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Tina Christin Antonsen Storeide, Amanda Aasen

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Abstract

Emotions have been given much attention in the field of judgement and decision-making and are thought to be one of the factors affecting cognitive processing and decision-making. Lately, more research has focused on how these emotions can be regulated by the use of emotion regulation techniques. Among these techniques, self-distancing has been given much attention and has been proven to work positively on regulating emotions. Still, the amount of research investigating the relationship between specifically self-distancing and information processing is narrow. Even more so, the influence of self-distancing from anxiety on information processing has been given no or very little attention. This master thesis sought to cover this gap in the literature. This was done by the use of experimental between-subject design in a laboratory setting. The participants were divided into two conditions: immersed and self-distanced. Each group was asked to recall an event where they felt anxious from an immersed/self-distanced perspective. Next, they completed the Iowa Gambling Task (IGT) and a self-reported scale that measured the extent to which they relied on intuition vs analysis during the IGT. As predicted, self-distancing led to an increase in analytical thinking and abstract thinking, and a decrease in arousal compared to self-immersion. Overall, the findings indicate that self-distancing can be an effective tool for regulating state anxiety and that it has consequences on how people process information. The results, implications, limitations, and future directions are discussed.

1.0 Introduction

How do people's emotions influence the way that they process information? Are decision-makers able to process information rationally, or are they affected by emotions more than one might think? If the latter is the case, are there ways to regulate these emotions? If so, can this lead to more rational information processing?

Emotions affect us in our everyday life; our judgement, our way of thinking, and the way we make decisions (Frijda, 1988, as cited in Carstensen et al., 2000; Fredrickson, 2013; Lerner et al., 2015; Trampe et al., 2015; Rudd et al., 2012; Wood et al., 2010). Emotions can be described as bodily and mental states. These states elicit reactions to external events, agents, or objects that vary in intensity, depending on the individual´s internal assessment (Ortony et al., 1998, as cited in Nabi, 1999). For this thesis, we will focus on incidental emotions. These are carried-over emotions from other situations (Blanchette & Richards, 2010) - which will be given a thorough explanation in the theoretical framework. According to Blanchette and Richards (2010), emotions can affect an individual's cognitive processing and the way they make decisions. Furthermore, it has been suggested that certain emotions decrease logical and rational thinking, and consequently lead to less rational decision-making (Hanoch & Vitouch, 2004).

In the current thesis, we examine how the regulation of anxiety, a negative and high-arousal emotion (Gray, 1991; Steimer, 2002), impacts information processing. Our prediction is derived from arousal-based models. However, it is worth noting that existing theories make opposing predictions regarding the influence of emotions like anxiety on information processing. For starters, arousal-based models predict an increase in intuitive processing (Easterbrook, 1959, as cited in Hanoch & Vitouch, 2004; Kaufman, 1999;). In contrast, some followers of the appraisal theory have argued that emotions characterised by uncertainty appraisal will lead to systematic processing (Tiedens & Linton, 2001), which we assume applies to anxiety because it is an emotion that seeks to reduce uncertainty (Raghunathan & Pham, 1999). In this thesis, we predict that non-regulated anxiety leads to more intuitive processing given that high-arousal emotions like anxiety activate regions in the brain responsible for emotional processing (Arnsten, 2009).

To illustrate, let us look at the following example. A student getting a harsh critique from their professor after holding a presentation might be anxious about getting a bad grade. This anxiety might consequently affect them at work when preparing their sales pitch before meeting important customers. The student then might make decisions they otherwise would not make. In fear of holding another bad presentation, the student might decide to withdraw from presenting at all.

The present thesis seeks to answer the question of how regulation of anxiety influences information processing. Surprisingly, little research has examined this question. One tactic of emotion regulation that has received considerable interest in recent years is self-distancing (Sun et al., 2018). Self-distancing refers to the use of cognitive strategy where the individual takes a third-person perspective so that they psychologically remove themselves from the situation at hand (Sun et al., 2018).

It is further proposed, in this thesis, that high-arousal emotions like anxiety (Gray, 1991; Steimer, 2002) impair cognitive processing (Miu et al., 2008), but we assume that this is only when individuals are immersed in their emotional experiences. On the other hand, taking a step back to adopt a broader perspective of an emotional experience (e.g., anxiety-inducing event) should lead to more rational information processing and decision-making. Moreover, we propose that self-distancing increases analytical processing because it enables individuals to see the bigger picture, free from contextual and emotionally charged details. Indeed, rational reasoning is typically characterised by a decontextualized and "big-picture" perspective (Stanovich & West, 2000).

Figure 1 illustrates the conceptual model of this thesis. That is, the model illustrates how the effect of self-distancing on analytical processing is mediated by arousal and abstract thinking. The relationship between anxiety and information processing is interesting to investigate because anxiety is a prevalent emotion in organisational settings (Andrea et al., 2009). One can imagine that this can be particularly problematic in jobs where tasks require careful and detailed information processing. An example of this might be jobs that are characterised by task uncertainty (Daft & Macintosh, 1981).

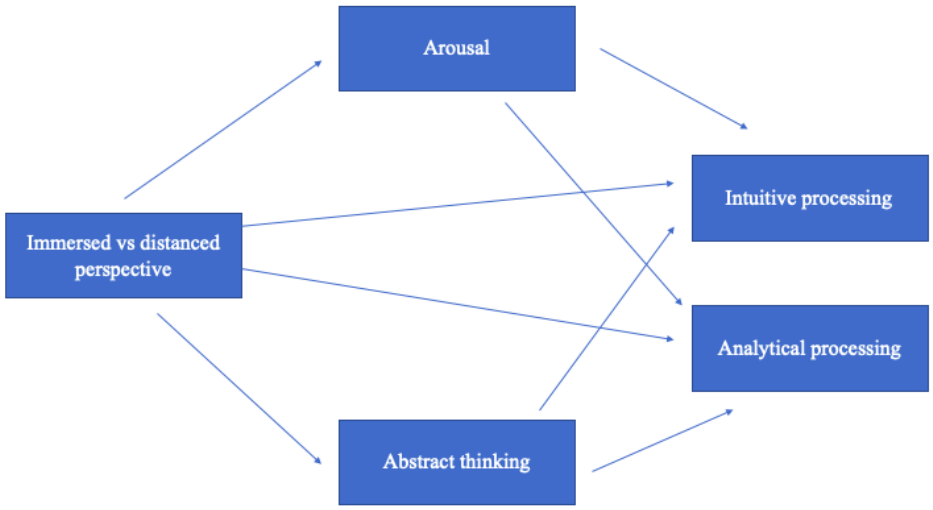
However, while our conceptual model indicates that self-distancing from anxiety will lead to more analytical processing, this does not mean that analytical processing is the superior option in all cases. That is, the use of intuitive

processing can be quite effective in some situations, especially when intuition is strong (Kahneman, 2012). But, when facing negative emotions, like anxiety, it has been suggested that rational reasoning is the better choice because of its analytical nature (Hanoch and Vitouch, 2004).

This thesis is guided by the following research question: "How does self-distancing from anxiety influence information processing?".

Figure 1

Conceptual model



Note. The effect of self-distancing on analytical processing is mediated by arousal and abstract thinking.

2.0 Theoretical framework and hypotheses

There is ample research on emotions and decision-making (Agrawal et al., 2007; Clore et al., 1994; De Hooge et al., 2008; Garg et al., 2005; Han et al., 2007; Maheswaran & Chen, 2006; So et al., 2015; Tiedens & Linton, 2001). However, to our knowledge, less is known about the relationship between emotion regulation and information processing. In this section of the paper, we present our theoretical framework guiding our hypotheses. The theoretical framework includes a literature review of emotions (anxiety in particular), decision-making and information processing, emotion regulation, and the mediating roles of

arousal and abstract thinking. The section about emotion regulation mainly focuses on self-distancing. The hypotheses are presented at the end of this section.

2.1 Emotions

Emotions can be defined as "internal, mental states representing evaluative, valenced reactions to events, agents, or objects that vary in intensity" (Ortony et al., 1998, as cited in Nabi, 1999, p.295). Emotions can be explained as a kind of subcategory of affective states. That is, Carruthers (2017) describes affective states as a broad class that can include everything from headaches to emotions of anger or fear, feelings of enjoyment, and moods like depression or happiness. Said in other words, it includes physical pain, emotions, pleasures, and moods.

In contrast to moods, emotions can be described as "differentiated, transient, targeted, and able to motivate certain distinct adaptive behaviours in reaction to the object that initiated the particular emotional response" (Nabi, 1999, p. 295). Moods are feelings that, in most cases, are less intense and generally not directed to a specific object or person (Larsen et al., 2008). In contrast, emotions are often high in intensity, last for a short period and most usually have a clear cognitive content or a direct cause (Forgas, 1995). Emotions are a response to external and internal stimuli, affecting how one evaluates and reacts to events, agents, or objects (Frijda, 1987). The level of intensity will vary according to how emotional the occurrence is for the person (Frijda, 1987). This implies that emotions are subjective and depend on the individual's cognitive scheme (Winter, 1997).

One can further distinguish between integral and incidental emotions. Integral emotions are related to the exact situation at hand, whereas incidental emotions are a carry-over from an unrelated situation (Blanchette & Richards, 2010). The latter can be portrayed as irrelevant emotions for that exact situation (Cameron et al., 2013). To illustrate, an example of integral emotions could be the anxiety you get before an exam. Whereas an example of incidental emotions could be if you let that anxiety affect the way you drive in traffic when driving home from the exam. This thesis will only focus on the latter.

