EFFECTS OF MOOD AND COGNITION ON THE SOCIAL INFORMATION-PROCESSING MECHANISMS UNDERLYING AGGRESSION

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ABSTRACT

The purpose of this study was to examine the effects of executive functions and anger activation on the social information-processing mechanisms related to aggressive behavior. The social information-processing stages examined were attribution, goal selection, and response evaluation. Participants were randomly assigned to either an anger or neutral mood induction and listened to three different scenario types: accidental, ambiguous and hostile. Hypotheses were: 1) the anger group when compared to the neutral would demonstrate more hostile aggressive responding in interpretation attribution, goal evaluation, and response evaluation in the ambiguous and hostile conditions, 2) executive functioning would moderate the relationship between anger and hostile-aggressive responding. Results are discussed in terms of integrating affect and executive function into models of social information processing.

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INTRODUCTION

Aggression is defined as any behavior intended to inflict psychological or physical harm to a person or object (Berkowitz, 1974). Bushman and Anderson (2001) added that the provocateur must intend to cause immediate harm to the victim, and the victim must intend to avoid the behavior. There are various ways in which people cause harm to others. The form of aggression that is most prominent is reactive aggression (Crick, 1996). Reactive aggression takes place when one attributes hostility from a provocateur then retaliates in some way (Crick and Dodge, 1996). Frustration may also induce reactive aggression if attainment of a goal is blocked (Berkowitz, 1989). Proactive aggression refers to the utilization of aggression to obtain a goal, for example, a bully uses aggression to obtain lunch money from a peer (Crick and Dodge, 1996). Relational aggression is another form of aggression that is most commonly found in female social interactions (Crick, 1995), that take place within relationships or friendships. It is best described as exclusion, or attempts to reduce group status of the victim. Regardless of the type of aggression, this behavior results in significant psychosocial and physical consequences to a target; therefore, it is important to develop theoretical models of aggression.

Aggression Models

There are a variety of behaviors that can be classified as aggressive acts. Examples consist of rape, domestic violence and road rage just to name a few. There is a need to better understand the antecedents of aggressive behavior. Subsequently the

scientific community can address these issues by conducting studies to test theories, and create intervention programs that target aggressive individuals.

The Cognitive-Neoassocianistic Model (Berkowitz, 1990) states that negative affect is the basis for most anger and anger-related aggression. In this model anger is defined as an experience that encompasses other feelings such as annoyance and irritation. There are certain conditions that can intensify the anger experience such as exposure to adverse conditions (hot temperatures, cold water, etc), frustration, or attribution of hostile intent. Associations are linked between current negative affect and anger related memories, ideas, or aggressive inclinations. The probability of an aggressive behavior increases when these associations have been established.

Higher-order functions play an important role in this model. Attribution of the situation, identifying goals for behavior, a decision of social appropriateness, and a determination of whether the behavior is efficacious constitute the higher-order functions. The Cognitive-Neoassocianistic model addresses environmental determinants of anger, and aggression, but it does not address anger that is present during interpersonal interactions. Scherer & Tannenbaum (1986) have shown that anger results from daily interpersonal relationships. Since the Cognitive-Neoassocianistic model does not account for social interactions a more appropriate model is needed to analyze such situations.

Anderson and Bushman (2002) have proposed a theory that parsimoniously explains aggression by the integration of past models of aggression. The General Aggression Model (GAM) draws off knowledge structures that affects perception of

social information, interpretation of that information, the decisions that are made to address the situation, and how the response is influenced by the situation. The knowledge structures are composed of perceptual, and personal schemata, as well as behavioral scripts. The knowledge structures are developed by past experiences that subsequently influence interpretation. The knowledge structures are also composed of beliefs, affect, and contingencies on how to behaviorally respond. With use these knowledge structures can become automatized. This is a very thorough theory of aggression, but does not provide an experimental model that could predict novel situations.

The social information-processing model originally proposed by Dodge (1986), and then reformulated by Crick in Dodge (1994) describes aggressive behavior in children. The model makes predictions about children's aggressive behavior in six non-linear, parallel steps of processing consisting of encoding of cues, interpretation of cues, goal clarification, response generation or construction, response evaluation, and behavioral enactment. This model also draws from memory systems such as social knowledge, heuristics and social schemas.

Steps 1 and 2 (encoding and interpretation, respectfully) of the social information-processing model uses social cues and schemata to organize the information encoded. Schemata or heuristics are based on prior knowledge and allow for more efficient encoding of the vast array of information being processed. Although heuristics allow for quicker encoding, errors can occur due to the lack of social cues utilized. The errors can

negatively affect the attribution processes involved in encoding and interpretation. Attributions of causality and intent are inferred to develop behavioral goals. The hostile attribution bias occurs when the intent of an instigator is interpreted as hostile.

Dodge and Coie (1987) found the hostile attribution bias is related to aggressive behavior. The hostility bias involves the attribution of intent from a provocateur as hostile ambiguous situations. This error in attribution is the result of not attending to enough social cues, as well as having pre-existing aggressive schemata (Huesmann, 1990). The hostile attribution bias has been found in a number of samples including aggressive children (Dodge, 1986), aggressive adolescents (VanOostrum & Horvath, 1997) in interactions with adults (Wyatt & Haskett, 2001) and mentally retarded adult males (Basquill, Nezu, Nezu, & Klein, 2004). In these studies the researchers found that aggressive individuals made more errors in detecting the intent of a peer in ambiguous scenarios subsequently increasing the probability of selecting an aggressive response. Dodge and his colleagues have investigated the hostile attribution bias in a number of different child samples. VanOostrum & Horvath (1997) extended the social information-processing model to a normal sample of adolescents. Different aspects of hostile intent, such as perceived harm, and the importance of the situation, were collected to better understand the aggressive response that followed. It was hypothesized that the greater the perceived harm, and the greater the importance would demonstrate a stronger level of aggressive response. The adolescent males read ambiguous intent scenarios and then rated on different scales the intent of the provocateur, the perceived harm, the importance

of the situations and the level of aggressive response. The results showed that the findings from Dodge's work on children could be extended to a normal adolescent sample. They found that the hostile attribution bias did predict a higher level of aggressive responding, and that perceived hostile intent from the provocateur significantly predicted aggressive responding. This shows that perceived harm and the importance of the situation do not play a key role in intent styles of normal adolescents. Basquil et al (2004) extended Dodge's research to adult males with mild mental retardation. A sample of aggressive, and non-aggressive participants was examined by using ambiguous intent stories derived from scenarios used by Dodge and Coie (1987). They found that in the aggressive group they attributed hostile intent more often, and produced more aggressive solutions to problem situations than the non-aggressive group. The authors concluded that the social information processing model is applicable to aggressive behavior in adult males with mild mental retardation. Currently there has not been research done on a normal adult population.

Step 3, goal clarification or formulation, was added to the reformulated social information-processing model in 1994. Goals are defined as focused arousal states. Since humans are in a constant state of arousal it is hypothesized that it is essential to understand the goals that are made due to the states. It might be the case as stated by Crick and Dodge (1994) that, "[anger] might serve as the impetus for a retaliatory goal" (p. 87). It is also hypothesized that goal clarification may influence the subsequent response generations and selection. Positive goals for enriching social relations are

associated with pro-social behavior; conversely, negative goals are associated with maladjustment and aggressive behaviors that may harm social relations with peers. In an unpublished study by Ogle and Fisher, there is evidence that goal clarification may be the step in the model that best predicts aggressive behavior. Further research is needed, on goal clarification concerning adult samples.

Step 4, response access or construction, involves the utilization of long-term memory to access or construct responses to a given situation. Responses are usually consistent with the goal that has been selected but not all responses that are generated are congruent with goals. There are three important aspects of response access, 1) the number of responses generated, 2) the content of the responses generated, and 3) the order in which the individual accesses certain types of responses. Aggressive children (Richard and Dodge, 1982), as well as adult males with mild mental retardation (Basqill et al, 2004) generate more aggressive responses in inappropriate situations than normal samples.

Response evaluation is stage five of the social information-processing model. Response evaluation involves decision-making processes after the goal has been clarified and responses have been generated. The individual assesses a number of characteristics about the responses generated to choose the most appropriate response for a given situation. Response evaluation is the assessment of the content of the responses, and whether they are socially appropriate. The individual then predicts outcomes from the behaviors generated. Maladjusted children (aggressive and rejected) tend to favor

expected negative outcomes, resulting in aggressive responding (Dodge, 1986). Lastly, the response efficacy is assessed. This is the individual's self perceived confidence that they will be able to enact the response that has been selected. Once a response is selected there is a behavioral enactment (step 6), followed by a response by the peer, and the process begins again. It is hypothesized that social processing is continuous, and can be in different stages all at once to handle the daily array of social interactions.

The reformulated social information processing model has produced a wide range of empirical research. Many different samples have been examined from preschool children (Crick and Ladd, 1993), mentally retarded children (Gomez and Hazeldine, 1996), juvenile delinquents (Shahinfar, Kupersmidt, and Matza, 2001), maltreated children (Price and Landsverk, 1998), and intoxicated adults (Sayette, Wilson, and Elias, 1993; Ogle and Miller, 2004). The model was developed to study social adjustment in children, but has been extended to adults by Sayette et al (1993), and Ogle and Miller (2004).

