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TOWARD AN UNDERSTANDING OF THE EMOTIVE STRUCTURE AND MOTIVATIONAL SYSTEMS AND THEIR INFLUENCE ON THE PROCESSING OF STRATEGIC HEALTH MESSAGES

A Dissertation in

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by

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ABSTRACT

In this project, I tested and utilized two competing structural models of affect and motivational systems, the valence model and the functional model, to investigate the interaction of emotions (happiness, anger, and fear) and framing of health messages (gain and loss). Before a formative test of hypotheses, I conducted three pretests to identify a valid emotion induction method and to develop effective and credible framed messages. Pretest 1 found that the Montreal Affective Voices failed to induce the intended emotions. Results from Pretest 2 indicated that the Life Event Inventory Task successfully induced distinct and robust happiness, anger, and fear. Pretest 3 offered convincing evidence that the framed messages developed for this project were perceived to convey the intended frames and credible information. Using the Life Event Inventory Task and the pretested messages, Study 1 formally tested the hypotheses. First, compared to the valence model, the functional model better accounted for the relationship between emotions and motivational systems (behavioral approach system, BAS, and behavioral inhibition system, BIS). Second, as prescribed by the functional model, I found interactions of emotion and framing to significantly influence attitude. While gain frames produced more favorable attitudes for happy and angry participants, loss frames yielded more favorable attitudes among fearful individuals. I also conducted Study 2 to replicate Study 1, to test a causal model for the emotion-by-framing interaction, and to identify the dominant motivational system under different emotion-by-framing match conditions. Consistent with Study 1, the functional model was again supported. However, only partial support for the emotion-by-framing interaction on intention was found. Structural equation modeling results revealed that emotion and framing had indirect effects on attitude and intention via message related cognition and fear. Additional model comparisons indicated that BAS guided the persuasion process when the approach emotions (anger and happiness) coupled with gain frames; BIS predicted the process when inhibition emotion (fear) fitted with loss frames. I discussed both theoretical and practical implications at the end.

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I still vividly remember the days I sat in Dr. S. Shyam Sundar's Mass Communication Research class. He opened a whole new world of social scientific research for me. His tireless energy and rigorous approach to scholarly inquiries are truly exemplars I followed in this project and will continue to do so.

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Finally, thanks to my wife, Yaqin Zhao, who never wavered in her confidence in me, a partner without whose steadfast support this endeavor would not have been possible. I cannot imagine a better partner to meander through life with.

DEDICATION

To my wife, Yaqin Zhao, with love!

Chapter 1

INTRODUCTION

The Centers for Disease Control and Prevention (2008) spent about $895 million on health promotion in 2007 to advocate effective health prevention and control practices such as usage of condoms in prevention of HIV and AIDS and early screening tests for cancer detection. A great deal of practical and theoretical attention has been directed to strategic variations of message features, such as framing. As applied to health communication, the idea of framing is that health related information could be constructed to focus on either benefits of compliance (gains) or costs of noncompliance (losses) and the subsequent preference for a risky or certain option is a function of such frame construes (for a review, see Rothman, Bartels, Wlaschin, & Salovey, 2006).

A recent meta-analysis revealed that the effect size of framing effects was negligible (O'Keefe & Jensen, 2006). One plausible explanation for the nonsignificant framing effects is the overlooking of the affective context within which the framed messages are delivered. Since the media environment is loaded with emotion inducing programs, the processing of mediated health messages is likely to be influenced by the moods and emotions of audiences. The persuasive effects of framing of health messages should also be contingent upon the pre-existing moods and emotions of audiences.

Though there have been a handful of studies on mood and framing, the empirical findings supported both mood congruency (Wegener, Petty, & Klein, 1994; Yan, Dillard, & Shen, 2008) and incongruence (Chang, 2007; Keller, Lipkus, & Rimer, 2003). The mixed findings could be attributed to the inappropriate structural models of affect and motivational systems employed in these studies.

There have been two major conceptions of affective structure: the dual-systems models (Green, Salovey, & Traux, 1999; Thayer, 1989) which advocate a bipolar positive–negative structure, and the models of discrete emotions which conceive of affect in accordance with every emotion's unique behavioral tendency (Ekman, 1992; Nabi, 2002). Though both models predict affect's relationship with the two motivational systems, the behavioral approach system (BAS) and the behavioral inhibition system (BIS), their accounts differ. The dual-systems models prescribe a valence model of BAS/BIS in which positive affect correlates with BAS and negative affect correlates with BIS. Nevertheless, the discrete-emotions models suggest a functional model of BAS/BIS in which each emotion's relationship with BAS/BIS mirrors its behavioral tendency distinctively.

The first goal of this project is to test the two competing structural models of affect and motivational systems and to investigate the application of the appropriate model in the context of framing of health messages. First, I will identify the appropriate structural model of affect and motivational systems. Then I will explore the interaction of emotion and framing in accordance with the correct structural model.

The second goal of the present project is to develop conceptual frameworks that outline the persuasion processes for emotion, framing, and motivational systems. In the last two decades persuasion research has converged to argue that persuasion is the result of both affect and cognition (Shen & Dillard, 2007). I will propose a causal model based on the appropriate structural model of affect and motivational systems to account for the interactive effects of pre-existing emotions of audiences and message framing styles on message related emotions and cognition, and eventually on attitudinal and intentional changes. I will also conduct model comparisons to explore the relationships among emotion activated motivational systems,

message related emotions and cognition, attitude and intention. If emotion could indeed activate motivational systems, there ought to be a dominant motivational system that guides the persuasion process under the conditions where the experimentally induced emotions of audiences match their assigned framing styles. The purpose of model comparisons is to locate such a dominant motivational system in the causal model.

