

Certainty & Control. For the control appraisal, there was significant differences between the groups, $F(1, 848) = 227.49$, $p < .001$. The anger condition reported higher levels of individual control ($M = 4.72$, $SD = 1.07$) compared to the fear condition ($M = 3.43$, $SD = 1.39$). For the certainty appraisal, there was also significant differences between the groups, $F(1, 848) = 24.38$, $p < .001$. The anger condition reported higher levels of certainty ($M = 3.89$, $SD = 0.99$) compared to fear conditions ($M = 3.55$, $SD = 0.96$).

Perceived distance. In order to investigate the effectiveness of the distancing manipulations, a one-way ANOVA was used. There was significant differences between the groups in how the participants perceived distance the described event, $F(1, 848) = 8.70$, $p = .003$. The distance group reported greater perceived distance ($M = 4.13$, $SD = 1.44$) compared to the immersed group ($M = 3.82$, $SD = 1.66$).

For self-reported fear, there were significant differences between the groups, $F(1, 848) = 26.87$, $p < .001$. The immersed group reported higher levels of self-reported fear ($M = 3.22$, $SD = 1.62$) compared to the distanced group ($M = 2.67$, $SD = 1.43$)

There were no significant differences between the groups in self-reported anger, $F(1, 848) = 2.26$, $p = .113$. The immersed group reported higher levels of self-reported anger ($M = 3.44$, $SD = 1.79$), however they were not significantly higher than the distanced group ($M = 3.26$, $SD = 1.73$).

To conclude, the manipulations successfully induced the target emotions and distancing. For the next part, the further results of the analysis will be presented.

4.1.2. Correlations

Table 4.1 below shows the correlations between the dependent variables, independent variables, manipulation checks and control variables.

Interestingly, the correlation analysis showed a significant negative correlation between the distance variable and intuitive processing. This indicates that participants who adopted a distant perspective while recalling an emotional event relied less on intuition during the risky decision-making task. However, there was no observable significant correlations between the distance variable and analytical processing.

It was expected that the risky disadvantageous decks (Decks A & B) would be chosen by participants seeking quick reward and relying on affective ques – such as a higher yield on the reward. The analysis showed that there was indeed a significant negative relationship between disadvantageous decks and analytical processing. This indicates that participants that relied on more analytical processing style were less likely to choose the risky disadvantageous decks. Additionally, selection of risky decks significantly correlated with valence, which indicates that the more negative valence-, the more likely they were to choose risky decks. Moreover, analytical processing correlated positively with selection of safe advantageous decks (Decks C & D) and negatively with risky disadvantageous decks (Decks A & B).

There was also a significant negative correlation between arousal and perceived distance to the emotional event. This indicates that the closer perceived

proximity to the emotional event, the higher the experienced arousal was for the participants.

Table 4.1.

Correlation Matrix

	1	2	3	4	5	6	7	8	9	10
1. Emotion (1=Anger)	-									
2. Distance (1=Distanced)	-.01	-								
3. Risky Decks (A & B)	.06	.02	-							
4. Safe Decks (C & D)	-.02	-.05	-.57**	-						
5. Intuitive Processing	-.08*	-.16**	-.01	.00	-					
6. Analytical Processing	.01	-.03	-.30**	.19**	.16**	-				
7. Arousal	.08*	-.06	.02	-.02	.08*	.01	-			
8. Valence	-.21**	.01	-,12**	.00	.01	.06	-.19**	-		
9. Control Appraisal	.46**	-.02	.02	.02	-.06	.06	.13**	-.10**	-	
10. Certainty Appraisal	.17**	-.05	.03	-.06	-.04	-.02	.01	.00	.05	-

Note. * $p < .05$. (2-tailed) ** $p < .001$. (2-tailed)

4.2. Analytical procedure

To test the hypotheses of this study, I performed a generalized linear mixed models (GLMM) analysis due to the repeated measure of dependent variable as measured by the IGT, which contained 100 trials. Following the common procedure used in prior studies, I divided the 100 trials into 5 different blocks. Thus, each participant had 5 responses on the depended variables: total count of safe deck selection in blocks 1-5 and total count of risky deck selection in blocks 1-5. Poisson regression was used because the dependent variable (frequency of safe decks selected) is a count variable. Block, emotion, distance, intuitive, and analytical were included as independent variables. Age, gender, arousal and valence were entered as control variables. Finally, since responses in the IGT differ across trials (Bechara et al., 1998; Damasio, 1996), I included block as a random effect. In addition, as subjects may differ in how they respond in the IGT, subjects was also entered as a random factor. In short, by including block and subjects, the model allows for individual differences among subjects and stimuli (DeBruine & Barr, 2021).

Next, I will present the results from the model with safe decks as the dependent variable using exponential coefficients (β) from the GLMM.

For the model (see Table 4.2.) predicting safe deck selection, the first four blocks positively predicted selections from the safe advantageous decks, in an increasing pattern: Block 1, β = 3.22, *p* = .033. Block 2, β = 4.07, *p* = .011. Block 3, β = 4.12, *p* = .010. Block 4, β = 4.71, *p* = .005. This is consistent with previous research indicating that participants learn, over time, to avoid the bad risky decks and choose safe decks over the course of the trials. The model negatively predicted selection from the safe decks and arousal β = 0.98, *p* = .006. Meaning that the less aroused the participants were, the more did they choose from the safe decks. Valance also negatively predicted β = 0.97, *p* = .004. Meaning that the more negative valence participants experienced, the more they choose from the safe deck option. Moreover, the emotion condition negatively predicted selections from the safe decks, β = 0.68, *p* < .001. Meaning that participants in the fear condition were more likely to choose from the safe decks than participants in the anger condition. Distancing also showed a negative effect on safe deck selection β = 0.72, *p* < .001. Meaning that participants who adopted a distanced perspective during the emotion recall selected less frequently from the safe decks. As predicted, there was a significant interaction between the emotion condition and the distancing condition, β = 2.37, *p* < .001. As shown in the interaction plot (Figure 4.1.), frequency of safe choices was higher in the fear compared to the anger condition, but only in the immersed condition. In the distanced condition, the effects of fear and anger on safe choices reversed.

Intuitive processing negatively predicted selections from the safe decks, β = 0.96, *p* = .028. Meaning that the higher participants scored on the intuitive processing, the less likely they were to select from the safe decks. Moreover, analytical processing positively predicted selections from the safe decks, β = 1.22, *p* < .001. Both of these findings are consistent with prior research which indicates that analytical processing is associated with safer, more rational choices in risky decision-making, and that intuitive processing is less associated with making risky averse choices.

Interestingly, I found the same results for Risky Decks (A & B) in the opposite direction as Safe Decks. However, these results are not presented due to space limitations.

Overall, these results support hypothesis H1-H3.

Table 4.2.