There have only been a few experiments that have utilized the social information-processing model in adult samples. These studies have been in the alcohol and aggression field. Many studies have looked at the behavioral effects of aggression when competitive shock tasks (Taylor, 1967) have been utilized. Sayette and his colleagues (1993) sought out to understand the underlying cognitive mechanisms that explain aggression displayed in prior research. They used the original version of the social information-processing model (Dodge, 1986) to examine each of the social skills

(encoding, interpretation, response generation and selection) necessary to competently navigate a social interaction. There were four experimental groups (control, placebo, low dose, and a high dose of alcohol). The participants viewed eight different vignettes in which different social situations were depicted (either prevocational or neutral situations). Sayette et al. found that the high alcohol dose participants were more likely to generate a greater number of aggressive responses, did not endorse competent behaviors, and selected more aggressive responses than the control participants. After this research was published in 1993, Crick and Dodge reformulated the social information-processing model (1994) to include goal clarification.

Ogle and Miller (2004) used the reformulated social information-processing model to address gender differences to varying levels of provocation in the alcohol aggression-link. Participants were randomly selected into an intoxication group (control, placebo, or alcohol). They then viewed either hostile or neutral scenarios depicting provocation from either males or females. The statistical analysis revealed that intoxicated males, as compared to all other groups demonstrated more hostile attributions in the male and female provocations, formulated more aggressive goals in the male provocation, generated more aggressive responses in the male provocation, and selected more aggressive responses in the male provocation.

The prior research has discussed topics ranging from aggressive children (Crick and Dodge, 1994), to alcohol intoxicated adults (Sayette et al., 1993; Ogle and Miller, 2004). Emotion is a variable that all of these studies have not addressed. In the Sayette

et al study they administered a hostility questionnaire to determine whether a person's hostility level could predict subsequent interpretation of hostile cues. This was not further discussed in the article. An examination of the role that emotion plays on the social information processing of interpersonal relationships could serve as a predictor of aggression. Negative affect has been found to be a causal determinant in aggression (Berkowitz, 1990). Lemerise and Arsenio (2000) integrated emotion into Crick and Dodge's social information processing model. They adopted all of the same steps from the model, but added emotion to each of the six steps. Emotion was addressed in two ways, internal or on-going mood states, and emotion presented by the peer within an interaction. In step one of the model emotional cues expressed by the peer is encoded. In steps two and three the emotions associated with that particular individual are processed. For instance, if the relationship with the peer is negative, negative emotions with negative causal attributions and goals increase the probability of hostile intent. In steps four and five, emotional processes are drawn from to generate and select responses. These emotional processes consist of the individual's temperament, their current mood state, and emotion regulation.

Although this model does integrate emotion into social information processing, it does so by targeting the emotions of the peer. Lemerise and Arsenio, as well as Crick and Dodge, acknowledge that specific mood states do have an important role within this model, but further research is needed on the topic. Specific mood states such as anger, sadness, anxiety, depression, fear, or happiness have all been studied in various ways, but

not in the context of the social information-processing model. Anger in particular has been singled out as a contributor to aggressive behavior (Berkowitz, 1990); therefore, understanding the role of anger in the context of social information processing is important.

Anger and Cognition

Anger has been heavily researched within the emotion literature. There are many definitions, and theories on the development of anger (see Berkowitz & Harmon-Jones, 2004). The effects of anger on cognition have also been studied (Eckhardt & Cohen, 1997; Cohen, Eckhardt, & Schagat, 1998; van Honk, Tuiten, de Haan, van den Hout, & Stam, 2001). These studies primarily examined the role of anger on attention allocation to specific variables. Attentional abilities are an important factor within the framework of the social information-processing model (Crick and Dodge, 1994). The following studies demonstrate a need to examine anger and aggression through social cognitive skills.

Eckhardt and Cohen (1997) examined trait anger and naturalistic insult on a variation of the emotional Stroop task. The variation of the Stroop task consisted of anger-relevant words, positive and neutral emotion words. The participants were classified as either high or low in trait anger, and randomly placed into an insult or no insult group. The naturalistic insult was enacted by a confederate who confronted the participant and then insulted the participant. It was thought that participants who were classified as high anger and who were insulted would demonstrate a longer latency, or

interference on the anger words compared to the other words. This interference would be due to mood congruent associative networks that would draw the attention of the participant. This hypothesis was supported by the data. In a later study by Cohen, Eckhardt, and Schagat (1998) this attentional bias was demonstrated in a visual search task.

These two studies show that when anger is induced on individuals high in trait anger they are more likely to attend to anger-relevant information compared to individuals with low trait anger. This myopic effect of anger salient information may decrease the amount of information encoded and subsequently interpreted in social interactions. As discussed by Crick and Dodge (1994), the probability of making an attribution error increases when the individual encodes less information from the social interaction. Therefore, anger may be a variable that disrupts information processing that is essential to socially acceptable behavior.

Executive Cognitive Functioning

In the social information-processing model, higher order cognitive capacities are essential to competent behavior. Cognitive abilities such as attention, self-monitoring, planning, decision-making, and goal directed behavior are needed (Berkowitz, 1990; Crick and Dodge, 1994). These abilities are often referred to as the executive cognitive functions (ECF). Hoaken, Shaughnessy, and Pihl (2003) researched the relationship between ECF, impulsivity, and aggression. This line of research suggests impulsivity is not appropriately inhibited by the executive functions, which leads to aggressive

behaviors. Individuals with low ECF scores were found to make decisions more quickly, without considering future consequences. Hoaken et al (2003) examined males and females who were either classified as low or high in ECF. This was determined by tasks that have been shown to be associated with functioning of the prefrontal cortex. The participants then "competed" in a factitious reaction time task, in which shocks would be administered by the participant or the confederate when a reaction time trial was won. The data showed that males low in ECF became more aggressive as provocation increased. These same males also showed a deficiency in inhibiting impulsive behavior on tasks associated with impulsivity (Hoaken et al., 2003).

There have been no studies to date examining the relationship of ECF in social information processing related to aggressive behavior. It is reasonable to assume that ECF moderates the relationship between social information processing and aggressive behavior. From a theoretical standpoint adaptive social information processing depends on intact ECF, and deficits in ECF are related to aggressive behavior. Given this, it is important to examine the role ECF plays in social information processing in a variety of social provocations.

The purpose of this study is to examine the effects of anger and ECF on the social information processing mechanisms related to aggression. More specifically, the role anger has on the social information processing stages of interpretation, goal selection, and response evaluation. Crick and Dodge (1994) agree that emotion does play an important role in the processing of social information. Lemerise and Arsenio (2000) integrated

emotion into the model proposed by Crick and Dodge, but emphasized the role of emotional cues from the peer and not the individual. The current study's aim is to extend the ideas of this integrated model to explain how anger (a mood state or an on going emotion) interacts with processing of different forms of provocation. A second goal is to investigate the relationship between social information-processing, emotion, and executive cognitive functioning processing.

The specific stages of the social information-processing (SIP) model that will be examined are interpretation (attribution), goal selection, and response evaluation. These stages will act as the dependent variables in the study. They will be quantified by using the protocol derived from Ogle and Miller (2004), and Tremblay and Belchevski (2004), discussed in the Methods section of this paper.

Hypotheses

Several hypotheses can be made based on findings of prior research. The participants in the anger condition, when compared to participants in the neutral condition, will attribute (interpret) more hostility in an ambiguous and hostile situation. This hypothesis is supported by data from Tremblay and Belchevski (2004), which showed that individuals high in trait aggression were more likely to respond in an aggressive retaliation when the intent of a provocateur was either hostile or ambiguous. The hypothesis is also based on data that found a hostile attribution bias in aggressive children (Dodge and Coie, 1987). Dodge, Murphy, and Buchsbaum (1984) have also found that aggression most likely follows the occurrence of attributing hostility in an

ambiguous situation. The author predicts the reason for this bias is due to the individual encoding less information, and subsequently interpreting the situation in a manner that is congruent to their disposition. Similarly, following this reasoning it seems appropriate to make the same prediction for the hostile provocation scenario. The angry sample will attribute more hostility in a hostile situation compared to the neutral induction. There are no hypothesized differences for the accidental situation across groups.

Goal selection is hypothesized to be more hostile in the anger induction compared to the neutral induction. Angry individuals will produce more hostile goals than that of the control group in the ambiguous and hostile situation. The accidental scenario will yield no differences in goal selection across groups. Induction will not produce any significant differences on aggressive response evaluation in any of the scenarios. In other words the anger group will not significantly rate aggressive responses higher than the neutral group. The reasoning behind this hypothesis stems from prior research. Crick and Dodge (1994) found that aggressive children generate fewer responses overall compared to non-aggressive children.

Executive functioning is hypothesized to act as a moderating variable in the relationship between anger and the social information processing steps associated with aggression. Prior research has found this relationship between executive functioning and aggressive behavior (Hoaken, Shaughnessy, and Pihl, 2003; Giancola, 2004; Fishbein, 2003). It seems appropriate to make the same prediction about the underlying mechanisms of aggression.