One of the most widely used models of emotion is the circumplex model (Remington et al., 2000). This model was developed by James Russell in 1980, in which he argues that all affective states are the product of valence and arousal

(Russell et al., 2005). The model proposes that we have two fundamental properties of affective experience, called valence and arousal (Carruthers, 2017; Posner et al., 2005). Valence informs us about the nature of the situation, which is based on whether the situation is seen as positive or negative. By arousal, one refers to how intense the emotion is, ranging from low to high (Citron et al., 2014). Arousal will be explained in more depth at the end of this theoretical framework, as it is one of the mediators in the conceptual model. In the current thesis, we have decided to focus on anxiety, an emotion that is characterised by negative valence and high arousal (Gray, 1991; Steimer, 2002).

2.1.1 Anxiety

Anxiety is a much-discussed topic - a quick search on Google generates over 152 000 000 results. Further, anxiety is prevalent in work life and might lead to employees experiencing functional disability and work impairment (Andrea et al., 2009). A recent report from Great Britain shows, for instance, that 822 000 workers suffer from work-related stress, depression, or anxiety (Health and Safety Executive, 2021a). This has increased a lot since the pandemic and thus shows that anxiety, in addition to stress and depression, is an occurring problem in our society (Health and Safety Executive, 2021a). Additionally, anxiety, stress, depression and musculoskeletal disorders stood for the majority of days lost in Great Britain because of work-related ill health in the years 2019/2020. That is, 17.9 million in 2019 and 8.9 million in 2020 (Health and Safety Executive, 2021b). One can imagine that this has an effect on organisations, as other employees might get an increased workload because of absent employees.

Anxiety is characterised by negative valence (Gray, 1991) and high levels of arousal (Steimer, 2002), which is also the case with fear (Lerner & Keltner, 2001; Posner et al., 2005). Gray (1991) states that anxiety subsumes fear, and that fear is caused by anticipatory frustration. Further, according to Lazarus (1991), anxiety occurs when one faces uncertain existential threats. Hence, both emotions are characterised by anticipating some future event. Their main function is to trigger an adaptational response and to warn against danger or threat (Steimer, 2002). Or possible activation of the fight/flight system, as stated by Gray (1978). Since fear is present when experiencing anxiety (Gray, 1991) and because of the similarities they share, we found it beneficial to include a description of both. The

following quotation from the book *The Power of Now* illustrates how anxiety subsumes fear:

> The psychological condition of fear is divorced from any concrete and true immediate danger. It comes in many forms: Unease, worry, anxiety, (…) This kind of psychological fear is always of something that might happen, not of something that is happening now. You are in the here and now, while your mind is in the future. This creates an anxiety gap. You can always cope with the present moment, but you cannot cope with something that is only a mind projection – you cannot cope with the future. (Tolle, 1999, p. 35)

So, anxiety, a kind of psychological fear, can be argued to be something of one's subjective creation. After all, it is fear of something that *might* happen in the future. Many people suffer from excessive thinking (Tolle, 1999), and rumination. This means that they want to ponder their past and predict their future (Tolle, 1999). However, you can never truly know what will happen in the future. And it is this lack of information and certainty that creates anxiety (Tolle, 1999). This anxiety gap, as Tolle (1999) calls it, has been of high concern in literature, arts, science, and religion (Spielberger, 1966). Anxiety has long been seen as a powerful influence in contemporary life (Bauman, 2006; Jackson & Everts, 2010; Priya, 2020). Freud was one of the first to explain the powerful influence of anxiety (Spielberger, 1966; Spielberger & Reheiser, 2009).

Freud stated that anxiety is distinguishable from other negative emotional states, such as anger, grief, and sorrow, due to its combination of phenomenological and physiological qualities (Spielberger, 1966). The phenomenological qualities make anxiety especially unpleasant with distinct attributes of negative emotions (Nabi et al., 2010). This is aligned with Endler & Parker´s theory (1990) where they state that anxiety has at least two components: a cognitive-worry component and an emotional arousal component. They also add that the cognitive-worry component, or the phenomenological qualities as Freud called it, typically contains self-doubt and potential failure (Endler & Parker, 1990). The physiological qualities (emotional arousal component) consist of symptoms associated with muscle over-activity (Sainsbury & Gibson, 1954), sweating, difficulty with breathing, restlessness, and chest pain, to mention a few

(Nabi et al., 2010). The attributes of the emotional arousal component mean that one can take tests to assess anxiety (Heeren et al., 2012).

In the discussion of anxiety, it helps to differentiate between trait anxiety and state anxiety as they are quite different from each other. Trait anxiety means that the emotion is more or less consistent, and the individual is predisposed to react in a certain way (Koutsimani, 2019; Lader & Marks, 1971). There are individual differences in the extent to which people are characterised by anxiety states (Koutsimani, 2019). State anxiety, on the other hand, is a transitory emotion that happens to individuals when encountered with feelings of apprehension, dread, and tension (Endler & Kocovski, 2001; Lader & Marks, 1971). More specifically, "it is the individual´s reaction towards the situation after having appraised it as threatening" (Koutsimani, 2019, p. 3). State anxiety is thus not a permanent part of the individual, but the individual might experience anxious feelings when confronted with certain situations or in different periods of life. The differences between trait- and state anxiety suggests that there must be a separation in anxiety assessment between the intensity of the transitory experience in a limited length of time or a specific situation (Endler, 1983, as cited in Endler et al., 1992). Furthermore, there are individual differences in that some might experience anxiety across various situations (Endler, 1983, as cited in Endler et al., 1992). In this thesis, the focus will be on state anxiety. We found the idea of investigating state anxiety more captivating than trait anxiety as it is something that can happen to all of us from time to time. This also allowed us to examine the causal relationship between anxiety and information processing.

2.2 Judgement and decision-making

In the field of judgement and decision-making, emotions have been given much focus (Lerner et al., 2015). Emotions are one of the factors thought to affect cognitive processing and decision-making (Blanchette & Richards, 2010). A large body of research has examined the role of emotions in judgement and decision-making (Andrade & Ariely, 2009). These effects are often explained by a change in information processing (Kahneman, 2012). In this chapter, the field of judgement and decision-making will be introduced. This will be followed by a further explanation of information processing.

One theory concerned with the relationship between emotions and decision-making is the somatic marker hypothesis introduced by Antonio Damasio (1996). Emerging evidence suggests that rational decision-making requires accurate emotional processing (Bechara & Damasio, 2005). This hypothesis provides a cognitive framework for explaining how emotions influence decision-making and the main idea is that our decision-making is influenced by marker signals that arise both consciously and unconsciously (Bechara & Damasio, 2005). Following this theory, when humans encounter situations that elicit certain emotions, similar situations will act as markers that will elicit the same response (Damasio, 1996; Dunn et al., 2006). That is, the somatic marker hypothesis is concerned with integral emotions (Bechara & Damasio, 2005).

The appraisal tendency framework, on the other hand, focuses on incidental emotions (Achar et al., 2016; Han et al., 2007). According to the appraisal tendency framework, emotions can carry over from situations unrelated to the task at hand and influence judgments and decisions (Han et al., 2007; Lerner & Keltner, 2000, 2001; Lerner & Tiedens, 2006). All this considered, one could argue that anxiety affects your decision-making. One study that looked into anxiety regarding decision-making was conducted by Miu and colleagues (2008). In this study, it was found that anxiety is associated with impaired decision-making and increased somatic markers. While this study looked into trait anxiety, and not state anxiety, it is considered here that the effect could be more or less the same - or at least be somewhat similar. How decision-making is affected by state anxiety will be explored in the experiment for this thesis.

The appraisal tendency framework, which was briefly mentioned above, is another theory explaining the relationship between emotions and decision-making (Cavanaugh et al., 2007). As mentioned in the introduction, the appraisal tendency framework states that emotions associated with appraisal of uncertainty increase analytical processing in an attempt to reduce uncertainty (Raghunathan & Pham, 1999; Tiedens & Linton, 2001).

In contrast, emotions associated with certainty, like anger, are believed to lead to more intuitive processing (Bodenhausen et al., 1994; Lerner & Tiedens, 2006; Coget et al., 2011). Further, this framework explains how emotions of the same valence and arousal can lead to opposing effects on decision-making and information processing (Lerner & Keltner, 2001; Lerner et al., 2015; Tiedens & Linton, 2001). In this theory, it is assumed that emotional effects on decision-

making and information processing arise from the emotions' unique appraisals (Lerner & Keltner, 2001). Lerner and Keltner (2001) state that fear and anxiety are associated with situational control (i.e., low personal control) and uncertainty. The emotion tends to be accompanied by decisions to reduce uncertainty (Raghunathan & Pham, 1999). Moreover, in risk decision-making, anxiety is characterised by a higher tendency to choose options low in risk and reward, instead of high in risk and reward. That is, choosing the safest option (Raghunathan & Pham, 1999).

2.3 Information processing and emotions

In the previous section, we showed that anxiety has been linked to various judgement and decision-making-related phenomena. However, we find that very little is known about how such emotions influence information processing. That is, how do emotions like anxiety influence the extent to which individuals engage in intuitive and analytical information processing?

Most psychologists agree that information processing consists of two modes of thinking (Epstein, 1994; Evans, 2006; Evans & Stanovich, 2013; Peer & Gamliel, 2013; Sloman, 1996), broadly known as dual-process theories (Osman, 2004), or system 1 and system 2 as labelled by Kahneman (2012). System 1 differentiates from system 2 by its intuitive nature, which leads to automatic and often unconscious thinking (Evans & Stanovich, 2013). The operations of system 2, in comparison, are more controlled and analytical (Kahneman, 2012). Both of these systems are essential when talking about the mind (Osman, 2004). In dual-process theories, system 1 is known as intuition/experiential thinking, and system 2 is known as logical/rational thinking (Chaiken & Trope, 1999). That is, dual-process theories divide mental processing into two main categories according to how they operate - is it in an automatic or controlled manner? (Gawronski & Creighton, 2013).