Generalized Linear Mixed Models, Dependent Variable: Safe Decks (C & D)

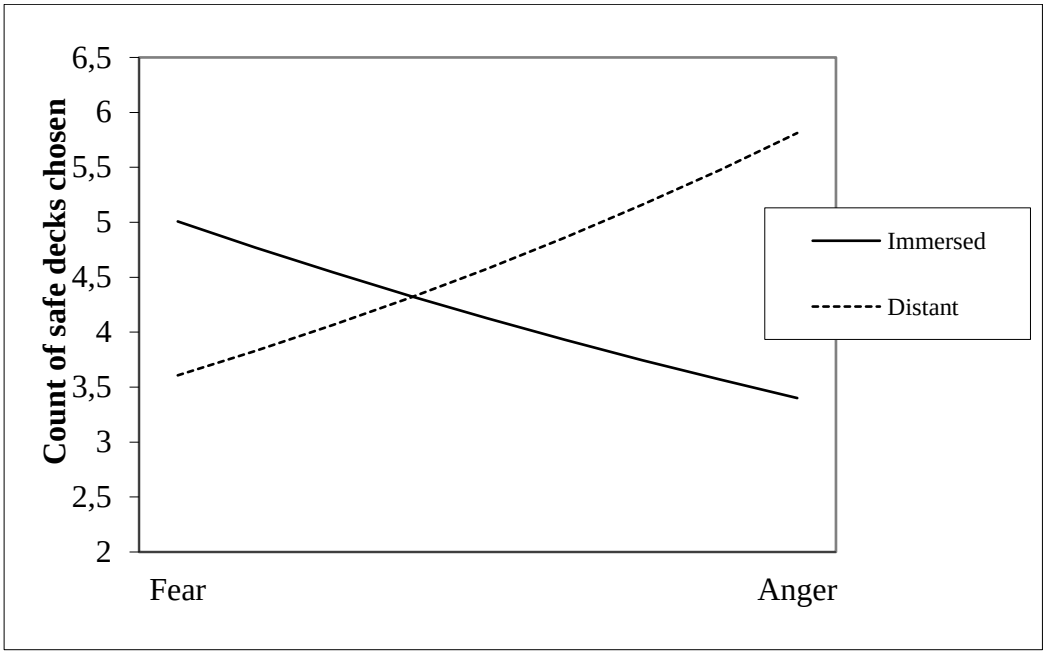
	B	SE	*p*	β
Intercept	0.28	.67	.679	1.32
Block 1	1.17	.55	.033	3.22
Block 2	1.40	.55	.011	4.07
Block 3	1.41	.55	.010	4.11
Block 4	1.55	.55	.005	4.71
Age	-0.00	.00	.103	1.00
Gender	0.04	.03	.283	1.04
Arousal	-0.02	.01	.006	0.98
Valence	-0.03	.01	.004	0.97
Emotion	-0.39	.05	.000	0.68
Distance	-0.33	.05	.000	0.72
Emotion x Distance	0.86	.06	.000	2.37
Affective Processing	-0.04	.02	.028	0.96
Rational Processing	0.20	.02	.000	1.22

Note. Probability distribution: Poisson. Link function: Log. *N* = 170
B = Standard Coefficient, SE = Standard Error, *p* = significance value, β = Exponential Coefficient.

Figure 4.1.

Interaction plot of 2 (fear x anger) x 2 (immersed x distance) conditions.

Dependent variable: Safe Decks



Note. Y-axis represents predicted frequency of Safe Decks selected within a block (1-20 trials).

To test the hypothesis concerning intuitive processing, I performed two linear regression analyses with intuitive processing (Table 4.3.) and analytical processing (Table 4.4.) as dependent variables. First, I will present intuitive processing, then analytical processing using the unstandardized coefficients (*B*).

As can be noted in the table below (Table 4.3.), a significant regression equation was found, $F(7,822) = 13.99$, $p < .001$. with and R^2 of .10. The analysis showed that age was a successful predictor for intuitive processing, $B = -.03$, $p < .001$. Meaning that the older the participants were, the less intuitive processing style they used. Gender was also a significant predictor for intuitive processing, $B = -.32$, $p < .001$. This indicates that that male participants were more likely to use intuitive processing, compared to women. Arousal was a significant predictor for intuitive processing, $B = .05$, $p = .002$. Meaning participants who were higher in arousal were more likely to use intuitive processing. However, valence was not a successful predictor for intuitive processing. There was no significant main effects (emotion and distance) in the analysis, however the interaction between emotion and distance was a significant predictor for intuitive processing, $B = -.33$, $p = .015$. This means that the interaction between emotion and distance is imperative in order to predict use of intuitive processing. As shown in the interaction plot below (Figure 4.2.), both emotions fear and anger increase intuitive processing in the immersed condition, and decreases intuitive processing in the distance condition, more so in the anger condition than the fear condition.

As can be noted in the table below (Table 4.4.), there was no significant regression equation, $F(7,822) = 0.99$, $p = .432$. with and R^2 of .00. None of the variables included in the analysis was a significant predictor for analytical processing.

These results support H4 that concerns how the influence that emotions have on intuitive processing will be moderated by distancing, but only in the immersed condition.

Table 4.3.

Linear regression analysis, Dependent Variable: Intuitive Processing.

	B	*B*(SE)	β
(Constant)	3.41**	.08	
Age	-.03**	.00	-.22
Gender	-.32**	.07	-.16
Arousal	.05**	.02	.11
Valence	.00	.02	.01
Emotion	-.08	.09	-.04
Distance	-.15	.09	-.07
Emotion x Distance	-.32*	.13	-.14
R^2	.10		
Adj. R^2	.10		
F for change in R^2	13.99**		

Note. *B* = Unstandardized Coefficients, *B*(SE) = Standard Error of Unstandardized Coefficients, β = Standardized Coefficient. *N = 170*. * $p < .01$. ** $p < .001$.

Table 4.4.

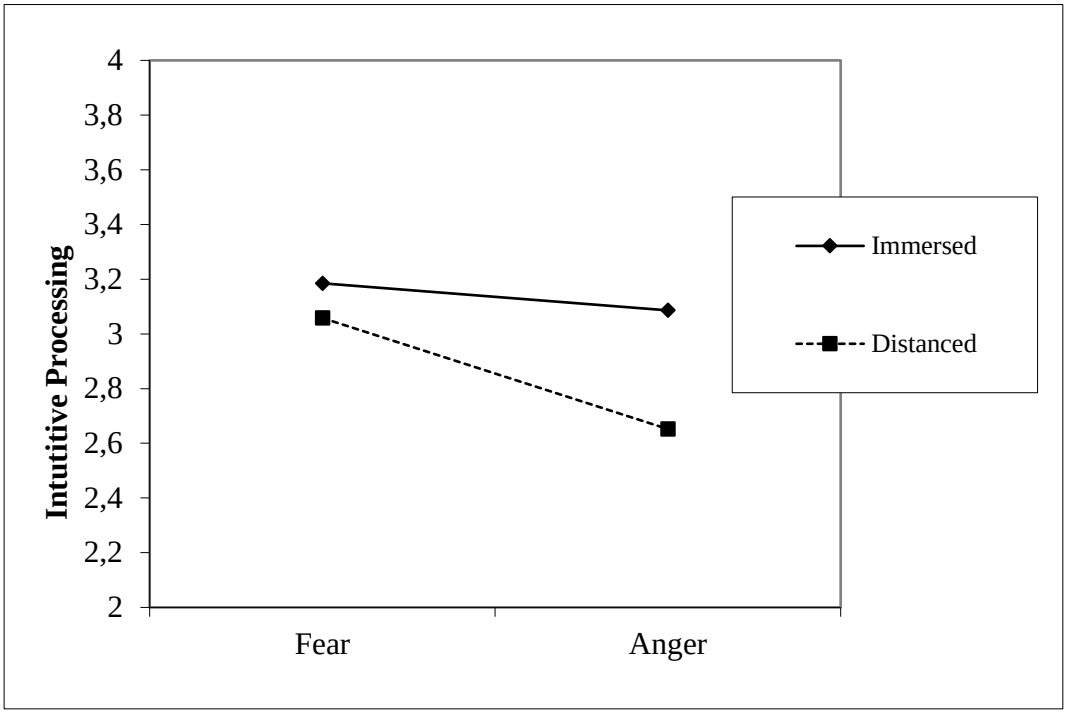
Linear regression analysis, Dependent Variable: Analytical Processing.