METHOD

Participants

220 participants (46% female) were recruited from the experimental sign-up board located in the Social and Behavioral Sciences building on the campus of The University of North Carolina Wilmington. The majority of the students participated to earn research credits required by their introductory psychology course. The mean age of the sample was 19.24(2.68) years old, and the mode was 18 (51%). One hundred ninety-seven participants were Caucasian (89.5%), 12 were African American, 5 Asian American, 3 Native American, and 3 of Hispanic ethnicity. The majority of the sample was college freshman (61%).

Materials

A battery of questionnaires was administered to assess certain demographics, personality, impulsivity, psychopathology, trait aggression and anger. The battery consisted of the following self-report questionnaires:

UPPS Impulsive Behavior Scale (UPPS) (Whiteside & Lynam, 2001): This is a 45-item self-reported inventory that measured impulsive behavior in four domains: urgency, premeditation, perseverance, and sensation seeking.

Buss and Perry Aggression Questionnaire (BPAQ) (Buss & Perry, 1992). This is a 29-item self-reported inventory that measured aggressive behavior in four domains: physical and verbal aggression, anger and hostility.

Profile of Mood States (POMS; Educational and Industrial Testing Service, 1971*)*: This is a 65-item self-report inventory which measures changes in affect on six subscales: tension-anxiety, depression, anger, vigor, fatigue, and confusion.

Neurocognitive Battery (Peterson, Pihl, Higgins, and Lee, 1999).

In addition to the questionnaires a battery of computerized neuropsychological tests was administered. The neurocognitive battery consists of five tests that examine the functioning of the prefrontal cortex (the executive functions). This battery is useful because it automates the testing procedure and eliminates the chance of human error. The neurocognitive battery will be administered on a Windows compatible PC.

Self-ordered pointing task (Concrete and Abstract): The participant is presented with a 3x4 array with either common objects, or abstract images that are easy to distinguish but difficult to name. The 3x4 array is presented consecutively 12 times over three trials. With each presentation the participants is instructed to choose a new image. The object of this task is to choose a different image with each presentation. The dependent variable is the total number of errors across trials. This task has been shown to be a sufficient test of working memory. Working memory is essential to processing a number of different stimuli at one time. Research has shown that working memory is critical to the inhibition of aggression (Séguin, Pihl, Harden, Tremblay and Boulerice, 1995; Lau, Peterson and Pihl, 1995).

Somatic Marker Sensitivity Test (SMST): This task is a computerized analogue of the Iowa Card Task and has been shown to measure orbital prefrontal functioning (Bechara et al, 1994) which is essential to the decision making process (Reavis and Overman, 2001). This task requires the participant to choose cards from four decks. Cards in two of the decks are associated with high reward but even higher sporadic loss of reward (bad or disadvantageous decks these are the blue and yellow cards). Cards in the other two decks are associated with low reward but with even lower sporadic losses (good or advantageous decks these are the red and green cards). Consistent choice of advantageous cards will result in low but long-term gain, whereas consistent choice of disadvantageous cards will result in overall loss of money. Over the course of 150 trials, normal control participants gradually formulate the strategy of picking from the low-paying (good) decks, which results in gain in the long run (Overman et al., 2004).

The Spatial Conditioned Association Task (SCAT): The participant is presented with a set of six circles and six rectangles. When the circles are lit the participant is to choose the rectangle that they believe is associated with the lit circle. If the participant chooses incorrectly the computer will respond with the message "wrong". The participant will continue to guess which rectangle is associated with the circle until correct association is made, and the computer will respond with, "right". Completion criterion is 18 successful trials in a row, or when 180 trials have elapsed. The dependent variables in this task are the number of trials

to complete task, total number of errors, and total number of incorrect trials. It has been shown by Petrides et al, (1993) by using functional magnetic resonance as well as positron emission tomography that the dorsolateral prefrontal cortex is functioning during the administration of this task.

The Non-spatial Condition Association Task (NSCAT): The participant is presented with a colored rectangle above a 2x3 array of abstract images that can easily be distinguished but are difficult to name. The participant is instructed to pair the color of the rectangle to one of the abstract images. At first, the participant learns the associations by trial-and-error. Once the participants answer an association correctly the order of the array is changed and the color of the rectangle changes to another color. The dependent variables of this task are the number of trials to complete task, total number of errors, and total number of incorrect trials.

The SCAT and the NSCAT have been shown to be valid tests of the dorsolateral pre-frontal cortex. The demonstration of conditioned associations predicts choosing competent behaviors in social interactions. It also demonstrates that the person can learn from mistakes when they are given feedback, and will correct their future behavior accordingly.

Anger Induction (Engebretson, et al., 1999).

The anger induction was administered via a Microsoft PowerPoint presentation. The phrases were placed in the center of each slide accompanied by an audio recording of the phrase. The attention of the participant could not be monitored because they were

behind a curtain. The objective of the audio recording was to ensure that the participant would hear the induction as well. The research assistant gave the following directions to the participant, "On each slide of the presentation there is one sentence or phrase, you are to read that sentence, imagine what the sentence is saying, recall any relevant memories, and generally try much as possible to get into the mood suggested by the sentence" (Engebretson et al., 1999, pg. 16). The slideshow automatically changed to the next slide every twenty seconds to ensure exposure to each phrase for the allotted time.

Neutral Mood Induction

The neutral induction was administered via a Microsoft PowerPoint presentation. The phrases were placed in the center of each slide accompanied by an audio recording of the phrase. The attention of the participant could not be monitored because they were behind a curtain. The objective of the audio recording was to ensure that the participant would hear the induction as well. The research assistant gave the following directions to the participant, "On each slide of the presentation there is one sentence or phrase, you are to read that sentence, imagine what the sentence is saying, recall any relevant memories, and generally try much as possible to get into the mood suggested by the sentence". The emotional content of the slides were proven to be neutral (Jennings, McGinnis, Lovejoy, and Stirling, 2000), and an adequate control group compared to the anger induction.

Audio Recorded Vignettes

Each participant listened to vignettes that were digitally recorded. The scenarios consisted of an interaction between two individuals, a target character and a provocateur.

The participant was directed to imagine that they are the person in the scenario called "You". In each of the vignettes the target character is matched to the participant's gender. To ensure the participant knew the target character was of the same sex the narrator's voice was either male or female. The audio recordings described three types of scenarios in which provocation was manipulated by the provocateur; accidental, ambiguous, and hostile intent. The accidental scenarios consisted of an interaction between the target and the provocateur in which the intent of the provocateur is accidental. The ambiguous scenarios depicted a social interaction in which intent is undetermined. The hostile scenarios showed an interaction that clearly demonstrates hostility from the provocateur. These vignettes were derived from Tremblay and Belchevski (2004) who also administered audio taped vignettes. They constructed 8 vignettes for non-intentional, ambiguous, and intentional. Three vignettes were randomly chosen from the eight in each provocation condition. A full description of each vignette is given in the appendix.

Social Information Processing Protocol

This protocol is derived from the protocols used by Ogle and Miller (2004), and Tremblay and Belchevski (2004). The protocol consists of eleven questions concerning the vignette presented prior to administration of the protocol. The eleven questions address three stages (representation, goal clarification, and response evaluation) of the social information-processing model. The questions are anchored 0 ("Not at all") to 10 ("Extremely"). A research assistant, located behind a drawn curtain, reads the questions

and records the participant's answers. The participant was instructed to give an answer verbally from 0 to 10 immediately after the question had been read aloud.

In the present study three social information-processing stages constituted the dependent variables. The first is the representational or interpretation stage, specifically the average ranking of hostile intent, anger, and anxiety (SIP variables 1, 2, and 3). The scores ranged from 0 to 10. The second dependent variable will measure goal clarification (SIP variables 4, 5, 6, and 7). The scores ranged from 0 to 10. The third dependent variable is response evaluation (SIP variables 8, 9, 10, and 11). These scares ranged from 0 to 10.

Procedure

Participants arrived at the Academic Support Building room 106 at their scheduled time, and were seated at a desk in the hall outside the room. They were read a description of the study, followed by an explanation of the voluntary and confidential nature of the experiment. The participant then gave their informed consent. They then began the questionnaire battery followed by the Profile of Mood States (POMS) to assess their baseline mood states. The participants were then randomly placed into the anger or neutral induction and then assigned to an accidental, ambiguous, or hostile provocation. Once the participant finished the battery of questionnaires along with the baseline POMS, the research assistant reviewed the materials for omitted information, and showed the participant into the lab to a seat located in front of a computer screen. The research assistant then explained the instructions for the mood induction, followed by instructions

for the vignettes. This was an important step because the participant was behind a drawn curtain, and the research assistant could not help the participant start the next manipulation. Once the participant was comfortable with the instructions the research assistant pulled the curtain and the mood induction began. When the induction was completed the participant was instructed to begin the PowerPoint presentation of the provocational vignettes. After each of the three vignettes the research assistant administered the social information-processing protocol (described in the METHODS section). When all of the vignettes were completed the second POMS was administered. After completion of the POMS the research assistant drew the curtain back and started the neurocognitive battery task on the computer for the participant. Once finished with the computer task the participant was debriefed and given credit for participating.

