2020

The Flexible Impact of Affective States on Group Decision-Making and Ideational Creativity

Young-Jae Yoon

LOYOLA UNIVERSITY CHICAGO

THE FLEXIBLE IMPACT OF AFFECTIVE STATES ON GROUP DECISION-MAKING AND IDEATIONAL CREATIVITY

A DISSERTATION SUBMITTED TO

THE FACULTY OF THE GRADUATE SCHOOL

IN CANDIDACY FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

PROGRAM IN PSYCHOLOGY

BY

YOUNG-JAE YOON

CHICAGO, IL

DECEMBER 2020

ACKNOWLEDGMENTS

I would like to express my gratitude to all the people who provided me support and advice throughout this process. First and foremost, I am deeply grateful for my mentor and dissertation chair, Dr. James Larson. His time, support, and exceptional advice throughout my graduate career are indispensable keys for me to continue on the path to becoming Dr. Yoon. It was a privilege to learn from him. It is also my honor to be his last Ph.D. student. I will always appreciate for the tremendous effort that he has offered me since I started my graduate program.

I also thank to the other members of my committee, Dr. Scott Tindale, Dr. Jeffery Huntsinger, and Dr. Arup Varma for their invaluable feedback. Going beyond the call of duty, they offered me their friendship, social support, and critical expertise to become a better psychologist. In addition, I am sincerely grateful for the support of the graduate students, faculty, and staff of the Psychology Department of Loyola University Chicago. In particular, To Jeremy, Fatima, Rayne, Danielle, Kala, Hannah, Chad, Linas, Liza, and Jamie, my friends, thank you for small talk, lunches, clever insights, and help. Special thanks to Dr. Robyn Mallet, Dr. Fred Bryant, and Dr. Yael Granot for their help, support, and advice.

I would also like to thank my family for their love and support. To my parents and parent-in-law, thank you for offering me your essential support. I really could not have completed this long project without your love and sacrifice. To Hahn, my son, thank you for coming into my life and making me a Dad. It is a great blessing to have you while working on this project. Last, but certainly not least, To Bora, my partner in love and life, thank you for

being the air that I can breathe. You've always been the source of my happiness and a great companion along this journey. I love you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Positive and negative affect are often thought to influence the cognitive performance of individuals and groups via their effects on two different dimensions of cognitive processing style: heuristic vs. systematic processing, and global vs. local attentional focus. Recently, research has suggested that the effects of affective states on the analytic and creative performance of individuals depend on the relative dominance of heuristic vs. systematic processing (for analytic performance) and of a global vs. local attentional focus (for creative performance) just prior to the affect's arousal (Huntsinger, Isbell, & Clore, 2014; Huntsinger & Ray, 2016).

Extending this individual-level evidence to small interacting groups, the two experiments reported here examined whether the effect of positive and negative affective states on group performance—decision-making (Study 1) and creative idea generation (Study 2)—depends on the relative dominance of heuristic vs. systematic processing (Study 1) and global vs. local attentional focus (Study 2) in group members just before the affective state was induced. Study 1 primed either heuristic or systematic processing and then induced either a happy or sad mood state (in that order). I hypothesized that when heuristic processing was initially primed, groups subsequently put into a sad mood would make more accurate decisions than groups subsequently put into a happy mood, while when systematic processing was initially primed, groups subsequently put into a happy mood would make more accurate decisions than groups subsequently put into a sad mood. Study 2 primed group members' global vs. local attentional

focus and then induced either a happy or sad mood state (again, in that order). I hypothesized that when a global attentional focus was initially primed, groups subsequently put into a happy mood would be more creative than groups put into a sad mood, while when a local attentional focus was initially primed, groups subsequently put into a sad mood would be more creative than groups put into a happy mood. I found support for all of these hypotheses. Limitations and implications of the studies are discussed, and direction for future research are suggested.

CHAPTER ONE

INTRODUCTION AND LITERATURE REVIEW

Groups are basic task-performing units in modern organizations, and the success of organizations heavily depends on whether groups perform their assigned tasks well. As a result, task performance by small groups has received much research attention not only in social psychology (e.g., Levine & Moreland, 2012; Moreland, Hogg, & Hains, 1994; Wittenbaum & Moreland, 2008) but also in other organization-related areas (e.g., Mathieu, Maynard, Rapp, & Gilpson, 2008; Sanna & Parks, 1997). Although in general groups can be effective, one of the robust findings in the literature is that groups do not always maximize their own potential (Hackman, 1998; Larson, 2010; Steiner, 1972). For example, groups often fail to bring to bear some of the varied perspectives of their members, leading to sub-optimal decisions (Larson, Christensen, Franz, & Abbott, 1998; Stasser & Titus, 1987). Sometimes, this results in disastrous decision outcomes (e.g., *groupthink;* Janis, 1982). Group interaction also inhibits creativity in workgroups. For instance, interacting groups tend to generate fewer ideas than do the same number of individuals working separately (Diehl & Stroebe, 1987; Mullen, Johnson, & Sala, 1991). Such findings have stimulated much research illuminating the antecedent conditions that either promote or hinder effective group performance (for reviews, see, Hackman & Katz, 2010; Larson, 2010; Levine & Moreland, 2012). Although this previous research has advanced our understanding of group performance, some variables have received less attention than others. One neglected but important variable is the affective state that group members experience while

preforming a task. The positive or negative affect (e.g., happiness, sadness) that members might share has been shown to play an important role in how they think and behave at work (for reviews, see, George, 2016; Barsade & Knight, 2015). Yet, research on the role of affective states in group performance remains scarce compared to research on how affective states influence many aspects of individual performance (e.g., judgment, decision-making, & creativity). To help fill this void, the present dissertation examined how the affective states shared among group members influence their collective performance on both decision-making and creativity tasks.

Affective states are generally thought to influence the cognitive performance of individuals and groups via their effects on two different dimensions of cognitive processing style: heuristic vs. systematic processing, and global vs. local attentional focus (e.g., Bramesfeld & Gasper**,** 2008; Clore, Gasper, & Garvin, 2001a; Huntsinger, Isbell, & Clore, 2014; Schwarz, 2012). The conventional assumption underlying most previous research in this area is that positive affect leads to *heuristic processing* and a *global attentional focus*, while negative affect leads to *systematic processing* and a *local attentional focus* (e.g., Schwarz, 2001, 2012; Schwarz & Clore, 2007). Systematic processing, relative to heuristic processing, generally benefits analytic performance, whereas a global attentional focus, relative to a local focus, generally benefits creative performance (Huntsinger & Ray, 2016; Markman, Lindberg, Kray, & Galinsky, 2007; Visser, Van Knippenberg, Van Kleef, & Wisse, 2013).

The distinction between heuristic and systematic processing styles represents a difference in the amount of effortful, elaborated thinking brought to the task at hand (Evans, 2008). Systematic processing is characterized by deep, analytic, logical thinking. It draws on

considerable cognitive resources and demands substantial mental effort (Petty & Cacioppo 1986). In contrast, heuristic processing is characterized by the use of simple, easy-to-apply rules and cognitive shortcuts (e.g., stereotypes, intuition, common sense, and rules of thumb; Evans, 2008). Heuristic processing allows one to make judgments quickly on the basis of salient, easy-to-comprehend cues, as opposed to painstakingly scrutinizing all available decision-relevant information (Chaiken & Ledgerwood, 2012). Thus, compared to systematic processing, heuristic processing involves a comparatively superficial and less effortful thinking style that makes relatively few cognitive demands.

Research on the effect of heuristic vs. systematic processing on group performance has been conducted primarily with complex decision-making tasks (e.g., group decision-making with distributed information; Galinsky & Kray, 2004; Postmes, Spears, & Cihangir, 2001; Scholten, Van Knippenberg, Nijstad, & De Dreu, 2007; Van Ginkel, Tindale, & Van Knippenberg, 2009). Decision-making can be defined as a process of gathering decision-relevant information, evaluating the merits of multiple alternatives, and then selecting the choice alternative that seems most likely to be the best. Because this process can benefit from an in-depth and comprehensive treatment of decision-relevant information, heuristic vs. systematic processing has been the distinction of interest when people perform complex decision-making and analytic problem solving tasks.[1]

Regarding the distinction between a global and local attentional focus, people are able to perceive the same object in different ways. They can "zoom out" and attend to objects as a

[1] I do not draw a clear distinction between "(complex) decision-making" and "(analytical) problem solving," and use these terms interchangeably throughout this paper.

whole (i.e., global aspects of the target), or "zoom in" and attend to its parts (local aspects of the target) (Förster & Dannenberg, 2010). A global vs. local focus thus refers to what aspects of a stimulus become the focus of attention. For instance, when separate targets (e.g., whales and sharks) are presented, a global focus results in more attention being paid to the similarities and relational features between them (e.g., they both have a dorsal fin and swim in the sea), while a local focus results in more attention being paid to their dissimilar parts and contrasting features (e.g., a whale is larger than a shark, and a whale is a mammal while a shark is a fish) (Förster & Dannenberg, 2008; Förster, Liberman, & Kuschel, 2008).

Variations in the scope of perceptual attention are associated with variations in the scope of conceptual attention (Förster, 2012; Förster & Dannenberg, 2008). Specifically, a global perceptual focus leads to spreading activation to conceptually distant concepts in memory, which in turn leads to the activation of broad, abstract, and superordinate ideas (Friedman, Fishbach, Förster, & Werth, 2003). By contrast, a local perceptual focus leads to the activation of concepts that are less abstract and are conceptually more closely-related in memory (Friedman et al., 2003). For example, people who have a local focus are more likely than those who have a global focus to come up with the concept "dog" in response to the concept "cat," two ideas that are conceptually proximal in memory. In contrast, when considering the concepts "dog" and "cat," people who have a global focus are more likely than those who have a local focus to come up with the concept "house," a conceptually more remote idea (Friedman et al., 2003; Mednick, 1962). The activation of conceptually remote ideas often leads to new or unconventional combinations among them, and is positively associated with generating creative products (Mednick, 1962; Ward, 1994, 1995). In support of this view, Friedman et al. (2003) found that

individuals primed with a global attentional focus performed better at creativity tasks than did individuals primed with a local attentional focus. Thus, global vs. local attentional focus has been the processing distinction of interest when people perform creative tasks.

Building on this body of work, all of which was done with individuals, the current dissertation comprises two laboratory experiments that examine how heuristic vs. systematic processing (Study 1) and global vs. local attentional focus (Study 2) are triggered by group members' affective states, and in turn influence the group's collective decision-making (Study 1) and creative performance (Study 2), respectively. The present research is concerned with transitory affective states and cognitive processing styles that change situationally and so potentially can be manipulated. Below, I describe in more detail what heuristic vs. systematic processing and global vs. local attentional focus are, and how these two dimensions are similar to and different from one another. I then discuss their distinct implications for complex decision-making and creativity tasks. This is followed by a brief review of research on the link between affective states and these two dimensions of cognitive processing style. Lastly, I presented two experiments that test my hypotheses that cognitive processing styles (i.e., heuristic vs. systematic processing for Study 1 and global vs. local attentional focus for Study 2) and affective states (i.e., happiness, sadness) interactively predict the decision-making (Study 1) and creative performance (Study 2) of small groups.

Cognitive Processing Styles

Like individuals, groups are often viewed as information processors (De Dreu, Nijstad, & Van Knippernberg, 2008; Hinsz, Tindale, & Vollrath, 1997; Larson & Christensen, 1993). Indeed, many tasks assigned to groups in organizations entail intellectual and cognitive activities

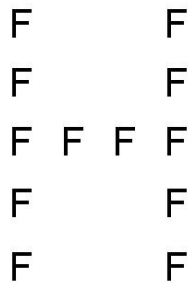
(e.g., attention, learning, processing and sharing information; Hinsz et al., 1997; Salas, Rozell, Mullen, & Driskell, 1999). Thus, it seems reasonable that cognitive processing style, which is the way that group members engage in cognitive activities, might affect group performance on a variety of cognitive tasks, just as it affects individual performance on such tasks (De Dreu et al., 2008; Tindale & Kameda, 2000, Tindale, Meisenhelder, Dykema-Engblade, & Hogg, 2001). To perform such tasks effectively, group members should adopt the cognitive processing style that is best suited for the group's task. The current research focuses on the impact of heuristic vs. systematic processing on group performance on a complex decision-making task (Study 1), as well as the impact of global vs. local attentional focus on group performance on a creativity task (Study 2).

According to dual-process theories (Chaiken, 1980; Evans, 2008; Petty & Cacioppo 1986), people are presumed to employ at any given moment one of two contrasting information processing styles, either a relatively effortful, systematic style or a less effortful, heuristic style. Because systematic processing draws on considerable cognitive resources, and because human beings tend to be cognitive misers who are generally hesitate to exert unnecessary cognitive efforts, heuristic processing is assumed to prevail over systematic processing most of the time (Chen et al., 1999; Fiske & Taylor, 2008). Heuristic processing relies on stereotypes and rules of thumbs stored in memory. As such, when people adopt a heuristic processing style, they do not spend much energy judging information and message validity. As a consequence, they are often more subject to cognitive mistakes and judgment bias (e.g., sexism) than when they adopt a systematic processing style (e.g., Bodenhausen, 1993; Fiske & Neuberg, 1990). For example, research on persuasion has shown that compared to when they engage in systematic processing,

when people engage in heuristic processing, their attitudes are more influenced by the messenger's expertise and attractiveness than by the quality or strength of the message's arguments, as the former is usually easier to comprehend than the latter (Chaiken, 1980; Petty, Wegener, & Fabrigar, 1997). Like expertise and attractiveness, gender can be a heuristic cue that is less cognitively demanding to judge. People often hold the prejudiced belief that male applicants are more competent and appropriate for an engineering position than female applicants, even when male and female applicants have the same qualifications (Foschi, Lai, & Sigerson, 1994). Research has shown that, relative to systematic processing, heuristic processing exacerbates this gender bias in employee selection decision-making, because heuristic processing leads to the activation and application of gender stereotypes (Rijnbout & McKimmie, 2012).

The other cognitive dimensions of interest here, global vs. local focus, refers to whether the scope of perceptual attention is directed broadly or narrowly (Förster & Dannenberg, 2008). To demonstrate the difference between a global focus and a local focus, Navon (1977) showed participants large letters that were constructed using a different small letter (see Figure 1). It was found that people attended to the entire structure of the stimuli ("H" in this example) before paying attention to their local elements ("F" in this example).

Figure 1. Sample item from the Navon-letter-task (Navon, 1977).



People can shift very easily between focusing on the global vs. local aspects of a given situation, but the default tendency is a global focus. In other words, a global focus not only takes precedence over a local focus (as Navon's, 1977, results suggest), it is dominant for most people (called the *global superiority effect*; Fiske & Taylor, 2008; Kimchi, 1992; Navon, 1977). The idea that one's attentional focus can be either globally or locally oriented was advanced many years ago by Gestalt psychologists (Koffka, 1963; Wertheimer, 1967), and has received renewed attention in connection with a variety of social psychological topics such as creativity (Friedman et al., 2003), similarity/dissimilarity judgments (Förster et al., 2008), and affective feelings (Gasper & Clore 2002; Huntsinger, Clore, & Bar-Anan, 2010). Förster and colleagues (Förster, 2012; Förster & Dannenberg, 2008) have developed a unifying framework for understanding global vs. local focus. They identified the antecedent conditions (e.g., affect) that promote either a global or local attentional focus and described how either a global or local focus can carry over to other tasks such as creativity and social judgments (presented below in detail).

Heuristic vs. systematic processing (the extent of effortful thinking) and global vs. local focus (the scope of perceptual attention) are conceptually different dimensions of cognitive processing style. People must attend to information prior to processing it. Therefore, in theory, whether they attend to information broadly or narrowly (i.e., global vs. local focus) is independent of whether the information focused on is thoroughly processed or not (i.e., systematic vs. heuristic processing). But it is difficult to tease apart these two dimensions in both real-world and experimental settings, because heuristic vs. systematic processing is often confounded with global vs. local focus (Bramesfeld & Gasper, 2008; Clore et al., 2001a): heuristic processing most commonly appears to entail a global rather than a local focus, whereas

systematic processing seems more often to involve a local rather than a global focus (Clore et al., 2001a). For example, when processing information in a careful, systematic way, people tend to engage in a narrow and detail-oriented focus. In a similar vein, when people make use of easily accessible stereotypes and rules of thumbs (i.e., heuristic processing), they not only take cognitive shortcuts but also make use of global, superordinate concepts (Bramesfeld & Gasper, 2008; Clore et al., 2001a). In line with this, people seem to use both heuristic processing and a global attentional focus more often than they use systematic processing and a local attentional focus (Evans, 2008, Fiske & Taylor, 2008). This further encourages the entanglement of the heuristic vs. systematic processing and global vs. local focus dimensions.

Although heuristic vs. systematic processing and global vs. local attentional focus are often intertwined, it is not the purpose of the current dissertation to disentangle their effects. Rather, this dissertation focuses separately on the impact of heuristic vs. systematic processing on analytic group decision-making (Study 1), and the impact of global vs. local attentional focus on group creative idea generation (Study 2). That is, heuristic vs. systematic processing has the most obvious implications for analytic problem solving and complex decision-making, while global vs. local focus has more distinct implications for creative activities. Indeed, many researchers have distinguished the cognitive processes that enhance creative performance from those that improve problem solving (e.g., Friedman & Förster, 2005a, 2005b; Huntsinger & Ray, 2016; Markman et al., 2007; Martindale, 1995; Nijstad, De Dreu, Rietzschel, & Baas, 2010; Visser et al., 2013). For example, Nijstad et al. (2010) argued that complex decision-making and analytic problem-solving tasks benefit from effortful, systematic processing that entails intense analyses of existing knowledge and relevant new information and ideas, whereas creativity tasks

benefit from broad attention, and unsystematic, flexible processing that leads to unusual associations by synthesizing conceptually remote ideas stored in memory.

In the sections that follow, I summarize some of the major findings from the affect-cognition literature. Specifically, I discuss how positive and negative affect are related to the two previously discussed pairs of cognitive processing dimensions: heuristic vs. systematic processing style and global vs. local attentional focus.

The Relationship Between Affective State and Cognitive Processing Style

Before discussing the link between affect and cognition, it is important first to clarify the definition of "affective state." The term *affect* (or *affective*) refers to an underlying experience of feeling, emotion, or mood (Hogg, Abrams, & Martin, 2010), and a *state* is a temporary condition of an organism (Clore, Wyer, Dienes, Gasper, Gohm, & Isbell, 2001b). Affect is often used as an umbrella term to refer to emotions and mood states. The distinction between emotions and moods is that emotions generally have a salient focal object (e.g., one is angry at or happy about *something*), while moods do not involve a clear focal object. Because mood states are not object-focused, they are more transitory, and readily dissipate over time relative to emotions (Clore & Schnall, 2005). Affective states are different from affective dispositions (e.g., negative affectivity; Watson & Clark, 1984). The latter refers to chronic tendencies to experience positive or negative affect. Following prior research concerned with affect and group decision-making and creativity (e.g., Bramesfeld & Gasper, 2008; Emich, 2014; Grawitch, Munz, Elliott, & Mathis, 2003a; Grawitch, Munz, & Cramer, 2003b; Kooij-de Bode et al., 2010; Van Knippenberg et al., 2010), in the current dissertation I focus on general positive and negative

affect—operationalized as happy and sad mood states—rather than on specific emotions like joy and anger. I use affective states and mood states interchangeably throughout this paper.

The Affect-as-Information Model

The link between affect and cognition has been the focus of much research in psychology and related fields. One notable theoretical approach that has received much attention in the affect-cognition literature is the *affect-as-information model* (Clore et al., 2001a; Schwarz & Clore, 2007, Schwarz, 2001, 2012). This model postulates that affective feelings provide information about the state of one's environment. Specifically, negative affect (e.g., sadness) is presumed to be a warning that there is a problem (e.g., danger) in the environment, and so activates systematic processing and a local attentional focus, because such detail-oriented styles of cognitive processing can help to identify the nature and likely cause of the problem (Clore et al., 2001b; Schwarz, 2001; Schwarz & Bless, 1991). By contrast, positive affect (e.g., happiness) is assumed to signal a benign environment, one that is safe, satisfactory, and nonproblematic. In benign environments there is less need for a detail-oriented style of cognitive processing, as heuristic processing and a global attentional focus should fare just as well. Thus, positive affect is thought to allow heuristic processing and a global attentional focus, because they are presumably no less effective when the environment is benign.