	B	*B*(SE)	β
(Constant)	2.86*	.08	
Age	.00	.00	-.02
Gender	.03	.07	.02
Arousal	.02	.02	.05
Valence	.04	.02	.07
Emotion	-.01	.10	.00
Distance	-.07	.10	-.04
Emotion x Distance	.03	.14	.01
R^2	.00		
Adj. R^2	.00		
F for change in R^2	0.99		

Note. *B* = Unstandardized Coefficients, *B*(SE) = Standard Error of Unstandardized Coefficients, β = Standardized Coefficient. *N* = 170. * $p < .01$. ** $p < .001$.

Figure 4.2.

Interaction plot of 2 (fear x anger) x 2 (immersed x distance) conditions. Dependent Variable: Intuitive Processing



Note. Y-axis represents participants score on intuitive processing (1-5).

5.0 Discussion

The purpose of this thesis was to examine the effects of fear and anger on risk-taking and how distancing as an emotion regulation technique moderates these effects. I hypothesized that anger would increase risk-taking (i.e., selecting risky decks in the IGT), while fear would decrease risk-taking (i.e., selecting safe decks in the IGT). Moreover, I hypothesized that distancing would moderate the effects of fear and anger on risk-taking, and that the predicted effects of H1 and H2 would only emerge at low levels of distancing. Lastly, I hypothesized that distancing would moderate the influence of emotions on cognitive processing, such that emotions will have a positive effect on intuitive processing, but only in the immersed condition.

The analysis found support for H1 and H2. The impact of emotion on risk-taking depends on whether participants reflected on the emotional event from an immersed or distant perspective. When immersed, fear reduces risk-taking while anger increases risk-taking. However, when distanced, these emotion effects

reverse, such that fear *increases* risk-taking, whereas anger *decreases* risk-taking. The differences on risk-taking behavior between immersed fear and immersed anger in this thesis supports the Appraisal-Tendency Framework by Lerner and Keltner (2000, 2001). Fear did indeed increase risk aversion and participants did experience more uncertainty and more situational control compared to the anger participants.

The analysis did also find support for H3, as distancing did in fact moderate the predicted effects of fear and anger on risk-taking. Previous research has found that using emotion regulation can reduce risk-taking behavior (Morawetz et al., 2019; Tabatabaei, 2020). This thesis does indeed find support for these previous findings. It was found that distancing oneself from anger, decreased risk-taking, indicating that this emotion regulation technique may beneficial in situations that do not favor risk-taking. Overall, this thesis builds upon research on emotion regulation and JDM by examining the psychological distancing tactic of reappraisal, which has been largely overlooked in the JDM literature.

What is also interesting with the findings in this thesis, is that participants were not asked to regulate their emotions – they were only instructed to take a distant perspective. The participants did still successfully regulate their emotions, which supports the idea that psychological distancing is a relatively simple and effective tool.

Previous research has shown that the use of psychological distancing can indeed reduce the effect of emotions (Gruber et al., 2009; Powers & LaBar, 2019; White et al., 2019). The results of this thesis add to these findings in that participants in the experiment that used distancing reported significantly less arousal than those immersed in the emotion. The higher their perceived distance to the emotional event, the less hold the emotion had on the participants – so much so that the initial effect of the emotion was greatly reduced when engaging in a subsequent in risky decision-making task.

As stated in H4, I hypothesized that distancing would moderate the influence of emotions on cognitive processing such that anger will have a positive effect on intuitive processing but only in the immersed condition. As reported in the results, the interaction between emotion and distance was a significant predictor for intuitive processing, indicating that the influence of emotion on intuitive

processing was reduced in the distanced condition. This is an interesting contribution research as it is evidence that distancing can indeed have an effect on not only risk-taking, but also on cognitive processing as well. Research on emotion and information processing shows that being aware of ones emotions, especially being in touch with affective cues, influence the extent to which people rely on intuitive processing (Sinclair et al., 2010). In this thesis I found that participants in the immersed condition showed higher levels of intuitive processing, while the distant condition showed less. These difference in intuitive processing between immersed and distanced was more prevalent in the anger participants. Meaning that not only did emotion regulation have an effect on how people behave in risky decision-making, but it also affected how people processed information.

Lerner and Keltner (2000) argues that anger, which is associated with individual control and certainty appraisals, will increase intuitive processing, while fear, which is associated with situational control and uncertainty, will increase analytical processing. The results in this thesis do not find strong support for the Appraisal-Tendency Framework in terms of cognitive processing.

There is, however, evidence that the results do appear to be more in line with arousal-based theories of cognitive processing. Such arousal-based theories predict that regardless of the valence or appraisals associated with an emotion, it is the arousal that determines an emotion's impact on cognitive processing. This is because arousal interrupts functions of the prefrontal cortex and activates the amygdala (Arnsten, 2009), both of which reduce capacity to engage in analytical processing (Hodgkinson & Sadler-Smith, 2017). Furthermore, no effects on analytical processing were observed.

The analysis showed that intuitive processing was higher in the immersed condition, compared to the distant condition. This could indicate that the emotion regulation was more effective for the anger condition because the anger condition showed higher levels of arousal. In other words, the anger condition may have been more susceptible to emotion regulation because participants were more "activated".

The use of cognitive processing style have been found to be compatible with similar processing-task at hand (Ayal et al., 2015). While certain tasks will rely on quick, intuitive thinking, the IGT is reliant on understanding and analytical processing in order to achieve better performance. The thesis supports these

findings, as participants using analytical processing style showed a higher propensity to choose from the Safe Decks, compared to the participants using intuitive processing. By using intuitive processing style on the IGT, participants performed worse and showed a higher propensity to choose from the riskier decks that on gave higher immediate reward, and thus on surface level seemed to be a good strategy to achieve a higher end sum of money.