Review of Literature

Framing of Health Message

Framing Defined

The term *framing* is used differently in media studies and health communication research. In media studies, a frame is a central organizing idea or a story line that gives meanings and connections to the pieces of information presented (Gamson, 1992; Price & Tewksbury, 1997). Different frames actually refer to different options. For instance, the causes of obesity could be framed either as social factors or as individual responsibilities. The two frames suggest different solutions, such as making changes either at societal level or at individual level.

Grounded in prospect theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1981), frames of heath messages refer to the ways in which factually equivalent options were presented differently to people. In health communication most of the advocacy is about the compliance of a particular behavior. Thus, instead of two options there is only one issue and the alternatives are compliance and noncompliance. Though framed differently, gain and loss frames should lead to essentially the same advocacy for healthy behaviors such as exercising regularly or eating less junk food.

Construing gain and loss frames starts with a reference point where no harms are done and no benefits are gained. After considering the framed health message a decision to comply

with the advocacy leads to benefits, a deviation above the reference point, whereas a decision of noncompliance means losses, a point below. Therefore, gain frames emphasize the advantages of compliance whereas loss frames highlight the disadvantages of noncompliance (Levin, Schneider, & Gaeth, 1998). There could be four types of gain and loss framing (Rothman & Salovey, 1997). Gain frames could be attaining desirable outcomes (e.g., to have clear vision for an advocacy for taking an eye exam regularly) and not attaining undesirable outcomes (e.g., to detect and treat potential eye diseases at an early stage). Loss frames may be construed as attaining undesirable outcomes (e.g., to have blurred vision) and not attaining desirable outcomes (e.g., to fail to detect and treat potential eye diseases at an early stage).

Issue Categorization and Risk Construal

Although health issues could be categorized under different labels such as detection and prevention (Rothman & Salovey, 1997), commencement of new behavior and abandonment of old behavior (Snyder, Hamilton, Mitchell, Kiwanuka-Tondo, Fleming-Milici, & Proctor, 2004), prescriptive advocacy and proscriptive advocacy (Yan et al., 2008), the detection–prevention dichotomy is the most commonly used categorization. It captures the difference between risk and certainty best, the two key concepts in the risk averse and risk seeking mechanism in prospect theory (Rothman et al., 2006).

When considering framed health messages risk is a subjective perception of the unpleasantness of performing the advocated behavior (Rothman & Salovey, 1997). Hence, some health advocacies such as having an HIV test could be deemed risky because of the probability of finding bad news, while others, e.g., wearing a seatbelt, are considered risk averse since the adoption of the advocacy only leads to desirable outcomes.

The function of detection behaviors such as mammograms is to detect the existence of

health problems. Considerations of such behaviors involve weighing the possibility of revealing unpleasant news so detection issues are perceived as being risk seeking. In contrast, prevention behaviors such as obesity prevention keep the onset of diseases from happening and lead to pleasant outcomes. Consequently, they are considered risk averse.

Framing Issue Interaction

Gain frames should be particularly effective for prevention issues whereas loss frames would yield more persuasion for detection issues (Meyerowitz & Chaiken, 1987; Rothman & Salovey, 1997). Since prevention issues are perceived to be risk averse, when encountered, people are more receptive to positive information. Such a processing bias matches gain frames that focus on the benefits of compliance. In contrast when presented with detection issues people are in the risk seeking mode and tend to pay more attention to negative information. Hence, loss frames that highlight the disadvantages of noncompliance suit the issues better.

Although a review of the studies of health message framing suggested that the majority of empirical findings supported such a framing-issue match (Rothman et al., 2006), a recent meta-analysis of 93 studies reported a nonsignificant effect size for the framing effects (O'Keefe & Jensen, 2006). Does this mean that loss and gain frames do not have any persuasive effects at all? Probably not.

Any findings rendered from a meta-analysis are circumscribed to the studies it analyzed. O'Keefe and Jensen's list of studies is not exhaustive. Several widely cited large-effect studies were not included in their review, e.g., the studies of Banks, Salovey, Greener, Rothman, Moyer, and Beauvais (1995), Cox and Cox (2001), Myers, Ross, Wolf, Balshem, Jepson, and Millner (1991), Schneider, Salovey, Apanovitch, Pizarro, McCarthy, and Zullo (2001), and Rothman, Salovey, Antone, Keough, and Martin (1993).

A closer look at the meta-analysis indicated appreciable framing effects in the studies where the issues were involving for the participants. For instance, having a mammogram was a very salient issue for medically underserved inner city females older than 40 in Schneider et al.'s (2001) study. The effect size for this study was r = .186 in O'Keefe and Jensen's (2006) meta-analysis. Similarly, skin cancer prevention was a very involving issue for beachgoers in Detweiler et al.'s (1999) study. The effect size for this study was r = .115 in O'Keefe and Jensen's (2006) report. The framing effects do exist but are contingent upon other variables that may affect motivations of audiences to attend to the messages. Recent responses to O'Keefe and Jensen's meta-analysis echo this point (Latimer, Salovey, & Rothman, 2007; Rothman, Wlaschin, Bartels, Latimer, & Salovey, in press).