Based on the affect-as-information model, many empirical studies have examined how positive and negative affect influence judgment, decision-making, and creativity. On complex decision-making tasks, which are relevant to Study 1 of the present discussion, a number of studies have found that, relative to negative affect, positive affect encourages a comparatively shallow processing style by relying on judgmental rules and cognitive heuristics (e.g.,

Bodenhausen, Kramer, & Susser, 1994; Ruder & Bless, 2003). For example, people in happy moods are less likely to consider the quality of a persuasive message that requires cognitive efforts to comprehend than those in neutral and sad moods. Rather, relative to sad people, happy people tend to rely more on a communicator's expertise, which is easily comprehend in a persuasion context (Schwarz, Bless & Bohner, 1991). These findings are also in line with the prior studies on persuasion and heuristic vs. systematic processing (i.e., Chaiken, 1980; Chaiken & Mahesqaran, 1994; Petty, Wegener, & Fabrigar, 1997). Moreover, compared to sad moods, happy moods make people more vulnerable to cognitive mistakes and judgment biases because it increases their reliance on superficial and heuristic reasoning, resulting in less intensive treatment of available information (e.g., Bodenhausen, 1993; Fiske & Neuberg, 1990; Melton, 1995). For instance, on the well-known "Linda" conjunction fallacy problem (Tversky & Kahneman, 1983), people read a short paragraph about an outspoken female student who is described as being particularly interested in discrimination and social justice issues. Then, they are asked to decide which is more likely: (a) Linda is a bank teller and a feminist, or (b) Linda is a bank teller. In fact, the likelihood of two independent events co-occurring, which describes alternative (a), is necessarily lower than the likelihood of either one occurring separately, which describes alternative (b). Nevertheless, when performing this task, people tend to think that the conjunction of the two events is more likely than either one occurring alone, because the paragraph they read makes them over-rely on easily accessible knowledge (i.e., Linda just seems like a feminist), instead of taking account of other possibilities. Research shows that people in a happy mood, who are assumed to engage in heuristic processing, appear to commit the

conjunction fallacy more than do those in a sad mood, who are assumed to engage in systematic processing (Clore et al., 2001a; Gasper, 1999).

On creativity tasks, which are relevant to Study 2 of this dissertation, numerous studies have shown that positive affect appears to enhance creativity through a global attentional focus that activates original thinking and cognitive flexibility, whereas negative affect appears to hinder creativity through a local focus that inhibits those thought processes (e.g., Gasper, 2004; Hirt, Devers, & McCrea, 2008; Isen, Daubman, and Nowicki, 1987; but see also, Gasper, 2003; George & Zhou, 2002). For example, Isen et al. (1987) found that relative to neutral moods or sad moods, happy moods improved creative problem solving as indicated by performance on Duncker's (1945) candle task and Mednick's (1968) Remote Associates Test (called, RAT). Gasper (2004) also examined the relationship between affective states and creative idea generation, and found that happy individuals generated more creative ideas than sad individuals.

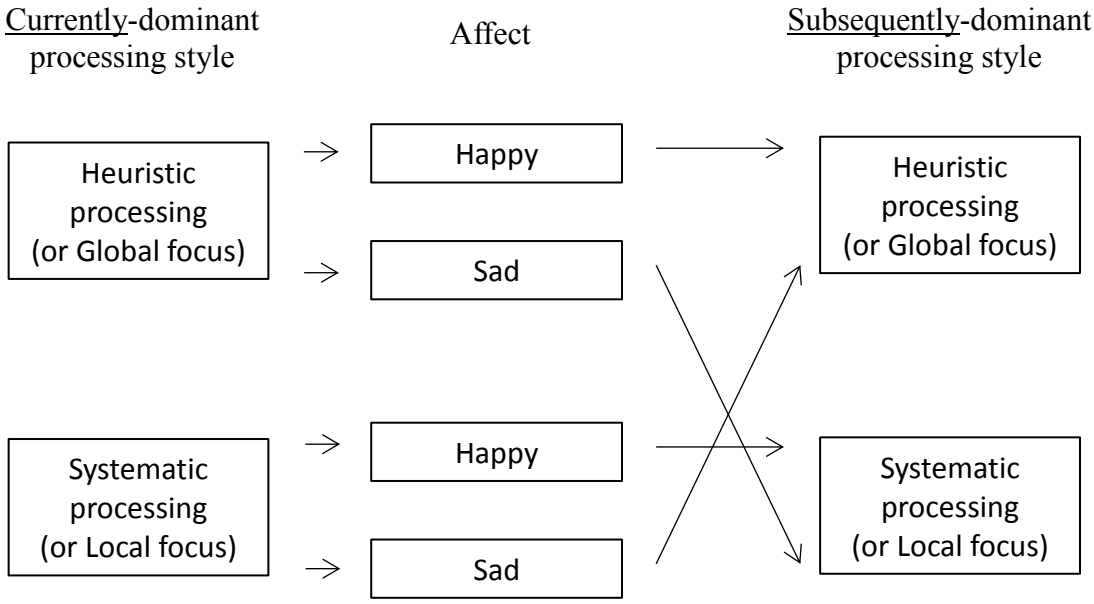
An Affect-as-Cognitive-Feedback Account

As reviewed above, much research has provided supportive evidence for the idea that negative affect leads to better decision-making by activating a systematic processing style, while positive affect improves creativity performance by activating a global focus. In other words, these studies, most of which have been conducted under the affect-as-information model, suggest a fixed (dedicated) link between affective states and cognitive processing styles. They state that positive affect always triggers heuristic processing and a global attentional focus, while negative affect always triggers systematic processing and a local attentional focus.

However, recently it has become apparent that the link between affective states and cognitive processing styles is likely more flexible (malleable) than the affect-as-information

model posits; positive affect may not always trigger heuristic processing and a global attentional focus, and negative affect may not always trigger systematic processing and a local attentional focus. This is the view taken by the *affect-as-cognitive-feedback account* recently proposed by Huntsinger et al. (2014; for other complementary approaches, see Martin, Ward, Achee, & Wyer, 1993; Petty & Briñol, 2015). According to this alternative perspective, positive and negative affect, rather than being linked to any particular information processing style, serve instead as feedback about the appropriateness of whatever processing style is currently at play, and so signal whether that style should be maintained or changed. Specifically, a positive mood (i.e., happiness) serves as a "go" signal, in that it encourages the continued use of the current processing style. In contrast, a negative mood (i.e., sadness) serves as a "stop" signal that discourages the continued use of the current processing style and prompts instead a shift in style. Thus, the processing style that prevails following a mood induction should depend both on the valence of the induced mood (positive or negative) and on the processing style in use just before the mood induction occurred. For instance, as seen in Figure 2, when heuristic processing (or a global attentional focus) is currently in use, a happy mood is predicted to lead to the continued use of heuristic processing (or global attentional focus), while a sad mood is predicted to prompt a switch to systematic processing (or a local attentional focus). Conversely, when systematic processing (or a local attentional focus) is currently in use, a happy mood is predicted to encourage the continued use of systematic processing style (or local attentional focus), whereas a sad mood is predicted to prompt a shift to heuristic processing (or a global attentional focus).

Figure 2. Affect-as-Cognitive-Feedback Model (Huntsinger et al., 2014).



Empirical evidence supporting this account has recently begun to accumulate at the individual level (e.g., Huntsinger, 2012; Huntsinger, Isbell, & Clore, 2012; Huntsinger & Ray, 2016). For example, Huntsinger and Ray (2016, Experiment 4) primed participants to use either a heuristic or systematic processing style, and then subsequently induced a happy or sad mood. They found that when heuristic processing was initially primed, individuals who were later put in a happy mood made more cognitive mistakes and judgment errors than did those later put in a sad mood. But when systematic processing was initially primed, the opposite occurred: happy individuals made fewer cognitive mistakes and judgment errors than did sad individuals. Although the former result is predicted by the more traditional, fixed-link affect-as-information model (Clore et al., 2001a; Gasper. 1999), the latter result is not. By contrast, both results are predicted by the flexible-link affect-as-cognitive-feedback account. Moreover, when a global

attentional focus was initially primed, happy moods, relative to sad moods, increased performance on a creative idea generation task (Experiment 1) as well as on the Remote Associates Test (Mednick, 1962) and insight problem-solving tasks (Schooler, Ohlsson, & Brooks, 1993) (Experiment 2). These results are in line both with the affect-as-cognitive-feedback model and with prior works conducted under the affect-as-information model (e.g., Gasper, 2004; Isen et al., 1987). However, when a local attentional focus was initially primed, this pattern reversed: sad individuals performed better at the creativity tasks than did happy individuals. This pattern is also predicted by the affect-as-cognitive-feedback model, but it is not predicted by the affect-as-information model. In order to reconcile such findings with the affect-as-information model, Huntsinger et al. (2014) argued that the reason why many results do seem to support the earlier, fixed-link model is likely due to the fact that previous studies did not experimentally control participants' cognitive processing style before introducing the mood induction, and because heuristic processing and a global attentional focus are more likely to have been the default styles used by participants at the outset of those experiments. In other words, the link between affect and cognitive processing style only appears to be fixed, because the cognitive processing style employed by participants prior to the mood induction tended to be fixed.

Although the affect-as-cognitive-feedback model has been successful in accounting for a number of intra-individual processes, its ability to predict and explain intra-group processes has not been tested. Thus, a question can be raised as to whether the influence of affective states on group performance on decision-making and creative tasks depend on the cognitive processing style (heuristic vs. systematic processing, and global vs. local attentional focus) in use by

members just before the affective state is induced. To address this question, the present research extends the affect-as-cognitive-feedback model to small interacting groups. I hope that such efforts can offer new insights into an area that has suffered from too little research and too many contradictory findings.

CHAPTER TWO

STUDY 1

Introduction

The main objective of Study 1 is to examine how heuristic vs. systematic processing and positive vs. negative affect interactively influence group performance on a complex decision-making task. An example of a complex decision-making task that demands substantial information processing is the *hidden profile* task (Stasser, 1988), which involves group decision-making with distributed information. In a hidden profile task, the positive and negative attributes of the various choice alternatives are asymmetrically distributed among group members, such that some information is given to all of the members (hereafter referred to *shared information*), while the rest is evenly divided among them (hereafter referred to *unshared information*). The group's goal is to determine which choice alternative is best. In this experimental setting, the best solution is determined by the amount of positive and negative information that is given. Therefore, in order to perform the task well, it is necessary to process the available information carefully.

Importantly, prior to discussion, attributes favoring the objectively best choice alternative in the hidden profile task are usually distributed among members as unshared information, while those favoring the suboptimal alternatives are distributed as shared information. As a result, the superiority of the best alternative is usually not apparent to—is "hidden" from—group members prior to discussion, because each member individually holds more information favoring one of

the suboptimal alternatives. In order to recognize and collectively choose that best alternative, during discussion groups must attend carefully to the unshared information their members hold. If instead group discussion focuses on the exchange of members' choice preferences rather than the exchange of information that they hold (Gigone & Hastie, 1993, 1997), or if they discuss more their shared than their unshared information (Larson et al., 1998), a low quality group decision is likely to result. Further, even when all of the task-relevant information is fully shared, group members still must evaluate that information fairly, regardless of whether it is consistent or inconsistent with their original preferences (for a detailed review, see Broadbeck, Kerschreiter, Mojzisch, & Schulz-Hardt, 2007). If instead they evaluate preference-consistent information as being more important and credible than preference-inconsistent information (Brodbeck et al., 2007; Greitemeyer & Schulz-Hardt, 2003), then again a low quality group decision is likely to result.

Using the hidden profile paradigm, a number of studies have tested the prediction that group performance on analytic problem solving and decision-making tasks benefits from systematic and elaborated thinking (e.g., Scholten et al., 2007; Van Ginkel et al., 2009; see for a comprehensive review, Schippers, Edmondson, & West, 2014). For example, Scholten et al. (2007) had groups perform a decision-making task in which their members each initially held a unique subset of the task-relevant information. Prior to starting this task, half of the groups were exposed to a process accountability manipulation intended to boost their systematic processing of task-relevant information relative to groups in a control condition. Specifically, groups in the process accountability condition were told that at the end of the experimental session they would be asked to explain their decision-making process, whereas groups in the control condition did

not expect to have to explain their decision-making process. According to prior research (e.g., De Dreu et al., 2008), process accountability encourages group members to engage in deep and thorough information processing. It was found that groups in the process accountability condition reported being more motivated to process information systematically, and in fact exchanged and discussed more of their critical, uniquely held task information, than did groups in the control condition. As a result, groups in the process accountability condition were more likely to choose the best choice alternative than were groups in the control condition.

More relevant to Study 1 of this dissertation, Yoon and Larson (2018) primed group member with either a heuristic or systematic processing style and examined its effect on their decision accuracy in a hidden profile task. In that study, members first made a preliminary choice based on an initial, incomplete set of information that was constructed to encourage them to prefer one of the sub-optimal choice alternatives. Then, they performed an allegedly unrelated priming task that was designed to instantiate either a heuristic or systematic processing style (Huntsinger & Ray, 2016). After priming the cognitive processing style, members received the full set of decision-relevant information (i.e., all of the information they has seen before, plus additional, unshared information), which, taken as a whole, suggested that the initially-preferred alternative was actually not the best. So, if they processed all of the decision-relevant information in a thorough, systematic way, they should have change their initial, incorrect choice preference. Consistent with this prediction, Yoon and Larson (2018) found that participants primed to engage in a systematic processing style were more likely to correctly solve the hidden profile problem than those primed to engage in a heuristic processing style. Along with the findings reported by Scholten et al. (2007), these results support the baseline assumption that,

other things being equal, a systematic processing style results in better decision-making in a hidden profile task than does a heuristic processing style.

Affective States within Groups: Group Decision-Making

Affective states and emotions are contagious (Hatfield, Cacioppo, & Rapson, 1993; Pugh, 2001). They are often transmitted between members in a group without conscious awareness (Neumann & Strack, 2000; Sy, Côté, & Saavedra, 2005; Visser et al., 2013). Although a few studies have shown that the affective states shared among group members can influence various aspects of group functioning (e.g., George, 2016; Barsade & Knight, 2015), relatively little research attention has been given to these effects compared to the effects observed at the individual level of analysis. Moreover, to my knowledge, no research has examined the flexible link between affective states and cognitive processing styles (i.e., the affect-as-cognitive-feedback model; Huntsinger et al., 2014) in small interacting groups. Rather, most research investigating affect in groups appears to have been conducted under the assumption of a fixed link between affect and cognitive processing style (i.e., the affect-as-information model; Schwarz, 2012). Nevertheless, some of the findings from those studies are difficult to reconcile with the affect-as-information model, as described below.

Given that systematic processing leads to better decisions than heuristic processing (Scholten et al., 2007; Yoon & Larson, 2018), the implication of the fixed-link, affect-as-information model for group decision-making seems straightforward. When performing complex decision-making tasks, groups in a negative mood should be more apt to engage in systematic information processing than those in a positive mood. Consequently, groups in a negative mood should also tend to make better decisions than those in a positive mood.

However, prior research on the relationship between member affect and group decision-making effectiveness has produced contradictory results. On the supportive side, Kooij-de Bode et al. (2010) found that groups made higher quality decisions when their members were high rather than low in dispositional negative affectivity (i.e., the predisposition to experience negative affect; Watson & Clark, 1984). Likewise, Van Knippenberg et al. (2010) found that groups produced higher quality decisions after being exposed to a negative rather than positive mood manipulation, though this occurred only for groups whose members were low in dispositional negative affectivity; those high in dispositional negative affectivity tended to produce higher quality decisions regardless of which mood manipulation condition they were in. On the other hand, in two studies by Bramesfeld and Gasper (2008) it was found that groups made better decisions after being exposed to a positive rather than negative mood manipulation. And Emich (2014) found that groups with one member in a positive mood made better decisions than did groups with either one member in a negative mood or all members in a neutral mood. These latter results are perplexing because they seem to imply that the less analytic, heuristic information processing style presumed by the fixed-link, affect-as-information model to be prompted by positive affect is more effective when making complex group decisions than is the effortful, detail-oriented, systematic processing style presumed to be prompted by negative affect. The affect-as-information model appears incapable of explaining these inconsistent results. Such mixed findings suggest that the impact of affective states on group decision-making effectiveness may be more complicated than the affect-as-information model presumes.

It thus seems reasonable to question the notion that positive affect always leads to heuristic processing and a global attentional focus, while negative affect always promotes

systematic processing and a local focus. Instead, a more flexible linkage may exist between affect and cognition, such as is proposed by the affect-as-cognitive-feedback model (Huntsinger et al., 2014). A flexible-link approach offers new insights that may help to make sense of the previous contradictory results found in the group decision-making literature (i.e., Bramesfeld & Gasper, 2008, Van Knippenberg et al., 2010). Indeed, there are some hints that the link between affect and cognition may be more flexible than once thought. For example, Bramesfeld and Gasper (2008) found that happy groups focused more on critical decision-relevant information and relied less on their pre-discussion choice preferences than did sad groups, suggesting that their happy groups were in fact using a more systematic processing style than were their sad groups. Similarly, Emich (2014) found that groups with one member in a positive mood both requested and exchanged more information with one another than did groups with one member in a negative mood, again suggesting that positive moods can sometimes prompt an effortful, systematic processing style. Thus, both studies seem to imply that better group decisions likely did result from effortful, systematic information processing, and so call into question the assumption of a fixed relationship between affect and cognitive style.

Drawing on the affect-as-cognitive-feedback account, Yoon, Larson, and Huntsinger (2018) recently obtained preliminary evidence for the idea that the impact of a mood manipulation on group decision-making depends on whether a heuristic or systematic processing style was at play just prior to the mood induction. Similar to previous research investigating the impact of mood on group decision-making, participants in the study performed a hidden profile task in 3-person groups (adapted from Larson, Sargis, Elstein, & Schwartz, 2002). Participants first made a preliminary decision based on an incomplete set of information they were initially

given, some of which they shared in common with others, and some that they held uniquely. After making that preliminary decision, their cognitive processing style (heuristic vs. systematic) and then their mood states (happy vs. sad) were manipulated (in that order). Then, the experimenter provided each participant a copy of the information that the other two members of his/her group held, in addition to a fresh copy of the information that he/she already had. Doing so gave group members access to all of the task-relevant information. Lastly, participants individually made a final choice based on all of the information. Because their initial information packet was not complete, and because the full set of task-relevant information was asymmetrically distributed so as to create a hidden profile, the best choice alternative was not readily apparent to members when they made their preliminary decisions. As a consequence, most participants initially chose a sub-optimal alternative. In order to select the best alternative as their final choice, participants had to engage in systematic processing of the information subsequently received. At the very end of the session, participants performed an unannounced recall test to measure how much attention they had paid to the information (Mojzisch, & Schultz-Hardt, 2010). The surprise recall test listed all of the decision-relevant information that they were previously given, but omitted the names of the choice alternatives to which the information belonged. Participants were asked to identify the alternative to which each item of information referred.

The results were consistent with the affect-as-cognitive-feedback predictions. When heuristic processing was instantiated, members subsequently put in a sad mood tended to pay more attention to the unshared information—as evidence by their being better able to recall the choice alternatives to which that information belonged—and made more accurate decisions than

happy members did. This result is consistent with both the affect-as-information model and the affect-as-cognitive-feedback model. However, when systematic processing was instantiated, the reverse pattern emerged: members subsequently put in a happy mood paid more attention to unshared information and made more accurate decisions than sad members did. This result too is in line with the affect-as-cognitive-feedback model, but not with the affect-as-information model.

The findings from Yoon et al. (2018) help to make sense of the seemingly contradictory pattern of results found in previous research on the relationship between affect and group decision-making effectiveness. Their results suggest that the link between affect and cognition may be more flexible than previously thought, including in contexts that closely parallel group decision-making. However, an obvious limitation of the study by Yoon et al. (2018) is that group members never actually interacted with one another. Although three participants attended each session and were asked to consider themselves a group during the experiment, they did not actually discuss the task materials with one another. Instead, an information exchange between members was simulated simply by providing every member a copy of what every other member had allegedly read. Further, after receiving that information, members made their final decisions individually, not as a group. Therefore, the Yoon et al. (2018) findings should be replicated in freely interacting groups. An interactive group setting in which members meet face-to-face to discuss their information and make a collective decision may include other influential variables that were not considered in the preliminary study. Replicating with truly interactive groups would provide further support for the idea that the affect-as-cognitive-feedback model can integrate the previous mixed findings. Study 1 aimed to provide that replication.

Consistent with previous research (i.e., Bramesfeld & Gasper, 2008; Emich, 2014; Scholten et al., 2007; Van Knippenberg et al., 2010), Study 1 was a laboratory experiment in which undergraduate students were assembled in three-person groups and performed a hidden-profiles task. At the outset of the experiment, the task-relevant information about two choice alternatives was asymmetrically distributed among group members, such that some information was given to all of the members, whereas the rest was evenly divided among them. Heuristic vs. systematic processing and happy vs. sad moods were manipulated independently just before the members began their discussion, but after they had privately read their individual information and had reported which choice alternative they personally thought was best. Specifically, after making a preliminary judgment about which choice alternative seemed best based on their own individual subset of the information, members performed individually two unrelated tasks. To mitigate potential demand effects, these tasks were introduced as part of another researcher's pilot study, but in reality they were designed to manipulate heuristic vs. systematic processing and happy vs. sad moods, respectively (described in detail below). Upon completion of the purported pilot study, participants started discussion. Their goal was to decide as a group which alternative as best in light of all available information. In Study 1, I tested the following three hypotheses:

Hypothesis 1: When group members are initially primed to engage in heuristic processing, subsequently inducing a sad mood will produce more accurate decisions than will inducing a happy mood. But when group members are initially primed to engage in systematic processing, subsequently inducing a sad mood will produce less accurate decisions than will inducing a happy mood.