The intuitive/automatic system can be characterised by the lack of effort put in because it has no sense of intentional control (Kahneman, 2012). The system, therefore, operates with no, or very little effort (Kahneman, 2012). Other ways to portray the automatic system 1 are implicit, parallel, tacit, associative, and heuristic (Pentland & Hærem, 2015). This first system, often referred to as the heuristic system in dual-process theories, tends to solve problems with the help of

prior knowledge and beliefs (De Neys & Glumicic, 2008). And since this heuristic default system operates automatically and with little or no effort (Kahneman, 2012), it tends to operate faster than the second system (De Neys & Glumicic, 2008). System 1 has both positive and negative aspects, depending on the situation. A positive aspect is that it is robust against stressors because it requires very few cognitive resources (Schneider & Chein, 2003, as cited in Pentland & Hærem, 2015). However, precisely since it requires few cognitive resources, it is slow at learning and unlearning (Schneider & Chein, 2003, as cited in Pentland & Hærem, 2015). These automatic processes of system 1 provide an explanation of the heuristics of judgement (Kahneman, 2012), which will be discussed later on in this chapter. The intuitive system is the main source for the conscious choices and explicit beliefs of the analytical system. Said in other words, our feelings and impressions. These feelings and impressions emerge from system 1 without much effort. They emerge through underlying automatic operations, which form rather complex patterns of ideas. However, it is only system 2 which can put the thoughts in an orderly line of steps (Kahneman, 2012).

System 2 contrasts system 1 in many ways. The most obvious way is that it handles analytical processing, while system 1 is intuitive (Evans, 2011). Kahneman (2012) states that when we think about ourselves, we identify with system 2, meaning that this system contains our beliefs and our conscious and deliberate decisions. When something requires our attention, we need system 2 to make sense of it, making this system much more effortful than system 1. System 2 is often called the working mind, that is because when people experience something new, it requires attention and effort from system 2 to know what to do next (Kahneman, 2012). The fact that system 2 handles analytical processing means that the processing is based on rules, and is explicit, serial, and analytic. Lastly, while system 1 can be portrayed as often accompanied by affect, this is not the case with system 2. Often enough system 2 is “affect-free" (Pentland & Hærem, 2015).

There is one common feature that can be seen in the diverse operations of system 2, that is, they demand attention and if the attention is taken away these operations are disrupted (Kahneman, 2012). The analytical system is sensitive to stress and more cognitively demanding (Pentland & Hærem, 2015). This can be linked to feelings of anxiety which are characterised by feelings of stress and cognitive strain (Nabi et al., 2010). When people feel anxious about a situation,

their attention is likely to be taken away (Gray, 1978), thus disrupting the operations of system 2. The reason behind this can partially be explained by that anxiety possibly activates the fight/flight system, which can result in selective attention (Gray, 1978). Let us look at an example to illustrate this. Imagine that you have been anxious about holding a presentation in front of your CEO and your colleagues. You are quite new in the company and this happens to be your first presentation in front of your CEO. During the whole morning and the presentation, you are not able to calm down and you are only able to focus on how much you are sweating and shaking. Unfortunately, this led you to say "mum" to your CEO. Which, not surprisingly, led to quite an awkward situation.

When talking about these two systems, it is logical to include the concept of rationality, as these two systems represent the distinction between rational and irrational thinking (Osman, 2004). Many economists believed that economic agents are rational when processing information, known as rational choice theory (Scott, 2000). Rationality can be interpreted as the ability to choose amongst different options, values, objectives, and priorities based on thorough reasoning (Sen, 2004). The idea is that all actions are inherently rational, and before making any decision, individuals will consider the possible cost and benefits of the action (Scott, 2000). Kahneman and Tversky (1979) challenged the rational choice theory by introducing the prospect theory, explaining how human choices deviate from the rules of rationality. System 1 is mostly to blame for this deviation (Kahneman, 2012), because of its many flaws in judgments (De Neys & Glumicic, 2008).

System 1 always tries to find a coherent explanation for what it sees, so that it matches prior situations. "It offers a tacit interpretation of what happens to you and around you, linking the present with the recent past and with expectations about the near future" (Kahneman, 2012, p. 58). Perception is affected by what people expect to see and what they want to see, which is why one could say that people's perceptions are influenced by prior beliefs and expectations (Plous, 1993). This implies that perception is more or less a product of system 1, which can make them systematically biased and thus illusory. The prior beliefs and expectations that influence people's perceptions come from their cognitive schemas (Lord & Foti, 1986). A cognitive schema is a "structure that represents organised knowledge about a given stimulus (person or situation), as well as rules that direct information processing" (Lord & Foti, 1986, p. 22). Cognitive schemas

include a person's heuristics and heuristics can be explained as a consequence of the mental shotgun. This means that the mind takes shortcuts to find a suitable answer in response to questions – often questions that the person does not have a proper answer for (Kahneman, 2012). The use of heuristics, which as commented above is present when using system 1, can lead to biased decision-making (Osman, 2004). System 2, on the other hand, can reject suggestions coming from system 1, making it more rational and less susceptible to biases (Kahneman, 2012).

From what has been said about judgement and decision-making, information processing, and anxiety, one can summarise the following: Anxiety can be characterised by high levels of arousal (Steimer, 2002) and negative valence (Gray, 1991), meaning that it can reduce the cognitive capacity for effortful and analysis-based information processing (Nabi et al., 2010). This means that when feelings of anxiety arise, people usually turn to their system 1. System 1 can lead to too much reliance on heuristics, thereby biased judgments (Dale, 2015; Kahneman, 2012). As Kahneman and Frederick (2005) state in their article: it is the rational system`s task to make biases disappear. So, anxiety affects information processing in that people might rely too much on their cognitive schemas, instead of acquiring new information. System 1 is not necessarily bad – it can be quite effective in some situations, especially when intuition is strong (Kahneman, 2012). However, when facing negative emotions, like anxiety, it has been suggested that system 2 is the better choice because of its analytical nature (Hanoch and Vitouch, 2004). System 2, in contrast to system 1, leaves out biases much more and facilitates analytical and rational decision-making (Kahneman, 2012).

2.4 Emotion regulation

This chapter about emotion regulation is included because we assume that it can affect information processing. The name itself implies what emotion regulation is all about, namely the attempt to regulate or influence one's own or others' emotions (McRae & Gross, 2020). Emotion regulation is closely linked to positive psychology (Tamir & Gross, 2011). Or more correctly said, certain emotion regulation techniques, such as self-distancing, which will soon be described, can be seen as closely linked to positive psychology. Seligman

introduced positive psychology in 2000, which expanded the field of psychology (Seligman & Csikszentmihalyi, 2000) - it was not just about healing people and repairing damage, but about focusing on building positive qualities. “Treatment is not just fixing what is broken, it is nurturing what is best” (Seligman & Csikszentmihalyi, 2000, p. 7). This quote perfectly illustrates the ground idea in positive psychology.

From the literature, it can be suggested that humans most often attempt to control emotional experiences (Gross, 2002, as cited in Heilman et al., 2010). When an individual experiences an emotion, the use of strategies to control the experience is quite common (Gross, 1998). From this, it makes sense to say that emotional regulation can be essential in information processing and decision-making (Heilman et al., 2010). When talking about emotion regulation here, this refers to a “concept subsuming the processes controlling which emotions we have, when we have them, and how we experience and express them” (Gross, 2002, as cited in Heilman et al., 2010, p. 258). More commonly used emotion regulation strategies are expressive suppression and cognitive reappraisal (John & Gross, 2004). Expressive suppression means that one tries to inhibit the emotional response that comes from a stimulus (John & Gross, 2004). It requires a lot of effort to keep the emotion away, and it has been proved that it is not effective at diminishing negative emotion (Heilman et al., 2010). That is, expressive suppression does not (indifference to cognitive reappraisal) effectively decrease the experience of negative emotions (Gross, 1998; Gross & Levenson, 1997).

Cognitive reappraisal, on the other hand, is an antecedent-focused emotion regulation strategy, meaning the strategy acts before the activation of the emotions (Heilman et al., 2010). It “alters the trajectory of emotional responses by reformulating the meaning of the situation” (Heilman et al., 2010, p. 258). This emotion regulation strategy works efficiently on positive and negative emotions (Gross, 1998; Gross & Levenson, 1997). Self-distancing is a specific cognitive reappraisal tactic people use to handle negative emotions (Denny & Ochsner, 2014) and this tactic will be the focus of this thesis.

2.4.1 Self-distancing

Self-distancing is an independent variable in the conceptual model, with two categories: distanced and immersed perspective. This is because we assume

that self-distancing will facilitate rational thinking (system 2), while the immersed perspective will facilitate intuitive thinking (system 1).

As mentioned earlier, self-distancing involves psychologically removing oneself from a situation by taking a third-person perspective (Sun et al., 2018). In a way, the person splits into two selves to reflect on the situation better. Meaning that the "self that is experiencing the situation is psychologically removed from the self that is observing the situation" (Kross & Ayduk, 2011, p. 187). In such a case where the individual is focusing on their feelings from a self-distanced perspective, they take a step back and take the perspective of a distanced observer. The saying "a fly on the wall" illustrates it quite well (Kross & Ayduk, 2011). Another perspective an individual can take, however, is the self-immersed perspective. This means that the "self that is experiencing the situation and the self that is observing the situation are one and the same" (Kross & Ayduk, 2011, p. 187). The self-immersed perspective is typically judgmental and critical because the individual sees the situation from a personal point of view. In contrast, self-distancing leads to more objective and less personal interpretations, resulting in a broader interpretation of the situation (Kross & Ayduk, 2011). This can be explained by the fact that self-distancing might facilitate abstract thinking because of a high construal level (Wiesenfeld, 2017). This very point will be elaborated on in the chapter on *"The mediating role of abstract thinking"*.