5.1. Implications

The IGT offers several advantages over other measure of risky decision-making. First, in this task, participants need to make a series of decisions with no knowledge about probabilities of different choices. This is a better reflection of real-world decision-making. Managers and organizational decision-makers often have little or no information to guide their decisions. Second, with the IGT, it is possible to obtain an objective measure of *performance.* The more participants choose from decks C and D, the better their performance, as these decks objectively yield a better outcome (higher monetary value) than decks A and B in the long run. Thus, it is more rational to choose decks C and D. With other risk-taking problems, such as the Asian Disease Problem (Tversky & Kahneman, 1981), it is not possible to measure such objective performance.

It is important to mention that it might not always be necessary or even beneficial to regulate emotions in risky decision-making contexts. As this thesis found, the impact of distancing on risk-taking depends on which emotion is being regulated. For instance, when participants were immersed in fear (vs. anger), they performed better on the IGT and made safer choices. Conversely, when fear was distanced, the participants showed a higher propensity to choose risky decks – thus, leading to lower overall performance in the task.

These findings might provide a more nuanced perspective of emotions and risk-taking. Nevertheless, distancing can be used as a simple and effective tactic in organizations that can help decision-makers manage their emotions in decision-making settings involving fear and uncertainty.

5.2. Limitations

Ideally, the experiment would be conducted in a laboratory setting that would have provided more control, which is especially important for the effectiveness of the kinds of manipulations used in this thesis.

There was a large drop off rate for subjects completing participation in the study. Of the 559 subjects starting the study, it was only possible to use data from 170 subjects. Completing the experiment on a web-based platform from home through a browser can cause many distractions. The attention for the study can easily be interrupted by distractions. The study is especially vulnerable to distractions because the study took ~15 minutes to complete in its entirety, which is quite the commitment to expect from subjects who are participating from home.

The results of the study showed that the arousal levels of fear and anger were different in the immersed condition – the anger participants reported higher levels of arousal, which could explain why there were differences in risk-taking between the emotions. Thus, it is not entirely clear whether the opposing effects of fear and anger on risk-taking is driven by differences in appraisals or arousal.

Moreover, there are some limitations with the emotion manipulation used in this thesis. The Autobiographical Recall Task is a less standardized method of eliciting emotions – the participant's recalled event can vary greatly in perceived emotional intensity. By using already-validated visual images that are previously validated as emotion elicitors (Lang et al., 2008), I could have ensured less variation in the effectiveness of the emotion manipulation. The reason I did use the ART is because this was an online experiment, and it was necessary to engage participants in the study by having them actively write rather than viewing an image stimulus.

Lastly, this thesis could not demonstrate the mechanisms underlying the effect of distancing on risk-taking. Theoretically, one could speculate that distancing prompted participants to engage in more abstract thinking (e.g., zooming out and looking at the big picture), while being immersed prompted participants to engage in more concrete processing (e.g., focusing on the detailed features of an event) (Bruehlman-Senecal & Ayduk, 2015; White et al., 2019).

5.3. Future Research

For future research, it would be interesting to examine whether the findings of this thesis generalize to trait measures of emotions (fear and anger) and distancing. That is, do individuals' general tendency to experience fear and anger, and their tendency to engage in distancing, predict risk-taking in the same way? If this is the case, it would have important practical implications for organizations. Recruitment and selection procedures could include such measures when hiring for

jobs where risk-taking is desirable or not desirable. In addition, this thesis did not include objective physiological measures of emotion. Participants' emotions were assessed using self-reported measures. It will be interesting to examine how distancing regulates physiological responses during decision-making.

Moreover, more research is needed to uncover how emotions of differing levels of arousal and valence, as well as different appraisals, predict information processing. In other words, what aspects of an emotion best predicts people's use of intuitive vs. analytical processing? One could test, for instance, whether appraisals moderate the influence of high arousal emotions on information processing. This thesis did find significant evidence of intuitive processing being predicted by the interaction between emotion and distancing, however there was no significant evidence for analytical processing. It is not clear why emotions and distancing did not predict analytical processing.

This thesis found evidence that emotion regulation affected cognitive processing and that distancing reduced intuitive processing. For future research, it would be interesting to examine and replicate these effects to see if distancing of fear (and other emotions) could reduce analytical processing, similar to how distancing of anger reduced intuitive processing.

6.0 Concluding Remarks

This study finds support for appraisal theories on emotion, in that fear and anger differ in their effects on risk-taking. The overall results also show how psychological distancing as an emotion regulation tactic is a successful moderator of the effect of emotions and that the initial effect of emotion could be reversed through distancing. There was also support for arousal-based theories of emotions on cognitive processing. Fear and anger, both of which are high arousal emotions, positively predicted intuitive processing. Overall, this thesis builds on a growing line of research on emotion regulation and decision-making by demonstrating distancing as a simple and successful tool that regulates emotional influences on risk-taking and information processing.

7.0 References

Arıkan İyilikci, E., & Amado, S. (2018). The uncertainty appraisal enhances the prominent deck B effect in the Iowa gambling task. *Motivation and Emotion, 42*(1), 1-16. https://doi.org/10.1007/s11031-017-9643-5

Arnsten, A. F. (2009). Stress signalling pathways that impair prefrontal cortex structure and function. *Nature reviews. Neuroscience, 10*(6), 410–422. https://doi.org/10.1038/nrn2648

Ayal, S., Rusou, Z., Zakay, D., & Hochman, G. (2015). Determinants of judgment and decision making quality: The interplay between information processing style and situational factors. *Frontiers in Psychology, 6*(1088). https://doi.org/10.3389/fpsyg.2015.01088

Bagneux, V., Font, H., & Bollon, T. (2013). Incidental emotions associated with uncertainty appraisals impair decisions in the Iowa Gambling Task. *Motivation and Emotion, 37*(4), 818-827. https://doi.org/10.1007/s11031-013-9346-5

Bakken, T. B., Haerem, T., Hodgkinson, G. P., & Sinclair, M. (2016). Development and validation of the Cognitive Processing Questionnaire (CPQ): an instrument for measuring cognitive aspects of decision making *Manuscript in preparation*.