Hypothesis 2: When group members are initially primed to engage in heuristic processing, subsequently inducing a sad mood will lead them to process unshared information about the various choice alternatives more deeply than will subsequently inducing a happy mood. But when they are initially primed to engage in systematic processing, subsequently inducing a sad mood will lead them to process unshared information less deeply than will subsequently inducing a happy mood.

Hypothesis 3: The interaction anticipated by Hypothesis 1 will be mediated by the degree to which groups focus on their unshared information during discussion. Specifically, a heuristic processing prime followed by a sad mood induction, and a systematic processing prime followed by a happy mood induction, will both lead to greater relative focus during discussion on unshared information than will either a heuristic processing priming followed by a happy mood induction or a systematic processing priming followed by a sad mood induction, and greater relative focus during discussion on unshared information will in turn lead to more accurate decisions.

Study 1 Method

Participants and Design

A prospective power analysis was conducted to estimate the required sample size for Study 1. I used the interaction effect size observed for individuals in the preliminary study ($\eta_p^2 = .104$; Yoon et al., 2018) to estimate the expected interaction effect size for groups. That analysis suggested that for power = .80 and $\alpha = .05$, a total sample size of 70 groups should be sufficient.

Thus, 216 students who were enrolled in introductory psychology courses at Loyola University Chicago were recruited for Study 1 and took part in the study for partial fulfillment of a course requirement. Three participants were scheduled for each of 72 experimental sessions, and each session was randomly assigned to one of four conditions in a 2 (processing style: heuristic vs. systematic) x 2 (mood state: happy vs. sad) complete factorial design. I excluded from my analyses two groups where one or more members chose the correct alternative as their initial preference. It is important to note that in Study 1 I was interested in the extent to which group members could overcome an initial incorrect choice preference by processing decision-relevant information in a thorough, systematic way. This is the central reason for having employed a hidden profile decision-making task. To that end, an initial packet of information, read privately by each member in the first phase of the experiment was constructed so as to encourage a preference for the sub-optimal choice alternative. This was done because participants who might otherwise favor the best choice alternative at the outset can shed no light on the performance implications of the cognitive processing style and affect manipulations (cf. Greitemeyer & Schulz-Hardt, 2003; Faulmüller, Kerschreiter, Mojzisch, & Schulz-Hardt, 2010; Mojzisch, & Schultz-Hardt, 2010). However, the results are not meaningfully changed by including these groups.

Decision Task

I adapted for this research the drug-choice task previously used by Larson et al. (2002). The materials consisted of written descriptions of two hypothetical cholesterol-lowering drugs (referred to as Chol-BLUE and Chol-GREEN). Each drug was described by eleven unique attributes, with each attribute being unambiguously either positive or negative. Specifically,

Chol-BLUE had 7 positive and 4 negative attributes, while Chol-GREEN had 5 positive and 6 negative attributes (22 attributes in total). Thus, when considering the full set of information, Chol-BLUE should have been seen as objectively best. Participants were to decide as a group which drug was more likely to become commercially successful.

Three separate reading packets were constructed from this information, with 10 attributes listed in all three packets (shared information) and 12 attributes evenly divided among them (unshared information). Each packet described 3 positive and 4 negative attributes for Chol-BLUE, and 5 positive and 2 negative attributes for Chol-GREEN. Thus, each packet was constructed so as to make Chol-GREEN seem best, and to obscure the overall superiority of Chol-BLUE. A complete description of the information distribution is provided in Table 1.

Table 1. Drug-Choice Task Information Distribution (Study 1).

	Alternative	
Information type and values	Chol-BLUE	Chol-GREEN
Shared information		
Positive	1	5
Negative	4	0
Unshared information		
Positive	6	0
Negative	0	6
Information available to each member		
Positive	3	5
Negative	4	2
Full information available to the group		
Positive	7	5
Negative	4	6

Procedure

Upon arrival, the three participants in each session were initially seated in separate cubicles and were informed that during the session they would participate in two ostensibly separate studies, a two-part "group decision-making study" and a pilot study for another researcher. The procedure unfolded in three phases.

Phase 1: Initial decision preference. The three participants were told that they would perform a two-part group decision-making task in which they were to decide which of two cholesterol-lowering drugs was more likely to become commercially successful. In this first part of the task, they each received one of three different information packets, and were told that some of the information in that packet was also in the packets given to the other two members of their group, but that some of it was in their packet alone. They were then given 15 minutes to study the packet. While doing so, they were allowed to take notes, which they could then refer to later during their group discussion. At the end of 15 minutes, participants privately indicated on a drug preference sheet which drug they personally thought was more likely to become commercially successful, after which all materials were collected by the experimenter.

Phase 2: Processing style and affect manipulations. Next, participants learned that there would be a brief delay as the experimenter prepared the second part of the group decision-making task. While waiting, they performed individually a word completion task and a "Life Events Inventory." These were used to manipulate their cognitive processing style and mood, respectively. These two tasks were alleged to be part of a pilot study for another researcher.

The cognitive processing style manipulation occurred first, and had two elements. The first was the word completion task. It required participants to identify the single letter missing

from each of 15 words presented on a computer screen (e.g., mis_ing). In the heuristic processing condition, 10 of the words related to heuristic thinking or action (e.g., intuitive, quick), while in the systematic processing condition, 10 of the words related to systematic thinking or action (e.g., analytical, investigative). To help conceal the purpose of this task, 5 neutral words (i.e., colossal, small) were also included in both conditions. This task has been used successfully in prior research as an effective method of priming either heuristic or systematic cognitive processing (e.g., Huntsinger, 2011; Huntsinger & Ray, 2016, Yoon & Larson, 2018).

The second element of the cognitive processing style manipulation consisted of informing participants in the systematic processing condition that they would be asked during an interview at the end of the study to explain the decision-making process they used during the main experiment. This was mentioned just prior to performing the word completion task. Participants in the heuristic processing condition did not receive this instruction. The purpose of this instruction was to bolster the systematic processing manipulation by making participants in that condition feel more accountable for the decisions they made. Previous research has shown that when groups expect to have to explain their decision-making process, they are more likely to engage in an effortful, analytic, information-driven style of decision-making than when they do not expect to have to explain the process (e.g., De Dreu et al., 2008; Scholten et al. 2007).

Next, after learning about the end-of-experiment interview (in the systematic processing condition) and performing the word completion task, participant next completed a "Life Events Inventory" designed to induce either a happy or sad mood. Participants were asked to write as vividly and in as much detail as possible about an event that made them feel either "really

happy" or "really sad." They did this for 8 minutes while listening via earphones to music that previously has been shown to induce either happy (Mozart's "Eine Kleine Nacht Musik") or sad moods (Mahler's "Adagietto"; Huntsinger, Clore, & Bar-Anan, 2010). To confirm the efficacy of this mood induction task, we conducted an independent pretest sample of n = 56 participants. They performed this task under similar conditions, but then immediately rated their mood on six 7-point scales (happy, sad, good, bad, positive, and negative; $\alpha = .89$). As expected, they reported significantly more positive affect in the happy mood condition than in the sad mood condition; $t\ (54) = 7.60$, $p < .001$, $d = 2.03$. No interaction among participants was permitted during either Phase 1 or Phase 2.

Phase 3: Group discussion and decision. The three participants were then moved from their separate cubicles to a common large table where they were to complete the second part of the group decision-making task. Their individual drug preference sheets and hand-written notes from Phase 1 were returned to them. The purpose of returning the individual drug preference sheets was to help ensure that at the beginning of discussion all members were aware of the decision preference of their groupmates (cf. Mojzisch, & Schultz-Hardt, 2010), and indeed, groups usually did begin their discussion by sharing their pre-discussion preferences. Groups were then given 10 minutes to discuss the two drugs and to decide collectively which drug was more likely to become commercially successful.

Finally, after making their decision, all materials were collected and participants individually performed an unannounced recall test to measure how much attention they had paid to the drug information (cf. Mojzisch, & Schultz-Hardt, 2010). The recall test listed all 22 drug attributes, but omitted the names of the drugs to which they belonged. Participants were asked to

identify the drug to which each item referred. After completing the recall test, participants were debriefed, thanked, and dismissed.

Dependent Variables

Group Decision Accuracy. The main dependent variable was whether groups chose the objectively best alternative. Group decision accuracy was coded as either correct (1= Chol-BLUE) or incorrect (0 = Chol-GREEN).

Recall Performance. I also analyzed group members' performance on the surprise recall test in order to assess their depth of information processing, under the assumption that the more deeply and systematically they processed the drug information, the more likely they were to have paid attention to that information and be able to recall it later (cf. Mojzisch & Schultz-Hardt, 2010). Specifically, I computed the proportion of shared and (separately) unshared information recalled by each member, then averaged across members to yield two average recall scores for each group.

Discussion Focus. Lastly, in order to examine how discussion of the drug information influenced decision accuracy, I video recorded each group during Phase 3 of the experiment. These recordings were coded by two trained research assistants who were blind to both the research hypotheses and the experimental conditions. They carefully viewed each recording several times, and identified each mention of a drug attribute by matching each member's statements to a master list of attributes. To be marked as mentioned, a specific, clear statement of the attribute had to be made at least once. Other aspects of the discussion were not coded. According to a simulation study by Stasser (1992), a group's decision accuracy may depend more on their relative focus during discussion on unshared information than on simply the

absolute amount of unshared information they mention. So, from the coded discussions I computed a *discussion focus score* that captured each group's relative focus during discussion on their unshared information. That score was defined as the number of items of unshared information that were mentioned at least once (i.e., repetitions were not counted) divided by the total number of items of the drug information of ether type (shared or unshared) that were mentioned (cf. Stasser & Stewart, 1992; Stewart & Stasser, 1998; Toma & Butera, 2009). One group was not recorded due to a technical problem with the recording equipment, and four others mentioned none of the drug attributes at all during their discussion. Consequently, a discussion focus score could not be computed for these five groups. This explains the lower-than-expected degrees of freedom in the discussion focus analyses.

The coders each independently scored approximately two-thirds of the group recordings, with one-third of them (24) scored by both coders. Because our discussion focus measure is based on counts of shared and unshared information mentioned, we correlated the counts obtained from the twice-coded recordings to assess inter-coder reliability (*intra-class correlation*; Shrout & Fleiss, 1979). The analysis revealed that inter-coder reliabilities were excellent; *ICC* (3, 2) = .987 for the number of items of shared information mentioned, and *ICC* (3, 2) = .998 for the number of items of unshared information mentioned.

Study 1 Results

Descriptive statistics and correlations among the variables are shown in Table 2.

Table 2. Means, Standard Deviations, and Correlations (Study 1). Independent variables were coded as 1 = systematic processing and happy mood, -1 = heuristic processing and sad mood. Note, * = $p < .05$, ** = $p < .01$.

Variables	*M*	*SD*	1	2	3	4	5	6
1. Cognitive Processing Style	.03	1.00	-					
2. Affective States	.00	1.00	.00	-				
3. Group Decision Accuracy	.25	.43	-.05	.03	-			
4. Proportion of shared information recalled	.93	.05	-.18	-.14	-.33**	-		
5. Proportion of unshared information recalled	.67	.17	-.05	.03	.46**	-.15	-	
6. Proportion of discussion focused on unshared information	.40	.18	.02	.00	.30*	-.12	.66**	-

Table 3. Decision Accuracy, Recall Performance, and Discussion Focus (Study 1). Note, * for this measure, the *n*s are, left-to-right, 16, 16, 16, and 17.

	Heuristic processing		Systematic processing	
	Happy mood (*n* = 17)	Sad mood (*n* = 17)	Happy mood (*n* = 18)	Sad mood (*n* = 18)
Dependent variables	*M* (*SD*)	*M (SD*)	*M* (*SD*)	*M* (*SD*)
Group decision accuracy	.12 (.33)	.41 (.51)	.39 (.50)	.06 (.24)
Proportion of shared information recalled	.94 (.05)	.94 (.05)	.91 (.06)	.94 (.05)
Proportion of unshared information recalled	.64 (.18)	.73 (.16)	.72 (.13)	.61 (.17)
Proportion of discussion focused on unshared information *	.33 (.24)	.46 (.11)	.47 (.09)	.34 (.21)

Group Decision Accuracy. Hypothesis 1 predicted that when group members were initially primed to engage in heuristic processing, subsequently inducing a sad mood would produce more accurate decisions than would inducing a happy mood, but when members were

initially primed to engage in systematic processing, subsequently inducing a sad mood would produce less accurate decisions than would inducing a happy mood.

To test this prediction, a binary logistic regression was performed with cognitive processing style (1 = systematic, -1 = heuristic), affect (1 = happy, -1 = sad), and their interaction as predictors, and decision accuracy as the dependent variable. That analysis revealed a significant interaction effect; $B = 1.01$ ($SE = .36$), $Wald\ \chi^2\ (1, N = 70) = 7.76$, $p = .005$. In support of Hypothesis 1, and as can be seen in Table 3, when heuristic processing was initially primed, groups were more likely to choose the correct alternative in the sad mood condition ($M = .41$) than in the happy mood condition ($M = .12$); $\chi^2\ (1, N = 34) = 4.25$, $p = .039$. By contrast, when systematic processing was initially primed, groups were less likely to choose correctly in the sad mood condition ($M = .06$) than in the happy mood condition ($M = .39$); $\chi^2\ (1, N = 36) = 6.89$, $p = .009$. Neither the cognitive processing style main effect nor the affect main effect were significant; $ps > .53$ for both.

Recall Performance. Hypothesis 2 predicted that when group members were initially primed to engage in heuristic processing, subsequently inducing a sad mood would lead them to process the unshared drug information more deeply than would inducing a happy mood, but when members were initially primed to engage in systematic processing, subsequently inducing a sad mood would lead them to process the unshared drug information less deeply than would inducing a happy mood. This hypothesis was tested using participants' recall performance as a proxy for depth of processing. Because participants received all of the shared information before being exposed to the manipulation of processing style and affect, but receive two-thirds of the

unshared information afterwards, I expected a between-condition recall difference for the latter but not for the former.

Consistent with this expectation, a 2 (processing style) by 2 (affect) analysis of variance (ANOVA) revealed a significant interaction between initial processing style and affective state on the proportion of correctly recalled unshared information, F (1, 66) = 6.79, p = .011, η_p^2 = .093; all other $F < 1$. As can be seen in Table 3, when systematic processing was initially primed, groups correctly recalled more of the unshared information in the happy mood condition (M = .72, SD = .13) than in the sad mood condition (M = .61, SD = .17); F (1, 66) = 4.11, p = .047. On the other hand, when heuristic processing was initially primed, groups tended to correctly recall more unshared information in the sad mood condition (M = .73, SD = .16) than in the happy mood condition (M = .64, SD = .18). However, this latter comparison did not meet a conventional level of statistical significance, F (1, 66) = 2.77, p = .101. Thus, while a significant interaction was observed, it seemed due more to the effect of the mood manipulation when systematic processing was initially primed than to its effect when heuristic processing was initially primed. Thus, Hypothesis 2 was only partially supported in this experiment.

As expected, when the same analysis was performed with the proportion of correctly recalled shared information as the dependent variable, the interaction effect was not significant, F (1, 66) = .73, p = .396, η_p^2 = .011. Nor was there a significant main effect of either processing style or affect, F (1, 66) = 2.16, p = .146, η_p^2 = .032 and F (1, 66) = 1.34, p = .251, η_p^2 = .020, respectively.

Discussion Focus. Hypothesis 3 predicted that the interaction between initial processing style and subsequently manipulated mood on group decision accuracy would be mediated by the

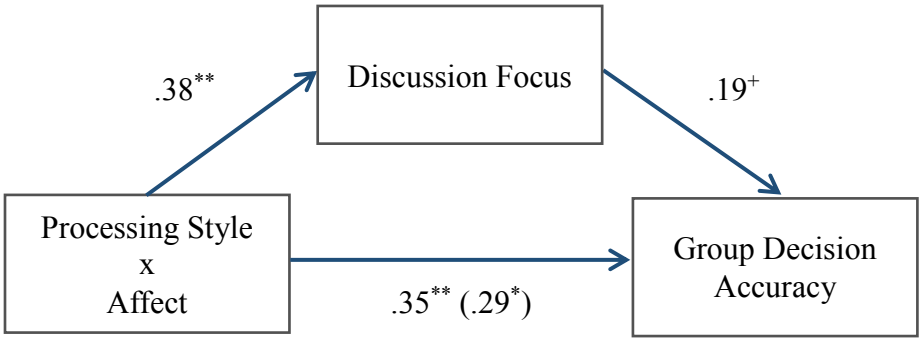
groups' relative focus during discussion on the unshared drug information. As part of this, it was expected that the heuristic processing prime would lead to greater focus on the unshared information when it was followed by the sad rather than the happy mood induction, and that the systematic processing prime would lead to greater focus on the unshared information when it was followed by the happy rather than the sad mood induction.

In support of this prediction, a 2-way ANOVA using the discussion focus measure as the dependent variable revealed a significant interaction effect, F (1, 61) = 10.02, p = .002, η_p^2 = .141. Consistent with Hypothesis 3, and as can be seen in Table 3, when heuristic processing was initially primed, during their subsequent discussion groups focused more on their unshared information in the sad mood condition (M = .46, SD =.11) than in the happy mood condition (M = .33, SD = .24); F (1, 61) = 5.01, p = .029. By contrast, when systematic processing was initially primed, groups focused more on their unshared information in the happy mood condition (M = .47, SD = .09) than in the sad mood condition (M = .34, SD = .21); F (1, 61) = 4.99, p = .029. Neither main effect was significant, both ps > .82.

Finally, to test the mediation effect predicted by Hypothesis 3, I tested the significance of indirect effect using the percentile bootstrapping method with 5,000 bootstrapped samples (Hayes & Preacher, 2014). The interaction between cognitive processing style and affect was the predictor in this analysis, discussion focus was the putative mediator, and decision accuracy was the dependent variable (see Figure 3). We found both a statistically significant indirect effect, B = .37, 95% CI [.05, 1.16], and a significant direct effect, B = .80, p = .027, 95% CI [.09, 1.51]. Note that the path from the mediator to the dependent variable in this model, controlling for the independent variable, was nonsignificant. However, Hayes (2018, p. 116) argues that the

indirect effect can be significant, thus indicating mediation, even if one or more of the individual coefficients in the indirect path are not significant. Thus, in line with Hypothesis 3, the interactive impact of processing style and affect on the groups' collective decision accuracy appears to have been mediated at least in part by the degree to which they focused on their unshared information during discussion.

Figure 3. Mediation model. Note. A value in parentheses reflects the inclusion of the mediator in the equation. $^{**}p < .01$, $^{*}p < .05$, $^{+}p < .14$.



Study 1 Discussion

Drawing on the affect-as-cognitive-feedback account proposed by Huntsinger et al. (2014), I predicted that the influence of positive and negative affect on group decision-making performance would depend on whether group members were engaged in heuristic or systematic information processing just before the affective state was aroused. Analyses revealed support for this prediction. In line with Hypotheses 1 and 2, when systematic processing was initially primed, subsequently inducing positive affect prompted greater attention to critical decision-relevant information, and ultimately more accurate decision making, than did inducing negative affect, while the reverse occurred when heuristic processing was initially primed. Moreover, consistent with Hypothesis 3, the degree to which groups focused on their unshared information

during discussion mediated the interaction between processing style and affect on their collective decision accuracy. These findings suggest that (a) performance on hidden profile decision-making tasks benefits from systematic information processing, (b) negative affect tends to prompt a shift in information processing style whereas positive affect does not, and so (c) whether positive or negative affect improves or impairs group decision-making quality in a given situation depends critically on the cognitive processing style that members are engaged in at the moment that affect is first aroused. In other words, member affect appears to have a flexible rather than fixed influence on information processing and decision-making quality in groups.

The findings of Study 1 help to make sense of the seemingly contradictory pattern of results found in previous research on the relationship between affect and group decision-making effectiveness. As noted earlier, most past research in this area seems to have proceeded under the assumption that positive affect generally encourages heuristic processing, while negative affect encourages systematic processing, with the implication that groups experiencing negative affect should, on average, produce higher quality decisions than those experiencing positive affect. However, while some studies confirm this pattern (e.g., Kooij-de Bode, et al., 2010; Van Knippenberg, et al., 2010), others contradict it (e.g., Bramesfeld & Gasper, 2008; Emich, 2014). The results of Study 1 suggest that the "contradictory" nature of this literature may actually be an illusion created by having assumed a fixed link between affect and information processing style. If we instead assume—as the affect-as-cognitive-feedback account suggests—that there is no dedicated link between the two, then either high or low quality decisions might be expected when members are put into either a positive or negative mood, depending on the information processing style in use when the affective state is aroused. Researchers who wish to examine the

impact of member affect on the intellective performance of groups should be mindful of this more complex, flexible relationship. Knowing whether group members are engaging in heuristic or systematic processing at the moment an affect manipulation is introduced appears to be critical for predicting the impact of such manipulations (cf. Clore & Huntsinger, 2007).