2.4.2. Self-distancing and information processing

As previously discussed, emotions like anxiety can increase intuitive processing. Hence, it seems logical that the downregulation of anxiety would decrease intuitive processing. Emotion regulation strategies, like self-distancing, activate parts of the brain that increase analytical processing (Arnsten, 2009; Drabant et al., 2009; Sokol-Hessner et al., 2013). That is, evidence suggests that reappraisal amplifies activation of the prefrontal cortex (Drabant et al., 2009; Sokol-Hessner et al., 2013), which is the part of the brain facilitating analytical processing (Arnsten, 2009). Consequently, this reduces the activation of the amygdala (Drabant et al., 2009; Sokol-Hessner et al., 2013). In short, the use of self-distancing might increase analytical processing through the activation of certain parts of the brain. To further argue for the use of self-distancing, we will

look into other cognitive aspects and possible advantages of the use of emotion regulation strategy.

According to Plous (1993) “memories are not like copies of our past experiences” (p. 31). The content of memories often takes the form of reconstruction which leads to logical inferences being filled with missing details. However, when these missing details are being filled, associated memories are often blended with the original memory (Plous, 1993). Self-distancing could, possibly, help by enabling the individual to get a more objective viewpoint as they step back from the situation. That is, removing themselves from the biases and heuristics often seen in memories. Or said in other words, not letting past experiences affect the present situation.

Another interesting way to look at self-distancing is through the words of Eckhart Tolle (2002):

> The beginning of freedom is the realisation that you are not “the thinker”, a higher level of consciousness becomes activated. You then begin to realise that there is a vast realm of intelligence beyond thought, that thought is only a tiny aspect of that intelligence. You also realise that all the things that truly matter – beauty, love, creativity, joy, inner peace – arise from beyond the mind. (Tolle, 2002, para. 1)

From this quote, it can be argued that self-distancing works because it allows the individual to step away from the thinking mind, and instead observe the thinker. This can be related to what was discussed earlier, which was about splitting into two selves (Kross & Ayduk, 2011). This can be interpreted as having one self representing the thinker and the other self representing the observer. We assume that people, generally speaking, spend most of their time as the thinker. According to Wiesenfeld et al. (2017), the inability to distance yourself from a situation leads to more concrete thinking. Considering this, one could say that being stuck as the thinker leads to concrete thinking. However, while this is usually the case, an individual can also take the role of an observer if they make the conscious decision of distancing themselves from the situation and taking a step back. Consequently, this leads to more abstract thinking (Wiesenfeld et al., 2017). Arguably, this can lead to what Tolle (2002) describes as “intelligence beyond thought” (para. 1).

It has been proven that self-distancing can have direct effects on people's emotions (Kross & Ayduk, 2008; Kross & Ayduk, 2011; Verduyn et al., 2012). In an article by Verduyn et al. (2012) they refer to recent studies that state that self-distancing can reduce negative emotions. That is, self-distancing will attenuate them, while the self-immersed perspective will increase the emotional intensity. However, when it comes to the relationship between self-distancing and *anxiety*, it is hard to find research that investigates this relationship. That is, we observed in their literature review that the amount of research on this relationship is rather limited. This paper aims to close this gap by exploring the effects of self-distancing on anxiety.

2.5 The mediating role of arousal

Arousal takes a mediating role in the conceptual model for this thesis - as visually shown in our introduction. This comes from the assumption that analytical thinking as a result of self-distancing might be explained by a decrease in arousal. That is, arousal mediates the relationship between self-distancing and analytical processing. This assumption will be tested through the experiment for this thesis and the analysis of it will be presented in the result section.

As stated earlier, anxiety has been identified as having high levels of arousal (Gray, 1991). By arousal, one refers to the feeling of being activated as opposed to being drowsy or relaxed (McCall et al., 2015). The theory of optimal arousal suggests that medium levels of arousal are most pleasant, and it becomes more unpleasant when arousal deviates from the medium level (Kuppens et al., 2013).

As mentioned initially, arousal models predict that high-arousal emotions, like anxiety, lead to an increase in intuitive thinking. This can be explained by that attention and the way information is processed are affected by high levels of arousal (Öhman et al., 2001, as cited in Hanoch & Vitouch, 2004; Sanbonmatsu & Kardes, 1988), and by anxiety specifically (Gray, 1978). Information processing is affected by high levels of arousal because of how sensitive the prefrontal cortex is to stress, even quite mild stressors (Arnsten, 2009). As mentioned above, the prefrontal cortex facilitates analytical thinking (Arnsten, 2009). Compared to the amygdala, which is strengthened by stress, the prefrontal cortex is impaired. Meaning that stress shifts the focus from the deliberate prefrontal cortex to the

conditioned responses of the amygdala (Arnsten, 2009), or as we interpret it - intuitive processing.

Following, when people experience high levels of arousal (and thus anxiety), it has been argued that information processing is restricted (Easterbrook, 1959, as cited in Hanoch & Vitouch, 2004). One might suggest that this will result in less rational information processing and consequently less rational decision-making. However, others found that this restriction in information can be beneficial and adaptive in that it improves performance (Öhman et al., 2001, as cited in Hanoch & Vitouch, 2004).

2.6 The mediating role of abstract thinking

Besides arousal, abstract thinking also takes a mediating role in the conceptual model presented in this thesis. We hypothesise that analytical processing, caused by self-distancing, might partially be explained by how self-distancing facilitates abstract thinking. As stated by Stanovich & West (2000), rational reasoning is typically characterised by an ability to look at the big picture and see situations from a bigger perspective. Moreover, rational reasoning often leads to the capability to view situations in isolation from the context at hand (Stanovich & West, 2000). We believe that the reason why rational reasoning has these characteristics is that it is mediated by abstract thinking. In previous research on abstract thinking it has been suggested that abstract thinking elicits schematic processing, as well as helps the individual to focus on the broader view by placing the information in a larger aspect (Shanks & Darby, 1998; Trope & Liberman, 2003, 2010; Tsai & Thomas, 2011). From this, it seems like rational reasoning includes abstract thinking, considering that rational reasoning often takes a decontextualized and big-picture perspective (Stanovich & West, 2000).

One theory that captures abstract vs. concrete thinking is the construal level theory (Dhar & Kim, 2007; Trope & Liberman, 2010). The construal level refers to the different ways people encode and retrieve information (Wiesenfeld et al., 2017). According to this theory, encoding and retrieving can be done either via abstraction or concrete cognition (Wiesenfeld et al., 2017). The theory suggests that a high construal level equals more abstract thinking, while a low construal level equals more concrete thinking. Let us look at an organisational example to illustrate the distinction between concrete and abstract thinking. Imagine two

colleagues at a big company. Robyn usually immerses themself in negative events by focusing on how the event is impacting them in the here and now. Alex, on the other hand, tends to take a step back, looking at negative events from a more objective perspective. They find out that their beloved leader, who is an important resource to the company, has resigned due to personal circumstances. Robyn believes that their future at the company is jeopardised and that they have no control over the situation. They refuse to see any solutions. Alex, on the other hand, believes that this might be a possibility for something greater, and if they influence the other co-workers this way, it can create a positive upheaval after all.

Returning to the construal level theory, the theory further states that psychological distancing leads to a higher construal level, resulting in abstract mental representations (Wiesenfeld et al., 2017). Psychological distancing is about distancing socially, temporally, spatially, and hypothetically (Wiesenfeld et al., 2017), meaning that it is different from self-distancing. Thus, we assume that, as in the case of psychological distance, self-distancing facilitates emotion regulation by activating a more abstract perspective. That is, we believe that self-distancing through a higher construal level can lead to abstract thinking. Abstract thinking then leads to more possibilities on how people can interpret situations and thus act. Said in other words, abstract thinking goes further than the details of the stimulus, which makes it less constraining than concrete thinking (Smith et al., 2008).

As referred to above, psychological distancing can lead to more abstract thinking. However, the number of studies investigating the theme of this thesis, *self-distancing*, with abstract thinking, is a rather small amount. One example is Gainsburg and Kross (2020) who investigated how self-talk changes how people conceptualise the self. They found that people who talk about themselves in the third person used more abstract ways to describe themselves. This implies that self-distancing and abstract thinking interact. Still, it has not been looked into how self-distancing specifically leads to more abstract thinking.

To summarise the above discussion, self-distancing might increase the construal level, leading to more abstract thinking. Further, abstract thinking might allow for information processing to happen more rationally. This type of information processing (rational), is more decontextualized and can see the bigger picture (Stanovich & West, 2000), in contrast to automatic information processing.

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

Hypothesis 1: Self-distancing from anxiety (vs self-immersing in anxiety) will increase analytical thinking.

Hypothesis 2: Self-distancing from anxiety (vs self-immersing in anxiety) will decrease intuitive thinking.

Hypothesis 3: Self-distancing from anxiety (vs self-immersing in anxiety) will decrease arousal.

Hypothesis 4: Self-distancing from anxiety (vs self-immersing in anxiety) will increase abstract thinking.

Hypothesis 5: Self-distancing from anxiety (vs self-immersing in anxiety) will reduce intuitive processing via a reduction in physiological arousal.