Motivational Systems and Framing

Latimer et al. (2007) argued that construal of health issues by individuals and individuals' dispositional factors such as motivational systems could be the moderating variables of framing effects that had been overlooked in the early studies reviewed in the meta-analysis.

Neuroscience researchers have long identified two motivational systems that guide our behaviors during goal pursual and self-regulation: the behavioral approach system (BAS), also known as the behavioral activation system (Fowles, 1987) or behavioral facilitation system (Depue & Iacono, 1989); and the behavioral inhibition system (BIS) (Gray, 1981; 1990). BAS is associated with high impulsivity with signs of high neuroticism and high extroversion while BIS is characterized with high anxiety with signs of high neuroticism and high introversion. The function of BAS is to provide the push toward actions that are seen as desirable; BIS is to constrain behaviors that might result in harm to the organism (Davidson, 1992; Gray, 1990). Such a functional view of BAS/BIS implies that BAS is associated with approach-tendency

behaviors while BIS is related with avoidance-prone behaviors. The activations of BAS/BIS are function-specific.

Carver and White (1994) suggest a valence model of BAS/BIS of a different bipolar conceptualization and argue that BAS sensitizes individuals to cues of reward and nonpunishment. In contrast, BIS predisposes individuals to cues of punishment, non-reward and novelty. Consequently, BAS sensitizes individuals to reward cues in gain frames, whereas BIS predisposes individuals to non-reward or punishment cues in loss frames. There are emerging empirical data demonstrating that motivation-congruent frames could yield more persuasion than motivation-incongruent frames. In the studies of Mann, Sherman, and Updegraff (2004), Sherman, Mann, and Updegraff (2006), and Updegraff, Sherman, Luyster, and Mann (2007), individuals with approaching disposition were persuaded more by gain-framed messages whereas inhibition-driven individuals were more receptive to loss frames.

Mood Framing Interaction

Mood and Motivational Systems

Although BAS and BIS were conceptualized as individual trait differences in motivation-congruency studies, advances in neuroscience suggest that activations and changes in BAS/BIS could be attributed to both temporally stable latent traits and occasion-specific fluctuations (Hagemann, Hweig, Seifert, Naumann, & Bartusske, 2005; Hagemann, Naumann, Thayer, & Bartussek, 2002). Yan et al. (2008) demonstrated that mood could activate BAS/BIS and explain the observed occasion-specific fluctuations of BAS and BIS. In their study (Study 1), consistent with the valence model of BAS/BIS, happy and sad moods were activated BAS and BIS respectively.

Mood Framing Congruency

Additional supports for a general valence model of BAS/BIS were also found in a mood by framing interaction (Study 2; Yan et al., 2008). Under the BAS system, gain frames were most effective when coupled with a positive mood. Under the BIS system, loss frames produced the most potent persuasive effects when message recipients were in a sad mood. Similar mood framing congruency was also observed in Wegener et al.'s (1994) study.

Affect research has provided ample empirical data supporting such a valence congruency bias where affect states (positive or negative) lead to valence-consistent judgment (optimistic or pessimistic) (e.g., Bower, 1991; Johnson & Tversky, 1983; Mayer, Gaschke, Braverman, & Evans, 1992; Schwarz & Clore, 1983). Bower's (1981) associative network model suggested that affect and cognition are integrally linked in an associative network of mental representations. Under the mood-congruency framework, cognitive responses mirror mood states. Consequently, cognitive content that is associated with the current mood is more accessible and more likely to be activated, recalled (Bower, Gilligan, & Monteiro, 1981), and employed in judgment and decision making (Forgas, 1992, 1995).

Mood Framing Incongruence

Nevertheless, mood framing incongruence was reported in at least two other studies while nonsignificant effect was reported in Mitchell's (2001) study. In Keller et al.'s (2003) study, a positive mood-loss frames vis-à-vis negative mood-gain frames match was found for obtaining a mammogram. Chang (2007) reported similar mood framing incongruence for taking antimalaria tablets (high risk) but mood framing congruency for using repellent cream (low risk).

Why have there been mixed findings on the interactions between mood and framing? The answers could be the oversimplifications of the dual-systems models of mood and the valence

model of BAS/BIS. To understand the persuasive effects of affect better on individuals' processing of framed health messages, the competing discrete-emotions models and the functional model of BAS/BIS should be introduced as another contending theoretical framework.

Emotion Framing Interaction

Mood and Discrete Emotions

Mood and emotion, though conceptually separable, are related under the umbrella of affect. Mood is the prolonged affective state with a bipolar structure of pleasure–displeasure, good–bad, or negative–positive (Frijda, 1986; Russell, 1999; Watson & Tellegen, 1985). It has low intensity and little cognitive content; it is not directed at any object and can be free-floating. People may or may not be aware of their mood and its effects (Clark & Isen, 1982). In contrast, emotion is usually intense and has a great deal of cognitive content; it is short-lived and directed toward specific objects (Gardner, 1985). Emotion and its effects are always known to an individual.

Competing Models of Affect and Motivational Systems

According to the dual-systems models (Thayer, 1989; Watson & Tellegen, 1985), positive or negative moods sensitize individuals to favorable or unfavorable appraisals of outside events respectively. Consequently, the dual-systems models of mood are parallel to the valence model of BAS/BIS. BAS/BIS could be either the causal antecedents of positive–negative mood productions (Carver & White, 1994) or the end results of positive–negative mood activations (Yan et al., 2008).