RESULTS

The following analysis is based on 220 participants, 118 males (54%), and 102 females (46%). Of the 118 males sampled, 62 were randomly selected into the anger induction, and 56 were administered the neutral induction. The 118 male participants were placed consecutively into one of three provocational conditions: accidental (39), ambiguous (39), and hostile (40). One hundred-two female participants were randomly selected equally into the anger induction (51), and the neutral induction (51). The 102 females were also consecutively placed into one of the provocational conditions: accidental (36), ambiguous (32), and hostile (34).

Integrity of Manipulations

The two independent variables that were manipulated were affect (anger, and neutral inductions), and provocation (accidental, ambiguous, and hostile).

Mood Inductions

An analysis of covariance (ANCOVA) was conducted on induction to assess baseline to post induction anger ratings on the Profile of Mood States (POMS). The baseline anger score was entered as the covariate. The analysis revealed that anger baseline was a significant covariate, $F(1, 217) = 591.19$, $p<.01$. Induction was also significant, $F(1.220) = 9.61$, $p<.01$. The means for POMS anger post induction were 11.17 (9.88) for the anger induction, and 9.71 (7.74) for the neutral induction. This analysis demonstrated that the anger induction significantly increased anger ratings from baseline to post induction on the POMS. Means for each of the POMS sub-scales can be found in Table 1. ANCOVA's were conducted on the remaining subscales (anxiety, depression, fatigue, vigor, and confusion) and anxiety was the only subscale from the remaining that was significantly affected by the induction $F(1,220) =5.71$, $p<.05$.

Provocation Levels

To test the effect of the provocation manipulation an ANOVA was calculated where condition was the fixed factor and level of hostility attributed (SIP 1) was the dependent variable. A significant effect of condition was found $F(2, 219) = 103.32$, $p<.001$. Post-hoc analysis using Tukey's HSD indicated that all three conditions were significantly different from each other ($p < .001$), that is, there was less hostility

Table 1. POMS subscale means for participants in the anger, and neutral induction.

				Induction		
		Anger			Neutral	
		Base	Post		Base	Post
Anger		9.14	11.16		9.63	9.71
Anxiety		15.95	15.82		15.67	14.42
Fatigue		10.21	8.41		9.86	8.25
Vigor		16.12	14.16		15.67	14.92
Confused		13.51	11.70		13.77	11.83
Depression		9.65	9.84		9.91	9.58

attributed in the accidental condition than either the ambiguous or hostile conditions and there was less hostility attributed for the ambiguous than the hostile condition.

Hypothesis Testing

The objective of this analysis was to test the hypotheses predicted based on the literature. A series of ANOVAs were conducted to test each hypothesis. The dependent variables measured in this analysis were the eleven social information processing variables. There were three separate hypotheses concerning attribution, goal selection, and response evaluation. The eleven SIP variables were categorized into these three groups accordingly. This section is organized in that respective order.

Attribution

Three SIP variables from the eleven were selected to assess attribution. SIP variable 1 was, "How HOSTILE was the individual in the scenario being toward you?", and will be called hostile intent. SIP variable 2 was, "How ANGRY would you be in this situation?", and will be called self-perceived anger. SIP variable 3 was, "How ANXIOUS would you be in this situation?", and will be called self-perceived anxiety. Hypothesis one predicted significant differences in the participants' ratings of hostile intent, and self-perceived anger and anxiety in the ambiguous and hostile provocations, but no significant differences for the accidental condition. An analysis of variance was conducted and revealed that ratings of self-perceived anxiety was significantly affected for participants in the ambiguous situation who were induced to anger, $F(1, 67) = 6.32$, $p < .05$. There were no other significant findings for the SIP variables in the accidental or

hostile conditions.

Goal Clarification

Of the eleven SIP variables four variables (SIP 4, 5, 6, and 7) were selected to assess goal clarification. SIP variable 4 was, "How would you want the situation to turn out such that the most important thing was that the person apologizes to you?", and will be called apology. SIP variable 5 was, "How much would you want the situation to turn out such that the most important thing was that conflict was avoided?", and will be called conflict avoidance. SIP variable 6 was, "How much would you want the situation to turn out such that the most important thing was that the person "pays" for what they did?" and will be called retribution. SIP variable 7 was, "To what degree would you want the situation to turn out such that the most important thing was that the person gets hurt enough to not do it again?", and will be called punishment.

Hypothesis two predicted significant differences in the participants' ratings of apology, conflict avoidance, retribution, and punishment in the ambiguous and hostile provocations. There were no predicted significant differences in the accidental condition. An analysis of variance was conducted and revealed that ratings for an apology was significantly affected for participants in the ambiguous condition who were induced to anger, $F(1, 71) = 9.15$, $p < .01$. There were no other significant findings for the SIP variables in the accidental or hostile conditions.

Response Evaluation

SIP variables 8, 9, 10, and 11 represented ratings of response evaluation. SIP

variable 8 was, "What is the likelihood that you would be RUDE to the person?", and will be called rude. SIP variable 9 was, "What is the likelihood that you would call the person a derogatory name?", and will be called verbal insult. SIP variable 10 was, "What is the likelihood you would threaten the person if the situation was not resolved?", and will be called verbal threat. SIP variable 11 was, "What is the likelihood that you would use physical force (push, grab, or hit) if the situation was not resolved?", and will be called physical force.

Hypothesis three predicted significant differences in the participants' ratings of rude, verbal insult, verbal threat, and physical force in the ambiguous and hostile conditions. There were no predicted differences in the accidental condition. An analysis of variance was conducted and revealed no significant differences across conditions on the four SIP variables due to the mood induction manipulation. The null findings supported by this analysis are discussed in the next section.

Executive Cognitive Functioning

Pearson correlations were conducted on the neurocognitive variables and social information-processing variables for induction, and then by condition. Significant correlations are presented in Tables 2, 3, 4, 5, and 6. (Anger induction, neutral induction, accidental, ambiguous, and hostile respectively). Table 7 presents significant Pearson correlations for ECF tests by induction and condition on SIP variable.

Table 2. Significant correlations for neurocognitive variables and SIP variables in the anger induction.

	SIP1	SIP2	SIP3	SIP4	SIP5	SIP6	SIP7	SIP8	SIP9	SIP10	SIP11
NEURO1											
NEURO2	.240*		.188*			.276**	.202*				
NEURO3											-.227*
NEURO4											
NEURO5											-.206*
NEURO6											
NEURO7					.199*						
NEURO8											
NEURO9									.247*		
NEURO10											
NEURO11											
NEURO12							-.202*				

neuro1 = self-ordered pointing (concrete errors).
neuro2 = self-ordered pointing (abstract errors).
neuro3 = spatial condition association task (trials to completed task).
neuro4 = spatial condition association task (total number of errors).
neuro5 = spatial condition association task (total incorrect trials).
neuro6 = non-spatial condition association task (trials to complete task).
neuro7 = non-spatial condition association task (total number of errors).
neuro8 = non-spatial condition association task (total incorrect trials).
neuro9 = Somatic Marker Sensitivity Test (deck 1 blue cards).
neuro10 = Somatic Marker Sensitivity Test (deck 2 yellow cards).
neuro11 = Somatic Marker Sensitivity Test (deck 3 green cards).
neuro12 = Somatic Marker Sensitivity Test (deck 4 red cards).
*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 3. Significant correlations for neurocognitive variables and SIP variables in the neutral induction.

	SIP1	SIP2	SIP3	SIP4	SIP5	SIP6	SIP7	SIP8	SIP9	SIP10	SIP11
NEURO1											
NEURO2											
NEURO3				-.217*							
NEURO4				-.249*							
NEURO5				-.256**							
NEURO6				-.203*	-.302**						
NEURO7					-.278**						
NEURO8					-.261**						
NEURO9											
NEURO10											
NEURO11		-.194*			.211*			-.230*			
NEURO12											

neuro1 = self-ordered pointing (concrete errors).
neuro2 = self-ordered pointing (abstract errors).
neuro3 = spatial condition association task (trials to completed task).
neuro4 = spatial condition association task (total number of errors).
neuro5 = spatial condition association task (total incorrect trials).
neuro6 = non-spatial condition association task (trials to complete task).
neuro7 = non-spatial condition association task (total number of errors).
neuro8 = non-spatial condition association task (total incorrect trials).
neuro9 = Somatic Marker Sensitivity Test (deck 1 blue cards).
neuro10 = Somatic Marker Sensitivity Test (deck 2 yellow cards).
neuro11 = Somatic Marker Sensitivity Test (deck 3 green cards).
neuro12 = Somatic Marker Sensitivity Test (deck 4 red cards).
*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 4. Significant correlations for neurocognitive variables and SIP variables in the accidental condition.