Bechara, A., Damasio A. R., Damasio H., & Anderson S. W. (1994). Insensitivity to future consequences following damage to human prefrontal cortex. *Cognition, 50*(1-3), 7-15. https://doi.org/10.1016/0010-0277(94)90018-3

Bechara, A., Damasio, H., Tranel, D., & Anderson, S. (1998). Dissociation Of Working Memory from Decision Making within the Human Prefrontal Cortex. *Journal of Neuroscience, 18*(1), 428-437. https://doi.org/https://doi.org/10.1523/JNEUROSCI.18-01-00428.1998

Bechara, A., Tranel, D., & Damasio, H. (2000). Characterization of the decision-making deficit of patients with ventromedial prefrontal cortex lesions. *Brain: A Journal of Neurology, 123*(11), 2189–2202. https://doi.org/10.1093/brain/123.11.2189

Bhanot, S. P., Chang, D., Lee Cunningham, J., & Ranson, M. (2020). Emotions and decisions in the real world: What can we learn from quasi-field

experiments? *PLOS ONE, 15*(12), e0243044. https://doi.org/10.1371/journal.pone.0243044

Bless, H., Clore, G. L., Schwarz, N., Golisano, V., Rabe, C., & Wölk, M. (1996). Mood and the use of scripts: Does a happy mood really lead to mindlessness? *Journal of Personality and Social Psychology, 71*(4), 665-679. https://doi.org/10.1037/0022-3514.71.4.665

Bollon, T., & Bagneux, V. (2013). Can the uncertainty appraisal associated with emotion cancel the effect of the hunch period in the Iowa Gambling Task? *Cognition & Emotion, 27*(2), 376-384. https://doi.org/10.1080/02699931.2012.712947

Bowman, C. H., Evans, C. E. Y., & Turnbull, O. H. (2005). Artificial time constraints on the Iowa Gambling Task: The effects on behavioural performance and subjective experience. *Brain and Cognition, 57*(1), 21–25. https://doi.org/10.1016/j.bandc.2004.08.015

Bradley, M. M., Greenwald, M. K., Petry, M., & Lang, P. J. (1992). Remembering pictures: pleasure and arousal inmemory. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 18*(2), 379–390. https://doi.org/10.1037/0278-7393.18.2.379

Bradley, M. M., & Lang, P. J. (1994). Measuring emotion: The self-assessment manikin and the semantic differential. *Journal of Behavior Therapy and Experimental Psychiatry, 25*(1), 49–59. https://doi.org/10.1016/0005-7916(94)90063-9

Braunstein, L., Herrera, S., & Delgado, M. (2013). Reappraisal and expected value modulate risk taking. *Cognition & Emotion, 28*. https://doi.org/10.1080/02699931.2013.809330

Brevers, D., Bechara, A., Cleeremans, A., & Noel, X. (2013). Iowa Gambling Task (IGT): twenty years after – gambling disorder and IGT [Review]. *Frontiers in Psychology, 4*(665). https://doi.org/10.3389/fpsyg.2013.00665

Bruehlman-Senecal, E., & Ayduk, O. (2015). This too shall pass: Temporal distance and the regulation of emotional distress. *Journal of Personality and Social Psychology, 108*(2), 356-375. https://doi.org/10.1037/a0038324.

Bynion, T.-M., & Feldner, M. T. (2017). Self-Assessment Manikin. In V. Zeigler-Hill & T. K. Shackelford (Eds.), *Encyclopedia of Personality and Individual Differences* (pp. 1-3). Springer International Publishing. https://doi.org/10.1007/978-3-319-28099-8_77-1

Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin, 125*(3), 367-383. https://doi.org/10.1037//0033-2909.125.3.367

Cauffman, E., Shulman, E. P., Steinberg, L., Claus, E., Banich, M. T., Graham, S., & Woolard, J. (2010). Age differences in affective decision making as indexed by performance on the Iowa Gambling Task. *Developmental Psychology, 46*(1), 193–207. https://doi.org/10.1037/a0016128

Charness, G., & Gneezy, U. (2012, 2012/06/01/). Strong Evidence for Gender Differences in Risk Taking. *Journal of Economic Behavior & Organization, 83*(1), 50-58. https://doi.org/https://doi.org/10.1016/j.jebo.2011.06.007

Chu, H., & Yang, J. Z. (2019). Emotion and the psychological distance of climate change. *Science Communication, 41*(6), 761-789. https://doi.org/10.1177/1075547019889637

Citron, F. M. M., Gray, M. A., Critchley, H. D., Weekes, B. S., & Ferstl, E. C. (2014). Emotional valence and arousal affect reading in an interactive way: neuroimaging evidence for an approach-withdrawal framework. *Neuropsychologia, 56*(100), 79-89. https://doi.org/10.1016/j.neuropsychologia.2014.01.002

Clore, G. L., & Ortony, A. (2008). Appraisal theories: How cognition shapes affect into emotion. In M. Lewis, J. M. Haviland-Jones, & L. F. Barrett (Eds.), *Handbook of Emotions* (3 ed., pp. 628-642). Guilford Press.

Coget, J. F., Haag, C., & Gibson, D. E. (2011). Anger and fear in decision making: The case of film directors on set. *European Management Journal, 29*(6), 476-490. https://doi.org/10.1016/j.emj.2011.06.003

Damasio, A. R. (1996). The somatic marker hypothesis and the possible functions of the prefrontal cortex. *Philosophical Transactions of the Royal Society of London. Series B Biological Sciences, 351*(1346), 1413-1420. https://doi.org/10.1098/rstb.1996.0125

Dancy, C. L., & Ritter, F. E. (2017). IGT-Open: An open-source, computerized version of the Iowa Gambling Task. *Behavior Research Methods, 49*, 972–978. https://doi.org/10.3758/s13428-016-0759-4

Darbyshire, P., Bell, R., & McDonald, H. (2006). Testing the Circumplex Model of Emotions in a consumer setting. *ANZMAC 2006 : Advancing theory, maintaining relevance, proceedings*.

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*(4), 590-598. https://doi.org/10.10170S1355617704104104

DeBruine, L. M., & Barr, D. J. (2021). Understanding Mixed-Effects Models Through Data Simulation. *Advances in Methods and Practices in Psychological Science, 4*(1). https://doi.org/10.1177/2515245920965119

Durning, S. J., Dong, T., Artino, A. R., van der Vleuten, C., Holmboe, E., & Schuwirth, L. (2015). Dual processing theory and experts' reasoning: exploring thinking on national multiple-choice questions. *Perspectives on Medical Education, 4*(4), 168-175. https://doi.org/10.1007/s40037-015-0196-6

Dwyer, P. D., Gilkeson, J. H., & List, J. A. (2002). Gender differences in revealed risk taking: evidence from mutual fund investors. *Economics Letters, 76*(2), 151-158. https://doi.org/https://doi.org/10.1016/S0165-1765(02)00045-9

Epstein, S. (2010). Demystifying intuition: What it is, what it does, and how it does it. *Psychological Inquiry, 21*(4), 295-312. https://doi.org/10.1080/1047840X.2010.523875

FeldmanHall, O., Glimcher, P., Baker, A. L., & Phelps, E. A. (2016). Emotion and decision-making under uncertainty: Physiological arousal predicts increased gambling during ambiguity but not risk. *Journal of experimental psychology. General, 145*(10), 1255-1262. https://doi.org/10.1037/xge0000205

Fernie, G., & Tunney R. (2006). Some decks are better than others: the effect of reinforcer type and task instructions on learning in the Iowa Gambling

Task. *Brain and Cognition, 60*(1), 94-102. https://doi.org/10.1016/j.bandc.2005.09.011

Ferrer, R. A., Maclay, A., Litvak, P. M., & Lerner, J. S. (2016). Revisiting the effects of anger on risk-taking: Empirical and meta-analytic evidence for differences between males and females. *Journal of Behavioral Decision Making, 30*(2), 516–526. https://doi.org/10.1002/bdm.1971

Fessler, D. M., Pillsworth, E. G., & Flamson, T. J. (2004). Angry men and disgusted women: An evolutionary approach to the influence of emotions on risk taking. *Organizational Behavior and Human Decision Processes, 95*(1), 107-123. https://doi.org/10.1016/j.obhdp.2004.06.006

Galentino, A., Bonini, N., & Savadori, L. (2017). Positive Arousal Increases Individuals' Preferences for Risk. *Frontiers in Psychology, 8*(2142). https://doi.org/10.3389/fpsyg.2017.02142

Gambetti, E., & Giusberti, F. (2009). Dispositional anger and risk decision-making. *Mind & Society, 8*, 7-20. https://doi.org/10.1007/s11299-008-0052-z

Gawronski, B., & Creighton, L. (2013). Dual Process Theories. In D. Carlston (Ed.), *The Oxford Handbook of Social Cognition* (pp. 282-312). Oxford University Press.