Since each is evolutionally developed to respond to a particular situation, emotions prepare and push individuals physically and motivationally to cope with situations differently (Frijda, 1986), i.e. emotions are discrete. They serve different functions and exhibit diverse

action tendencies (Dillard & Peck, 2001; Dillard & Shen, 2007). Therefore, a discrete emotion's association with BAS/BIS should be guided by its unique function and action tendency rather than its valence. Following this logic, the functional model of BAS/BIS suggests different associations with BAS/BIS for emotions with the same valence but different functions. For instance, while the valence model predicts the same relationship with BIS for fear (withdrawal) and anger (attack), which are both negatively valenced, under the functional model, they should correlate with BIS and BAS respectively.

Emotion and Framing

As already reviewed, emotion seems to activate BAS/BIS, and BAS/BIS could sensitize individuals to different message frames. Yet the directions of association of emotions with BAS/BIS differ under the valence model and the functional model. Accordingly, the ways in which emotion interacts with message framing hinge upon the appropriate structural model of affect and its subsequent relationship with motivational systems. The proposed model testing and comparisons are also contingent upon the results from testing the two competing structural models of affect.

To begin, the competing structural models of affect and their suggested relationships with motivational systems should be tested. An appropriate test should include both same-valenced emotions with different functions and similar-function emotions with different valences. A parsimonious selection includes three emotions: fear (negative valence, withdrawal); anger (negative valence, approach); and happiness (positive valence, approach). Competing hypotheses could be proposed based on the valence model and the functional model distinctively.

Hypotheses

The Structure of Affect

The Valence Model

H1a: Negative emotions (fear and anger) are associated with BIS; positive emotion (happiness) is associated with BAS. Specifically: (a) fearful and angry participants will report higher BIS scores than BAS scores; (b) self-reported fear and anger of fearful and angry participants will predict BIS positively; (c) happy participants will report higher BAS scores than BIS scores; and (d) self-reported happiness of happy participants will predict BAS positively.

The Functional Model

H1b: Inhibition emotion (fear) is associated with BIS; approach emotions (anger and happiness) are associated with BAS. Specifically: (a) fearful participants will report higher BIS than BAS scores; (b) self-reported fear of fearful participants will predict BIS positively; (c) angry and happy participants will report higher BAS than BIS scores; and (d) self-reported anger and happiness of angry and happy participants will predict BAS positively.

Emotion Framing Interaction

Depending on the results of H1a and H1b, the interaction of emotion and framing could also be hypothesized accordingly.

The Valence Model

H2a: Negative emotions (fear and anger) couple with loss frame; positive emotion (happiness) couples with gain frame. Specifically, emotions interact with framed messages such that: (a) fearful and angry participants will report more favorable attitude and intention toward the advocacy when they read the loss-framed message; and (b) happy participants will report more favorable attitude and intention toward the advocacy when they read the gain-framed message.

The Functional Model

H2b: Inhibition emotion (fear) couples with loss frame; approach emotions (anger and happiness) couple with gain frame. Specifically, emotions interact with framed messages such that: (a) fearful participants will report more favorable attitude and intention toward the advocacy when they read the loss-framed message; and (b) angry and happy participants will report more favorable attitude and intention toward the advocacy when they read the gain-framed message.

Once the appropriate structural model of affect and motivational systems is identified in H1a and H1b and the direction of the emotion by framing interaction is determined in H2a and H2b, a causal model accounting for the persuasion process of emotion and framing could be proposed. Subsequent model comparisons could also be conducted to locate the dominant motivational system in such a process. Since the relationships among emotion, framing, and motivational systems in the causal model depend on the outcomes of H1a, H1b, H2a, and H2b, the hypothesized model and the subsequent model comparisons will be introduced later.

Chapter 2

PRETESTS

A valid emotion induction method and effectively framed messages were needed before testing the hypotheses. I conducted Pretests 1 and 2 to examine the validity of two emotion induction methods. I carried out Pretest 3 to assess the perceived frames, persuasiveness, and credibility of framed messages.

Emotion Induction Methods

Pretest 1

The Montreal Affective Voices

The purpose of Pretest 1 was to gauge the validity of the Montreal Affective Voices (Belin, Fillion-Bilodeau, & Gosselin, 2007) as an emotion induction method. I will compare affective responses of participants between the three emotion conditions: happiness, anger, and fear.

I adopted the Montreal Affective Voices (Belin, Fillion-Bilodeau, & Gosselin, 2007) to induce happiness, anger, and fear. The stimuli were originally developed to address the problematic interaction between the affective tone of speech and the affective value of the semantic content in auditory affect induction. They consisted of 10 short (about 2 sec) nonlinguistic interjections of the French vowel “ah” expressing each intended emotion. The ones for happiness, anger, and fear were included in this pretest. The vocalizations were portrayed by professional male and female actors. All vocal stimuli were validated by individuals’ ratings of valence, arousal, and perceived intensity. The results indicated that individuals identified all stimuli as accurate portrayals of the intended emotions. However, it is unclear if the stimuli could induce individuals into the targeted emotion. Such data were not available in the original report.

Participants. Forty-one undergraduate students enrolled in communications courses at XX University participated in this experiment in exchange for a small amount of extra credit. Of the total sample, 31 (76%) reported their sex as female, 10 (24%) as male; 35 (85%) indicated that they were Caucasian, 1 (2%) African-American, 5 (12%) Asian-American. The average age was 21 yr.