	SIP1	SIP2	SIP3	SIP4	SIP5	SIP6	SIP7	SIP8	SIP9	SIP10	SIP11
NEURO1	.243*		.312**								
NEURO2	.336**										
NEURO3										-.258*	-.239*
NEURO4								-.329**	-.319**	-.298**	-.275*
NEURO5								-.300**	-.290*	-.303**	-.273*
NEURO6											
NEURO7								-.256*			
NEURO8								-.237*			
NEURO9											
NEURO10											
NEURO11											
NEURO12											

neuro1 = self-ordered pointing (concrete errors).
neuro2 = self-ordered pointing (abstract errors).
neuro3 = spatial condition association task (trials to completed task).
neuro4 = spatial condition association task (total number of errors).
neuro5 = spatial condition association task (total incorrect trials).
neuro6 = non-spatial condition association task (trials to complete task).
neuro7 = non-spatial condition association task (total number of errors).
neuro8 = non-spatial condition association task (total incorrect trials).
neuro9 = Somatic Marker Sensitivity Test (deck 1 blue cards).
neuro10 = Somatic Marker Sensitivity Test (deck 2 yellow cards).
neuro11 = Somatic Marker Sensitivity Test (deck 3 green cards).
neuro12 = Somatic Marker Sensitivity Test (deck 4 red cards).
*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 5. Significant correlations for neurocognitive variables and SIP variables in the ambiguous condition.

	SIP1	SIP2	SIP3	SIP4	SIP5	SIP6	SIP7	SIP8	SIP9	SIP10	SIP11
NEURO1					-.282*						
NEURO2	.271*										
NEURO3											
NEURO4											
NEURO5											
NEURO6						.289*					
NEURO7											
NEURO8											
NEURO9											
NEURO10											
NEURO11				-.271*							
NEURO12											

neuro1 = self-ordered pointing (concrete errors).
neuro2 = self-ordered pointing (abstract errors).
neuro3 = spatial condition association task (trials to completed task).
neuro4 = spatial condition association task (total number of errors).
neuro5 = spatial condition association task (total incorrect trials).
neuro6 = non-spatial condition association task (trials to complete task).
neuro7 = non-spatial condition association task (total number of errors).
neuro8 = non-spatial condition association task (total incorrect trials).
neuro9 = Somatic Marker Sensitivity Test (deck 1 blue cards).
neuro10 = Somatic Marker Sensitivity Test (deck 2 yellow cards).
neuro11 = Somatic Marker Sensitivity Test (deck 3 green cards).
neuro12 = Somatic Marker Sensitivity Test (deck 4 red cards).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 6. Significant correlations for neurocognitive variables and SIP variables in the hostile condition.

	SIP1	SIP2	SIP3	SIP4	SIP5	SIP6	SIP7	SIP8	SIP9	SIP10	SIP11
NEURO1											
NEURO2			.233*								
NEURO3											
NEURO4											
NEURO5									.236*		
NEURO6					-.326**						
NEURO7											
NEURO8					-.274*						
NEURO9								.322**			
NEURO10											
NEURO11											
NEURO12											

neuro1 = self-ordered pointing (concrete errors).
neuro2 = self-ordered pointing (abstract errors).
neuro3 = spatial condition association task (trials to completed task).
neuro4 = spatial condition association task (total number of errors).
neuro5 = spatial condition association task (total incorrect trials).
neuro6 = non-spatial condition association task (trials to complete task).
neuro7 = non-spatial condition association task (total number of errors).
neuro8 = non-spatial condition association task (total incorrect trials).
neuro9 = Somatic Marker Sensitivity Test (deck 1 blue cards).
neuro10 = Somatic Marker Sensitivity Test (deck 2 yellow cards).
neuro11 = Somatic Marker Sensitivity Test (deck 3 green cards).
neuro12 = Somatic Marker Sensitivity Test (deck 4 red cards).
*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 7. Significant correlations for neurocognitive variables and SIP variables by induction and condition. SIP Variable (correlation).

		Induction				
	Anger			Neutral		
	Accidental	Ambiguous	Hostile	Accidental	Ambiguous	Hostile
Neuro1	3(.408*) 6(.352*)	5(-.354*)				
Neuro2	1(.513**) 6(.386*)			5(-.384*)		
Neuro3	11(-.326*)		1(.353*) 4(.346*)			5(-.383*)
Neuro4	8(-.394*) 10(-.322*) 11(-.335*)			9(-.415*)		4(-.354*) 5(-.350*) 9(.338*)
Neuro5	8(-.351*) 10(-.354*) 11(-.364*)			9(-.396*)		4(-.425**) 5(-.361*)
Neuro6						4(-.354*) 5(-.484**)
Neuro7	8(-.358*)				1(.399*)	5(-.482**)
Neuro8						5(-.512**)
Neuro9		5(.347*)	3(.334*)	9(-.336*)		5(-.389*) 8(.358*)
Neuro10						
Neuro11		6(.351*)			4(-.389*)	2(-.336*) 5(.345*) 8(-.413*)
Neuro12		3(-.344*) 7(-.347*)				3(.344*)

neuro1 = self-ordered pointing (concrete errors).
neuro2 = self-ordered pointing (abstract errors).
neuro3 = spatial condition association task (trials to completed task).
neuro4 = spatial condition association task (total number of errors).
neuro5 = spatial condition association task (total incorrect trials).
neuro6 = non-spatial condition association task (trials to complete task).
neuro7 = non-spatial condition association task (total number of errors).
neuro8 = non-spatial condition association task (total incorrect trials).
neuro9 = Somatic Marker Sensitivity Test (deck 1 blue cards).
neuro10 = Somatic Marker Sensitivity Test (deck 2 yellow cards).
neuro11 = Somatic Marker Sensitivity Test (deck 3 green cards).
neuro12 = Somatic Marker Sensitivity Test (deck 4 red cards).
*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

Summary of Findings

There were significant findings for the effectiveness of the manipulations. The anger induction did produce a significant increase in anger ratings over the neutral induction. The neutral induction did not produce a significant increase of anger, proving that the neutral induction was a sufficient control group for the anger induction.

The analysis of variance was conducted to assess the provocation manipulation on SIP variable one was significant. SIP variable one is the question addressing perceived hostility from the instigator. This variable was chosen as the dependent variable in this test because the objective of the independent variable was to manipulate hostility across groups. A Tukey's HSD revealed that the accidental group rated hostility lower than the participants in the ambiguous and hostile groups. The participants in the ambiguous group rated the hostility level lower than the hostile group. The data suggests that the manipulations were valid.

Hypothesis one predicted a main effect for induction in the ambiguous, and hostile condition, but not in the accidental on the SIP variables related to attribution. The analysis of variance revealed a significantly greater rating in self-perceived anxiety (SIP variable 3) in the ambiguous condition, but not the hostile condition for the participants in the anger induction. There were no significant differences in the attribution SIP variables in the accidental condition as predicted. Although the condition manipulation proved to be effective there were no significant differences due to anger on hostile intent ratings (SIP variable 1) across conditions, as well as self-perceived anger ratings (SIP

variable 2). It is strange how the anger induction increased anger, and the provocation increased hostility, but there was no effect on these two variables. Reasons for this are addressed in the Limitations section.

Goal clarification was addressed in hypothesis two (SIP variables apology, conflict avoidance, retribution, and punishment). It was hypothesized that the anger induction would increase hostile goal evaluation in the ambiguous and hostile provocations. Once again there were no predicted differences in the accidental condition. The results revealed that SIP variable apology was significantly affected in the ambiguous situation. SIP variables conflict avoidance, retribution, and punishment yielded no significant differences in the accidental, ambiguous, or hostile provocations. SIP variable 4 assesses the goal of having the instigator apologize for the situation.

Hypothesis three predicted significant increases of hostile response evaluation for participants in the ambiguous and hostile provocations who were induced to anger. There were no significant findings at all on the four SIP variables that constituted response evaluation; therefore, the null hypothesis was not rejected.

Pearson correlations were conducted to examine the relationship between the ECF tasks and responding on the social information-processing variables. The four tests of executive functioning and the dependent variables were self-ordered pointing (concrete errors and abstract errors), spatial condition association task (trials to complete task, total number or errors, total number of incorrect trials), non-spatial condition association task (trials to complete task, total number or errors, total number of incorrect trials), and the

somatic marker sensitivity test (blue, yellow, green and red cards).

The correlations were ran for ECF by induction (anger, and neutral), ECF by condition (accidental, ambiguous, and hostile), and then for ECF by induction and condition (anger and accidental; anger and ambiguous; anger and hostile; neutral and accidental; neutral and ambiguous; neutral and hostile).

There was a positive correlation between ratings of hostile intent (SIP variable 1) and abstract errors on the self-ordered pointing task for angered participants in the accidental condition. There was also a positive correlation between ratings of hostile intent and abstract errors in the ambiguous condition when induction was not factored into the equation. Hostile intent ratings were also positively related to trials to complete the spatial condition association task in the anger/hostile condition.

Self-perceived anger ratings were negatively related to the selection of green cards on the somatic marker sensitivity test in the neutral/hostile condition. There were no other significant relations hips for this variable.