In Study 1, I demonstrated that the affect-as-cognitive-feedback model can be usefully applied at the group-level of analysis. While prior research with this model has focused exclusively on intra-individual processes (e.g., Huntsinger et al., 2014; Huntsinger & Ray, 2016), Study 1 provided the first evidence for the idea that it can help as well in understanding the role of affect in intra-group processes.

CHAPTER THREE

STUDY 2

Introduction

Whereas Study 1 focused on testing the interaction of affect and heuristic vs. systematic cognitive processing on decision-making in interacting groups, Study 2 tested the interaction of affect and another dimension of cognitive processing style, global vs. local attentional focus, and did so in a different domain of group performance: creativity. As described earlier, global vs. local attentional focus refers to the variation in the scope of attention, and has been the processing distinction of interest when people perform creative tasks. A typical task that involves creativity is idea generation. Creativity is commonly conceptualized as the generation of ideas, products, or solutions that are both novel (original) and useful (appropriate or feasible) (Amabile, 1996; Paulus & Nijstad, 2019). Since a creative product or solution often comes out of a creative idea, idea generation is regarded as a first step toward organizational innovation and social change (Paulus & Dzindolet, 2008; Paulus, Dzindolet, & Kohn, 2012). A novel (original) idea is often defined as one that is new, unusual or rare (e.g., Diehl & Stroebe, 1987; Harvey, 2013; Paulus, 2000). For example, if someone thinks of an idea that other people have already mentioned or that is habitually mentioned, that idea is not considered original. In this regard, the ability to go beyond pre-existing, familiar ideas and mental sets is indispensable in creative idea generation (Choi & Yoon, 2018; Smith, 2003). When generating ideas on a topic, most people usually begin by searching for relevant concepts and knowledge in their long term memory

(Nijstad & Strobe, 2006; Ward, 1994). Individual's long-term memory can be viewed as an associative semantic network representing inter-connected nodes, where each node represents a concept (e.g., Anderson, 2013; Brown, Tumeo, Larey, & Paulus, 1998; Collins & Loftus, 1975). Depending on the level of abstraction, concepts represented as inter-connected nodes can be referred to ideas or categories. For example, if one treats "chair" and "desk" as ideas, they can be conceptualized as being within the same category (e.g., furniture) because those ideas are conceptually close. Similarly, if one considers "chair" as a category, then "three-leg chairs" and "four-leg chairs" would be classified as ideas within that category.

In the representation of memory as an associative semantic network, it is assumed that closely connected ideas (e.g., desk, table, & chair) within the same category (e.g., furniture) are more likely to activate one another than less closely connected ideas (e.g., desk, whale, & airplane) from different categories (e.g., furniture, animal, and transportation, respectively). For instance, if the idea "desk" is activated in memory, "table" or "chair" are more likely to follow it than "whale" or "airplane." The latter two ideas, derived from different categories, would be regarded as an infrequent or unusual compared to the former two, given that the initial idea is "desk." Thus, original ideas are often achieved through spreading activation to conceptually remote (less closely connected) categories in memory (e.g., Amabile, 1983; Mednick, 1962; Osborn, 1963; Simonton, 1999). In general, it is expected that the more unusual the categories considered, the more likely it is that original combinations of ideas will come to mind (e.g., Nijstad et al., 2010). Indeed, ideas derived from categories that are not habitually considered together are usually evaluated as being more original (e.g., Kohn & Smith, 2011).

To summarize, creative idea generation benefits from being able to move readily between conceptually distant categories (Choi & Yoon, 2018; Guilford, 1967; Mednick, 1962; Simonton, 1999). A global attentional focus is presumed to facilitate such movement, while a local attentional focus inhibits it (Förster & Dannenberg, 2010). A global attentional focus should therefore improve performance on creativity tasks relative to a local focus, a prediction that has been empirically supported at the individual level (e.g., Friedman et al., 2003). Based on the foregoing arguments, I expect that group creativity too may benefit from a global (as opposed to local) attentional focus.

Affective States within Groups: Group Creativity

Previous research suggests that positive affect (e.g., happiness) improves individual creativity because positive affect activates a global attentional focus that is beneficial for creativity performance (e.g., Gasper, 2004; Hirt et al., 2008; Isen et al., 1987). Extending these individual-level findings to small interacting groups, a handful of studies have also examined the effect of affective states on group creativity. For instance, Grawitch et al. (2003a) investigated how group members' mood influences their collective idea-generating performance. They found that groups produced more original ideas when a happy mood was induced than when a neutral mood (neither positive nor negative) were induced. Further, Grawitch et al. (2003b) examined the effects of positive, neutral, and negative mood states on group creativity using a creative production task. It was found that groups in positive moods made more creative products than those in neutral and negative moods. These results are in line with prior individual-level studies conducted under the affect-as-information model (e.g., Gasper, 2004; Hirt et al., 2008; Isen et al., 1987). However, it should be noted that all of those previous studies have been conducted under

the assumption of a fixed link between affect and cognition, and thus did not manipulate participants global vs. local attentional focus prior to inducing the mood states. Given that a global attentional focus is often the default processing orientation (Fiske & Taylor, 2008; Kimchi, 1992; Navon, 1977), it seems reasonable to speculate that in those studies the introduction of negative affect caused members to switch from a global to a local attentional focus, while positive affect encouraged them to hold fast to the global focus.

Again, no research to date has directly examined whether the impact of mood states on group creativity depends on the relative dominance of global vs. local attentional focus. Even in the studies by Grawitch et al., (2003a, 2003b), participants' initial attentional focus was not experimentally controlled. Thus, it remains untested whether the effect of affective states on group creativity would depend on the relative dominance of global vs. local attentional focus just before the mood induction.

On the basis of the affect-as-cognitive-feedback account (Huntsinger et al., 2014; Huntsinger & Ray, 2016), in Study 2, I predict an interactive effect of global vs. local attentional focus and happy vs. sad moods on group creativity. As in Study 1, cognitive style and affective states were manipulated independently and individually. In Study 2, however, either a global or a local attentional focus (as opposed to heuristic or systematic processing) was primed, because thinking broadly or narrowly is more relevant to ideational creativity than is thinking intuitively or analytically.

Consistent with previous research, I adopted a group brainstorming paradigm to investigate ideational creativity in groups (e.g., Diehl & Stroebe, 1987; Paulus & Dzindolet, 1993). Brainstorming is one of the most widely-used techniques for studying creative idea

generation in groups (Osborn, 1963; Sutton & Hargadon, 1996), and it has been employed for a long time in real world organizational settings (e.g., Paulus & Nijstad, 2019; Paulus, Korde, Dickson, Carmeli, & Cohen-Meitar, 2015). In this experiment, group members collaboratively produced ideas on how to improve their university (Goldenberg, Larson, & Wiley, 2013; Kohn, Paulus, & Choi, 2011; Putman & Paulus, 2009). This topic has been widely used in the extant literature on brainstorming because it is assumed to be important and relevant to the undergraduate samples that have often been employed in experimental studies of group creativity. Specifically, undergraduate participants usually have direct experience with and relevant knowledge about that topic, just as workgroup members in organizations usually have direct experience with and relevant knowledge about the topics they consider. Thus, even though the research is conducted with ad-hoc groups consisting of undergraduate students, the findings can be generalized to real world.

Research on group brainstorming has typically examined group creativity in terms of the quantity and quality of the generated ideas (see Diehl & Stroebe, 1987; Guilford, 1967; Nijstad & Stroebe, 2006; Paulus et al., 2001). Consistent with this research tradition, I assessed both quantitative and qualitative aspects of group creativity – the sheer number of non-redundant ideas generated by a group (fluency), the number of idea categories used (flexibility), and idea originality (originality). In Study 2, the following hypotheses were tested:

Hypothesis 4: When a global attentional focus is initially primed, groups subsequently put into a happy mood will generate more ideas than will groups subsequently put into a sad mood. By contrast, when a local attentional focus is initially primed, groups subsequently put into a sad mood will generate more ideas than groups subsequently put into a happy mood.

Hypothesis 5: *When a global attentional focus is initially primed, groups subsequently put into a happy mood will consider more idea categories than will groups subsequently put into a sad mood. By contrast, when a local attentional focus is initially primed, groups subsequently put into a sad mood will consider more idea categories than groups subsequently put into a happy mood.*

Hypothesis 6: *When a global attentional focus is initially primed, groups subsequently put into a happy mood will generate more original ideas than will groups subsequently put into a sad mood. By contrast, when a local attentional focus is initially primed, groups subsequently put into a sad mood will generate more original ideas than groups subsequently put into a happy mood.*

Study 2 Method

Participants and Design

An a priori power analysis with G*Power was conducted to estimate the appropriate sample size for Study 2, using the interaction effect size observed in the previous study by Huntsinger & Ray (2016; Experiment 1). That analysis suggested that for power = .80 and α = .05, a total sample size of 73 groups should be sufficient. However, because that effect size was observed for individuals rather than groups, we slightly raised the sample size per cell. Thus, 246 undergraduates enrolled in introductory psychology courses at Loyola University Chicago were recruited for Study 2 and participated for course credits. They were formed into three-person groups (N= 82), and groups were randomly assigned to conditions in a 2 (attentional focus: global vs. local focus) x 2 (mood state: happy vs. sad) between-groups design.

Creativity Task

In Study 2, groups performed a creative idea-generation task. Three-person groups were given 15 min to generate ideas on how to improve their university. They were told that their job as a group was to generate as many ideas as they could on the given topic. One of the group members was randomly selected as a scribe who entered the ideas generated by the group into a Microsoft word document using a desktop computer. Every new idea a member spoke was to be added by the scribe into the word document file. Before starting idea-generation, the experimenter emphasized four brainstorming rules that the group was to follow (Kohn et al., 2011; Osborn, 1953). Specifically, group members were asked to refrain from making any evaluative comments about the ideas (whether their own or others') as they were being generated (criticism is ruled out), to generate as many ideas as possible on a given topic (quantity is desired), and focus on the task even when productivity is low (stay-focused on the task). They were also told that any seemingly weird, radical, or creative ideas are welcomed (free-wheeling is welcomed).

Procedure

The experimental procedure was identical to Study 1 with two exceptions. First, a modified version of the Navon-letter-task (Huntsinger, 2012; Huntsinger & Ray, 2016) was used to prime a global or a local focus (see below for details). Second, groups performed the group brainstorming task. The basic procedure was as follows.

Three participants were invited to a laboratory room for each session and were seated in separate cubicles. The experiment was introduced as two ostensibly separate studies – a purported pilot study for another researcher and a "Group Brainstorming Study." The pilot study

includes two unrelated tasks presented as a "Letter recognition task" (cf. Navon, 1977) and the "Life Events Inventory." As described below, the two tasks were designed to manipulate global vs. local attentional focus and happy vs. sad moods, respectively, and were presented on a desk-top computer. At the outset of the study, participants were individually primed to engage in either a global or local attentional focus and then performed the same Life Events Inventory task as used in Study 1 for the mood induction. As soon as they completed these tasks, the three participants were moved from their separate cubicles to a common table where they were to perform the group brainstorming task, which they worked on for 15 minutes. After the group completed the brainstorming task, the members were thanked, debriefed, and dismissed.

Manipulation of Attentional Focus and Affective States

Prior to beginning the brainstorming task, participants completed the "pilot study" allegedly containing the two unrelated tasks. The first of these was a variant of the Navon-letter-task (Navon, 1977) that has been used in previous research as an effective method of priming either a global or local attentional focus (Huntsinger, 2012; Huntsinger et al., 2010; Huntsinger & Ray, 2016). This letter recognition task requires participants to determine whether each of 80 figures contain an "L" or an "H." Each figure consists of a large letter made up of small letters, similar to what is shown in Figure 1. Participants viewed one of two sets of 80 figures, with one used to prime a global attentional focus, and one to prime a local attentional focus. The set used to prime a global attentional focus always consisted of either a large H or large L made up of some other small letter (e.g., F, T), whereas the set used to prime a local attentional focus always consisted of a large letter other than H or L (e.g., F, T) that was always made up of either small Hs or small Ls. These figures were presented one at a time in random order on a computer

screen. If the figure contained an H, participants had to press 1 on the keyboard. If the figure contained an L, they had to press 0 on the keyboard (see Appendix M). By doing so, participants' attentional focus was directed globally (large letter) or locally (small letter), respectively. For example, when a large F made up of small Ls was presented to participants, they had to press 0 because the figure contained the small Ls. Thus, they were guided to develop a local attentional focus. In contrast, when a large H made of small Fs was presented to participants, they had to press 1 because the figure contained the large H. Therefore, they were guided to develop a global attentional focus. Participants were to do this as quickly and accurately as possible throughout the 80 rounds of the task.

Upon completion of the letter recognition task, the same Life Events Inventory task used in Study 1 was presented to induce either a positive or negative mood state. As in Study 1, participants were asked to recall and describe an event that made them feel either "really happy" or "really sad," and they did so while listening to a happy music (Mozart's "Eine Kleine Nacht Musik") or a sad music (Mahler's "Adagietto"). After they wrote individually about a happy or sad memory for 8 min, participants were moved to the common table where they completed the group brainstorming task.

Dependent Variables

Creative Fluency. One of the most frequently used measures of creativity performance in brainstorming tasks is the sheer number of non-redundant ideas generated by each group (hereafter called, *fluency*). In general, it is expected that the more ideas a group produces, the more it is likely that they are able to arrive at an original (novel and infrequent) outcome (i.e., *quantity breeds quality*; Diehl & Stroebe, 1987, Simonton, 1999). To assess fluency, I examined

the list of ideas produced by each group and ascertained for the number of non-repetitive ideas generated. I did this in such a way that I was (temporarily) blind to the experimental conditions.

Flexibility. Another quantitative measure of brainstorming performance is the number of unique idea categories (hereafter called, *flexibility*). As discussed above, idea categories can be represented as an associative semantic network consisting of inter-connected cognitive nodes (e.g., Anderson, 2013; Brown et al., 1998; Collins & Loftus, 1975). For example, when generating ideas on a given topic, the ideas "desk" and "table" can be conceptualized as being within the same category (e.g., furniture). In contrast, the ideas "desk" and "airplane" seem to be from different categories (e.g., furniture and transportation, respectively). The ability to shift flexibly from one category to another is necessary in order to be able to generate ideas in many different idea categories. Such flexibility is considered to be a critical determinant of creativity (Guilford, 1967), since the more categories considered, the more varied will be the ideas generated, which in turn should lead to more original idea combinations (e.g., Bass et al., 2008; Kohn & Smith, 2011; Nijstad et al., 2010).

Flexibility was evaluated by a pair of trained research assistants who were blind to the hypotheses and experimental conditions. They each analyzed approximately two-thirds of the ideas, with one-third (26 groups, 749 of 2,642 ideas) evaluated by both coders. The twice-coded groups were used to assess inter-coder reliability. Each assistant classified every idea generated by a group into one of 23 mutually exclusive categories. The categories were based on prior research with this topic (e.g., Baruah & Paulus, 2011; Goldenberg et al., 2013; Kohn et al., 2011; Putman & Paulus, 2009). The specific definition of each category was developed by the author under the supervision of Dr. Larson (cf. Goldenberg et al., 2013). Among the categories were

food, dorms and housing, maintenance, commuting, financing, library, athletics, and safety (see Appendix N for a complete list and examples). The two coders were trained using a detailed definition of each category. I assessed inter-rater reliability by computing Cohen's kappa, which is an agreement between two coders with regard to categorization decisions (e.g., categorize an idea into the same category or not). Agreement between the two coders was high (Cohen's kappa = .88). Flexibility was defined simply the total number of unique idea categories sampled by each group.

Idea Originality. As a qualitative measure of group creativity, I obtained a consensual measure of originality at the idea level via observer ratings. A separate pair of research assistants independently rated each idea for originality, which was defined as "an idea that is infrequent, novel, unusual, and original," using a 5-point scale (1 = 'Least Original', 5 = 'Very Original'). An original idea was operationalized as one that went beyond a simple improvement or revision of something that already existed in the university (see Appendix O). To increase the coder's shared understanding of originality, I gave them a detailed description for each point of the rating scale, and included for each several example ideas. For example, the ideas "a new dining hall," "fix broken elevators," and "more sports teams" were regarded least original, while the ideas "Zip line between buildings," "build underground tunnels," and "fair wages for employees at Loyola" were regarded original.

The coders were senior-level undergraduate students who had direct, up-to-date experience at Loyola University Chicago and therefore were knowledgeable about the topic of the brainstorming task. So, I believe those raters were qualified to code the creativity of the generated ideas. A Pearson correlation coefficient was computed to assess inter-rater reliability,

which was excellent (r = .92). I averaged the originality ratings across all of the ideas generated by a group in order to control for differences in fluency between groups.

Study 2 Results

Descriptive statistics and correlations among the variables are shown in Table 4.

Table 4. Means, Standard Deviations, and Correlations (Study 2). Independent variables were coded as 1 = global focus and happy mood, -1 = local focus and sad mood. Note. * = $p < .05$, ** = $p < .01$.

Variables	*M*	*SD*	1	2	3	4	5
1. Cognitive Processing Style	.02	1.00	-				
2. Affective States	.00	1.00	.00	-			
3. Fluency	32.23	11.68	-.01	.13	-		
4. Flexibility	12.23	2.52	-.11	.02	.63**	-	
5. Average Originality of Ideas	1.23	.18	-.02	-.02	.16	.24*	-

Table 5. Fluency, Flexibility, and the Average Originality of Ideas (Study 2).

	Global attentional focus		Local attentional focus	
	Happy mood (n = 21)	Sad mood (n = 21)	Happy mood (n = 20)	Sad mood (n = 21)
Dependent variables	*M* (*SD*)	*M (SD*)	*M* (*SD*)	*M* (*SD*)
Creative Fluency	37.33 (10.94)	26.86 (11.11)	30.00 (11.08)	34.65 (11.45)
Flexibility	12.81 (2.27)	11.09 (2.23)	11.70 (2.68)	13.35 (2.43)
Average Originality of Ideas	1.29 (.21)	1.17 (.12)	1.17 (.11)	1.31 (.21)

Creative Fluency. Hypothesis 4 predicted that when group members were initially primed to engage in a global attentional focus, subsequently inducing a positive mood would produce greater fluency than would inducing a negative mood, but when members were initially primed to engage in a local attentional focus, the pattern would reverse. To test this prediction, I

performed a 2 (attentional focus) x 2 (affect) analysis of variance (ANOVA). That analysis revealed a statistically significant interaction effect on the sheer number of ideas generated; F (1, 78) = 9.44, p = .003, η_p^2 = .108. As can be seen in Table 5, when a global attentional focus was initially primed, groups generated more ideas in the happy mood condition (M = 37.33, SD = 10.94) than in the sad mood condition (M = 26.86, SD = 11.11); F (1, 78) = 9.28, p = .003. On the other hand, when a local attentional focus was initially primed, groups tended to produce more ideas in the sad mood condition (M = 34.65, SD = 11.45) than in the happy mood condition (M = 30.00, SD = 11.08). However, this latter difference did not reach a conventional level of statistical significance, F (1, 78) = 1.74, p = .191. Thus, while a significant interaction was observed, it seemed due more to the effect of the mood manipulation when a global attentional focus was initially primed than when a local focus was initially primed. So, Hypothesis 4 was only partially supported. Neither main effect was significant; ps > .24 for both.

Flexibility. Hypothesis 5 predicted that when group members were initially primed to engage in a global attentional focus, subsequently inducing a positive mood would produce greater flexibility than would inducing a negative mood, but when members were initially primed to engage in a local attentional focus, the opposite pattern would emerge. In support of this, a two-way ANOVA using the number of idea categories sampled as the dependent variable revealed a significant interaction between attentional focus and affect; F (1, 78) = 10.01, p = .002, η_p^2 = .114. Simple effect analyses revealed that when a global attentional focus was initially primed, flexibility was higher in the happy mood condition (M = 12.81, SD = 2.27) than in the sad mood condition (M = 11.09, SD = 2.23); F (1, 78) = 5.33, p = .024. On the other hand, when a local attentional focus was initially primed, flexibility was higher in the sad mood

condition (M = 13.35, SD = 2.43) than in the happy mood condition (M = 11.70, SD = 2.68); F (1, 78) = 4.70, p = .033. Thus, the Hypothesis 5 was fully supported.

Originality of Ideas. Hypothesis 6 predicted that when group members were initially primed to engage in a global attentional focus, subsequently inducing a positive mood would results in groups producing more original ideas than would inducing a negative mood, but when members were initially primed to engage in a local attentional focus, the pattern would reverse. For the average idea originality ratings, I found a significant interaction effect; F (1, 78) = 12.04, p = .001, η_p^2 = .134. Simple effect analyses revealed that when a global attentional focus was initially primed, rated originality was higher in the happy mood condition (M = 1.29, SD = .21) than in the sad mood condition (M = 1.17, SD = .12); F (1, 78) = 5.33, p = .023. On the other hand, when a local attentional focus was initially primed, rated originality was higher in the sad mood condition (M = 1.31, SD = .21) than in the happy mood condition (M = 1.17, SD = .11); F (1, 78) = 6.70, p = .011. Thus, the Hypothesis 6 was fully supported.