Goldberg, J. H., Lerner, J. S., & Tetlock, P. E. (1999). Rage and reason: the psychology of the intuitive prosecutor. *European Journal of Social Psychology, 29*(5-6), 781-795. https://doi.org/10.1002/(SICI)1099-0992(199908/09)29:5/6<781::AID-EJSP960>3.0.CO;2-3

Gronchi, G., & Giovannelli, F. (2018). Dual process theory of thought and default mode network: A possible neural foundation of fast thinking. *Frontiers in Psychology, 9*(1237). https://doi.org/10.3389/fpsyg.2018.01237

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85*, 348-362.

Gruber, A., Harvey, J., & Johnson, S. (2009). Reflective and ruminative processing of positive emotional memories in bipolar disorder and healthy controls. *Behaviour Research and Therapy, 47*(8), 697– 704. https://doi.org/10.1016/j.brat.2009.05.005

Hanoch, Y., & Vitouch, O. (2004). When less is more information, emotional arousal and the ecological reframing of the Yerkes-Dodson law. *Theory & Psychology*, *14*(4), 427-452. https://doi.org/10.1177/0959354304044918

Heilman, R. M., Crişan, L. G., Houser, D., Miclea, M., & Miu, A. C. (2010). Emotion regulation and decision making under risk and uncertainty. *Emotion*, *10*(2), 257-265. https://doi.org/10.1037/a0018489

Hodgkinson, G., & Sadler-Smith, E. (2017). The dynamics of intuition and analysis in managerial and organizational decision making. *Academy of Management Perspectives*, *32*(4), 473-492. https://doi.org/10.5465/amp.2016.0140

Hua, Y., Wangb, D., Pangc, K., Xua. G., & Guo, J. (2015). The effect of emotion and time pressure on risk decision-making. *Journal of Risk Research*, *18*(5), 637-650. https://doi.org/10.1080/13669877.2014.910688

Inbar, Y., & Gilovich, T. (2011). Angry (or disgusted), but adjusting? The effect of specific emotions on adjustment from self-generated anchors. *Social Psychological and Personality Science*, *2*(6), 563–569. https://doi.org/10.1177/1948550611401426

John, O. P., & Gross, J. J. (2004). Healthy and unhealthy emotion regulation: Personality processes, individual differences, and life span development. *Journal of Personality*, *72*, 1301-1334.

Johnson, E. J., & Tversky, A. (1983). Affect, generalization and the percption of risk. *Journal of Personality and Social Psychology*, *45*(1), 20-31. https://doi.org/10.1037/0022-3514.45.1.20

Kahneman, D. (2003). A perspective on judgment and choice: Mapping bounded rationality. *American Psychologist*, *58*(9), 697–720. https://doi.org/10.1037/0003-066X.58.9.697

Kahneman, D. (2011). *Thinking, Fast and Slow*. Farrar, Straus and Giroux.

Kligyte, V., Connelly, S., Thiel, C., & Devenport, L. (2013). The Influence of Anger, Fear, and Emotion Regulation on Ethical Decision Making. *Human Performance*, *26*(4), 297-326. https://doi.org/10.1080/08959285.2013.814655

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (2008). International affective picture system (IAPS): Affective ratings of pictures and instruction manual. *Technical Report A-8*.

Lench, H. C., Bench, S. W., & Davis, E. L. (2016). Distraction from emotional information reduces biased judgements. *Cognition & Emotion, 30*(4), 638-653. https://doi.org/10.1080/02699931.2015.1020767

Lerner, J. S., Han, S., & Keltner, D. (2007). Feelings and Consumer Decision Making: Extending the AppraisalTendency Framework. *Journal of Consumer Psychology, 17*(3), 181–187. https://doi.org/10.1016/s1057-7408(07)70027-x

Lerner, J. S., & Keltner, D. (2000). Beyond valence: Toward a model of emotion-specific influences on judgement and choice. *Cognition and Emotion, 14*(4), 473–493. https://doi.org/10.1080/026999300402763

Lerner, J. S., & Keltner, D. (2001). Fear, anger, and risk. *Journal of Personality and Social Psychology, 81*(1), 146-159. https://doi.org/10.1037//O022-3514.81.1.146

Lerner, J. S., Li, Y., Valdesolo, P., & Karim S. Kassam, K. S. (2015). Emotion and Decision Making. *Annual Review Psycholgy, 66*, 799–823. https://doi.org/10.1146/annurev-psych-010213-115043

Levine, L. J., Burgess, S. L., & Laney, C. (2008). Effects of discrete emotions on young children's suggestibility. *Developmental Psychology, 44*(3), 681-694. https://doi.org/10.1037/0012-1649.44.3.681

Li, X., Lu, Z., D'Argembeau, A., Marie Ng, M., & Bechara, A. (2010). The Iowa Gambling Task in fMRI Images. *Human Brain Mapping, 31*(3), 410–423. https://doi.org/10.1002/hbm.20875

Linnet, J. (2013, 2013-October-08). The Iowa Gambling Task and the three fallacies of dopamine in gambling disorder [Review]. *Frontiers in Psychology, 4*(709). https://doi.org/10.3389/fpsyg.2013.00709

Linnet, J., Røskjær, S., Nygaard, J., & Maher, B. A. (2006). Episodic chasing in pathological gamblers using the Iowa gambling task. *Scandinavian Journal of Psychology, 47*, 43–49. https://doi.org/10.1111/j.1467-9450.2006.00491.x

Magar, E. C. E., Phillips, L. H., & Hosie, J. A. (2008). Self-regulation and risk-taking. *Personality and Individual Differences, 45*(2), 153-159. https://doi.org/https://doi.org/10.1016/j.paid.2008.03.014

Miu, A. C., & Crisan, L. G. (2011). Cognitive reappraisal reduces the susceptibility to the framing effect in economic decision making. *Personality and Individual Differences, 51*, 478-482. https://doi.org/10.1016/j.paid.2011.04.020

Morawetz, C., Mohr, P., Heekeren, H., & Bode, S. (2019). The effect of emotion regulation on risk-taking and decision-related activity in prefrontal cortex. *Social cognitive and affective neuroscience, 14*. https://doi.org/10.1093/scan/nsz078

Murray, S. L., Derrick, J. L., Leder, S., & Holmes, J. G. (2008). Balancing connectedness and self-protection goals in close relationships: A levels-of-processing perspective on risk regulation. *Journal of Personality and Social Psychology, 94*(3), 429-459. https://doi.org/10.1037/0022-3514.94.3.429

Murtagh, A. M., & Todd, S. A. (2004). Self-regulation: A challenge to the strength model. *Journal of Articles in Support of the Null Hypothesis, 3*(1), 19-51.