Procedure. I gave the consent forms to the participants on their arrival. I told them to participate in a human voice recognition test to mask the real purpose of this study. Then I assigned the participants randomly to one of the three emotion conditions. Each participant listened to 10 vocal stimuli for a given emotion on a desktop computer with an individual headset. After that, they filled out a questionnaire measuring their identifications of the voice (masked questions) and their emotions.

Measured variables. I measured the emotions of participants after they listened to the vocal stimuli by a 5-point response scale where 0 = *None of this feeling* and 4 = *A great deal of this feeling* (Dillard & Shen, 2007). The scales and their corresponding items were: *anger* (irritated, angry, annoyed, and aggravated; $\alpha = .91$); *fear* (fearful, afraid, and scared; $\alpha = .93$); *happiness* (happy, elated, cheerful, and joyful; $\alpha = .79$). I summed and averaged all emotion measures.

Results. I performed repeated measures ANOVA and *post hoc* tests where the emotion conditions were the between-subjects independent variable, and the three emotion scores were the within-subjects dependent variable. The results in Figure 1 show that while a fearful condition induced fear and an angry condition failed to produce anger, all three emotion conditions induced happiness, $F(2, 38) = 10.04$, $p < .0001$, $\eta^2 = .23$ (see also Table 1).

Figure 1. Pretest 1: Emotion Induction via the Montreal Affective Voices.

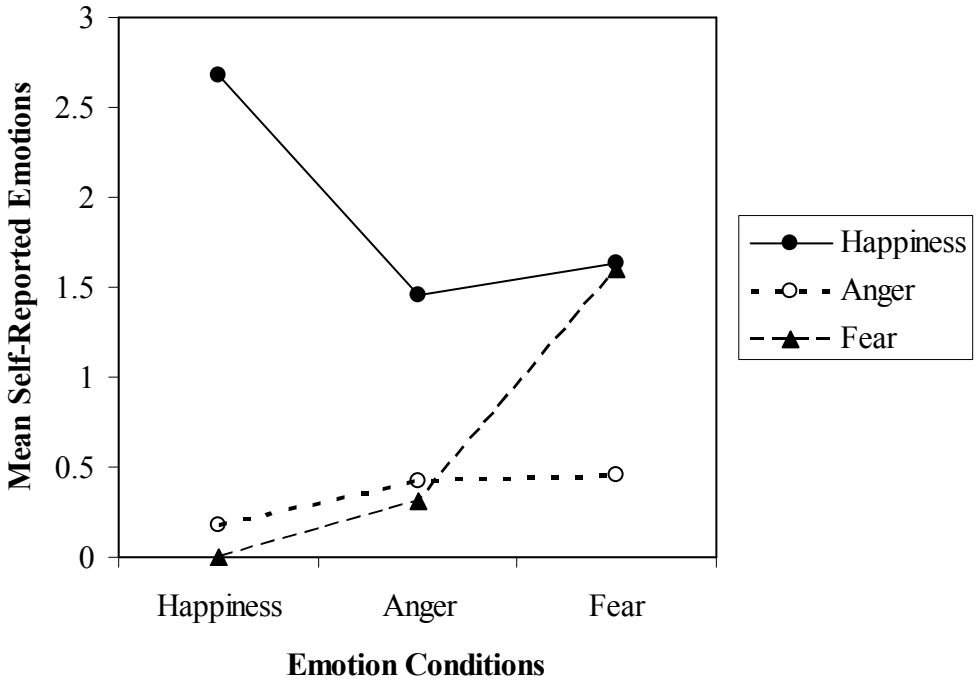


Table 1

The Montreal Affective Voices: Mean Scores and Standard Deviations of Self-Reported Emotions in Different Emotion Conditions

Emotion Conditions		Self-Reported Emotion Scores		
		Happiness	Anger	Fear
Happiness	*M*	2.68_a	0.18_b	0.00_b
	SD	0.95	0.36	0.00
Anger	*M*	1.46_a	0.42_b	0.31_b
	SD	0.92	0.74	0.63
Fear	*M*	1.63_a	0.46_b	1.60_a
	SD	1.29	0.81	1.40

Note. $n = 41$. Emotion scores were measured on 5-point scales (0 = *none of this feeling*, 4 = *a great deal of this feeling*). Means in the same row that do not share subscripts differ at $p < .05$ in the Tukey honestly significant difference comparison.

It is possible that participants perceived the induction method to be artificial and did not take it seriously. Even the observed happiness in the happy condition could be attributed to naturally occurring positive emotions rather than experimentally induced happiness. The Montreal Affective Voices failed to induce distinct and robust fear, anger, and happiness.

Pretest 2

Life Event Inventory Task

I carried out Pretest 2 to assess the validity of the Life Event Inventory Task (Bless, Clore, Schwarz, Golisano, Rabe, & Woelk, 1996; Forgas, 1999) as a continuing effort to search for an effective emotion induction method. I will compare affective responses of participants between the three emotion conditions: happiness, anger, and fear.