Study 2 Discussion

The key objective of Study 2 was to further explore the flexible impact of affective states on the performance of small groups, focusing on a different cognitive processing dimension and on a different task domain. Participants were grouped into triads, and their attentional focus (global or local) and mood state (happy or sad) were manipulated (in that order). Then, groups performed a creative idea generation task. Study 2 found that when a global focus was initially primed, groups subsequently put in a happy mood had greater fluency and flexibility, and generated more original ideas, than those put in a sad mood. But when a local focus was initially primed, this pattern was reversed. These results suggest that either high or low group creativity

can be achieved when members are put into either a happy or sad mood, depending on the cognitive style in use by members at the moment the affective state is induced.

Unlike flexibility and originality, however, one of the simple effects on fluency was not statistically significant. Even so, the direction of the means was as predicted. It should be noted here that although both fluency and flexibility reflect the quantitative aspect of ideational creativity, a global and local attentional focus may have different implications for them. A local attentional focus results in a narrowing of attention to a few relatively closely related categories (Förster & Dannenberg, 2010). But this does not automatically imply less fluency, as groups with a local attentional focus might still be able to generate many ideas from within just a few categories (Nijstad et al., 2010; Nijstad & Stroebe, 2006). But flexibility captures the ability to switch between distantly related categories, and is presumed to be facilitated by a global attentional focus. As described earlier, a global attentional focus leads to spreading activation to semantically remote categories, which in turn leads to relatively frequent switching among them (Förster & Dannenberg, 2010). Thus, compared to fluency, flexibility might be a more sensitive measure for the effect of a global attentional focus on ideational creativity.

Also, consistent with previous research (e.g., Bass et al., 2008; Nijstad et al., 2010), flexibility was positive correlated with fluency ($r = .63$, $p < .01$) and originality ($r = .24$, $p < .05$). But unexpectedly, fluency was not correlated with originality ($r = .16$, $p = .15$). This result might be due in part to the fact that Study 2 adopting Osborn's brainstorming rules, which emphasize quantity rather than quality (e.g., *the more ideas the better*; Osborn, 1953). Consequently, a considerable number of the ideas that groups generated were rated not original.

Indeed, 85% (2,256) of the total set of ideas (2,642) were given a rating of “1” by the coders, which represents the lowest level of original.

CHAPTER FOUR

GENERAL DISCUSSION

The main purpose of this dissertation was to test whether the affective states shared among members have a flexible or fixed influence on group effectiveness. The positive and negative affect (e.g., happiness, sadness) that people momentarily experience has long been assumed to influence how they think and behave (e.g., Forgas, 2006; George & Dane, 2016). Indeed, a substantial amount of research has demonstrated the impact of affective feelings on the thinking and behavior of individuals (Huntsinger et al., 2014; Schwartz**,** 2012). However, although many complex and important tasks are left to groups, relatively less attention has been paid to how such feelings might influence group performance, and only a handful of studies have examined specifically how affect influences group decision-making (e.g., Bramesfeld & Gasper, 2008, Emich, 2014; Van Knippenberg et al., 2010) and creativity (e.g., Grawitch et al. 2003a, 2003b). The present research thus examines a significant but understudied problem in group and organizational psychology.

Additionally, most past research on the relationship between member affect and group performance appears to have been conducted under the implicit assumption of a fixed link between affect and cognition (e.g., the affect-as-information model; Schwarz, 2012). No research to date has directly examined the flexible link, affect-as-cognitive-feedback model (Huntsinger et al., 2014) in task-performing groups. The goal of the current research was to fill this void. Drawing on the affect-as-cognitive-feedback model, I hypothesized in Study 1 that

the influence of happy and sad moods on group decision-making effectiveness would depend on the cognitive processing style—heuristic vs. systematic—in which group members were engaged just before either mood was aroused. In Study 2, I predicted that the impact of happy and sad moods on group creativity would depend on the relative dominance of members' global vs. local attentional focus just prior to the affect's arousal. The results from the two experiments provided support for these hypotheses. Study 1 found that when systematic processing was initially primed, subsequently inducing positive affect prompted greater discussion of critical, uniquely-held information, and ultimately more accurate decision making, than did inducing negative affect, whereas the pattern reversed when heuristic processing was initially primed. In addition, Study 2 found that when a global attentional focus was initially primed, subsequently inducing positive affect prompted greater fluency, flexibility, and originality of ideas generated by groups than did inducing negative affect, whereas the reverse occurred when a local attentional focus was initially primed. These results are in line with the patterns predicted by the affect-as-cognitive-feedback model (Huntsinger et al., 2014). They also extend Huntsinger and Ray's (2016) study by showing that the flexible link between affect and cognition exists in groups in the same way that it seems to exist in individuals. My research is an initial step toward a systematic examination of the flexible impact of member affect on group processes and performance.

Theoretical and Practical Implications

I have demonstrated that the affect-as-cognitive-feedback model can be usefully applied at the group-level of analysis. While prior research with this model has focused exclusively on intra-individual processes (e.g., Huntsinger et al., 2014; Huntsinger & Ray, 2016), the current

dissertation suggests that it can be used as well as a framework for understanding the role of affect and cognition in intra-group processes. The link between affect and cognition was found to be more flexible than previously thought, both when group members collaboratively perform analytic tasks and creative tasks. The current research sheds some light on how the interplay of affect and cognition can shape group information processing and performance.

A useful direction for future research would be to further examine the flexible impact of affective states in other areas of group intellective performance, such as collective memory and creative problem solving. For example, if group members attend to and encode information into memory more thoroughly, they may later recall that information more accurately. In this regard, people performing a memory encoding task should benefit more from a detail-oriented, systematic processing style rather than a shallow, heuristic processing style. Consistent with this idea, Storbeck and Clore (2005) found that a positive mood prompted more memory errors in a recall task than did neutral and negative moods, because the former inhibited an item-specific, systematic processing style at encoding rather than at retrieval. This result was originally interpreted as support for the fixed-link, affect-as-information model, which suggests that people in a happy mood commit more recall errors because they are engaged in shallow, heuristic processing, whereas people in a sad mood commit fewer recall errors because they are engaged in more thorough, systematic processing (e.g., Schwarz & Clore, 2007). But their study did not experimentally control participants' cognitive processing style before inducing a mood state. Given that heuristic processing is often the default processing style at the outset of a laboratory experiment (Huntsinger et al., 2014), it seems reasonable to conjecture that in their study positive affect encouraged participants to continue their heuristic processing, while negative affect led

them to switch from heuristic to systematic processing. Thus, how affective states influence the recall performance of individuals—and of group—may depend on whether a heuristic or systematic processing style is at play just before the mood is induced. Testing the affect-as-cognitive-feedback model in other group tasks requiring a particular processing style will provide more comprehensive evidence for the flexible link between affect and cognition, allowing a deeper understanding of the role of member affect in groups.

One practical implication of the two studies reported here is that it may not be easy for organizations to leverage affect as a means of promoting group effectiveness, as both positive and negative affect appear capable of either improving or impairing group performance on complex decision-making and creativity tasks, depending on the circumstances under which they are aroused. Simply put, my research indicates that "one-size-fits-all" recommendations (e.g., to always promote either positive or negative affect in task-performing groups) are unlikely to be effective. This is important because researchers and organizations tend to prematurely conclude that positive affect, relative to negative affect, is always good for task performance and psychological health (e.g., Bramesfeld, & Gasper, 2008; Fredrickson, 2001). Leaders and decision-makers in organizations should be further advised to carefully consider the nature of group task (analytic vs. creative task), and the flexible link between affect and cognition. Team effectiveness and management decisions might benefit from taking these into consideration.

Limitations and Directions for Future Research

Although the current studies provide novel insights into the relationship between affect and cognition in groups, several limitations should be mentioned. First, the studies reported here focus exclusively on transitory affective states, and say nothing about how long the observed

interaction between initial processing style and subsequently aroused affect is likely to persist. Relatedly, I have ignored chronic, affect-related dispositional tendencies, such as the proclivity to experience positive and/or negative affect (cf., Watson & Clark, 1984). However, several studies have shown that stable dispositions of this sort can influence group decision-making quality (e.g., Kooij-de Bode et al., 2010; Van Knippenberg et al., 2010). Furthermore, Van Knippenberg et al. (2010) found that group members' dispositional negative affectivity and transitory affective states can interactively influence group decision quality. Specifically, inducing a negative mood led to more accurate decisions than did inducing a positive mood when group members were low in negative affectivity, but not when they were high in negative affectivity. An important direction for future research is to better understand the impact of such stable dispositional tendencies, and how they might interact with situationally determined affect and cognitive processing styles. Whether affect-related dispositional tendencies can be accommodated within the affect-as-cognitive-feedback theoretical framework is an open question that deserves attention.

Second, I considered only the effects of happy and sad mood states. Real groups, of course, can experience many emotions other than happiness and sadness while performing a task. According to the affect-as-cognitive-feedback perspective, some of these other affective states can, like happiness and sadness, signal the appropriateness of either maintaining or changing one's current cognitive processing style. For example, anger and anxiety both are negative in tone (valence), but the former is an activating negative emotion with high levels of arousal, whereas the latter is a deactivating negative emotion with low levels of arousal. Activating affective states (e.g., anger, happiness) are predicted to reinforce the use of one's current

processing style whereas deactivating affective states (e.g., anxiety, sadness) are predicted to trigger a change in style (Huntsinger et al., 2014; Clore & Huntsinger, 2007). Consistent with this idea, research on advice-taking and belief revision among individuals has shown that, compared to being in a neutral mood, anxiety promotes more openness, and does anger less openness, to taking advice from others (Gino, Brooks, & Schweitzer, 2012; Gino & Schweitzer, 2008). Although participants' cognitive processing style prior to the mood manipulation was not experimentally controlled in these studies, given that heuristic processing is often the default orientation (Fiske & Taylor, 2008), it seems reasonable to speculate that in these studies the introduction of anxiety caused participants to switch from heuristic to systematic processing, while anger encouraged them to hold fast to heuristic processing. This is because systematic processing implies taking account of more information, including advice, while heuristic processing implies taking account of less information, and so a greater likelihood of ignoring advice. Testing the effects of these other affective states in group judgment and decision-making contexts, especially when group members' initial cognitive processing style can be experimentally controlled, would provide a more comprehensive test of the affect-as-cognitive-feedback model, and would greatly expand our understanding of the role that affect plays in groups.

Third, we exposed the members of each group to exactly the same affect manipulation at exactly the same time. Such homogeneity of affect no doubt does sometimes occur in real-world groups. More often, however, it is likely that just one or two members may experience discernable positive or negative affect in a given situation (e.g., as a carry-over from a separate incident that occurred just before the group convened). There is some evidence that moods and

emotions are "contagious"—they can be transmitted from one member to a member without conscious awareness (Hatfield et al., 1993; Neumann & Strack, 2000; Pugh, 2001; Sy et al., 2005; Van Knippenberg et al., 2013). And as previously described, Emich (2014) found that groups with just one member in either a positive or negative mood can have a discernable impact of the quality of a groups' collective decision making. But there is much more to be learned here, including whether initially having just one member in either a positive or negative affective state is enough to prompt the group as a whole to either maintain or change its current cognitive processing style. Addressing such questions is thus another useful direction for future research.

Finally, regarding the timing of affect arousal, it should be noted that group members' cognitive processing style and affective state were manipulated just prior to a relatively brief group interaction (10 minutes in Study 1, 15 in Study 2). It remains to be seen how the interplay of affect and cognition operates during longer group interactions. Previous research has shown that working in a group can sustain members' positive affect but may diminish their negative affect over time (e.g., Park & Hinsz, 2015). In other words, group interaction itself seems capable of altering members' affective states. However, if positive affect persists and negative affect fades during group interaction, that interaction should tend not to change whatever style is operating after the initial induction (because the signal to change—negative affect—tends to fade). In other words, there is at least some reason to believe the interaction effects observed in the present studies might persist for more than 10–15 minutes. Exploring empirically the duration of these effects is an issue worth exploring.

Conclusion

In conclusion, I propose that the Huntsinger et al. (2014) affect-as-cognitive-feedback account offers useful insights into the role of affect in group intellective performance. Understanding how group members' affect influences their cognitive processing style is important because their cognitive processing style can significantly impact their collective performance. The literature on the role of member affect in groups is filled with studies that presume a fixed-link between affect and cognition. Taking a new theoretical approach, my research demonstrates the benefits of considering the possibility of a flexible link between affect and cognition in groups. I hope that it stimulates further research in this area.

APPENDIX A

STUDY 1 INFORMED CONSENT FORM

CONSENT TO PARTICIPATE IN RESEARCH

Project Title: Group Investment Study
Researchers: Young-Jae, Yoon, MA, and James R. Larson, Jr., Ph.D.

Introduction: You are being asked to take part in a research study that is being conducted by Dr. James R. Larson, Jr. who is a faculty member in the Department of Psychology at Loyola University Chicago. You are eligible to participate in this study because you are enrolled in either Psychology 100 or Psychology 101 and are at least 18 years of age.

Please read this document carefully and ask any questions you may have before deciding whether or not to participate in the study.

Purpose: You are invited to participate in this research project on group decision-making. Its purpose is to learn more about the processes underlying group investment decisions.

Procedures: You will be asked to review some information about several financial investment options, and then decide as a group what is most likely to become commercially successful. The investment options all concern (hypothetical) pharmaceutical companies that are developing new drugs.

You will be asked to discuss the investment decision with the other participants. Also, your discussion may be video-recorded. If your discussion is recorded, you will be asked at the end of the session for your verbal permission to save that recording. If you agree, it will be saved and used for research purposes only. But if you feel at all uncomfortable about having been video-recorded, you may ask the experimenter to delete the video, and it will be deleted immediately.

As part of this experiment, you will be asked to take part in a separate pilot test for another researcher. It consists of a simple word puzzle task and describing a life event memory. The pilot task will take about 10 min. The session as a whole will take no longer than one hour to complete.

Compensation: You will receive two research credits for the study that count toward the fulfillment of the research participation component of your introductory psychology course.

Risks and Benefits: There are no foreseeable risks involved in participating in this research beyond those experienced in everyday life. There are no direct benefits associated with participating in this research other than learning about how psychological research is conducted.

Confidentiality: All of the data obtained in this study are confidential and will be used for research purposes only. No individually identifying information will be stored with the data, and only aggregate findings will be described in written or oral reports of this research.

Paper forms and questionnaires used in this research will be stored in secure cabinets, and will be destroyed as soon as the data contained on them have been transferred to electronic data files. Any video recordings that might be made as part of this research will also be stored in secure cabinets, and will be destroyed as soon as the data they contain have been coded and entered into electronic data files. All electronic data files will be stored in a secure location for an indefinite period of time for archival purposes. Again, these data files will contain no individually identifying information.

If a video recording is made of today's session, then at the end of the session you will be asked to give your permission to use that recording as part of the research. If you give your permission, we will, within one year, code and transcribe the recording, then destroy it. However, if at the end of today's session you prefer for any reason that we not use the recording, you may say so, and we will destroy it immediately without making any use of it whatsoever.

Voluntary Participation: Your participation is voluntary. You may withhold any information that you do not wish to disclose, and you do not have to answer any questions that you do not wish to answer. You have the right to withdraw from this study at any time without loss of class credit or risk of penalty.

Contacts and Questions: If you have questions about this study, you may contact Dr. Jim Larson at jlarson4@luc.edu or (773) 508-3192 or Mr. Young-Jae Yoon at yyoon1@luc.edu. If you have questions about your rights as a research participant, you may contact the Loyola University Office of Research Services at (773) 508-2689.

Statement of Consent to Participation:
Your signature below indicates that you have read the information provided above, have had an opportunity to ask questions, and agree to participate in this research study.

_____ _____
Full name of Participant (please print) Date

_____ _____
Signature of Participant Signature of Researcher

Statement of Consent to Use Video Recording:
Your signature below indicates that you have read the information provided above, have had an opportunity to ask questions about it, and agree to allow the video recording made of your group discussion to be coded and/or transcribed, after which it will be destroyed.

_____ _____
Signature of Participant Date

_____ _____
Signature of Researcher Date

APPENDIX B

STUDY 1 GENERAL INSTRUCTION

Group Investment Study

1. Investment options:

Pharmaceutical company	Developing Cholesterol-lowering Drug
Bluestone Pharmaceuticals	*Chol-BLUE*
Green Tree Pharmaceuticals	*Chol-GREEN*

2. Read the **colored-booklets about the two cholesterol-lowering drugs** carefully. Make sure you understand all of the information it contains. Try to remember as many of the details of this information as you can. Your ability to remember this information will be important later. You will be asked to discuss this information with other members. If so, you will not be able to refer back to the written material during discussion. It all must come from memory.

3. Decide whether the information contained in each packet is positive or negative for that drug.

   - Positive information indicates that the drug is effective, safe to use, inexpensive to manufacture, or likely be in high demand by consumers. ***The more positive information there is about a drug, the greater the likelihood that the drug will become commercially successful.***

   - Negative information indicates that the drug is ineffective, dangerous to use, expensive to manufacture, or likely not to be in demand by consumers. ***The more negative information there is about a drug, the lower the likelihood that the drug will become commercially successful.***

4. Based on your evaluation of all this information, you will decide individually and collaboratively which of the two drugs has the highest potential for becoming commercially successful.

APPENDIX C

STUDY 1 BACKGROUND INFORMATION ABOUT CHOLESTEROL

Cholesterol Background Information

- Heart disease is the single largest cause of death in the United States. Although many factors contribute to raising a person's risk of heart disease, ***a high level of LDL cholesterol in the blood is a major cause of atherosclerosis that is a major cause of heart disease***.

- For many years, scientists have known that there is a strong relationship between heart disease and high blood LDL cholesterol levels.

- There are two different types of cholesterol: ***low-density lipoproteins (LDL)*** and ***high-density lipoproteins (HDL)***. Most cholesterol about 80% -- is carried by LDL. Interestingly, unlike LDL, researchers have found that as the amount of HDL increases, the risk of heart attack actually decreases.

- To help lower cholesterol, researchers have tried to develop drugs that block the production of cholesterol in the liver. Of course, the liver is a very important organ, and should not be tampered with haphazardly. Therefore, before any cholesterol-lowering drug is used, great care must be taken to ensure that the drug does not have any negative effects on the liver, or on any other part of the body.

- Another approach to lowering cholesterol is to develop drugs that help the body excrete cholesterol. Excretion is possible as long as the cholesterol continues to circulate in the blood, instead of sticking to and building up on the lining of the arteries. Some research indicates that HDL may play a role in helping to prevent cholesterol from building up on artery walls. Therefore, ***drugs that increase HDL may also serve to reduce overall blood cholesterol levels.***

APPENDIX D

STUDY 1 INDIVIDUAL INFORMATION PACKETS

Chol-BLUE **Item Set**

- Member 1 -

- ***Chol-BLUE*** reduced the likelihood of secondary strokes.

- A market survey suggested that there is likely to be a strong consumer demand for ***Chol-BLUE***. [Unshared]

- ***Chol-BLUE*** is absorbed completely and fast in animals. This is likely to be equally the case in humans. [Unshared]

- ***Chol-BLUE*** may not be effective for some patients when used over a long period of time.

- MRI studies revealed that patients treated with ***Chol-BLUE*** may be susceptible to liver damage.

- ***Chol-BLUE*** caused hidden reproductive problems in mice that appeared only in subsequent generations. It is unknown if this will occur in humans.

- ***Chol-BLUE*** interferes with the body's natural weight control mechanisms and hinders efforts toward weight loss in some overweight patients. Weight loss is an important component of heart disease treatment.

Chol-GREEN Item Set

- Member 1 -

- ***Chol-GREEN*** can be delivered in an effective way that some patients may find especially convenient.

- Both tablet and liquid forms of ***Chol-GREEN*** were effective in reducing LDL (bad) cholesterol in children.

- ***Chol-GREEN*** helps decrease LDL (bad) cholesterol in the majority of elderly patients.

- ***Chol-GREEN*** worked effectively in adult women through early middle-age, with no evidence of child-bearing complications.

- ***Chol-GREEN*** received a scientific award for excellence. This is a marketing advantage because physicians generally favor drugs that receive this type of scientific recognition.

- ***Chol-GREEN*** caused diarrhea and vomiting in some elderly patients. Unpleasant gastrointestinal side effects like these may discourage some patients from taking this drug. [Unshared]

- ***Chol-GREEN*** may have an adverse impact on skeletal muscle tissues, especially among younger patients. [Unshared]

Chol-BLUE **Item Set**

- Member 2 -

- ***Chol-BLUE*** reduced the likelihood of secondary strokes.

- ***Chol-BLUE*** may be beneficial to human patients as a post-operative treatment following many types of surgical procedures. [Unshared]

- The American Heart Association would likely endorse ***Chol-BLUE***. This will foster consumer confidence and improve sales. [Unshared]

- ***Chol-BLUE*** may not be effective for some patients when used over a long period of time.

- MRI studies revealed that patients treated with ***Chol-BLUE*** may be susceptible to liver damage.