Hypothesis 6: Self-distancing from anxiety (vs self-immersing in anxiety) will increase analytical processing via a reduction in physiological arousal.

Hypothesis 7: Self-distancing from anxiety (vs self-immersing in anxiety) will increase analytical processing via an increase in abstract thinking.

Hypothesis 8: Self-distancing from anxiety (vs self-immersing in anxiety) will reduce intuitive processing via an increase in abstract thinking.

These hypotheses will be explored by using an experimental between-subject design. In the following section, we explain the methodology used in this study.

3.0 Methodology

The issue of this paper was investigated using an experimental between-subject design with two conditions. The two conditions were immersed and distanced perspectives and were explored in a laboratory setting. Our data is drawn from a larger dataset that was collected for a project on fear, anger, distancing, and risk-taking. This dataset contains a repeated measure of risk-taking (100 trials per participant) in the Iowa Gambling Task. Thus, our dataset contains a total of 7500 observations due to the repeated measure of risk-taking (75 participants x 100 trials). Our thesis does not examine risk-taking in the Iowa Gambling Task, but rather, the extent to which participants engaged in intuitive and analytical processing during the task.

3.1 Sample

A total number of 75 respondents participated in the study. To ensure the highest number of participants possible, the respondents had an equal chance of winning two gift cards. That is, two participants would, by the end of the data collection, be randomly drawn from the pool of participants, to win a 500 kroner gift card each. The respondents were recruited from our social network, social media, and by putting up flyers around Oslo. Additionally, we were able to recruit a lot of people by asking students at BI Norwegian Business School to participate. Our target group had very few requirements (being over 18 years old), making the recruitment process easier.

The sample consisted of 33 males and 42 females (none of the participants chose “other/do not wish to answer”. The average age was 26.37 (SD = 7.72) and ranged from 20 to 55.

3.2 Data collection

The study was approved by NSD (Norwegian Centre for Research Data) before running the experiment. Two participants were randomly picked to win a gift card worth 500 NOK.

3.2.1 Experimental design

The study manipulated emotions in a between-subjects design with two conditions (self-immersed vs distanced perspective). As part of our self-distancing from anxiety manipulation, participants completed an Autobiographical Recall Task. This is a common emotion induction tool in the field of judgement and decision-making. This task is also particularly common in studies investigating discrete, incidental emotions, as in our thesis. Participants were randomly assigned to one of the two conditions. In both conditions, participants were asked to recall and describe an anxiety-related event in the past six months. However, in the immersed condition, we asked participants to immerse themselves and imagine the event unfolding right before their eyes as if it was happening now. In the self-distanced condition, we asked participants to adopt the perspective of a distant, uninvolved observer. Participants received the instructions below - these manipulations are quite similar to those used by Mayiwar and Björklund (2021). Do note that *fearful* and *fear* in the instructions is referring to being anxious and experiencing anxiety.

Immersed condition:
"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."

Distanced condition:
"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."

Next, participants completed a risky decision-making task, the Iowa Gambling Task. This is a decision-making task developed by Bechara et al.

(1994). After the Iowa Gambling task, participants completed a questionnaire called Cognitive Processing Questionnaire (Bakken et al., 2016). This scale measures the extent to which participants rely on intuitive or analytical processing during a task. Finally, the participants completed various manipulation checks and indicated their age and gender.

3.2.2 Experimental procedure

The subjects took part in the experiment in a laboratory at BI Norwegian Business School, Oslo. By random assignment using Qualtrics, the participants were divided into one of two groups: immersed condition and distanced condition. Before starting the writing task, the participants were guided to their respective booths and connected to skin sensors that measured their skin conductance. After taking a couple of sharp breaths and relaxing for a minute, the writing task began. The participants were told to recall and identify an event where they experienced anxiety, and to describe the event from an immersed or distanced perspective. For this writing task, the participants were given about 3 minutes.

Before introducing the participants to the next step in the experiment, the risky-decision-making task (Iowa Gambling Task), they were given a randomised ID. This was done to ensure that the data from the first part of the experiment could be matched with the data from the Iowa Gambling Task which was hosted on an external website (PsyToolkit). After they finished the Iowa Gambling Task, the participants were returned to the main questionnaire where they answered several survey questions. They responded to questions measuring information processing. Additionally, two manipulation checks measured to which degree they experienced the target emotion when doing the writing task (self-reported emotions) and perceived distance. Lastly, they responded to the control variables: age, gender, valence, and subjective arousal.

3.3 Measures

3.3.1 Dependent variables

Intuitive and analytical processing. We used the Cognitive Processing Questionnaire (CPQ) developed by Bakken et al. (2016) to measure the extent to which respondents relied on intuitive or analytical processing. This questionnaire has 22 items, and explores five dimensions of cognitive processing: Rational (5 items), control (6 items), knowing (4 items), urgency (4 items), and affective (3 items). Rational and control constitute analytical processing, while urgency and affective constitute intuitive processing. Considering our research question, the dimension "knowing" was not included. The scale ranged from 1 (strongly disagree) to 5 (strongly agree).

As a decision-making task, we used the Iowa Gambling Task. The respondents were guided to a web page, called PsyToolkit, where the task was hosted. The task consists of 100 trials and the respondents had to choose between four decks (A, B, C, D). Each of the decks represents either a risky option with high gains and high losses or a safe option (low gains, low losses). Decks A and B are the least advantageous in the long term as they yield a high reward ($100), but there is a 50% chance to receive a fine ($250). Deck C and D are the most advantageous in the long term with a low reward ($50) and a 50% chance to receive a low fine ($50). Participants completed the CPQ after the IGT.

3.3.2 Mediators

Physiological arousal. We used the Biogauge Sudologger to measure physiological arousal. Participants were connected with sensors measuring skin conductance as soon as they had taken their seats. Five sensors were connected to the respondents during the entire study. Three sensors were connected to the non-dominant arm, and two sensors were connected to the chest. The two sensors that were connected to the chest were used to measure HRV. However, HRV was not included in the analysis of this thesis. The participants were instructed to sit completely still during the whole experiment and only use the dominant arm for writing. We used integrated skin conductance responses (ISCR), which has been recommended over other indices (Benedek & Kaernbach, 2010; Caruelle et al., 2019; Christopoulos et al., 2019). Skin conductance is one of the most commonly

used physiological measures of arousal and is traditionally measured at the fingers or palms (van Dooren et al., 2012). According to Tronstad et al. (2010), skin conductance is mainly sensitive to sweating. Thus, if arousal is high, it should be easy to detect this through the skin conductance measure. To capture what is relevant to the research question, we examined physiological arousal in a 15 seconds time window following the onset of the self-distancing instructions.

Abstract thinking. Abstract thinking was measured with one item, where the participants had to answer the following question: "How concrete vs. abstract was the event in your mind when you were describing the event in the writing task?". The scale ranged from 1 (very concrete) to 9 (very abstract).

3.3.3 Manipulation checks

Self-reported emotions. To measure the extent to which the participants felt the manipulated emotion (anxiety) a Likert scale was used. The scale ranged from 1 to 7, where 1 is *not at all*, and 7 is *very much*. In other words, participants that chose number 7 felt very anxious after the recall task.

Perceived distance. To investigate and measure how effective the perceived distancing manipulation was, the respondents were asked to respond to the following: "Describe how far you felt from the event you recalled". For this item, a Likert scale ranging from 1 to 7 was used, where 1 stood for *very near* and 7 stood for *very distant.*

3.3.4 Control variables

In this study, four control variables were used. The control variables that were included are age, gender (0 = male, 1 =female), valence and subjective arousal. These control variables were chosen because previous research has shown that they might have an effect on emotion regulation and/or information processing. Specifically, we wanted to see if some of the same effects apply to self-distancing.

Blanchard-Fields et al. (2004) found that there exist age differences in emotion regulation. They found that middle-aged adults are better at emotion regulation strategies than both younger and older adults. McRae et al. (2008)

found, in their study, that there were gender differences in emotion regulation. Using functional magnetic resonance imaging, McRae et al. (2008) asked their participants to downregulate their emotional responses by using reappraisal when being exposed to negatively valenced pictures. They found that when comparing men to women, it was shown that men had less increase in prefrontal regions associated with reappraisal. Further, that men had a larger decrease in the amygdala, as well as less engagement than women of ventral striatal regions. The latter is regions associated with reward processing. These results led McRae and colleagues (2008) to consider some possible explanations for the gender differences. One being that men might, through a greater use of automatic emotion regulation, use less effort when applying cognitive regulation. However, they stated it was too early to know whether this possible explanation was correct or not.

The self-assessment manikin by Bradley and Lang (1994) was used for both subjective arousal and valence. It was used as a tool to measure the control variables. Previous research suggests that emotional effects on information processing are driven by valence rather than other components like arousal (Baron, 1987; Bless, et al., 1990; Bless, et al., 1996; Mackie & Worth, 1989; Semmler & Brewer, 2002; Sinclair, 1988). Due to this research, we wanted to control for valence, to see if they were correct in their statements. Further, we controlled for it to examine the influence of distancing above and beyond valence.

We were more interested in physiological arousal as the main predictor, which is why we wanted to control for subjective arousal. Previous research has shown that physiological and subjective arousal do not always overlap. Some researchers view these as two distinct components of arousal that should be studied separately (LeDoux & Pine, 2016). Hopefully, the results of this study might give an indication of whether this is correct or not.