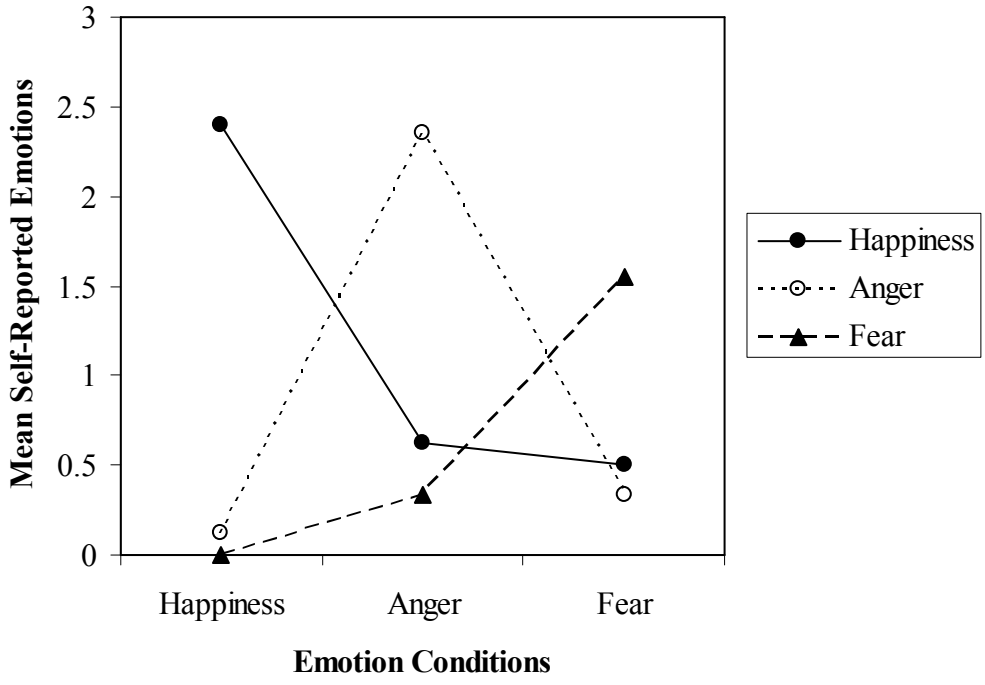
Chang (2007), Keller et al. (2003), and Yan et al. (2008) have employed the Life Event Inventory Task in previous mood-framing studies and proven it to be valid and reliable. But the method was employed to induce moods rather than discrete emotions.

Participants. Fifty-eight undergraduate students enrolled in communications courses at XX University participated in this experiment in exchange for a small amount of extra credit. Of the total sample, 49 (85%) reported their sex as female, 9 (15%) as male; 47 (81%) indicated that they were Caucasian, 4 (7%) African-American, 4 (7%) Asian-American, 3 (5%) Hispanic. The average age was 22 yr.

Procedure. I gave the consent forms to the participants upon their arrival for this pretest. I told them to participate in two separate studies to mask the real purpose of this study, one memory test (Life Event Inventory Task) and the other a personality survey (emotion measures). Then I assigned the participants randomly to one of the three emotion conditions. Each participant first performed the Life Event Inventory Task. As in previous studies, participants were asked to spend 7 minutes remembering and writing about a specific life event that had made them very happy, very angry, or very fearful. After that, they filled out a questionnaire measuring their evaluations of the memory test (masked questions) and their emotions.

Measured variables. I measured emotions of participants after the Life Event Inventory Task by the same scales employed in Pretest 1. Their α coefficients were: *anger* (α = .90); *fear* (α = .92); *happiness* (α = .87). I summed and averaged all emotion measures.

Figure 2. Pretest 2: Emotion Induction via the Life Event Inventory Task.



Results. I performed repeated measures ANOVA and *post hoc* tests where the emotion conditions were the between-subjects independent variable, and the three emotion scores were the within-subjects dependent variable. The results in Figure 2 show that all three emotion conditions induced the intended emotions, F (2, 55) = 53.97, $p < .0001$, $\eta^2 = .60$ (see also Table 2). Unlike the artificial voice stimuli in the Montreal Affective Voices, writing an affective experience was very engaging and the self-generated story ensured an idiosyncratic source for the targeted emotions. Therefore, the Life Event Inventory Task induced distinct and robust fear, anger, and happiness.

Table 2

Life Event Inventory Task: Mean Scores and Standard Deviations of Self-Reported Emotions in Different Emotion Conditions

Emotion Conditions		Self-Reported Emotion Scores		
		Happiness	Anger	Fear
Happiness	*M*	2.40_a	0.12_b	0.00_b
	SD	0.93	0.35	0.00
Anger	*M*	0.63_b	2.35_a	0.33_b
	SD	0.79	0.97	0.80
Fear	*M*	0.50_b	0.34_b	1.55_a
	SD	0.60	0.47	0.50

Note. $n = 58$. Emotion scores were measured on 5-point scales (0 = *none of this feeling*, 4 = *a great deal of this feeling*). Means in the same row that do not share subscripts differ at $p < .05$ in the Tukey honestly significant difference comparison.

Based on the results from Pretests 1 and 2, this project will adopt the Life Event Inventory Task as the emotion induction technique in the main studies.

Message Development

I chose the hepatitis C test as the issue for this study for three reasons. First, since there is no vaccine against hepatitis C virus, the detection test is a vital means to combat the disease. Second, according to the National Institutes of Health (NIH) (2007), many hepatitis C infections

are “community-acquired”. The convivial living style of many college students makes them at particularly high risk for hepatitis C virus infection. Thus, the issue is relevant to the targeted audiences. Third, the awareness of the issue is relatively low (NIH, 2007). Consequently, the possible confound of pre-existing knowledge and attitude of the issue could be reduced to the minimum.

I cited the NIH as the source of information to bolster the credibility of the messages. In addition, the messages implied their relevance to the participants by emphasizing that “many infections are ‘community-acquired’”.