Nabi, R. (1999). A cognitive-functional model for the effects of discrete negative emotions on information processing, attitude change, and recall. *Communication Theory, 9*(3), 292-320.

Ochsner, K. N., & Gross, J. J. (2008). Cognitive Emotion Regulation: Insights from Social Cognitive and Affective Neuroscience. *Current directions in psychological science, 17*(2), 153–158. https://doi.org/10.1111/j.1467-8721.2008.00566.x

Park, S., & Jang-Han, L. (2011). How cognitive reappraisal of anger influences risk-taking behavior. *Social Behavior and Personality, 39*(3), 411-418. https://doi.org/10.2224/sbp.2011.39.3.411

Pittig, A., Pawlikowski, M., Craske, M., & Alpers, G. (2014). Avoidant decision making in social anxiety: the interaction of angry faces and emotional responses. *Frontiers in Psychology, 5*(1050). https://doi.org/10.3389/fpsyg.2014.01050

Polyportis, A., Kokkinaki, F., Horváth, C., & Christopoulos, G. (2020). Incidental emotions and hedonic forecasting: The role of (un)certainty. *Frontiers in Psychology*, *11*(2709). https://doi.org/10.3389/fpsyg.2020.536376

Posner, J., Russell, J. A., & Peterson, B. S. (2005). The circumplex model of affect: an integrative approach to affective neuroscience, cognitive development, and psychopathology. *Development And Psychopathology*, *17*(3), 715-734. https://doi.org/10.1017/S0954579405050340.

Powers, J. P., & LaBar, K. S. (2019). Regulating emotion through distancing: A taxonomy, neurocognitive model, and supporting meta-analysis. *Neuroscience and biobehavioral reviews*, *96*, 155–173. https://doi.org/10.1016/j.neubiorev.2018.04.023

Remington, N., Fabrigar, L., & Visser, P. (2000). Reexamining the Circumplex Model of Affect. *Journal of Personality and Social Psychology*, *79*(2), 286-300. https://doi.org/10.1037//0022-3514.79.2.286

Russell, J. (1980, 12/01). A Circumplex Model of Affect. *Journal of Personality and Social Psychology*, *39*, 1161-1178. https://doi.org/10.1037/h0077714

Salas, E., Rosen, M. A., & DiazGranados, D. (2010). Expertise-based intuition and decision making in organizations. *Journal of Management*, *36*(4), 941-973. https://doi.org/10.1177/0149206309350084

Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology*, *45*(3), 513-523. https://doi.org/10.1037/0022-3514.45.3.513

Schwarz, N., & Clore, G. L. (2007). Feelings and phenomenal experiences. In A. W. Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (pp. 385–407). The Guilford Press.

She, S., Eimontaite, I., Zhang, D., & Sun, Y. (2017). Fear, Anger, and Risk Preference Reversals: An Experimental Study on a Chinese Sample. *Frontiers in Psychology*, *8*, 1371-1371. https://doi.org/10.3389/fpsyg.2017.01371

Sinclair, M., & Ashkanasy, N. M. (2005). Intuition: Myth or a decision-making tool? *Management Learning*, *36*(3), 353–370. https://doi.org/10.1177/1350507605055351

Sinclair, M., Ashkanasy, N. M., & Chattopadhyay, P. (2010). Affective antecedents of intuitive decision making. *Journal of Management & Organization, 16*(3), 382-398. https://doi.org/10.1017/S1833367200002030

Sloman, S. A. (1996). The empirical case for two systems of reasoning. *Psychological Bulletin, 119*(1), 3–22. https://doi.org/10.1037/0033-2909.119.1.3

Steimer, T. (2002). The biology of fear- and anxiety-related behaviors. *Dialogues in clinical neuroscience, 4*(3), 231–249. https://doi.org/10.31887/DCNS.2002.4.3/tsteimer

Stoet, G. (2010). PsyToolkit - A software package for programming psychological experiments using Linux. *Behavior Research Methods, 42*(4), 1096-1104.

Stoet, G. (2017). PsyToolkit: A novel web-based method for running online questionnaires and reaction-time experiments. *Teaching of Psychology, 44*(1), 24-31.

Szasz, P. L., Hofmann, S. G., Heilman, R. M., & Curtiss, J. (2016). Effect of regulating anger and sadness on decision-making. *Cognitive Behaviour Therapy, 2016, 45*(6), 479–495. https://doi.org/10.1080/16506073.2016.1203354

Tabatabaei, S. M. (2020). The effectiveness of emotion regulation training on emotion regulation strategies and social competence of adolescents with high risk behaviors. *Clinical and Experimental Psychology, 6*(4), 1-4.

Tamir, M., Bigman, Y. E., Rhodes, E., Salerno, J., & Schreier, J. (2015). An expectancy-value model of emotion regulation: Implications for motivation, emotional experience, and decision making. *Emotion, 15*(1), 90-103. https://doi.org/10.1037/emo0000021

Tiedens, L. Z., & Linton, S. (2001). Judgment under emotional certainty and uncertainty: The effects of specific emotions on information processing. *Journal of Personality and Social Psychology, 81*(6), 973–988. https://doi.org/10.1037/0022-3514.81.6.973

Todd, A., R., , Forstmann, M., Burgmer, P., Brooks, A. W., & Galinsky A.D. (2015). Anxious and egocentric: How specific emotions influence

perspective taking. *Journal of Experimental Psychology: General, 144*(2), 374-391. https://doi.org/10.1037/xge0000048.supp

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. In G. Wright (Ed.), *Behavioral Decision Making*. Springer. https://doi.org/10.1007/978-1-4613-2391-4_2

van den Bos, R., Homberg, J., & de Visser, L. (2013, 2013/02/01/). A critical review of sex differences in decision-making tasks: Focus on the Iowa Gambling Task. *Behavioural Brain Research, 238*, 95-108. https://doi.org/https://doi.org/10.1016/j.bbr.2012.10.002

van der Schalk, J., Bruder, M., & Manstead, A. (2012). Regulating Emotion in the Context of Interpersonal Decisions: The Role of Anticipated Pride and Regret. *Frontiers in Psychology, 3*(513). https://doi.org/10.3389/fpsyg.2012.00513

Vatansever, D., Menon, D. K., & Stamatakis, E. A. (2017). Default mode contributions to automated information processing. *Proceedings of the National Academy of Sciences, 114*(48), 12821. https://doi.org/10.1073/pnas.1710521114

Vroom, V. H., & Pahl, B. (1971). Relationship between age and risk taking among managers. *Journal of Applied Psychology*, *55*(5), 399–405. https://doi.org/10.1037/h0031776

White, R. E., Kuehn, M. M., Duckworth, A. L., Kross, E., & Ayduk, Ö. (2019). Focusing on the future from afar: Self-distancing from future stressors facilitates adaptive coping. *Emotion, 19*(5), 903-916. https://doi.org/10.1037/emo0000491

Zhao, D., Gu, R., Tang P., Yang, Q., & Luo, Y. (2016). Incidental emotions influence risk preference and outcome evaluation. *Psychophysiology, 53*, 1542-1551. https://doi.org/10.1111/psyp.12694

Appendices

Appendix A: Instructions to the study on Qualtrics.