Both self-reports consisted of five pictures and a nine-point Likert scale. However, the content in the two of them is different. The pictures for arousal illustrate increasing activation/arousal. The scale asks to what extent they felt aroused after the autobiographical recall task, where 1 is *calm* and 9 is *aroused/activated*. In the pictures for valence, the illustrations showed a sad face that increasingly turned into a happy face with a smile. The participants were then asked how they felt after the autobiographical recall task, where 1 was *unhappy* and 9 were *happy*.

4.0 Results

4.1 Descriptive statistics

4.1.1 Manipulation checks

Self-reported anxiety and perceived distance. To investigate whether the manipulation of self-reported anxiety and perceived distance was successful, an independent samples t-test was used (Table 4.1). The test showed that it was a successful manipulation. Namely, the self-reported anxiety was significantly lower in the self-distanced group, and the perceived distance was significantly higher in the self-distanced group. There was a significant difference in the scores for self-reported anxiety and perceived distance. These results suggest that self-distancing minimises self-reported anxiety and that self-distancing results in feeling more distanced from the situation.

The independent samples t-tests have two hypotheses, which are the null hypothesis and the alternative hypothesis (Gerald, 2018). If one confirms the null hypothesis in the model, it means that the means for the two populations are equal. On the other hand, if an alternative hypothesis is confirmed, it means that the means for the two populations are not equal (Gerald, 2018). The p-value in the model (Table 4.1) is beneath the significance level (p = <.001), meaning that the null hypothesis is rejected. Since the null hypothesis is rejected, we can confirm that it is an alternative hypothesis and that the populations are significantly different from each other.

Table 4.1

Independent samples t-test, Manipulation checks: Self-reported anxiety and perceived distance

	Statistic	df	p	Mean difference	SE difference	Effect Size (Cohen´s d)
Anxiety	10.84	7498.00	<.001	0.43	0.04	0.25
Self-distancing	-13.44	7498.00	<.001	-0.45	0.03	-0.31

4.1.2 Correlations

Table 4.2 illustrates the correlations between the independent variables, dependent variables, mediating variables, manipulation checks, and control variables.

As hypothesised, there is a negative correlation between self-distancing and intuitive thinking (r = -0.25***). This means that the participants allocated to the self-distanced condition relied less on intuitive thinking. Next, it was hypothesised that the use of self-distancing decreases physiological arousal. The correlation matrix supports this hypothesis, as there is a negative correlation between the two variables (r = -0.13***). However, while this correlation is significant (p = <.001), the correlation is quite low. Simply put, this indicates that self-distancing helps the participants to regulate their emotions, consequently decreasing their physiological arousal.

We hypothesised that there is a positive relation between intuitive thinking and physiological arousal. The correlation matrix indicates that this is true, as the correlation matrix shows a positive correlation (r = 0.17***) between the two. Still, while the relationship is significant (p = <.001), the correlation itself is quite low. All of this indicates that physiological arousal increases intuitive thinking.

The correlation matrix shows that there is a negative correlation between abstract thinking and analytical processing (r = -0.012***). We had, however, hypothesised that there would be a positive correlation between the two. This correlation matrix indicates the opposite and while the correlation is low, the relationship is shown as significant (p = <.001). This indicates a negative relationship between abstract thinking and analytical processing, which almost can be interpreted as analytical processing leading to less abstract thoughts.

Lastly, there is a positive correlation between physiological arousal and subjective arousal (r = 0.28***), and the relationship is significant (p = <.001).

Table 4.2

Correlation matrix

	1	2	3	4	5	6	7	8	9
1.Distancing									
2.Intuitive	-0.25***	-							
3.Analytical	0.02	-0.07***	-						
4.Phy arousal	-0.13***	0.17***	0.05***	-					
5.Sub arousal	0.01	-0.06***	-0.02	-0.08***	-				
6.Valence	-0.13***	-0.10***	0.25***	0.28***	-0.51***	-			
7.Abstract	-0.06***	0.00	-0.12***	-0.03***	0.21***	-0.13***	-		
8.Age	0.02	0.15***	0.05***	-0.14***	0.23***	-0.03**	0.19***	-	
9.Gender	-0.07***	0.18***	-0.39***	-0.09***	0.17***	-0.15***	0.17***	0.20***	-

*Note. Gender (0= male, 1=female), Distance (0=immersed, 1= self-distanced. * p < .05, ** p < .01, *** p < .001. Sub arousal = Subjective arousal, Phy arousal = Physiological arousal*

4.2 Analytical procedure

To test the hypotheses of this experiment, we used multiple linear regression analysis. Multiple linear regression is a flexible tool to use when you want to look into the relationship between several independent variables and one dependent variable (Aiken et al., 2003). Here, we have used multiple linear regression analysis to test the independent variable, self-distancing, against the dependent variables, analytical- and intuitive thinking, while controlling for age, gender, valence, and subjective arousal. Each variable is presented in the table below.

Hypothesis 1: Self-distancing from anxiety (vs. self-immersing in anxiety) will increase analytical thinking. The results from the dependent variable, analytical thinking, are presented in Table 4.3. This hypothesis was supported through the multiple linear regression analysis. As shown in Table 4.3, there is a positive and significant relationship between self-distancing and analytical thinking ($\beta = 0.05$, $p = .015$). This suggests, as in our hypothesis, that self-distancing increases analytical thinking.

Gender has a significant relation with analytical thinking ($\beta = -0.78$, $p = <.001$). These results indicate that the male participants used more analytical thinking than the female participants. Further, age has a positive relation to

analytical thinking, although it is very low (β = 0.01, *p* = <.001). Valence was positively associated with analytical processing, thus suggesting that positive feelings facilitate analytical thinking. Lastly, the R-square is 0.22, meaning that the model explains 22 % of the overall variance.

Table 4.3

Multiple linear regression. Dependent variable: Analytical thinking

Predictor	Estimate	SE	t	p
Intercept	1.79	0.06	28.15	<.001
Age	0.01	0.00	8.77	<.001
Gender	-0.78	0.02	-36.91	<.001
Subjective arousal	0.09	0.01	13.89	<.001
Valence	0.22	0.01	23.65	<.001
Immersed vs distanced anxiety	0.05	0.02	2.44	0.015
R^2	0.22			

Hypothesis 2: Self-distancing from anxiety (vs. self-immersing in anxiety) will decrease intuitive thinking. Then, the results from the dependent variable, intuitive thinking, will be presented (Table 4.4). Self-distancing has a significant relation with intuitive thinking (*p* = <.001). This means that self-distancing does have an impact on intuitive thinking as hypothesised. Further, the estimate (β = -0.56) indicates that self-distancing decreases intuitive thinking, thus supporting our hypothesis.

Gender is positively associated with intuitive thinking (β = 0.28, *p* = <.001). This indicates that female participants used more intuitive thinking than male participants. Moreover, age has a positive relation with intuitive thinking, although it is very low (β = 0.02, *p* = <.001). Additionally, valence is significantly and negatively related to intuitive thinking (β = - 0.18, *p* = <.001), indicating that valence has an influence (a negative one) on this type of information processing. Lastly, in Table 4.4 we see that the R-square is 0.16, meaning that 16 % of the overall variance is explained by the model.

Table 4.4

Multiple linear regression, Dependent variable: Intuitive thinking

Predictor	Estimate	SE	t	p
Intercept	4.21	0.07	61.65	<.001
Age	0.02	0.00	15.68	<.001
Gender	0.28	0.02	12.38	<.001
Subjective arousal	-0.12	0.01	-18.83	<.001
Valence	-0.18	0.01	-18.37	<.001
Immersed vs distanced anxiety	-0.56	0.02	-25.20	<.001
R^2	0.16			

Hypothesis 3: Self-distancing from anxiety (vs. self-immersing in anxiety) will decrease physiological arousal. This hypothesis was supported. That is, the results showed that self-distancing from anxiety decreased physiological arousal. The results from physiological arousal are presented in the table below (Table 4.5). The *estimate* between self-distancing and physiological arousal is β = -0.08, indicating a negative relationship between the two. This suggests that self-distancing decreases physiological arousal. The p-value is less than 0.05 (*p* = <.001), meaning that this reduction in arousal is significant.

The analysis does not indicate a relationship between gender and physiological arousal (β = - 0.00, *p* = .898). Furthermore, age has a negative association with physiological arousal, even though it is quite low (β = - 0.01, *p* = <.001). Additionally, valence has a positive relation to physiological arousal (β = 0.10, *p* = <.001). Lastly, Table 4.5 shows an R-square of 0.11, meaning that 11% of the overall variance is explained by the model.

Table 4.5

Multiple linear regression predicting physiological arousal

Predictor	Estimate	SE	t	p
Intercept	0.31	0.03	9.60	<.001
Age	-0.01	7.66e-4	-11.58	<.001
Gender	-0.00	0.01	-0.13	0.898
Subjective arousal	0.03	0.00	8.91	<.001
Valence	0.10	0.00	21.08	<.001
Immersed vs distanced anxiety	-0.08	0.01	-7.34	<.001
R^2	0.11			

Hypothesis 4: Self-distancing from anxiety (vs. self-immersing in anxiety) will increase abstract thinking. The analysis shows that self-distancing from anxiety increases abstract thinking, therefore supporting this hypothesis. Results are presented in the table below (4.6). The estimate between self-distancing and abstract thinking is β = 0.20, indicating a positive relationship between the two. The p-value is less than 0.5 (p = <.001), meaning that this increase in abstract thinking is significant.

Gender is positively related to abstract thinking (β = 0.42, p = <.001). This indicates that female participants used more abstract thinking, in comparison to the male participants. Moreover, age is positively associated with abstract thinking (β = 0.03, p = <.001), even though it is quite low. Additionally, valence has a negative relation with abstract thinking (β = -0.04, p = .039). Lastly, Table 4.6 shows that 8% (R-square = 0.08) of the overall variance is explained by the model.