The two means of instantiating gain framing and the two means of instantiating loss framing were intermingled to ensure the appropriate dose and the maximum effect. For gain framing, the messages emphasized both attaining desirable outcomes (i.e. better response to treatment and higher survival rate) and not attaining undesirable outcomes (i.e. avoid becoming a source of transmission to others and reduce the risk for chronic liver disease). For loss framing, the messages focused on attaining undesirable outcomes (i.e. become a source of transmission to others and high risk for chronic liver disease) and not attaining desirable outcomes (i.e. miss detection and treatment).

Pretest 3

Message Pretest

I carried out Pretest 3 to assess the perceived frames, persuasiveness and credibility of messages in the two framing conditions: gain, and loss frames.

Participants. Fifty-six undergraduate students enrolled in communications courses at XX University participated in this experiment in exchange for a small amount of extra credit. Of the total sample, 49 (88%) reported their sex as female, 7 (13%) as male; 46 (82%) indicated that

they were Caucasian, 3 (5%) African-American, 2 (4%) Asian-American, 2 (4%) Hispanic, 3 (5%) other ethnicities. The average age was 22 yr.

Procedure. I gave the consent forms to the participants on their arrival for this pretest. I told them to read a health related message that was a rough draft developed for a local health organization and solicited their opinions. I instructed them to attend to the message as they would normally read a newspaper article. Then I assigned the participants randomly to one of the two framing conditions. Each participant first read the article. After that, they filled out a questionnaire measuring their evaluations of the message's persuasiveness and credibility.

Measured variables. I assessed the perceived frames of participants by a 7-point semantic differential scale anchored at - 3 and + 3. The scale items were negative–positive, costs–benefits, and losses–gains. The α coefficient was .83. I summed and averaged all measures.

I measured the assessment of the participants of the quality of the message by a persuasiveness scale and a credibility scale. The scale items and the α coefficients were: *persuasiveness* (persuasive, effective, convincing, compelling; α = .76); *credibility* (credible, believable, clear; α = .72). The items use 5-point Likert-type scales anchored at 1 = *Not at all persuasive/credible* and at 5 = *Very persuasive/credible*. I summed and averaged all measures.

Results. I conducted an independent-sample *t* test for a manipulation check of the frames. The results indicated that loss-framed messages were perceived to focus on the losses (M = - 0.78, SD = 0.56); and gain-framed messages were perceived to focus on the gains (M = 0.61, SD = 0.19), t (57) = - 3.77, $p < .0001$.

I performed one-way ANOVA tests where the two framing conditions were the between-subjects independent variable and the scales were dependent variables. The results revealed no significant difference between the two framing conditions for both persuasiveness, F

(1, 54) = 1.01, p = .32, η^2 = .02, and credibility, F (1, 54) = 0.89, p = .35, η^2 = .02. The messages were rated highly persuasive (M = 3.51, SD = 0.63) and credible (M = 3.65, SD = 0.81) across the framing conditions.

In conclusion, the results in Pretest 3 indicated that the messages developed for this project induced the intended frames and were perceived to be highly persuasive and credible.

To summarize the pretest results, the Montreal Affective Voices were found to be ineffective at inducing discrete emotions in Pretest 1. I will employ the Life Event Inventory Task that induced the intended emotions in Pretest 2 as the emotion induction technique in the subsequent studies. I will also use the messages tested in Pretest 3 in the following studies.

Chapter 3

STUDY 1

The pretest results identified a valid emotion induction method, the Life Event Inventory Task, and a set of persuasive and credible framed messages. I carried out Study 1 using the emotion induction method and the framed messages of the hepatitis C test to test the hypotheses. Study 1 is a 3 (emotions: happiness, anger, and fear) by 2 (framing: gain and loss) between-subjects design. Affective responses of participants, BAS/BIS scores, attitude and intention of having a hepatitis C test are the measured variables.

Methods

Participants

One hundred and seventeen undergraduate students enrolled in communications courses at XX University participated in this experiment in exchange for a small amount of extra credit. Of the total sample, 96 (82%) reported their sex as female, 21 (18%) as male; 99 (85%) indicated that they were Caucasian, 6 (5%) African-American, 8 (7%) Asian-American, 4 (3%) Hispanic. The average age was 22 yr ($M = 21.56$, $SD = 0.90$).

Procedure

I gave the consent forms in this main study to the participants on their arrival. I told them to participate in two separate studies to mask the real purpose of this study, one memory test (Life Event Inventory Task) and the other a health message evaluation. I presented them in separate booklets and linked the responses of the participants to both by a unique ID number I assigned to each individual. I assigned participants randomly to one of the three emotion conditions. Each participant first performed the Life Event Inventory Task. After that, they filled out a questionnaire measuring their evaluations of the memory test (masked questions), their

emotions, and BAS/BIS scores.

Once I had collected their completed first booklets I gave them the second booklet. In this I randomly gave either a gain-framed or a loss-framed message. Immediately after reading the framed message, they completed a questionnaire assessing their attitude, intent, and standard demographic information.

Measured Variables

Affective responses. I measured emotions of participants after the Life Event Inventory Task. I measured *happiness* (α = .93), *anger* (α = .95), and *fear* (α = .94) as in Pretests 1 and 2 adding new items: *sadness* (sad, dreary, and dismal; α = .91); *surprise* (surprised, startled, and astonished; α = .76); *guilt* (guilty and ashamed; α = .71); *contentment* (contented, peaceful, mellow, and tranquil; α = .90). I summed and averaged all emotion measures.