Self-perceived anxiety was positively related to concrete errors on the self-ordered pointing task in the anger/accidental condition. Anxiety ratings were also significantly correlated (positively and negatively) to the different decks of the somatic marker sensitivity test.

Rating an apology as important was negatively related to the non-spatial and spatial condition association task dependent variables in the neutral/hostile condition, and positively related in the anger/hostile condition. Need for an apology was also negatively

related to green cards selected on the somatic marker sensitivity test in the neutral/ambiguous condition.

Avoidance of conflict (SIP variable 5) correlated to the most ECF tests, compared to the rest of the SIP variable, either in a positive or negative way. Avoidance of conflict was negatively related for all measurements of the non-spatial and spatial condition association task in the neutral/hostile condition. It was also highly correlated with the selection of blue and green cards from the somatic marker sensitivity test. The self-ordered pointing task also was related to avoidance of conflict.

Retribution was positively correlated to the concrete and abstract errors on the self-ordered pointing task in the anger/accidental condition. It was also positively correlated to the selection of green cards in the anger/ambiguous situation.

The SIP variable punishment (To what degree would you want the situation to turn out such that the most important thing was that the person gets hurt enough to not do it again) was negatively correlated to the selection red cards in the anger/ambiguous condition.

SIP variables rude, verbal insult, and verbal threat were all similarly related across conditions on the spatial and non-spatial condition association task. Physical force was negatively related to the spatial condition association task in the anger/accidental condition.

Integrity of Manipulations

In this study mood and provocation were selected as variables that would be manipulated to test the predictive capabilities of the social information-processing model. Statistical analysis has shown that the independent variables did significantly affect the intended dependent variables. The anger induction produced significantly greater rankings in anger and anxiety when compared to the neutral induction. Decreased self reported vigor approached significance after the anger induction when compared to the neutral induction ($p=.10$). The provocation manipulation was also shown to significantly effect hostile intent ratings (accidental < ambiguous < hostile). Therefore, it can be said with confidence that the significant differences found were due to the procedure and not to alternative causes. The main obstacle faced by these manipulations was that they had small effects on the dependent variables. A discussion of more potent manipulations will be addressed in a later section.

The Role of Emotion in Social Information Processing

The mood induction was shown to be successful at producing anger and anxiety, but at low magnitudes. There is research that claims there is a small physiological difference between anger and anxiety states (Berkowitz, 1990). The difference that does exist may be a matter of semantics or context. Nevertheless, participants who were brought to anger rated interactions in the ambiguous condition as more anxiety provoking than those in the neutral mood induction. Obviously the anger induction was successful at inducing a negative affective state. The objective of this study was to examine and explain how negative affect can affect social information-processing. A mood congruent

bias may explain this relationship, where current mood state directly influences interpretation of a mood state as a result of a social interaction. This effect did take place in an ambiguous situation, so the anger induction produced a bias that was not there for the participants in the neutral induction. Well then why was there not a mood congruent bias for the self-perceived anger ratings if the participants were induced to anger? This question may be as simple as noting that there was not a large enough effect size for the induction. In other words, there was not enough anger aroused to produce the mood congruent bias for interpretation of social interactions. Bryan, Sullivan-Burstein, and Mathur (1998) state that there is a difference between emotions and affective states. Emotions are experienced globally and may take over all behavior, compared to affective states that are not as pervasive but can influence social information processing. If this difference does exist it would account for the differences in attribution and goal clarification in the anger condition compared to the neutral.

Participants in the anger induction rated the importance of an apology higher in the ambiguous condition compared to participants in the neutral induction. Goal clarification is theorized to be the "arousal-regulating process" (Crick and Dodge, 1994), and could account for the increased need for an apology as well as increased self-perceived anxiety. When a person is anxious the intuitive behavior is to avoid any kind of conflict so that the anxiety will be reduced. If a person is apologized to for a perceived wrong doing the anxiety is more likely to be ameliorated. For this reason, increased hostile response evaluation was not endorsed for SIP variables probability of being rude,

verbal insult, verbal threat, or physical force. If any of these responses were selected it would defeat the purpose of the goal.

In conclusion, affective states influence the stages of social information processing by biasing the interpretation of an individual's self-perceived mood state for a given provocation. Concomitantly, a goal is produced congruent to the existing affective state. Response generation and evaluation serve to facilitate the attainment of the established goal.

The Role of Executive Cognitive Functioning in Social Information Processing.

The ECF tasks administered in this study addressed working memory, conditioned associative learning, and decision making. Working memory was measured by the concrete and abstract self-ordered pointing tasks. Conditioned associative learning was measured by the SCAT and the NSCAT. Decision-making was measured by the SMST. An objective of this study was to explore any relationships that may exist between ECF and SIP variables. Significant correlations were presented in Table 8, between ECF variables and SIP variables for induction by condition.

In the anger/accidental condition, associative learning was negatively related to the likelihood of rudeness, verbal threat, and physical force. These SIP variables constituted the response evaluation stage. The hostile nature of each of the response evaluation questions could explain the negative relationship. One of the characteristics of associative learning is that behaviors that are not socially accepted or reinforced are less likely to occur in the future. Acting rude, threatening people verbally, and using physical

force are not accepted in daily life, therefore, this relationship demonstrates competent response evaluation.

In the neutral/accidental condition, only response evaluation question likelihood of verbal assault was negatively related to associative learning. It is interesting that the other response evaluation questions that were relevant in the anger condition are not in the neutral induction. Berkowitz (1990) states that anger is experienced on a day-to-day basis. For that reason, social decisions have to be made frequently while angered. Berkowitz goes on to state that people with healthy higher- order cognitive capacities become more aware of their responses when they are angry and are more likely to self-censor their behavior. The relationship in this study suggests that ECF capabilities heighten during affective states to ensure competent social behavior.

Associative learning was also negatively related to need for an apology and avoidance of conflict in the neutral/hostile condition, but not in the anger/hostile condition (the only exception to this relationship was a positive relationship between need for an apology and SCAT trials to complete task). ECF faculties were more influential in the avoidance of a conflict in a hostile situation when the participants were not angry. Since the ANOVA's conducted on induction and provocation did not yield any significant differences in the endorsement of hostile response evaluation or goal clarification the negative relationship is not responsible for aggressive responding. It is interesting that angry individuals are less likely to seek an apology or avoid conflict in a

hostile situation. The avoidance of conflict is a desired behavior, but the affective state must over ride the attainment of an apology.

There was a significant positive correlation between retribution and working memory, for both abstract and concrete, in the anger induction compared to the neutral induction. Working memory is essential to the inhibition of aggression (Séguin, Pihl, Harden, Tremblay and Boulerice, 1995; Lau, Peterson and Pihl, 1995). The more errors that were made were related to increase ratings of retribution. In other words, the participants in the anger induction who ranked the importance of the instigator "paying" for what they did greater than the participants in the neutral induction, were less capable to process more information into working memory. Affective states may inhibit working memory by making mood congruent cues from an instigator more salient; therefore, there is less information to interpret. This explains the participants' increased endorsement of provocateur "paying" for what they did.

Decision-making was measured by the somatic-marker sensitivity test. This test is a valid indicator of risky behaviors. This is demonstrated by the relationship between SIP variable likelihood to be rude and the different types of decks in the SMST. There is a significant positive relationship for likelihood to be rude and number of times the blue deck is drawn from. The number of blue cards selected demonstrates the need for short-term reward over and above long term circumstances. Choosing to be rude in response to provocation is a retaliatory goal that maybe rewarding to some, but may produce negative consequences in the long run. Conversely, there was a negative relationship between

selection of green cards and probability of responding with rudeness. Selection of green cards indicates a smaller short term reward with greater long term benefits. Participants who endorsed rudeness less ignored the short term reward of retaliation, and instead focused on the long term benefits of not responding aggressively.

In conclusion, affective states not only affect social information processing they also influence neurocognitive functioning. Associative learning is affected by affective states by the inhibition of hostile response generation in an attempt to enact a behavior that will be rewarded. ECF capacities heighten when angered to ensure competent behavior. Working memory can be negatively influenced by affective states due to a mood congruent bias that allocates attention to mood congruent cues in the environment. The consequence of the mood congruent bias is that there is less information in working memory that the individual can draw from to make an accurate mental representation.

Finally, competent decision-making is crucial to the attainment of long-term benefits of not responding aggressively. There were no distinct patterns due to affective state like the other ECF functions. The relationships found in this study between ECF, emotion, and social information processing demonstrates a need to integrate higher-order functions into information-processing models.

Limitations

There are a number of limitations to be aware of when reviewing the results of this study. The first limitation is lack of power. The recruitment of more participants and a longer period of time to collect data may help. Another limitation related to power is

that of the effect sizes for the two manipulations. The anger induction and provocations were significantly effective, but on a small scale. Future mood inductions should produce higher levels of the emotion studied. As discussed earlier, there is a difference between the experience of an emotion and an affective state. There are many other anger induction procedures such as music induction, frustration tests, or even naturalistic insult. It is difficult to induce a person to anger, especially in a controlled laboratory setting where ethics play an important role. The anger induction in this study was effective so with the help of other variables that account for emotion maybe there would be an increase in effect size. Variables such as personality traits could be controlled for, where participants that score high in trait aggression, anger, or impulsivity would be placed into separate conditions. This data was collected in this study but was not part of the statistical analysis. Also, agents that produce arousal accompanied by the anger induction could be beneficial at producing a stronger mood state. For instance, the inclusion of an alcohol condition or caffeine condition would produce arousal that would exacerbate the effects of the anger induction.