Table 4.6

Multiple linear regression predicting abstract thinking

Predictor	Estimate	SE	t	p
Intercept	1.85	0.13	14.74	<.001
Age	0.03	0.00	11.54	<.001
Gender	0.42	0.04	9.92	<.001
Subjective arousal	0.14	0.01	11.10	<.001
Valence	-0.04	0.02	-2.06	0.039
Immersed vs distanced anxiety	0.20	0.04	5.02	<.001
R^2	0.08			

The mediator models test hypotheses 5,6,7 and 8. We performed a series of mediation analyses in JAMOVI using the med package to test our four mediation hypotheses. We examined the mediation effects using 5000 bootstrap samples and 95% bias-corrected confidence intervals. The first mediation model tested whether self-distancing reduces intuitive processing through a reduction in physiological arousal. The mediation index was significant (β = -0.04, SE = 0.00, 95% Bootstrap CI = -0.05, -0.03, *p* = <.001), indicating that self-distancing reduced intuitive processing via a reduction in physiological arousal.

The second mediation model tested whether self-distancing increases analytical processing through a reduction in physiological arousal. The mediation index was significant (β = -0.02, SE = 0.00, 95% Bootstrap CI = -0.02, -0.01, *p* = <.001), indicating that self-distancing had a negative indirect effect on analytical processing through a reduction in physiological arousal. Thus, we find no support for our hypothesis predicting a positive indirect effect of self-distancing on analytical processing through a reduction in physiological arousal.

The third mediation model tested whether self-distancing increases analytical processing through an increase in abstract thinking. The mediation index was significant (β = -0.01, SE = 0.00, 95% Bootstrap CI = -0.02, -0.01, *p* = <.001). The indirect effect is in the opposite direction of our hypothesis 7, which predicted a positive indirect effect of self-distancing on analytical processing

through an increase in abstract thinking. Thus, we find no support for our hypothesis 7.

Finally, the fourth mediation model tested whether self-distancing reduces intuitive processing through an increase in abstract thinking. The mediation index was not significant (β = 0.00, SE = 0.00, 95% Bootstrap CI = -6.16, 0.01, p = .159). Thus, we find no support for our hypothesis predicting a negative indirect effect of self-distancing on intuitive processing through an increase in abstract thinking.

5.0 Discussion

The purpose of this study was to explore the relationship between self-distancing and information processing. Through this thesis, we wanted to answer the question of how the regulation of anxiety influences information processing. More specifically, our master thesis was guided by the research question: "How does self-distancing from anxiety influence information processing?". Additionally, our conceptual model also included two mediators, namely arousal and abstract thinking. Through our findings, we wanted to find out whether the effect of self-distancing on analytical thinking is mediated by arousal and abstract thinking.

The analysis found support for hypothesis 1 and hypothesis 2. That is, self-distancing from anxiety was shown to increase analytical thinking (hypothesis 1) and decrease intuitive thinking (hypothesis 2). Hence, the action of self-distancing can influence information processing: changing it from intuitive to more analytical. Moreover, these results indicate a positive relationship between self-distancing and analytical processing, and a negative relationship between self-distancing and intuitive processing. This supports the statement of several scholars arguing that emotion regulation strategies (here: self-distancing) activate the brain in a way that increases analytical processing, and decreases intuitive thinking (Arnsten, 2009; Drabant et al., 2009; Sokol-Hessner et al., 2013). The participants who self-distanced did experience more analytical processing than the participants who self-immersed.

The analysis also found evidence supporting the third hypothesis. We hypothesised that self-distancing from anxiety would decrease physiological arousal. The participants in our experiment that had a self-distanced perspective showed lower levels of physiological arousal than the ones self-immersing. This suggests that when the participants are switching from a first-person point of view to a third perspective point of view, the language change helps downregulate anxiety, and thus decreases arousal.

Self-distancing seems to work well as a tool to regulate anxiety, thus also affecting and decreasing the level of arousal, which is a bodily reaction to anxiety (Endler & Parker, 1990). These results also support Verduyn et al. (2012) statement saying that self-distancing can reduce negative emotions, or at least the negative emotion anxiety. It further confirms another statement made by several scholars, saying that self-distancing can have a direct effect on people's emotions (Kross & Ayduk, 2008; Kross & Ayduk, 2011; Verduyn et al., 2012).

Hypothesis four was about whether self-distancing from anxiety will increase abstract thinking. This hypothesis was also supported. This indicates that when the participants adopt a third-person point of view or a self-distanced perspective, they can look at their emotions in a bigger picture and decontextualize. Previous research, such as the construal level theory, has stated that psychological distancing leads to a higher construal level, resulting in abstract mental representations (Wiesenfeld et al., 2017). We believed that our experiment would produce similar results when looking at self-distancing instead of psychological distancing. This belief seems to have gathered some support through the results of our experiment. This further supports the claim by Gainsburg and Kross (2020) who says that people talking in the third person use more abstract ways to describe themselves.

Further, when it comes to our mediation analyses, the results were more mixed (hypotheses: 5, 6, 7, 8). The hypotheses concern the *independent variable* self-distancing; the *mediating variables* physiological arousal and abstract thinking; the *dependent variables* intuitive and analytical thinking. We hypothesised that both physiological arousal and abstract thinking mediate the relationship between self-distancing and analytical/intuitive processing. This means that we predicted that a decrease in arousal and an increase in abstract thinking would lead to more analytical thinking. Additionally, an increase in arousal and a decrease in abstract thinking would lead to more intuitive thinking.

The analysis supports hypothesis 5, but not hypothesis 6. The analysis suggests that self-distancing reduces intuitive processing through a reduction in physiological arousal, thus supporting hypothesis 5. In contrast, the hypothesis that self-distancing from anxiety would increase analytical processing through a reduction in physiological arousal (hypothesis 6), was not supported by the analysis. Still, while hypothesis 6 remains unsupported, hypothesis 5 does indicate that physiological arousal plays a role in mediating the relationship between self-distancing from anxiety and information processing. At the very least, the analysis indicates that physiological arousal influences the interplay between self-distancing and intuitive processing.

As mentioned in the introduction, our prediction is derived from arousal-based models. The results from hypothesis 5 support the arousal-based model. That is, self-distancing reduces intuitive processing through a reduction in physiological arousal. Therefore, suggesting that arousal increases intuitive processing (Easterbrook, 1959, as cited in Hanoch & Vitouch, 2004; Kaufman, 1999). One can argue that Easterbrook´s (1959) theory stating that information processing is restricted when people experience high levels of arousal is true as well. This is considering that according to our analysis, the respondents turn more to their intuitive way of thinking when they experience anxiety, and their access to analytical thinking might be limited. Interestingly, this indicates that even when the participants experienced mild stressors (anxiety) this impairs the prefrontal cortex and strengthens the amygdala (Arnsten, 2009).

As previously mentioned, there was no evidence supporting hypothesis 6. The analysis showed no indication of self-distancing from anxiety increasing analytical processing *through* a reduction in physiological arousal. There was no change in analytical processing in the two conditions. Thus, it is possible that the intuitive mode of information processing is more sensitive to emotions and emotion regulation.

In regards to the mediation analyses for abstract thinking, we found no support for hypotheses 7 and 8. The analysis shows no support for the prediction that self-distancing increases analytical processing via an increase in abstract thinking (hypothesis 7). Similarly, the prediction that self-distancing would reduce intuitive processing via abstract thinking (hypothesis 8) remains unsupported. However, we can take a look at this hypothetically, and imagine that this means that the hypotheses are false. That would suggest that abstract thinking does not

contribute to analytical thinking (Shanks & Darby, 1998; Trope & Liberman, 2003, 2010; Tsai & Thomas, 2011) and does not reduce intuitive thinking. Further, it does not mediate the relationship between self-distancing and analytical thinking, and between self-distancing and intuitive thinking. If this is the case, abstract thinking could be taken out of the conceptual model without any change happening.

Raghunathan & Pham (1999) and Tiedens & Linton (2001) argued that emotions associated with uncertainty are accompanied by analytical thinking. Anxiety is an emotion associated with uncertainty (Raghunathan & Pham, 1999), making this theory relevant. However, our analysis does not give strong evidence for The Appraisal Tendency Framework regarding information processing. In contrast, the results indicate that anxiety is accompanied by intuitive thinking.

However, the findings from our analysis are more in line with the theory stating that physiological arousal decreases analytical thinking, namely the arousal-based model (Easterbrook, 1959, as cited in Hanoch & Vitouch, 2004; Kaufman, 1999). The arousal-based models predict that high-arousal emotions, like anxiety, lead to increased intuitive thinking, as the information processing is affected by high levels of arousal (Gray, 1978; Öhman et al., 2001, as cited in Hanoch & Vitouch, 2004; Sanbonmatsu & Kardes, 1988). The prefrontal cortex, which facilitates analytical thinking, is sensitive to even quite mild stressors. This means that information processing is affected by high levels of arousal (Arnsten, 2009). This aligns with the results of this study.

The results from our control variables merit some interesting findings. Our control variables were age, gender, valence and subjective arousal. These were, as mentioned before, included as control variables because we thought they might have an effect on emotion regulation and/or information processing, based on previous research. The findings suggested that all of these variables had an impact on the effect of self-distancing on information processing.

Age was found to be positively associated with analytical thinking, intuitive thinking, and abstract thinking. Additionally, age had a negative relation with physiological arousal. This suggests that age has an impact on the effect of self-distancing on information processing. Thus, supporting the study by Blanchard-Fields et al. (2004), where they found that there exist age differences in emotion regulation.