- ***Chol-BLUE*** caused hidden reproductive problems in mice that appeared only in subsequent generations. It is unknown if this will occur in humans.

- ***Chol-BLUE*** interferes with the body's natural weight control mechanisms and hinders efforts toward weight loss in some overweight patients. Weight loss is an important component of heart disease treatment.

Chol-GREEN **Item Set**

- Member 2 -

- ***Chol-GREEN*** can be delivered in an effective way that some patients may find especially convenient.

- Both tablet and liquid forms of ***Chol-GREEN*** were effective in reducing LDL (bad) cholesterol in children.

- ***Chol-GREEN*** helps decrease LDL (bad) cholesterol in the majority of elderly patients.

- ***Chol-GREEN*** worked effectively in adult women through early middle-age, with no evidence of child-bearing complications.

- ***Chol-GREEN*** received a scientific award for excellence. This is a marketing advantage because physicians generally favor drugs that receive this type of scientific recognition.

- Hamsters treated with ***Chol-GREEN*** had an unusually high likelihood of developing gallstones. Humans may also be at risk for this complication. [Unshared]

- ***Chol-GREEN*** production process creates a dangerous gas. This problem needs to be solved before launching the product. Such a delay would give competitors and advantage, and might ultimately hurt the profitability of ***Chol-GREEN***. [Unshared]

Chol-BLUE **Item Set**

- Member 3 -

- ***Chol-BLUE*** reduced the likelihood of secondary strokes.

- ***Chol-BLUE*** reduced the death rate of patients diagnosed with cardiovascular disease (CV). [Unshared]

- ***Chol-BLUE*** was effective for males in their teens and early adult years. [Unshared]

- ***Chol-BLUE*** may not be effective for some patients when used over a long period of time.

- MRI studies revealed that patients treated with ***Chol-BLUE*** may be susceptible to liver damage.

- ***Chol-BLUE*** caused hidden reproductive problems in mice that appeared only in subsequent generations. It is unknown if this will occur in humans.

- ***Chol-BLUE*** interferes with the body's natural weight control mechanisms and hinders efforts toward weight loss in some overweight patients. Weight loss is an important component of heart disease treatment.

Chol-GREEN **Item Set**

- Member 3 -

- ***Chol-GREEN*** can be delivered in an effective way that some patients may find especially convenient.

- Both tablet and liquid forms of ***Chol-GREEN*** were effective in reducing LDL (bad) cholesterol in children.

- ***Chol-GREEN*** helps decrease LDL (bad) cholesterol in the majority of elderly patients.

- ***Chol-GREEN*** worked effectively in adult women through early middle-age, with no evidence of child-bearing complications.

- ***Chol-GREEN*** received a scientific award for excellence. This is a marketing advantage because physicians generally favor drugs that receive this type of scientific recognition.

- ***Chol-GREEN*** reduced white blood cell counts below normal levels. Because white blood cells are important for fighting infection, there is a danger that treatment with ***Chol-GREEN*** could make patients more susceptible to a wide range of infectious diseases. [Unshared]

- ***Chol-GREEN*** may produce internal tissue damage and collateral bleeding in some male patients. [Unshared]

APPENDIX E

STUDY 1 MEMORY SHEET FOR NOTE-TAKING

Chol-BLUE Item Set

Please write below the Key Phrase (the under-lined sentence) for ***Chol-BLUE***. Place the Key Phrase that you judge to be **POSITIVE** about the drug at the **TOP** of the page, and the Key Phrase that you judge to be **NEGATIVE** about the drug at the **BOTTOM**.

POSTIVE INFORMATION DOCUMENTS

No	*KEY PHRASE*

NEGATIVE INFORMATION DOCUMENTS

No	*KEY PHRASE*

Chol-GREEN Item Set

Please write below the Key Phrase (the under-lined sentence) for ***Chol-GREEN***. Place the Key Phrase that you judge to be **POSITIVE** about the drug at the **TOP** of the page, and the Key Phrase that you judge to be **NEGATIVE** about the drug at the **BOTTOM**.

POSTIVE INFORMATION DOCUMENTS

No	*KEY PHRASE*

NEGATIVE INFORMATION DOCUMENTS

No	*KEY PHRASE*

APPENDIX F

STUDY 1 INDIVIDUAL DECISION FORM

Individual Decision Form

1. Given the information provided above, which drug do you think the highest potential for becoming a commercially viable product? (circle only one)

Chol-BLUE ***Chol-GREEN***

2. Please briefly explain the logic behind your decision in a sentence or two.

_____

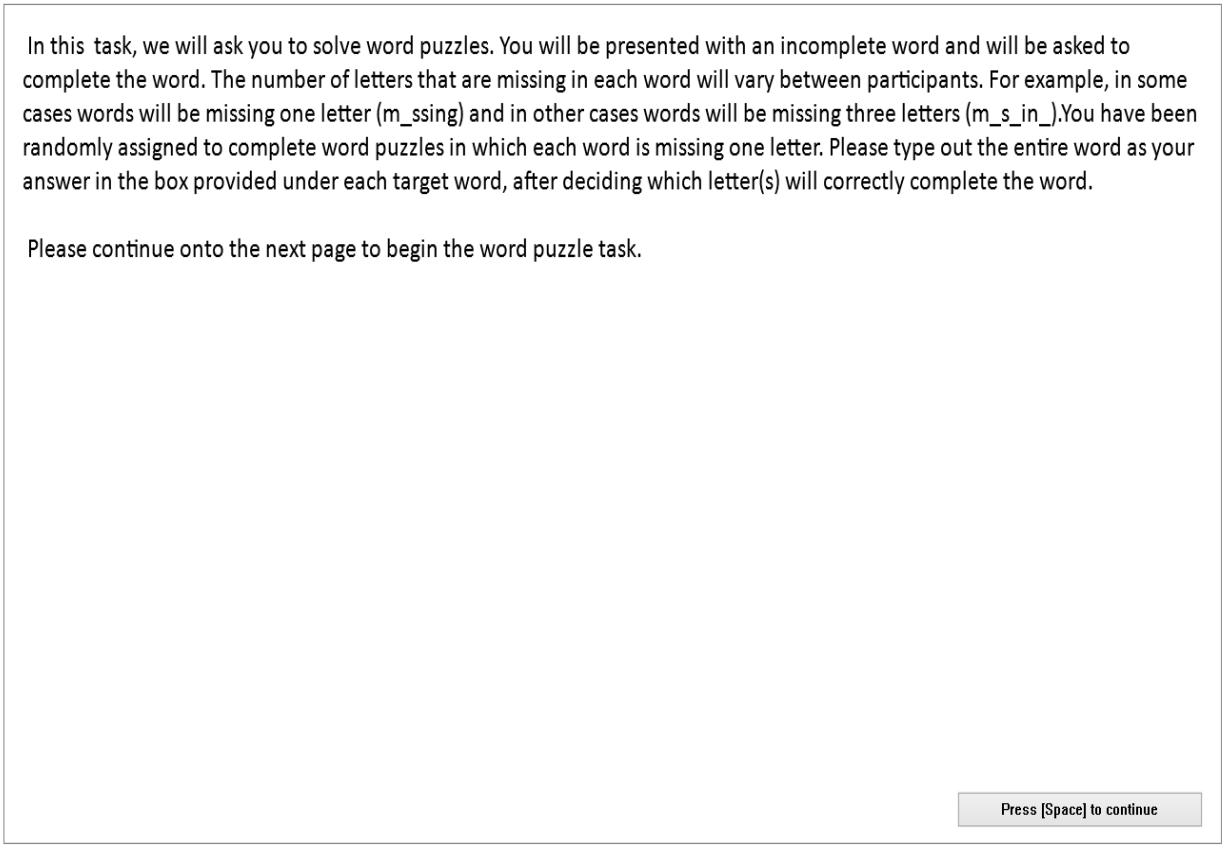
_____

_____

PLEASE TURN THE PAGE OVER WHEN YOU ARE DONE.

APPENDIX G

STUDY 1 MANIPULATION OF HEURISTIC VS. SYSTEMATIC PROCESSING



- Sample items to prime Heuristic processing

Effort_ess Qui_k

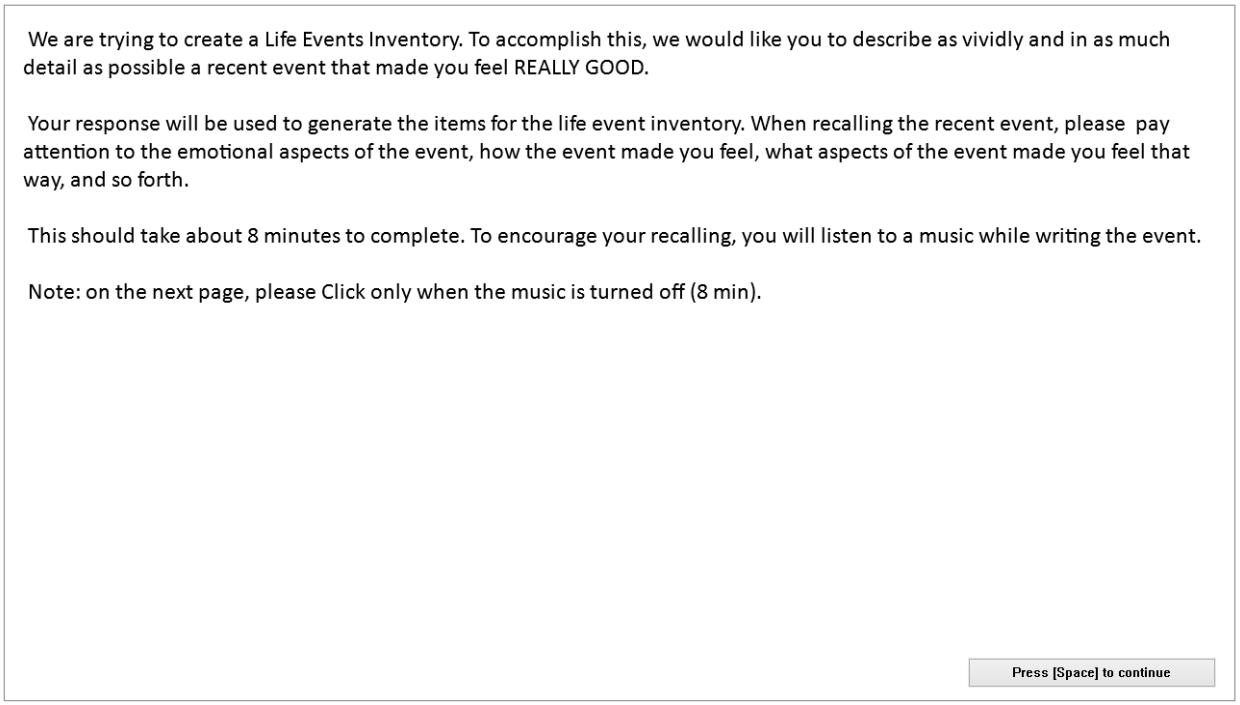
- Sample items to prime Systematic processing

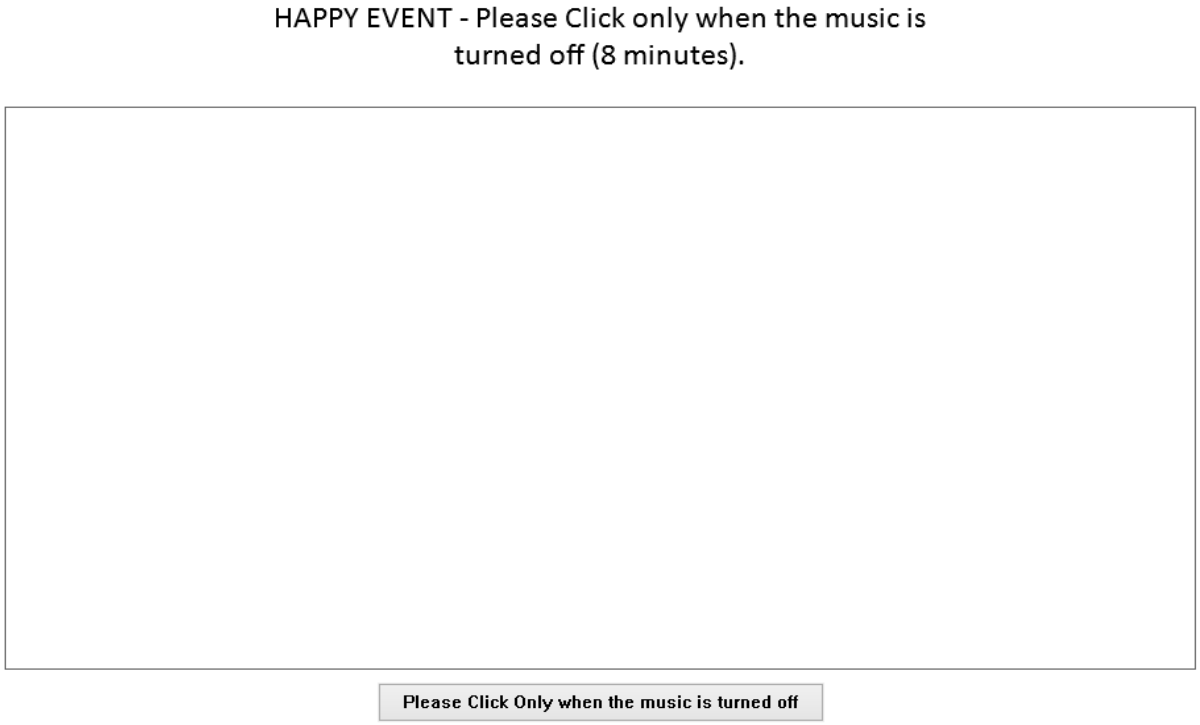
Ana_ytical Ca_eful

APPENDIX H

STUDY 1 MANIPULATION OF MOOD STATES

♦ Happy moods condition.





♦ Sad moods condition.

We are trying to create a Life Events Inventory. To accomplish this, we would like you to describe as vividly and in as much detail as possible a recent event that made you feel REALLY SAD.

Your response will be used to generate the items for the life event inventory. When recalling the recent event, please pay attention to the emotional aspects of the event, how the event made you feel, what aspects of the event made you feel that way, and so forth.

This should take about 8 minutes to complete. To encourage your recalling, you will listen to a music while writing the event.

Note: on the next page, please Click only when the music is turned off (8 min).

Press [Space] to continue

SAD EVENT - Please Click only when the music is turned off (8 minutes).

Please Click Only when the music is turned off

APPENDIX I

STUDY 1 FINAL (GROUP) DECISION FORM

Final Decision Form

Given the entire information provided, please decide as a *Group* what drug is **MOST** likely to become commercially successful. Again, just one of these drugs is likely to be a good long-term investment.

Please indicate your answer by circling one drug on the table below.

Chol-BLUE ***Chol-GREEN***

APPENDIX J

STUDY 1 SURPRISE RECALL TEST QUESTIONNAIRE

Please read the following instructions carefully!

1. On the following pages are listed all of the original **22** statements of drug information that you read during the study period, but with the name of drug obscured (i.e., ***Chol-BLUE*** -> **this drug**). Please re-read each statement. Then, please identify the drug to which each statement refers.

1. **This drug** helps decrease LDL (bad) cholesterol in the majority of elderly patients.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

2. **This drug** worked effectively in adult women through early middle-age, with no evidence of child-bearing complications.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

3. **This drug** may have an adverse impact on skeletal muscle tissues, especially among younger patients.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

4. A market survey suggested that there is likely to be a strong consumer demand for **this drug**.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

5. Hamsters treated with **this drug** had an unusually high likelihood of developing gallstones. Humans may also be at risk for this complication.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

6. MRI studies revealed that patients treated with **this drug** may be susceptible to liver damage.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

7. **This drug** can be delivered in an effective way that some patients may find especially convenient.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

8. **This drug** was effective for males in their teens and early adult years.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

9. **This drug** may produce internal tissue damage and collateral bleeding in some male patients

This statement refers to…

Chol-BLUE ***Chol-GREEN***

10. **This drug** caused diarrhea and vomiting in some elderly patients. Unpleasant gastrointestinal side effects like these may discourage some patients from taking this drug.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

11. **This drug** interferes with the body's natural weight control mechanisms and hinders efforts toward weight loss in some overweight patients. Weight loss is an important component of heart disease treatment.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

12. The American Heart Association would likely endorse **this drug**. This will foster consumer confidence and improve sales.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

13. **This drug** reduced white blood cell counts below normal levels. Because white blood cells are important for fighting infection, there is a danger that treatment with **this drug** could make patients more susceptible to a wide range of infectious diseases.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

14. **This drug** reduced the likelihood of secondary strokes.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

15. Both tablet and liquid forms of **this drug** were effective in reducing LDL (bad) cholesterol in children.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

16. **This drug** production process creates a dangerous gas. This problem needs to be solved before launching the product. Such a delay would give competitors and advantage, and might ultimately hurt the profitability of **this drug.**

This statement refers to…

Chol-BLUE ***Chol-GREEN***

17. **This drug** may be beneficial to human patients as a post-operative treatment following many types of surgical procedures.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

18. **<u>This drug</u>** caused hidden reproductive problems in mice that appeared only in subsequent generations. It is unknown if this will occur in humans.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

19. **<u>This drug</u>** is absorbed completely and fast in animals. This is likely to be equally the case in humans. Physicians who prescribe cholesterol-reducing drugs will find these characteristics very desirable.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

20. **<u>This drug</u>** reduced the death rate of patients diagnosed with cardiovascular disease (CV).

This statement refers to…

Chol-BLUE ***Chol-GREEN***

21. **<u>This drug</u>** may not be effective for some patients when used over a long period of time.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

22. **<u>This drug</u>** received a scientific award for excellence. This is a marketing advantage because physicians generally favor drugs that receive this type of scientific recognition.

This statement refers to…

Chol-BLUE ***Chol-GREEN***

APPENDIX K

STUDY 2 INFORMED CONSENT FORM

CONSENT TO PARTICIPATE IN RESEARCH

Project Title: Group Brainstorming Study
Researchers: Young-Jae, Yoon, MA, and James R. Larson, Jr., Ph.D.

Introduction: You are being asked to take part in a research study that is being conducted by Dr. James R. Larson, Jr. who is a faculty member in the Department of Psychology at Loyola University Chicago. You are eligible to participate in this study because you are enrolled in either Psychology 100 or Psychology 101 and are at least 18 years of age.

Please read this document carefully and ask any questions you may have before deciding whether or not to participate in the study.

Purpose: You are invited to participate in this research project on group brainstorming. Its purpose is to learn more about the idea generation processes of groups.

Procedures: You are going to brainstorm in a group of three people. Specifically, you will be asked to invent as a group as many ideas as possible on a given topic.

Your group discussion may be video-recorded. If your discussion is recorded, you will be asked at the end of the session for your verbal permission to save that recording. If you agree, it will be saved and used for research purposes only. But if you feel at all uncomfortable about having been video-recorded, you may ask the experimenter to delete the video, and it will be deleted immediately.

As part of this experiment, you will be asked to take part in a separate pilot test for another researcher prior to the group brainstorming session. It consists of a simple word puzzle task and describing a life event memory. The pilot task will take about 10 min. The session as a whole will take no longer than one hour to complete.

Compensation: You will receive two research credits for the study that count toward the fulfillment of the research participation component of your introductory psychology course.

Risks and Benefits: There are no foreseeable risks involved in participating in this research beyond those experienced in everyday life. There are no direct benefits associated with participating in this research other than learning about how psychological research is conducted.

Confidentiality: All of the data obtained in this study are confidential and will be used for research purposes only. No individually identifying information will be stored with the data, and only aggregate findings will be described in written or oral reports of this research.

Paper forms and questionnaires used in this research will be stored in secure cabinets, and will be destroyed as soon as the data contained on them have been transferred to electronic data files. Any video recordings that might be made as part of this research will also be stored in secure cabinets, and will be destroyed as soon as the data they contain have been coded and entered into electronic data files. All electronic data files will be stored in a secure location for an indefinite period of time for archival purposes. Again, these data files will contain no individually identifying information.

If a video recording is made of today's session, then at the end of the session you will be asked to give your permission to use that recording as part of the research. If you give your permission, we will, within one year, code and transcribe the recording, then destroy it. However, if at the end of today's session you prefer for any reason that we not use the recording, you may say so, and we will destroy it immediately without making any use of it whatsoever.

Voluntary Participation: Your participation is voluntary. You may withhold any information that you do not wish to disclose, and you do not have to answer any questions that you do not wish to answer. You have the right to withdraw from this study at any time without loss of class credit or risk of penalty.

Contacts and Questions: If you have questions about this study, you may contact Dr. Jim Larson at jlarson4@luc.edu or (773) 508-3192 or Mr. Young-Jae Yoon at yyoon1@luc.edu. If you have questions about your rights as a research participant, you may contact the Loyola University Office of Research Services at (773) 508-2689.

Statement of Consent to Participation:
Your signature below indicates that you have read the information provided above, have had an opportunity to ask questions, and agree to participate in this research study.