The provocation manipulation was administered via a PowerPoint presentation where the person read and listened to a vignette. There are certainly more salient administrations available, such as video-taped vignettes or role playing that would produce a "more real" effect. These two alternatives were not selected due to the time restraint of data collection and the lack of funds to produce quality video-taped vignettes.

This sample consisted of college students with a mean age of just over 19.

Overall, this is a healthy population, and most likely is not deficient on ECF. These results may differ for a clinical sample, such as head trauma patients or severe alcohol dependents, etc. Future research on this topic should address different samples to form a better understanding of the role the frontal lobe plays in the social information processing models.

Future Directions

There are a number of directions this research topic could go in the future. Topics that could be considered are gender, traits (such as aggressive, hostility, anger, urgency etc.), administration of alcohol, stronger anger inductions, and different emotions. Conducting these types of experiments in clinical samples would also provide more availability that could help further the understanding of ECF and SIP. The questions addressed in this study are programmatic, and the findings suggest that pursuing this question is a worthwhile endeavor.

With continued research this topic could be important in the application of interventions that address interpersonal violence or anger management skills. This research is also capable of identifying risk factors that may make individuals more likely to be violent. This information could be utilized by public health agencies to educate individuals who are at risk victims of violence. Violence prevention initiatives could target services such as domestic abuse shelters, police departments, and universities. A better understanding of the causes of aggressive thoughts and violent acts will only benefit society as a whole.

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APPENDIX A

Buss and Perry Aggression Questionnaire (BPAQ)

Below is a list of statements that are to varying degrees characteristic of people. For each statement circle the number that corresponds to the degree to which the statement is characteristic of you, 1 being EXTREMELY UNCHARACTERISTIC OF ME to 5 being EXTREMELY CHARACTERISTIC OF ME.

Once in a while I can't control the urge to strike another person. 1 2 3 4 5

I tell my friends openly when I disagree with them. 1 2 3 4 5

I flare up quickly but get over it quickly. 1 2 3 4 5

I am sometimes eaten up with jealousy. 1 2 3 4 5

Given enough provocation, I may hit another person. 1 2 3 4 5

I often find myself disagreeing with other people. 1 2 3 4 5

When frustrated, I let my irritation show. 1 2 3 4 5

At time I feel I have gotten a raw deal out of life. 1 2 3 4 5

If somebody hits me, I hit back. 1 2 3 4 5

When people annoy me, I may tell them what I think of them. 1 2 3 4 5

I sometimes feel like powder keg ready to explode. 1 2 3 4 5

Other people always seem to get the breaks. 1 2 3 4 5

I get into fights a little more than the average person. 1 2 3 4 5

I can't help getting into arguments when people disagree with me. 1 2 3 4 5

I am an even-tempered person. 1 2 3 4 5

I wonder why sometimes I feel so bitter about things. 1 2 3 4 5

If I have to resort to violence to protect my rights, I will. 1 2 3 4 5

My friends say that I'm somewhat argumentative. 1 2 3 4 5

Some of my friends think I am a hot head. 1 2 3 4 5

I know that "friends" talk about me behind my back. 1 2 3 4 5

There are people who pushed me so far that we came to blows. 1 2 3 4 5

Sometimes I fly off the handle for no good reason. 1 2 3 4 5

I am suspicious of overly friendly strangers. 1 2 3 4 5

I can think of no good reason for ever hitting a person. 1 2 3 4 5

I have trouble controlling my temper. 1 2 3 4 5

I sometimes feel that people are laughing at me behind my back. 1 2 3 4 5

I have threatened people I know. 1 2 3 4 5

When people are especially nice, I wonder what they want. 1 2 3 4 5

I have become so mad that I have broken things. 1 2 3 4 5

APPENDIX B

Profile of Mood States (POMS)

Below is a list of word that describe feeling people have. Please read each one carefully. Then fill in ONE circle under the answer to the right, which best describes HOW YOU HAVE BEEN FEELING DURING THE PAST WEEK INCLUDING TODAY.

0 = Not at all
1 = A little
2 = Moderately
3 = Quite a bit
4 = Extremely

Friendly	0	1	2	3	4
Tense	0	1	2	3	4
Angry	0	1	2	3	4
Worn out	0	1	2	3	4
Unhappy	0	1	2	3	4
Clear-headed	0	1	2	3	4
Lively	0	1	2	3	4
Confused	0	1	2	3	4
Sorry for things done	0	1	2	3	4
Shaky	0	1	2	3	4
Listless	0	1	2	3	4
Peeved	0	1	2	3	4
Considerate	0	1	2	3	4
Sad	0	1	2	3	4
Active	0	1	2	3	4
On edge	0	1	2	3	4
Grouchy	0	1	2	3	4
Blue	0	1	2	3	4
Energetic	0	1	2	3	4
Panicky	0	1	2	3	4
Hopeless	0	1	2	3	4
Relaxed	0	1	2	3	4
Unworthy	0	1	2	3	4
Spiteful	0	1	2	3	4
Sympathetic	0	1	2	3	4
Uneasy	0	1	2	3	4
Restless	0	1	2	3	4
Unable to concentrate	0	1	2	3	4
Fatigued	0	1	2	3	4
Helpful	0	1	2	3	4
Annoyed	0	1	2	3	4

Discouraged	0	1	2	3	4
Resentful	0	1	2	3	4
Nervous	0	1	2	3	4
Lonely	0	1	2	3	4
Miserable	0	1	2	3	4
Muddied	0	1	2	3	4
Cheerful	0	1	2	3	4
Bitter	0	1	2	3	4
Exhausted	0	1	2	3	4
Anxious	0	1	2	3	4
Ready to fight	0	1	2	3	4
Good natured	0	1	2	3	4
Gloomy	0	1	2	3	4
Desperate	0	1	2	3	4
Sluggish	0	1	2	3	4
Rebellious	0	1	2	3	4
Helpless	0	1	2	3	4
Weary	0	1	2	3	4
Bewildered	0	1	2	3	4
Alert	0	1	2	3	4
Deceived	0	1	2	3	4
Furious	0	1	2	3	4
Efficient	0	1	2	3	4
Trusting	0	1	2	3	4
Full of pep	0	1	2	3	4
Bad-tempered	0	1	2	3	4
Worthless	0	1	2	3	4
Forgetful	0	1	2	3	4
Carefree	0	1	2	3	4
Terrified	0	1	2	3	4
Guilty	0	1	2	3	4
Vigorous	0	1	2	3	4
Uncertain about things	0	1	2	3	4
Bushed	0	1	2	3	4

APPENDIX C

UPPS

This questionnaire contains 45 statements. Read each statement carefully. For each statement, circle the response that best represents your opinion.

ANSWER SCALE:

1	2	3	4
EXTREMELY UNCHARACTERISTIC OF ME	**UNCHARACTERISTIC OF ME**	**CHARACTERISTIC OF ME**	**EXTREMELY CHARACTERISTIC OF ME**

I have a reserved and cautious attitude toward life. **1 2 3 4**

I have trouble controlling my impulses. **1 2 3 4**

I generally seek new and exciting experiences and sensations. **1 2 3 4**

I generally like to see things through to the end. **1 2 3 4**

My thinking is usually careful and purposeful. **1 2 3 4**

I have trouble resisting my cravings (for food, cigarettes, etc.). **1 2 3 4**

I'll try anything once. **1 2 3 4**

I tend to give up easily. **1 2 3 4**

I am not one of those people to blurt out things without thinking. **1 2 3 4**

I often get involved in things I later wish I could get out of. **1 2 3 4**

I like sports and games in which you have to choose your next move more quickly. **1 2 3 4**

Unfinished tasks really bother me. **1 2 3 4**

I like to stop and think things over before I do them. **1 2 3 4**

When I feel bad, I will often do things I later regret in order to make myself better now. **1 2 3 4**