Gender, in our study, was negatively associated with analytical thinking and positively associated with intuitive thinking. Thus, indicating that the analytical processing was higher among the male participants than the female participants. Additionally, that intuitive processing was higher among the female participants, than the male participants. Overall, this suggests that there are gender differences in the effect of self-distancing on information processing. Thus, supporting McRae and colleagues (2008) study, where they had found gender differences in emotion regulation (cognitive reappraisal). Additionally, they had, after reflecting on these results, considered some possible explanations for this. One of these was that men might, through a greater use of automatic emotion regulation, use less effort when applying cognitive regulation. However, they were not able to say whether this was correct or not. Still, considering how similar our results are to theirs, this explanation seems plausible. That is, it could be possible that male participants in our study had higher analytical processing than the female participants, because they were able to use less effort when applying self-distancing. Still, it is too early to say whether this is correct and future research is necessary.

Nevertheless, it is important to remember what we mentioned already in our introduction. That is, analytical processing is not always the superior option. The use of intuitive processing can also be beneficial and quite effective in some situations, especially when intuition is strong (Kahneman, 2012). That as it may, when experiencing negative emotions, like anxiety, it has been suggested that analytical reasoning is the better option because of its analytical nature (Hanoch and Vitouch, 2004).

We controlled for valence due to previous research stating that information processing is driven by valence rather than other components like arousal. Additionally, we controlled for valence to examine the influence of distancing above and beyond valence. Valence, in our analysis, had a positive association with analytical thinking and a negative association with intuitive thinking. Thus, suggesting that positive feelings facilitate analytical processing. Previous research indicating that emotional effects on information processing are driven by valence rather than other components like arousal is therefore partly correct (Baron, 1987; Bless, et al., 1990; Bless, et al., 1996; Mackie & Worth, 1989; Semmler & Brewer, 2002; Sinclair, 1988). That is, valence has an association with information processing, but so does subjective- and physiological arousal. The

findings indicate that subjective and physiological arousal overlap. This is opposed to the theory by LeDoux and Pine (2016) stating that they are two distinct components and should thus be studied separately. All in all, subjective arousal, valence, age, and gender are strong control variables.

Overall, the analysis showed that self-distancing influences information processing. The use of self-distancing lead to a decrease in intuitive processing and an increase in analytical processing. That is, by using the technique the participants were able to more analytically and rationally process information. Additionally, the results showed that self-distancing increased abstract thinking and decreased physiological arousal.

The analysis demonstrated that anxiety affects the way information is processed and that by regulating this emotion, people can facilitate more analytical thinking. As mentioned earlier, previous studies have shown that self-distancing works positively on regulating emotions, which our results support.

5.1 Implications

As mentioned earlier, anxiety is prevalent in work-life and might lead to workers experiencing functional disability and work impairment (Andrea et al., 2009). It has been an occurring problem in society, alongside stress and depression (Health and Safety Executive, 2021a). Especially in jobs where tasks require careful and detailed information processing, one can imagine this being particularly problematic. One example of this might be jobs that have a lot of task uncertainty (Daft & Macintosh, 1981).

Therefore, organisations might benefit from teaching their employees how to apply emotion regulation techniques when they experience state anxiety at work. Our study indicates that self-distancing could be a simple, yet effective, emotion regulation technique to use for this purpose. That is, our study indicates that self-distancing works positively on regulating state anxiety and leads to more analytical thinking and less intuitive thinking. Our findings also indicate that organisations should, in general, pay attention to the employees' emotional experiences at work and outside work.

Self-distancing as a technique is not only effective and simple, but it is also cost-free. It can be applied to several areas, such as onboarding, employee training, and leadership training, and is also a tool that can be used outside work.

The use of such a technique might also help to raise awareness among employees on how emotions affect information processing. Additionally, it could help to create a focus on building positive qualities such as emotional awareness, the ability to take a third perspective, and looking at the big picture through the use of self-distancing.

Besides practical implications, our study has some theoretical implications as well. Our study has investigated an area in the literature that has been rather narrow in regard to research, namely the relationship between emotion regulation and information processing. The findings from our study indicate that emotion regulation, like self-distancing, affects how people process information. Future research should investigate this further and look into how other emotion regulation techniques would affect information processing. Additionally, other emotions than state anxiety should be investigated.

5.2 Limitations

The study has several limitations. First, the fact that the experiment was done in a laboratory setting might make it less relevant to real-life settings. It can be suggested that the artificial context makes it hard to generalise in the real world because they might not respond in the same way. The situation in itself, being in a lab, is likely to evoke certain emotions, as well as make people more attentive to their emotional and cognitive processes. Furthermore, only a small part of the variation in cognitive processing was explained by the independent variable *self-distancing* or the mediator's *abstract thinking* and *physiological arousal*. This suggests that there could be factors not included in our study that are more important in regard to cognitive processing.

Secondly, in this study, the cognitive processing variable was built on a self-report questionnaire filled out by the participants. They received the questionnaire after the experiment and in this questionnaire, they needed to look back at and assess their information processing. By doing this, we could measure several aspects of information processing. It also allowed us to at least partly validate the measures, examining their relationship to the time used doing the task. However, we still remained dependent on the participants' willingness and ability to assess and report their information processing in a correct and honest manner. In the future, we would advise (and encourage) researchers to explore

other options than self-report that can capture several aspects of information processing.

Thirdly, the experiment was open to distractions. That is, the attention of the participants could have been interrupted by distractions such as people talking outside their designated stall or another participant asking for help during the experiment. Some people did report that they got interrupted or startled sometimes during the experiment (e.g., a participant calling out that they were done with the experiment). Besides affecting their concentration, it could have also made them move their hand suddenly - thus affecting their arousal data.

Fourth, there is the possibility of carry-over emotions affecting the results of the study. Maybe they had a rushed morning, or met a lot of traffic on the way? These possible carry-over emotions could have affected how they felt and responded to the experiment. Some participants may have had some trouble understanding English on a good level, which could have had an effect as well. Further, social desirability is likely to occur in the self-reports. Meaning that there is a "tendency to present oneself and one's social context in a way that is perceived to be socially acceptable, but not wholly reflective of one's reality" (Bergen & Labonté, 2019, p. 783). This tendency makes it hard to ascertain whether their responses are true.

Fifth, there were some inconveniences when attaching the sensors to the subjects. That is, some of the respondents told us that they were sweating due to a lot of caffeine, which made it somewhat troublesome to attach the sensors to their arms. This is likely to have affected their arousal level and heartbeat rate. Additionally, some subjects said they were nervous already at the beginning of the experiment. Moreover, some subjects thought the experiment was over before it was, thus taking the sensors off too early. Sometimes the Sudologger did not work either and the experiment ended up being performed without attaching the participants to the Sudologger through sensors. Consequently, we are missing skin conductance data for some of the participants.

Additionally, it can be argued that a methodological weakness of our study is the number of participants. It was not easy to recruit participants for the study, as they had to be in the lab physically. Lastly, considering that the experiment was conducted in a laboratory setting, limits the study somewhat in regard to generalisation and relevance to real-life settings.

5.3 Future research

In future research, it would be interesting to look at the use of self-distancing in a real-life setting, as ours were performed in an artificial context. As mentioned in limitations, being performed in a laboratory might mean that people would not react in the same manner in the real world, such as in an organizational setting. Furthermore, as people might be more aware of their own cognitive processing, it might not yield the same results as in an organizational setting. Therefore, to be even more beneficial for organizations, we would suggest investigating the effect of self-distancing on information processing in a real-life setting. In that way, it might be more applicable and generalizing to an organizational setting.

It would also be interesting to employ a longitudinal design to look into long-term effects of self-distancing. Moreover, as mentioned before, only a small part of the variation in cognitive processing was explained by self-distancing and abstract thinking/physiological arousal. Future research should therefore look into other possible factors than the ones included in our study, in regard to cognitive processing.

Future research should also further examine possible gender differences in emotion regulation and information processing. Our results indicated that there are gender differences in the effect of self-distancing on information processing. More specifically, our results indicated that the analytical processing was higher among the men participating, compared to the women. In future research it would be interesting to look if this would be the case when using other emotion regulation techniques. Additionally, if the same results would occur if investigating other emotions than anxiety. Our results further indicated that there were age differences in the effect of self-distancing on information processing. This would be another area that would be interesting to further investigate. Lastly, investigating possible gender and age differences on the effect of emotion regulation on information processing, could be quite relevant to the organization setting as well. That is, the organizations would be more aware of how effectively people of different genders and ages apply emotion regulation strategies. Which could affect the way they teach the emotion regulation strategies to their employees and the expectations they have for them.

6.0 Concluding remarks

This study has looked at how self-distancing from state anxiety can influence information processing. More specifically, it has looked at how incidental emotion regulation can affect information processing. The overall results suggest that self-distancing can be an effective emotion-regulation technique. It helps to moderate the effect of anxiety, making it possible to reverse the initial impact of emotion by using it. Most interestingly, our analysis supports the fact that: the way self-distancing from anxiety influences information processing is through reducing intuitive thinking (1) and increasing analytical thinking (2). In other words, self-distancing has a positive relationship with analytical processing and a negative one with intuitive processing.

The study also found some support for the arousal-based theories on information processing. Meaning that there exists a negative relationship between self-distancing and intuitive processing - mediated by physiological arousal. Moreover, there is a positive relationship between self-distancing and abstract thinking. However, when it comes to abstract thinking as a mediator between self-distancing and information processing, our study could not prove anything. All in all, this study allowed us to investigate the causal relationship between anxiety and information processing.

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