_____ _____
Full name of Participant (please print) Date

_____ _____
Signature of Participant Signature of Researcher

Statement of Consent to Use Video Recording:
Your signature below indicates that you have read the information provided above, have had an opportunity to ask questions about it, and agree to allow the video recording made of your group discussion to be coded and/or transcribed, after which it will be destroyed.

_____ _____
Signature of Participant Date

_____ _____
Signature of Researcher Date

APPENDIX L

STUDY 2 TASK INSTRUCTION

Task instruction.

We ask you now to start brainstorming in a group of three people. Brainstorming is a popular technique that is widely used in a large number of US corporations to facilitate idea generation.

The following four rules for brainstorming have been developed. We want you to apply these rules while working in your group.

(1) No-Criticism: Criticism is ruled out. No evaluative judgments of any ideas are permitted.
(2) Quantity: Quantity is desired. The more ideas the better
(3) Free-Wheeling: Free-wheeling is welcomed. The wilder the ideas the better.
(4) Stay-focused on the task: Members should stay focused and persist at the task even when productivity is low.

The goal of the brainstorming task is to invent **as many ideas as possible** on the following topic:

How can Loyola University Chicago be improved?

Your group is supposed to write down your group's own ideas. To do so, your group gets some lined sheets of paper. Please note just one idea per line in order. Your group has 15 minutes for brainstorming.

Important: Mention each new idea you have aloud to the other group members. Afterwards write it down on the sheets of paper. As soon as a certain idea has been mentioned and noted by one group member (scribe), it is not allowed to mention and note it a second time. In other words, each idea only counts once. If the same idea is noted by your group, the repetitions will be judged as invalid.
In case you have further questions, you can address the experimenter now.

APPENDIX M

STUDY 2 MANIPULATION OF GLOBAL VS. LOCAL FOCUS

The following task measures your ability to determine whether a given stimulus, in this case a particular letter, is presented.

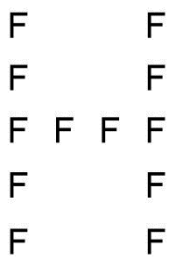
More specifically, please press the 1 key if the stimulus contain the letter L and press the 0 (zero) key if the stimulus contains the letter H.

Use the 1 and 0 keys at the top of the keyboard, and not those located on the right-hand side of the keyboard.

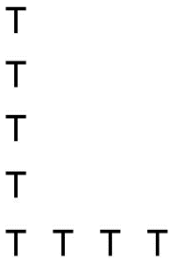
Finally, please respond as quickly and accurately as possible throughout the task.

Press [Space] to continue

♦ Sample items to prime a Global focus

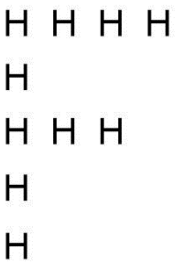


1 = H 0 = L

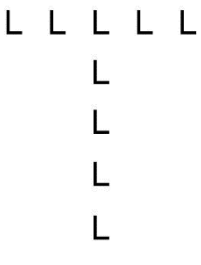


1 = H 0 = L

♦ Sample items to prime a Local focus



1 = H 0 = L



1 = H 0 = L

.

APPENDIX N

STUDY 2 IDEA FLEXIBILITY CODING SCHEME

1. Dorms and housing (e.g., cost, rules and policies, and options of on- and off-campus housing)
2. Food (e.g., meal options, quality, hygiene, and pricing of on- and off-campus eating)
3. Maintenance (e.g., snow plowing, water drain, janitorial services, heating and cooling)
4. Commuting (e.g., policies and services for commuting students)
5. Athletics and health (e.g., wellness center, sports teams, gym, athletics)
6. Community-based or Campus-based events and programs (e.g., speakers, entertainment, extracurricular activities, non-sport clubs, career fairs, help accommodation)
7. Instruction (e.g., professors, classes, summer school, grading, office hours, course evaluation)
8. Academic policies (e.g., admissions, academic calendar, curriculum, registration)
9. School spirit (e.g., university logo items, school mission)
10. Parking and transportation (e.g., parking availability, public transportation)
11. Computing and technology (e.g., computer lab, e-services, classroom technology)
12. Advising and counseling (e.g., academic advising, counseling and tutoring resources)
13. Financing (e.g., scholarships, campus jobs, tuition and fees, financial aid)
14. Bookstore (e.g., free textbook, merchandise)
15. Library (e.g., study space, study room)
16. Research (e.g., undergraduate and graduate research opportunities, RA's more involved)
17. Staff (e.g., evaluation of staff, more, nicer, and more trained staff)
18. Diversity and equal opportunity (e.g., racial/ethnic diversity status, minority group support)
19. Advertisements and Press (e.g., University student newspaper, University News center)
20. Safety (e.g., campus security)
21. Campus (e.g., renovations, construction, rules and regulations, convenience services)
22. Environment (e.g., sustainability, green space, recycle, garbage, rabbit)
23. Other (e.g., an idea that does not fit into any of the above-listed categories)

APPENDIX O

STUDY 2 IDEA ORIGINALITY RATING SCALE

Idea Originality Rating (5-point)

5 point (Very Original) – Extremely goes beyond the improvement or revision (not simply "more", "easier", "better") of things that are already existing inside or outside Loyola University Chicago. New & Rare Ideas.
Example: Zip line between buildings. Heated sidewalks, Heat lamps at the street lights, Better publicity for all sports teams, Treat that non tenured teachers with equality, Hand out more contraceptives, Personal bodyguard for each students, Loyola phoenix more transparent

4 point (Original) – Moderately goes beyond the improvement or revision (not simply "more", "easier", "better") of things that are already existing inside or outside Loyola University Chicago. More frequent ideas than the 5-point ones.
Example: "Minority Appreciation Day", more efforts at the university level for diversity/minorities, Create live feed for graduation, Build tunnels. Build underground tunnels.

3 point – Slightly goes beyond the improvement or revision (simply more, easier, better, add a new) of things that are already existing. Or the 3-point ideas could be the simple change but the change is a little bit extreme or the idea is more elaborated than 1- or 2- point ideas.
Example: International News Center, Gender based violence awareness, Swim team in lake. Moving pathways like in the airports to get people across campus, Less prejudice against speakers, More student run businesses. Outdoor pool overlooking lake

2 point (Little original) – Add something new to the things that have already been inside or near around universities. But the idea is more specific and more elaborated than 1 point ideas
Example: Amazon store pickup near Loyola, Build a new dorm that is ecofriendly, Make free pizza for commuters actually free, For a language minor if you can skip classes because you did well on the placement exam you should get credited those hours, Bus should come on time like it says on the website, Better professors with teaching degrees

1 point (Least Original) – Simply add, replace, improve, or change the things that have already been at Loyola University Chicago.
Example: Free tuition, Free stuffs, Free study abroad, Easier ways to compost or recycle, More green space for the campus, Easier curriculum, Fix broken elevators, More elevators, A New dining hall, Serve breakfast longer, Replace the shuttles, More sports teams

REFERENCE LIST

Amabile, T. M. (1983). The social psychology of creativity: A componential conceptualization. *Journal of Personality and Social psychology*, *45*, 357-376. https://doi.org/10.1037/0022-3514.45.2.357

Amabile, T. M. (1996). *Creativity and innovation in organizations. Update to the social psychology of creativity*, Boulder, CO: Westview Press.

Anderson, J. R. (2013). *The architecture of cognition*. Psychology Press.

Baas, M., De Dreu, C. K., & Nijstad, B. A. (2008). A meta-analysis of 25 years of mood-creativity research: Hedonic tone, activation, or regulatory focus?. *Psychological Bulletin*, *134*, 779-806. https://doi.org/10.1037/a0012815

Barsade, S. G., & Knight, A. P. (2015). Group affect. *Annual Review of Organizational Psychology and Organizational Behavior*, *2*, 21-46. https://doi.org/10.1146/annurev-orgpsych-032414-111316

Bartel, C. A., & Saavedra, R. (2000). The collective construction of work group moods. *Administrative Science Quarterly*, *45*, 197-231. https://doi.org/10.2307/2667070

Baruah, J., & Paulus, P. B. (2011). Category assignment and relatedness in the group ideation process. *Journal of Experimental Social Psychology*, *47*, 1070-1077. https://doi.org/10.1016/j.jesp.2011.04.007

Bless, H. (2001). The consequences of mood on the processing of social information. In A. Tesser, & N. Schwarz (Eds.), *Blackwell handbook of social psychology: Intraindividual processes*, (pp, 391-412). Oxford, England: Blackwell.

Bless, H., & Fiedler, K. (2006). Mood and the regulation of information processing and behavior. In J. P. Forgas (Ed.), *Hearts and minds: Affective influences on social cognition and behaviour* (pp. 65–84). New York: Psychology Press.

Bodenhausen, G. V. (1993). Emotions, arousal, and stereotypic judgments: A heuristic model of affect and stereotyping. In *Affect, cognition and stereotyping* (pp. 13-37). San Diego: Academic Press.

Bodenhausen, G. V., Kramer, G. P., & Süsser, K. (1994). Happiness and stereotypic thinking in social judgment. *Journal of Personality and Social Psychology*, *66*, 621-632. https://doi.org/10.1037/0022-3514.66.4.621

Bramesfeld, K. D., & Gasper, K. (2008). Happily putting the pieces together: A test of two explanations for the effects of mood on group-level information processing. *British Journal of Social Psychology*, *47*, 285-309. https://doi.org/10.1348/000712607X218295

Brodbeck, F. C., Kerschreiter, R., Mojzisch, A., & Schulz-Hardt, S. (2007). Group decision making under conditions of distributed knowledge: The Information Asymmetries Model. *Academy of Management Review*, *32*, 459-479. https://doi.org/10.2307/20159311

Brown, V., Tumeo, M., Larey, T. S., & Paulus, P. B. (1998). Modeling cognitive interactions during group brainstorming. *Small Group Research*, *29*, 495-526. https://doi.org/10.1177/1046496498294005

Chaiken, S. (1980). Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology, 39*, 752-766. https://doi.org/10.1037/0022-3514.39.5.752

Chaiken, S., & Ledgerwood, A. (2012). A theory of heuristic and systematic information processing. In P. A. M. van Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology* (pp. 246-266). Thousand Oaks, CA: Sage.

Chaiken, S., & Maheswaran, D. (1994). Heuristic processing can bias systematic processing: effects of source credibility, argument ambiguity, and task importance on attitude judgment. *Journal of Personality and Social Psychology*, *66*, 460-473. https://doi.org/10.1037/0022-3514.66.3.460

Chaiken, S., & Stangor, C. (1987). Attitudes and attitude change. *Annual Review of Psychology*, *38*, 575-630. https://doi.org/10.1146/annurev.ps.38.020187.003043

Chen, S., & Chaiken, S. (1999). The Heuristic-Systematic Model in its broader context. In S. Chaiken, & Y. Trope (Eds.), *Dual-process theories in social psychology* (pp. 73–96). New York: Guilford Press.

Chen, S., Duckworth, K., & Chaiken, S. (1999). Motivated heuristic and systematic processing. *Psychological Inquiry, 10*, 44-49. https://doi.org/10.1207/s15327965pli1001_6

Choi, H. S., & Yoon, Y.-J. (2018). Collectivistic values and an independent mindset jointly promote group creativity: Further evidence for a synergy model. *Group Dynamics: Theory, Research, and Practice, 22*, 236-248. https://doi.org/10.1037/gdn0000093

Clore, G. L., Gasper, K., & Garvin, E. (2001a). Affect as information. In J. P. Forgas, (Ed.). *Handbook of Affect and Social Cognition* (pp. 121-144). Mahwah, NJ.: Lawrence Erlbaum Associates.

Clore, G. L., & Huntsinger, J. R. (2007). How emotions inform judgment and regulate thought. *Trends in Cognitive Sciences, 11*, 393-399. https://doi.org/10.1016/j.tics.2007.08.005

Clore, G. L., Wyer, R. S., Dienes, B., Gasper, K., Gohm, C., & Isbell, L. (2001b). Affective feelings as feedback: Some cognitive consequences. In L. L. Martin & G. L. Clore (Eds.), *Theories of mood and cognition: A user's guide* (pp. 27–62). Mahwah, NJ: Erlbaum.

Clore, G. L., & Schnall, S. (2005). The influence of affect on attitude. In D. Albarracín, B. T. Johnson, & M. P., Zanna (Eds.), *Handbook of attitudes* (pp. 437-489). Mahwah: Erlbaum.

Collins, A. M., & Loftus, E. F. (1975). A spreading-activation theory of semantic processing. *Psychological Review, 82,* 407-428. https://doi.org/10.1037/0033-295X.82.6.407

De Dreu, C. K. W., Nijstad, B. A., & Van Knippenberg, D. (2008). Motivated information processing in group judgment and decision making. *Personality and Social Psychology Review, 12,* 22-49. https://doi.org/10.1177/1088868307304092

De Vries, N. K., De Dreu, C. K. W., Gordijn, E., & Schuurman, M. (1996). Majority and minority influence: A dual role interpretation. *European Review of Social Psychology, 7,* 145–172. https://doi.org/10.1080/14792779643000001

Diehl, M., & Stroebe, W. (1987). Productivity loss in brainstorming groups: Toward the solution of a riddle. *Journal of Personality and Social Psychology, 53,* 497-509. https://doi.org/10.1037/0022-3514.53.3.497

Draine, S. (2012). Inquisit 4.0.2 64bit [computer software]. Seattle, WA: Millisecond Software LLC.

Duncker, K. (1945). On problem-solving (L. S. Lees, Trans.). *Psychological Monographs, 58,* i-113. http://dx.doi.org/10.1037/h0093599

Erdfelder, E., Faul, F., & Buchner, A. (1996). GPOWER: A general power analysis program. *Behavior Research Methods, Instruments, & Computers, 28,* 1-11. https://doi.org/10.3758/BF03203630

Evans, J. S. B. T. (2008). Dual-processing accounts of reasoning, judgment, and social cognition. *Annual Review of Psychology, 59,* 255-278. https://doi.org:10.1146/annurev.psych.59.103006.093629

Eysenck, H. J. (1993). Creativity and personality: Suggestions for a theory. *Psychological Inquiry, 4,* 147–178. https://doi.org/10.1207/s15327965pli0403_1

Eysenck, H. J. (1995). *Genius: The natural history of creativity*. Cambridge, UK: Cambridge University Press.

Faul, F., Erdfelder, E., Lang, A., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*, 175-191. https://doi.org/10.3758/BF03193146

Faulmüller, N., Kerschreiter, R., Mojzisch, A., Schulz-Hardt, S. (2010). Beyond group-level explanations for the failure of groups to solve hidden profiles: The individual preference effect revisited. *Group Processes & Intergroup Relations, 13*, 653-671. https://doi.org/10.1177/1368430210369143

Fiske, S. T., & Neuberg, S. L. (1990). A continuum of impression formation, from category-based to individuating processes: Influences of information and motivation on attention and interpretation. *Advances in Experimental Social Psychology, 23*, 1-74. https://doi.org/10.1016/S0065-2601(08)60317-2

Fiske, S. T., & Taylor, S. E. (2008). *Social cognition: From brains to culture*. New York, NY: McGraw-Hill.

Förster, J. (2012). GLOMOsys: The how and why of global and local processing. *Current Directions in Psychological Science, 21*, 15-19. https://doi.org/10.1177/0963721411429454

Förster, J., & Dannenberg, L. (2010). GLOMOsys: A systems account of global versus local processing. *Psychological Inquiry, 21*, 175-197. ttps://doi.org/10.1080/1047840X.2010.487849

Förster, J., Liberman, N., & Kuschel, S. (2008). The effect of global versus local processing styles on assimilation versus contrast in social judgment. *Journal of Personality and Social Psychology, 94*, 579-599. https://doi.org/10.1037/0022-3514.94.4.579

Forgas, J.P. (Ed.) (2006). *Affect, cognition and social behaviour*. New York: Psychology Press.

Foschi, M., Lai, L., & Sigerson, K. (1994). Gender and double standards in the assessment of job applicants. *Social Psychology Quarterly*, 326-339. https://doi.org/10.1037/0022-3514.94.4.579

Fredrickson, B. L. (1998). What good are positive emotions?. *Review of General Psychology, 2*, 300-319. https://doi.org/10.1037/1089-2680.2.3.300.

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist, 56*, 218-226.

Friedman, R. S., Fishbach, A., Förster, J., & Werth, L. (2003). Attentional priming effects on creativity. *Creativity Research Journal, 15*, 277–286. http://dx.doi.org/10.1080/10400419.2003.9651420

Friedman, R. S., & Förster, J. (2005a). The influence of approach and avoidance cues on attentional flexibility. *Motivation and Emotion, 29*, 69-81. http://dx.doi.org/10.1006/jesp.2001.1488

Friedman, R. S., & Förster, J. (2005b). Effects of motivational cues on perceptual asymmetry: Implications for creativity and analytical problem solving. *Journal of Personality and Social Psychology*, *88*, 263-275. https://doi.org/10.1037/0022-3514.88.2.263

Friedman, R. S., & Förster, J. (2010). Implicit affective cues and attentional tuning: An integrative review. *Psychological Bulletin, 136,* 875–893. http://dx.doi.org/10.1037/a0020495

Galinsky, A. D., & Kray, L. J. (2004). From thinking about what might have been to sharing what we know: The effects of counterfactual mind-sets on information sharing in groups. *Journal of Experimental Social Psychology, 40,* 606–618. https://doi.org/10.1016/j.jesp.2003.11.005

Gasper, K. (1999). *How thought and emotional awareness influence the role of affect in processing: When attempts to be reasonable fail*. Unpublished doctoral dissertation, University of Illinois, Urbana-Champaign.

Gasper, K. (2003). When necessity is the mother of invention: Mood and problem solving. *Journal of Experimental Social Psychology*, *39*, 248-262. https://doi.org/10.1016/S0022-1031(03)00023-4

Gasper, K. (2004). Permission to seek freely? The effect of happy and sad moods on generating old and new ideas. *Creativity Research Journal*, *16*, 215-229. https://doi.org/10.1207/s15326934crj1602&3_6

Gasper, K., & Clore, G. L. (2002). Attending to the big picture: Mood and global versus local processing of visual information. *Psychological Science*, *13*, 34-40. https://doi.org/10.1111/1467-9280.00406

Gendolla, G. H. E. (2001). On the impact of mood on behavior: An integrative theory and a review. *Review of Psychology, 4,* 378–408. https://doi.org/10.1037/1089-2680.4.4.378

George, J. M., & Dane, E. (2016). Affect, emotion, and decision making, *Organizational Behavior and Human Decision Processes*, *136*, 47-55. https://doi.org/10.1016/j.obhdp.2016.06.004

George, J. M., & Zhou, J. (2002). Understanding when bad moods foster creativity and good ones don't: The role of context and clarity of feelings. *Journal of Applied Psychology*, *87*, 687– 697. https://doi.org/10.1037/0021-9010.87.4.687

Gigone, D., & Hastie, R. (1993). The common knowledge effect: Information sharing and group judgment. *Journal of Personality and Social Psychology, 65*, 959-974. https://doi.org/10.1037/0022-3514.65.5.959

Gigone, D., & Hastie, R. (1997). The impact of information on small group choice. *Journal of Personality and Social Psychology, 72*, 132-140. https://doi.org/10.1037/0022-3514.72.1.132

Goldenberg, O., Larson Jr, J. R., & Wiley, J. (2013). Goal instructions, response format, and idea generation in groups. *Small Group Research*, *44*, 227-256. https://doi.org/10.1177/1046496413486701

Gough, H. G. (1976). Studying creativity by means of word association tests. *Journal of Applied Psychology*, *61*, 348–353. https://doi.org/10.1037/0021-9010.61.3.348

Grawitch, M. J., Munz, D. C., Elliott, E. K., & Mathis, A. (2003a). Promoting creativity in temporary problem-solving groups: The effects of positive mood and autonomy in problem definition on idea-generating performance. *Group dynamics: Theory, Research, and Practice, 7*, 200-213. https://doi.org/10.1037/1089-2699.7.3.200

Grawitch, M. J., Munz, D. C., & Kramer, T. J. (2003b). Effects of member mood states on creative performance in temporary workgroups. *Group dynamics: Theory, Research, and Practice*, *7*, 41-54. https://doi.org/10.1037/1089-2699.7.1.41

Greitemeyer, T., & Schulz-Hardt, S. (2003). Preference-consistent evaluation of information in the hidden profile paradigm: beyond group-level explanations for the dominance of shared information in group decisions. *Journal of Personality and Social Psychology*, *84*, 322-339. https://doi.org/10.1037/0022-3514.84.2.322

Guilford, J. P. (1967). *The nature of human intelligence.* New York: McGraw Hill.

Hackman, J. R. (1998). Why teams don't work. In R. Tindale, L. Heath, J. Edwards, E. J. Posavac, F. B. Bryant, Y. Suarez-Balcazar, ... & J. Myers (Eds.), *Theory and research on small groups* (pp. 245-267). New York: Plenum Press.

Hackman, J. R., & Katz, N. (2010). Group behavior and performance. In S. T. Fiske, D. T. Gilbert, G., & Lindzey (Eds.), *Handbook of social psychology* (5th ed., Vol. 2, pp. 1208-1251). Hoboken, NJ, US: John Wiley & Sons Inc.