Instructions for Part 1 and Part 2

Instructions for Part 1: "Learning and Memory":
You will complete a timed writing task (~ 3 minutes) where you will be asked to recall and describe a past event. The "Next" button will appear when approx. 3 minutes have passed, after which you can either proceed to the next page or continue writing. This is to ensure that responses are not too short, which, unfortunately, we cannot use. We therefore ask that you try to complete this study uninterrupted and provide as much detail as possible.

Instructions for Part 2: "Gambling Game":
Once you have completed the writing task, you will complete a gambling game (~ 5 minutes). In this task, you will be asked to choose between 4 different buttons (labeled A, B, C and D). Each time you "push" a button, there is a chance you will win money and a chance you will lose money. Your goal is to make as much money as possible in 100 trials.

Please continue through all 100 trials until you get to the end screen. Unfortunately, we cannot use incomplete responses, and we therefore ask that you try to complete this game uninterrupted.

Your responses will be anonymized (i.e., will not be accompanied by any identifying information).

Appendix B: Autobiographical Recall Task, Fear and Anger recall.

Adapted from Bruehlman-Senecal and Ayduk (2015) and White et al. (2019)

Fear

Please recall a memory of an event within the past year that made you feel fear. For instance, you might think about a specific time when you were in danger. You might have been threatened with harm and you were either uncertain about how to deal with the situation or felt unable to cope.

Please note, it is important that you try your best to focus on a situation that made you feel fear and not other emotions. Once you have identified a specific event that made you very fearful, please describe the event in the text box below using only a few words ("e.g., I saw a snake").

(Note: You have to spend at least one minute on this page until you can proceed to the next page. The "Next"-button will appear after approx. 1 minute.)

Anger

Please recall a memory of an event within the past year that made you very angry. For instance, you might think about a specific time when someone else was to blame for something that happened to you. The person or thing who was at fault harmed you in some way or prevented you from getting something you wanted.

Please note, it is important that you try your best to recall a situation that made you feel angry and not other emotions. Once you have identified a specific event that made you very angry, please describe the event in the text box below using only a few words (e.g., "My boss treated me unfairly").

(Note: You have to spend at least one minute on this page until you can proceed to the next page. The "Next"-button will appear after approx. 1 minute.)

Appendix C: Immersed condition

Fear

Now that you've thought of a specific event that made you fearful, imagine this very event unfold through your own eyes as if it was happening to you right now. Try to picture the event as vividly as possible. As you continue to see the situation unfold in your own eyes, please take the next couple of minutes to describe your stream of thoughts about how you feel about this event that makes you experience fear.

Please provide as much detail as possible (minimum approx. 20 words).
Your word count is: 0

(*Note*: The "Next"-button will appear after ~2 Minutes.)

Anger

Now that you've thought of a specific event that made you angry, imagine this very event unfold through your own eyes as if it was happening right infront of you right now. Try to picture it as vividly as possible. As you continue to see the situation unfold in your own eyes, please take the next couple of minutes to describe your stream of thoughts about how you feel about this event that makes you angry.

Note: The "Next"-button will appear after ~3 Minutes.

Please provide as much detail as possible (minimum approx. 20 words).
Your word count is: 0

Appendix D: Distanced Condition.

Fear

Now that you've thought of a specific event that made you feel fear, please take a few steps back and move away from the event to a point where it feels very distant from you. Think about the event from the perspective of a distant and uninvolved observer.

Take the next couple of minutes to describe your stream of thoughts about how you feel about the specific event that made you fearful from this distant perspective.

Please provide as much detail as possible (minimum approx. 20 words).
Your word count is: 0

Anger

Now that you've thought of a specific event that made you angry, please take a few steps back and move away from the event to a point where it feels very distant from you. Think about the event from the perspective of a distant and uninvolved observer.

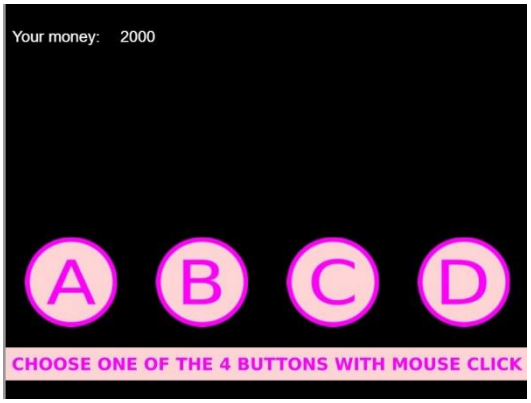
Take the next couple of minutes to describe your stream of thoughts about how you feel about the specific event that made you angry from this distant perspective.

Please provide as much detail as possible (minimum approx. 20 words).
Your word count is: 0

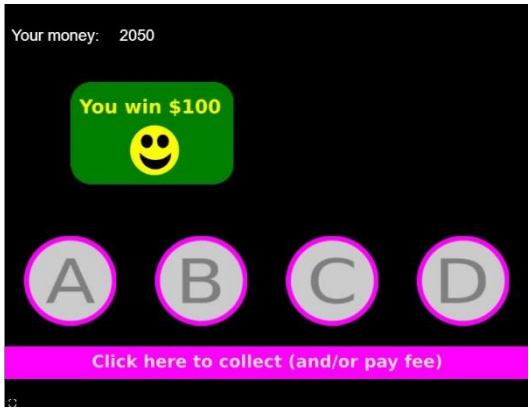
Appendix E: Iowa Gambling Task (Bechara et al. 1994).

Presented through PsyToolKit's web tool (Stoet, 2010, 2017).

Instructions for the IGT.



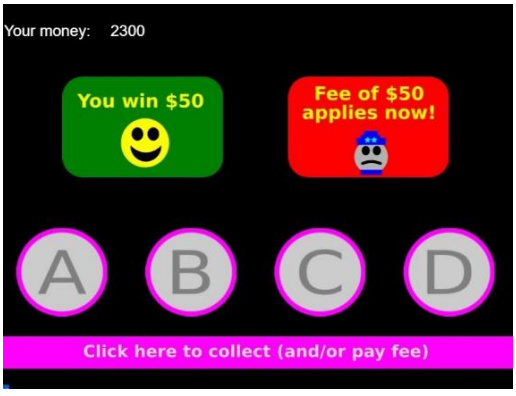
Start screen with deck (button) selection.



Received reward from Deck A or B.

Received reward and fine from Deck A or B.

Received reward from Deck C or D.



Received reward and fine from Deck C or D.