I would enjoy water skiing. **1 2 3 4**

Once I get going on something I hate to stop.	**1**	**2**	**3**	**4**
I don't like to start a project until I know exactly how to proceed.	**1**	**2**	**3**	**4**
Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.	**1**	**2**	**3**	**4**
I enjoy taking risks.	**1**	**2**	**3**	**4**
I concentrate easily	**1**	**2**	**3**	**4**
I tend to value and follow a rational, "sensible" approach to things.	**1**	**2**	**3**	**4**
When I am upset I often act without thinking.	**1**	**2**	**3**	**4**
I would enjoy parachute jumping.	**1**	**2**	**3**	**4**
I finish what I start.	**1**	**2**	**3**	**4**
I usually make up my mind through careful reasoning.	**1**	**2**	**3**	**4**
When I feel rejected, I will often say things that I later regret.	**1**	**2**	**3**	**4**
I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.	**1**	**2**	**3**	**4**
I am pretty good about pacing myself so as to get things done on time.	**1**	**2**	**3**	**4**
I am a cautious person.	**1**	**2**	**3**	**4**
It is hard for me to resist acting on my feelings.	**1**	**2**	**3**	**4**
I would like to learn to fly an airplane.	**1**	**2**	**3**	**4**
I am a productive person who always gets the job done.	**1**	**2**	**3**	**4**
Before I get into a new situation I like to find out what to expect from it.	**1**	**2**	**3**	**4**
I often make matters worse because I act without thinking when I am upset.	**1**	**2**	**3**	**4**
I sometimes like doing things that are a bit frightening.	**1**	**2**	**3**	**4**
Once I start a project, I almost always finish it.	**1**	**2**	**3**	**4**
I usually think carefully before doing anything.	**1**	**2**	**3**	**4**
In the heat of an argument, I will often say things that I later regret.	**1**	**2**	**3**	**4**
I would enjoy the sensation of skiing very fast down a high mountain slope.	**1**	**2**	**3**	**4**
There are so many little jobs that need to be done that I sometimes just ignore them all.	**1**	**2**	**3**	**4**
Before making up my mind, I consider all the advantages and disadvantages.	**1**	**2**	**3**	**4**

I am always able to keep my feelings under control.	**1 2 3 4**
I would like to go scuba diving.	**1 2 3 4**
Sometimes I do things on impulse that I later regret.	**1 2 3 4**
I would enjoy fast driving.	**1 2 3 4**

APPENDIX D

Anger Mood Induction Engebretson, Sirota, Niaura, Edwards, & Brown (1999).

Today is neither better nor worse than any other day.
However, I do feel a little irritated today.
If some isn't being logical, I don't just let it go by.
There have been times when I've been criticized unjustly.
I can be impatient with foolish people.
I've worked under people who take credit for good work but pass off mistakes on those who are under them
Some of my family and friends have habits that bother and annoy me very much.
I know what it feels like to be cheated.
At times, I've been deceived by others.
No one cares much what happens to anyone but them selves.
Some of the policies at school make me indignant.
Sometimes I think people do things just to irritate me.
I've been dad-tempered at times in my life and I can recapture those feelings easily.
Few things make me more bitter than being take for granted.
I feel like being sarcastic with someone who has angered me.
I can become quick-tempered if the situation provokes me enough.
There are occasions when I'm hot-headed.
I get angry when I think about the creeps that make it unsafe to walk alone at night.
It's maddening the way people don't really listen to me.
I feel rather aggravated now.
There are people who I thought I could trust who betrayed me.
I feel grouchy and spiteful.
Member of my family have treated me poorly at times and made me very angry.
If someone mistreats me, I can really harbor a grudge.
It makes me bitter to think of the way so called friends have sometimes treated me.
Although it is probably irrational, I can't help but see red when someone insults me.
Some of the things that go on at school make me downright angry and resentful.
I feel vindictive.
I can feel my body getting tense with anger.
I can be incredibly bitchy at times. In fact I'm feeling that way now.
The cruelty that goes on in the world often incenses and even enrages me.
I feel angry at the whole world.
I can be confronting with people who are rude or annoying. They piss me off!
I feel rebellious and ready to fight.
I'm not going to take any mistreatment from anyone. Just let someone even try to take advantage of me today!
I feel vicious.
There have been days when I feel hostile and bitter and unable to control those feelings.
To make this anger go away would be nearly impossible.
I feel like striking out at someone who has angered me.
I've lain awake at night so mad that I couldn't stop thinking about what made me feel

that way.
Sometimes I seem to go blind with rage.
I'm so hostile that I could easily lose control.
I've been so angry I could have bashed someone's head in!
I can feel my fists clenched in fury.
I feel like I could explode.
I want to yell and scream. That's how upset I feel.
I couldn't stay calm now no matter what. I'm to incensed.
My heart is pounding and I'm boiling inside.
I am consumed with hatred.
I'm livid with rage.

APPENDIX E

Neutral Mood Induction. First 35 phrases by Jennings, McGinnis, Lovejoy, and Stirling (2000).

You may have to take the ferry to get to the island.
Some say that lady bugs are good for the garden.
The rug was made according to an old Navajo pattern.
The reefs along the coast are made of coral.
The Pacific Ocean has fish.
The nightclub had a female vocalist and a live band.
The movie theatre was located downtown.
The Gulf Islands are in British Columbia.
The Eucalyptus tree was the largest tree on the block.
The desert climate is hot and dry.
New York City is in New York state.
Some think that electricity is the safest form of power.
Some chimps have been taught to use sign language.
Some baseball bats are made from the wood of the ash tree.
She walked over to the shop and knocked on the door.
Savannah is in the state of Georgia.
Perennials bloom every year.
Olympia is the capital of the state of Washington.
New Mexico is in the United States
Most oil paintings are done on canvas.
Most high school have a band.
Many buildings in Washington are made of marble.
It snows in Idaho.
Mules hauled the supplies up the mountain.
Santa Fe is the capital of New Mexico.
An orange is a citrus fruit.
Apples are harvested in the Fall.
He played basketball yesterday morning.
Elephants carried the supplies.
Diamonds really can cut glass.
Corn is sometimes called maize.
Basket weaving was invented before pottery making.
Arizona has both deserts and pine-covered mountains.
All the children were playing on the swings.
A neuron fires rapidly.
The telephone makes a ringing noise.
Pens usually come in blue or black ink.
The dog lays on the floor.
The car in the parking lot is white.
The radio has an antennae.
The computer came with a monitor and speakers.

The chair has four legs.
Lake Erie is one of the Great Lakes.
California borders the Pacific Ocean.
Niagara Falls is between Canada and the United States.
China has the highest population in the world.
Microsoft Word is a word processor.
The box was full of folders.
Chicago is in the state of Illinois.
There are four drawers in the filing cabinet.
The floor was made up of tiles.

APPENDIX F

Provocation conditions (Tremblay and Belchevski, 2004).

Accidental

You are at a bar and a very drunk guy dancing next to you steps on your foot and spills his beer all over your new shirt.
You are having dinner at a bar with some friends. A guy and a girl at the table next to you are arguing. At one point the guy who appears to be angry gets up and bumps into you accidentally spilling your drink on your shirt.
Two of your guy friends who have been drinking get into a physical fight. You try to stop them from fighting but one of them punches you in the stomach accidentally.

Ambiguous

You and your friends have been waiting in line for over half an hour to get into a bar. You are to be the next ones to get in but two guys who appear to be very intoxicated butt in front of you.
You are at a bar and you are introduced to several people you don't know. One guy starts talking to you and tells you something that you find insulting.
You are at a local nightclub. While you are dancing a guy bumps into you very roughly.

Hostile

You are standing at the bar waiting for a drink you ordered. A guy shoulders you roughly out of the way and gives you a dirty look.
You and a friend are at a bar and you both leave your table briefly, leaving your jackets on the seats, to get some food and drinks. When you return, you notice that two guys are sitting in your seats. Your friend politely explains to them that you have been sitting there, but they tell you ''That's too bad, go find another table.''
You are walking home after a night out at the local night club. You cross a busy intersection, and it is clear that you have the right-of-way. A guy in a car, who is trying to turn right, almost hits you. He brakes in the middle of the street and yells out at you, ''You stupid idiot.'' He then pulls over in a parking spot a few meters away.

APPENDIX G

Social Information Processing Protocol

1. How HOSTILE was the individual in the scenario being toward you?

0	1	2	3	4	5	6	7	8	9	10
Not at all										Extremely

2. How ANGRY would you be in this situation?

0	1	2	3	4	5	6	7	8	9	10
Not at all										Extremely

3. How ANXIOUS you would be in this situation?

0	1	2	3	4	5	6	7	8	9	10
Not at all										Extremely

4. How much would you want the situation to turn out such that the most important thing was that the person apologizes to you?

0	1	2	3	4	5	6	7	8	9	10
Not at all										Extremely

5. How much would you want the situation to turn out such that the most important thing was that conflict was avoided?

0	1	2	3	4	5	6	7	8	9	10
Not at all										Extremely

6. How much would you want the situation to turn out such that the most important thing was that the person “pays” for what they did?

0	1	2	3	4	5	6	7	8	9	10
Not at all										Extremely

7. To what degree would you want the situation to turn out such that the most important thing is that the person gets hurt enough to not do it again?

0	1	2	3	4	5	6	7	8	9	10
Not at all										Extremely

8. What is the likelihood that you would be RUDE to the person?

0	1	2	3	4	5	6	7	8	9	10
Not at all										Extremely

9. What is the likelihood you would call the person a derogatory name?

0	1	2	3	4	5	6	7	8	9	10
Not at all										Extremely

10. What is the likelihood you would threaten the person if the situation were not resolved?

0	1	2	3	4	5	6	7	8	9	10
Not at all										Extremely

11. What is the likelihood that you would use physical force (push, grab or hit) if the situation were not resolved?

0	1	2	3	4	5	6	7	8	9	10
Not at all										Extremely