Harvey, S. (2013). A different perspective: The multiple effects of deep level diversity on group creativity. *Journal of Experimental Social Psychology*, *49*, 822-832. https://doi.org/10.1016/j.jesp.2013.04.004

Hatfield, E., Cacioppo, J. T., & Rapson, R. L. (1993). Emotional contagion. *Current Directions in Psychological Science*, *2*, 96-100. https://doi.org/10.1111/1467-8721.ep10770953

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). New York: Guilford Press.

Hinsz, V. B., Tindale, R. S., & Vollrath, D. A. (1997). The emerging conceptualization of groups as information processors. *Psychological Bulletin*, *121*, 43-64. https://doi.org/10.1037/0033-2909.121.1.43

Hirt, E. R., Devers, E. E., & McCrea, S. M. (2008). I want to be creative: Exploring the role of hedonic contingency theory in the positive mood-cognitive flexibility link. *Journal of Personality and Social Psychology, 94*, 214-230. ttps://doi.org/10.1037/0022-3514.94.2.94.2.214

Hogg, M.A., Abrams, D., & Martin, G.N. (2010). Social cognition and attitudes. In Martin, G.N., Carlson, N.R., Buskist, W., (Ed.), *Psychology* (pp 646-677). Harlow: Pearson Education Limited.

Huntsinger, J. R. (2011). Mood and trust in intuition interactively orchestrate correspondence between implicit and explicit attitudes. *Personality and Social Psychology Bulletin, 37*, 1245–1258. http://dx.doi.org/10 .1177/0146167211410069

Huntsinger, J. R. (2012). Does positive affect broaden and negative affect narrow attentional scope? A new answer to an old question. *Journal of Experimental Psychology: General, 141*, 595-600. https://doi.org/10.1037/a0027709

Huntsinger, J. R., Clore, G. L., & Bar-Anan, Y. (2010). Mood and Global-Local Focus: Priming a local focus reverses the link between mood and global-local processing. *Emotion, 10*, 722-726. https://doi.org/10.1037/a0019356

Hunsinger, M., Isbell, L. M., & Clore, G. L. (2012). Sometimes happy people focus on the trees and sad people focus on the forest: Context-dependent effects of mood in impression formation. *Personality and Social Psychology Bulletin, 38*, 220-232. https://doi.org/10.1177/0146167211424166

Huntsinger, J. R., Isbell, L., & Clore, G. L. (2014). The affective control of thought: Malleable, not fixed. *Psychological Review, 121*, 600-618. https://doi.org/10.1037/a0037669

Huntsinger, J. R., & Ray, C. (2016). A flexible influence of affective feelings on creative and analytic performance. *Emotion, 16*, 826-837. https://doi.org/10.1037/emo0000188

Isen, A. M., Daubman, K. A., & Nowicki, G. P. (1987). Positive affect facilitates creative problem solving. *Journal of Personality and Social Psychology, 52*, 1122-1131. https://doi.org/10.1037/0022-3514.52.6.1122

Janis, I. (1982). *Groupthink* (2nd ed.). Boston: Houghton-Mifflin.

Kimchi, R. (1992). Primacy of wholistic processing and global/local paradigm: a critical review. *Psychological Bulletin, 112,* 24-38. https://doi.org/10.1037/0033-2909.112.1.24

Koffka, K. (1963). Principles of Gestalt psychology. New York: Harcourt, Brace & World. (Original work published 1935).

Kohn, N. W., Paulus, P. B., & Choi, Y. (2011). Building on the ideas of others: An examination of the idea combination process. *Journal of Experimental Social Psychology, 47,* 554-561. https://doi.org/10.1016/j.jesp.2011.01.004

Kohn, N. W., & Smith, S. M. (2011). Collaborative fixation: Effects of others' ideas on brainstorming. *Applied Cognitive Psychology, 25,* 359-371. https://doi.org/10.1002/acp.1699

Kooij-de Bode, H. J., Van Knippenberg, D., & Van Ginkel, W. P. (2010). Good Effects of Bad Feelings: Negative Affectivity and Group Decision-making. *British Journal of Management, 21,* 375-392. https://doi.org/10.1111/j.1467-8551.2009.00675.x

Kruglanski, A. W. (1989). The psychology of being" right": The problem of accuracy in social perception and cognition. *Psychological Bulletin, 106,* 395-409. https://doi.org/10.1037/0033-2909.106.3.395

Kruglanski, A. W., & Webster, D. M. (1996). Motivated closing of the mind: "Seizing" and "freezing." *Psychological Review, 103,* 263-283. https://doi.org/10.1037/0033-295X.103.2.263

Larson, J. R. (2010). *In search of synergy in small group performance*. Psychology Press.

Larson Jr, J. R., & Christensen, C. (1993). Groups as problem-solving units: Toward a new meaning of social cognition. *British Journal of Social Psychology, 32,* 5-30. https://doi.org/10.1111/j.2044-8309.1993.tb00983.x

Larson, J. R., Christensen, C., Franz, T. M., & Abbott, A. S. (1998). Diagnosing groups: the pooling, management, and impact of shared and unshared case information in team-based medical decision making. *Journal of Personality and Social Psychology, 75,* 93-108. https://doi.org/10.1037/0022-3514.75.1.93

Larson, J. R., Jr., Sargis, E. G., Elstein, A. S., & Schwartz, A. (2002). Holding shared versus unshared information: Its Impact on Perceived Member Influence in Decision-Making Groups. *Basic and Applied Social Psychology, 24,* 145-155. https://doi.org/10.1207/S15324834BASP2402_6

Levine, J. M., & Moreland, R. L. (2012). A history of small group research. In A. W. Kruglanski & W. Stroebe (Eds.), *Handbook of the history of social psychology* (pp. 383-405). New York, NY, US: Psychology Press.

Mathieu, J., Maynard, M. T., Rapp, T., & Gilson, L. (2008). Team effectiveness 1997-2007: A review of recent advancements and a glimpse into the future. *Journal of Management, 34*, 410-476. https://doi.org/10.1177/0149206308316061

Markman, K. D., Lindberg, M. J., Kray, L. J., & Galinsky, A. D. (2007). Implications of counterfactual structure for creative generation and analytical problem solving. *Personality and Social Psychology Bulletin, 33*, 312-324. https://doi.org/10.1177/0146167206296106

Martin, L. L., Ward, D. W., Achee, J. W., & Wyer, R. S. (1993). Mood as input: People have to interpret the motivational implications of their moods. *Journal of Personality and Social Psychology, 64*, 317-326. https://doi.org/10.1037/0022-3514.64.3.317

Martindale, C. (1995). Creativity and connectionism. In S. M. Smith, T. B. Ward, & R. A. Finke (Eds.), *The creative cognition approach* (pp. 249–268). Cambridge, MA: MIT Press.

Mednick, S. A. (1962). The associative basis of the creative process. *Psychological Review, 69,* 220–232. https://doi.org/10.1037/h0048850

Mednick, S. A. (1968). The Remote Associates Test. *The Journal of Creative Behavior, 2*, 213-214. https://doi.org/10.1002/j.2162-6057.1968.tb00104.x

Melton, R. J. (1995). The role of positive affect in syllogism performance. *Personality and Social Psychology Bulletin, 21,* 788-794. https://doi.org/10.1177/0146167295218001

Mojzisch, A., & Schulz-Hardt, S. (2010). Knowing others' preferences degrades the quality of group decisions. *Journal of Personality and Social Psychology, 98,* 794-808. https://doi.org/10.1037/a0017627

Moreland, R. L., Hogg, M. A., & Hains, S. C. (1994). Back to the future: Social psychological research on groups. *Journal of Experimental Social Psychology, 30,* 527-555. ttps://doi.org/10.1006/jesp.1994.1025

Mullen, B., Johnson, C., & Salas, E. (1991). Productivity loss in brainstorming groups: A meta-analytic integration. *Basic and Applied Social Psychology, 12,* 3–24. https://doi.org/10.1207/s15324834basp1201_1

Navon, D. (1977). Forest before trees: The precedence of global features in visual perception. *Cognitive Psychology, 9*, 441-474. https://doi.org/10.1016/0010-0285(77)90012-3

Neumann, R., & Strack, F. (2000). " Mood contagion": the automatic transfer of mood between persons. *Journal of Personality and Social Psychology, 79*, 211-223. https://doi.org/10.1037/0022-3514.79.2.211

Newell, A., & Simon, H. A. (1972). Human problem solving. Englewood Cliffs, NJ: Prentice Hall.

Nijstad, B. A., De Dreu, C. K., Rietzschel, E. F., & Baas, M. (2010). The dual pathway to creativity model: Creative ideation as a function of flexibility and persistence. *European Review of Social Psychology*, *21*, 34-77. https://doi.org/10.1080/10463281003765323

Nijstad, B. A., & Stroebe, W. (2006). How the group affects the mind: A cognitive model of idea generation in groups. *Personality and Social Psychology Review, 10*, 186-213. https://doi.org/10.1207/s15327957pspr1003_1

Osborn, A. F. (1963). *Applied imagination: Principles and procedures of creative problem-solving* (3rd revised ed.). New York, NY: Scribners

Paulus, P. B. (2000). Groups, teams, and creativity: The creative potential for idea-generating groups. *Applied Psychology: An International Review, 49*, 237–262. https://doi.org/10.1111/1464-0597.00013

Paulus, P. B., & Dzindolet, M. T. (1993). Social influence processes in group brainstorming. *Journal of Personality and Social Psychology*, *64*, 575-586. https://doi.org/10.1037/0022-3514.64.4.575

Paulus, P. B., & Dzindolet, M. (2008). Social influence, creativity and innovation. *Social Influence, 3*, 228-247. https://doi.org/10.1080/15534510802341082

Paulus, P. B., Dzindolet, M., & Kohn, N. W. (2012). Collaborative creativity: Group creativity and team innovation. In M. D. Mumford (Ed.), *Handbook of organizational creativity* (pp. 327 – 357). New York, NY: Academic Press.

Paulus, P. B., Korde, R. M., Dickson, J. J., Carmeli, A., & Cohen-Meitar, R. (2015). Asynchronous brainstorming in an industrial setting: Exploratory studies. *Human factors*, *57*, 1076-1094.

Paulus, P. B., & Nijstad, B. A. (Eds.). (2019). *The oxford handbook of group creativity and innovation*. Oxford Library of Psychology.

Petty, R. E., & Briñol, P. (2015). Emotion and persuasion: Cognitive and meta-cognitive processes impact attitudes. *Cognition and Emotion*, *29*, 1-26. https://doi.org/10.1080/02699931.2014.967183

Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In *Communication and persuasion* (pp. 1-24). Springer, New York, NY.

Petty, R. E., Cacioppo, J. T., & Goldman, R. (1981). Personal involvement as a determinant of argument-based persuasion. *Journal of Personality and Social Psychology, 41*, 847-855. https://doi.org/10.1037/0022-3514.41.5.847

Petty, R. E., Wegener, D. T., & Fabrigar, L. R. (1997). Attitudes and attitude change. *Annual Review of Psychology, 48*, 609-647. https://doi.org/10.1146/annurev.psych.48.1.609

Postmes, T., Spears, R., & Cihangir, S. (2001). Quality of decision making and group norms. *Journal of Personality and Social Psychology, 80*, 918-930. https://doi.org/10.1037/0022-3514.80.6.918

Pugh, S. D. (2001). Service with a smile: Emotional contagion in the service encounter. *Academy of management journal, 44*, 1018-1027. https://doi.org/10.5465/3069445

Putman, V. L., & Paulus, P. B. (2009). Brainstorming, brainstorming rules and decision making. *The Journal of Creative Behavior, 43*, 29-40. https://doi.org/10.1002/j.2162-6057.2009.tb01304.x

Rijnbout, J. S., & McKimmie, B. M. (2012). Deviance in group decision making: Group-member centrality alleviates negative consequences for the group. *European Journal of Social Psychology, 42*, 915-923. https://doi.org/10.1002/ejsp.1917

Ruder, M., & Bless, H. (2003). Mood and the reliance on the ease of retrieval heuristic. *Journal of Personality and Social Psychology, 85*, 20-32. https://doi.org/10.1037/0022-3514.85.1.20

Salas, E., Rozell, D., Mullen, B., & Driskell, J. E. (1999). The effects of team building on performance: An integration. *Small Group Research, 30*, 309-329. https://doi.org/10.1177/104649649903000303

Sanna, L. J., & Parks, C. D. (1997). Group research trends in social and organizational psychology: Whatever happened to intragroup research? *Psychological Science, 8*, 261-267. https://doi.org/10.1111/j.1467-9280.1997.tb00436.x

Schippers, M. C., Edmondson, A. C., & West, M. A. (2014). Team reflexivity as an antidote to team information-processing failures. *Small Group Research, 45*, 731-769. https://doi.org/10.1177/1046496414553473

Scholten, L., Van Knippenberg, D., Nijstad, B. A., & De Dreu, C. K. (2007). Motivated information processing and group decision-making: Effects of process accountability on information processing and decision quality. *Journal of Experimental Social Psychology, 43*, 539-552. https://doi.org/10.1016/j.jesp.2006.05.010

Schooler, J. W., Ohlsson, S., & Brooks, K. (1993). Thoughts beyond words: When language overshadows insight. *Journal of Experimental Psychology: General, 122*, 166-183. https://doi.org/10.1037/0096-3445.122.2.166

Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin, 86*, 420–428. https://doi.org:10.1037/0033–2909.86.2.420

Schulz-Hardt, S., & Mojzisch, A. (2012). How to achieve synergy in group decision making: Lessons to be learned from the hidden profile paradigm. *European Review of Social Psychology*, *23*, 305-343. https://doi.org/10.1080/10463283.2012.744440

Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective states. In R. Sorrentino & E. T. Higgins (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (Vol. 2, pp. 527–561). New York: Guilford Press.

Schwarz, N. (2001). Feelings as information: Implications for affective influences on information processing. In L. L. Martin & G. L. Clore (Eds.), *Theories of mood and cognition: A user's handbook* (pp. 159-176). Mahwah, NJ: Erlbaum.

Schwarz, N. (2012). Feelings-as-information theory. In P. Van Lange, A. Kruglanski, & E. T. Higgins (eds.), *Handbook of theories of social psychology* (pp. 289-308). New York: Sage.

Schwarz, N., Bless, H., & Bohner, G. (1991). Mood and persuasion: Affective states influence the processing of persuasive communications. *Advances in Experimental Social Psychology, 24*, 161-199. https://doi.org/10.1016/S0065-2601(08)60329-9

Schwarz, N., & Bless, H. (1991). Happy and mindless, but sad and smart? The impact of affective states on analytic reasoning. In J. P. Forgas (Ed.), *Emotion and social judgments* (pp. 55–71). Elmsford, NY: Pergamon Press.

Schwarz, N., & Clore, G. L. (2007). Feelings and phenomenal experiences. In A. W. Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles (2nd ed.).* (pp. 385-407). New York, NY US: Guilford Press.

Simonton, D. K. (1999). *Origins of genius: Darwinian perspectives on creativity*. New York: Oxford University Press.

Smith, S. M. (2003). The constraining effects of initial ideas. In P. B. Paulus & B. A. Nijstad (Eds.), *Group creativity: Innovation through collaboration* (pp. 15–31). New York, NY: Oxford University Press. http://dx.doi.org/10.1093/acprof:oso/9780195147308.003.0002

Sohrab, S. G., Waller, M. J., & Kaplan, S. (2015). Exploring the Hidden-Profile Paradigm: A Literature Review and Analysis. *Small Group Research*, *46*, 489-535. https://doi.org/10.1177/1046496415599068

Stasser, G. (1988). Computer simulation as a research tool: The DISCUSS model of group decision making. *Journal of Experimental Social Psychology*, *24*, 393-422. https://doi.org/10.1016/0022-1031(88)90028-5

Stasser, G. (1992). Information salience and the discovery of hidden profiles by decision-making groups: A "thought experiment". *Organizational Behavior and Human Decision Processes, 52,* 156-181. https://doi.org/10.1016/0749-5978(92)90049-D

Stasser, G., & Titus, W. (1987). Effects of information load and percentage of shared information on the dissemination of unshared information during group discussion. *Journal of Personality and Social Psychology, 53,* 81-93. https://doi.org/10.1037/0022-3514.53.1.81

Steiner, I. (1972). *Group process and productivity*. New York: Academic Press.

Stroebe, W., Nijstad, B. A., & Rietzschel, E. F. (2010). Beyond productivity loss in brainstorming groups: The evolution of a question. *Advances in Experimental Social Psychology, 43,* 157-204. https://doi.org/10.1016/S0065-2601(10)43004-X

Sutton, R. I., & Hargadon, A. (1996). Brainstorming groups in context: Effectiveness in a product design firm. *Administrative Science Quarterly, 41,* 685–718. https://doi.org/10.2307/ 2393655.

Sy, T., Côté, S., & Saavedra, R. (2005). The contagious leader: impact of the leader's mood on the mood of group members, group affective tone, and group processes. *Journal of Applied Psychology, 90,* 295-305. https://doi.org/10.1037/0021-9010.90.2.295

Tindale, R. S., Meisenhelder, H. M., Dykema-Engblade, A. A., & Hogg, M. A. (2001). Shared cognition in small groups. *Blackwell handbook of social psychology: Group processes,* 1-30.

Tversky, A., & Kahneman D. (1983). Extensional versus intuitive reasoning: The conjunction fallacy in probability judgment. *Psychological Review, 90,* 293-315. https://doi.org/10.1037/0033-295X.90.4.293

Visser, V. A., van Knippenberg, D., Van Kleef, G. A., & Wisse, B. (2013). How leader displays of happiness and sadness influence follower performance: Emotional contagion and creative versus analytical performance. *The Leadership Quarterly, 24,* 172-188. https://doi.org/10.1016/j.leaqua.2012.09.003

Van Ginkel, W., Tindale, R. S., & van Knippenberg, D. (2009). Team reflexivity, development of shared task representations, and the use of distributed information in group decision making. *Group Dynamics: Theory, Research and Practice, 13,* 265-280. https://doi.org/10.1037/a0016045

Van Knippenberg, D., Kooij-de Bode, H. J., & Van Ginkel, W. P. (2010). The interactive effects of mood and trait negative affect in group decision making. *Organization Science, 21,* 731-744. https://doi.org/10.1287/orsc.1090.0461

Ward, T. B. (1994). Structured imagination: The role of category structure in exemplar generation. *Cognitive Psychology, 27*, 1-40. https://doi.org/10.1006/cogp.1994.1010

Ward, T. B. (1995). What's new about old ideas. In S. M. Smith, T. B. Ward, & R. A. Finke (Eds.), *The creative cognition approach* (pp. 157–178). Cambridge, MA: MIT Press.

Watson, D., & Clark, L. A. (1984). Negative affectivity: the disposition to experience aversive emotional states. *Psychological Bulletin, 96*, 465-490. https://doi.org/10.1037/0033-2909.96.3.465

Webster, D. M., & Kruglanski, A. W. (1994). Individual differences in need for cognitive closure. *Journal of Personality and Social Psychology, 67*, 1049-1062. https://doi.org/10.1037/0022-3514.67.6.1049

Wertheimer, M. (1967). Gestalt theory. In W. D. Ellis (Ed.), *A source book of Gestalt psychology* (pp. 1-11). New York: Humanities Press. (Original work published 1925)

Winquist, J. R., & Larson Jr, J. R. (1998). Information pooling: When it impacts group decision making. *Journal of Personality and Social Psychology, 74*, 371-377. https://doi.org/10.1037/0022-3514.74.2.371

Wittenbaum, G. M., & Moreland, R. L. (2008). Small-Group Research in Social Psychology: Topics and Trends over Time. *Social and Personality Psychology Compass, 2*, 187-203. https://doi.org/10.1111/j.1751-9004.2007.00065.x

Yoon, Y.-J., & Larson, J. R., Jr. (2018). *Effect of Cognitive Processing Styles on Preference-consistent Information Bias and Decision-making*. Poster presented at the 90th Annual Meeting of the Midwestern Psychological Association, Chicago, IL.

Yoon, Y.-J., Larson, J. R. Jr., & Huntsinger, J. R. (2018). *A Flexible Impact of Mood on Decision-making in the Hidden profile paradigm.* Poster submitted to the 13th annual conference of the Interdisciplinary Network for Group Research (INGRoup), Bethesda, Maryland.

VITA

Young-Jae Yoon was born and raised in Seoul, South Korea. He attended Sungkyunkwan University in Seoul, South Korea, where he earned a Bachelor of Arts in Law in 2011 and obtained a Master of Arts in Psychology in 2014.

Dr. Yoon continued his research at Loyola University Chicago (LUC), working with Dr. James R. Larson, Jr. While at Loyola, Dr. Yoon served as a graduate research and teaching assistant, and taught industrial and organizational psychology and social psychology lab courses. He took a Doctor of Philosophy in Social Psychology in 2020. His primary research interests are in group information processing and performance.

Currently, Dr. Yoon teaches courses in research methods and social psychology at LUC while he applies for tenure-track professorships in psychology. He resides in Glenview, IL, with his family.