BAS/BIS. I employed Carver and White's (1994) 20-item BAS/BIS scales to measure the behavioral inhibition and approach systems. The items use 5-point Likert-type scales anchored at 1 = *Strongly disagree* and at 5 = *Strongly agree*. Sample items of BIS include *I worry about making mistakes* and *Criticism or scolding hurts me quite a bit*. Sample items of BAS include *It would excite me to win a contest* and *When I want something, I usually go all out to get it*. I summed and averaged the 7 BIS items and the 13 BAS items. The α coefficients were .65 for BIS and .67 for BAS.

Attitude and intention. The attitude and intention of participants at having a hepatitis C test were all composite measures with 5-point response scales anchored at 1 = *Strongly disagree* and at 5 = *Strongly agree*. Their α coefficients were: attitude (α = .80) and intention (α = .83). I summed and averaged all measures.

Perceived frames. Perceived frames of participants were measured using the same scale

as in Pretest 3. The α coefficient was .81. I summed and averaged all measures.

Results

Manipulation Check

Perceived frames. I conducted an emotion by framing a two-way ANOVA for a manipulation check of the perceived frames. No emotion main effect, F (2, 111) = 1.78, p = .17, η^2 = .03, nor the emotion by framing interaction effect, F (2, 111) = 1.14, p = .32, η^2 = .02, were reported. However, a significant framing main effect indicated that loss-framed messages were perceived to focus on the losses (M = - 0.51, SD = 0.47), and gain-framed messages were perceived to focus on the gains (M = 0.38, SD = 0.37), F (2, 111) = 11.81, p <.001, η^2 = .09. Hence, the message frames were perceived to be effective.

Emotion induction. Pair-sample t tests were conducted for all pairwise comparisons of all self-reported emotions with the intended emotion (happiness, anger, or fear) in each emotional condition (see Table 3). The results indicated that self-reported happiness of happy participants was significantly higher than all other measured emotions. Self-reported anger of angry participants was significantly higher than all other measured emotions. Self-reported fear of fearful participants was significantly higher than all other measured emotions except sadness. Since fear and sadness share the same valence and have similar inhibition function, such nondifferences should not confound the persuasive effects of fear.

Table 3

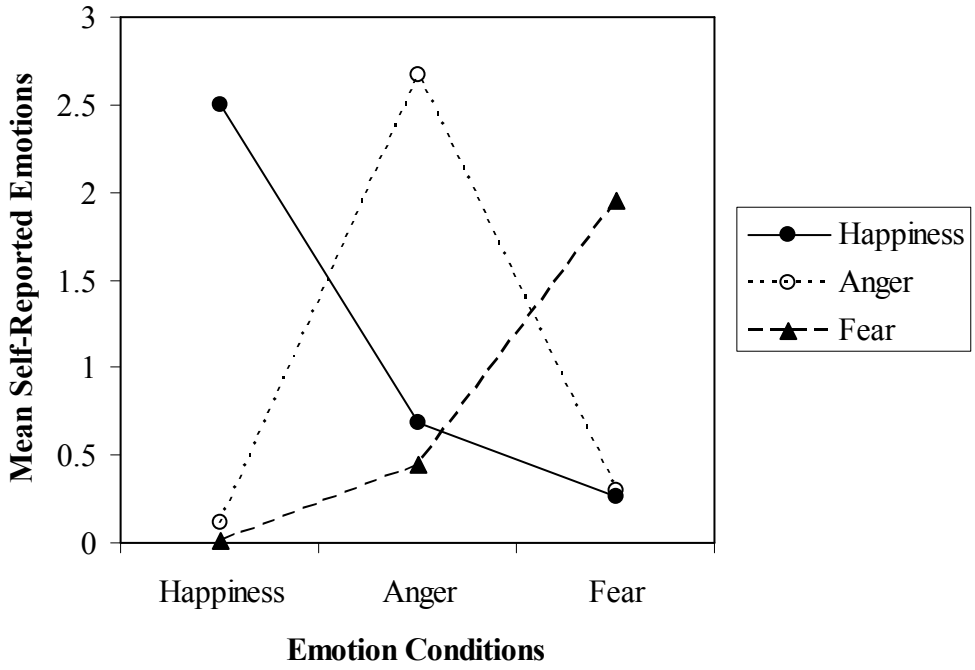
Emotion Manipulation Check in Study 1: Mean Scores and Standard Deviations of Self-Reported Emotions in Different Emotion Conditions

Emotion Conditions		Self-Reported Emotion Scores						
		Happiness	Anger	Fear	Sadness	Surprise	Guilt	Contentment
Happiness	*M*	2.50_a	0.11_b	0.01_b	0.43_b	0.54_b	0.23_b	2.13_b
	SD	0.98	0.32	0.08	0.73	0.72	0.52	0.91
Anger	*M*	0.69_b	2.67_a	0.45_b	1.46_b	0.67_b	0.70_b	1.34_b
	SD	0.87	1.12	0.92	1.20	0.72	0.98	1.13
Fear	*M*	0.26_b	0.30_b	1.95_a	1.57_a	0.84_b	0.29_b	1.01_b
	SD	0.42	0.49	0.75	1.15	0.87	0.47	0.81

Note. $n = 117$. Emotion scores were measured on 5-point scales (0 = *none of this feeling*, 4 = *a great deal of this feeling*). Means in the same row that do not share subscripts with the intended emotion (happiness, anger, or fear) within the condition differ at $p < .05$ in the Tukey honestly significant difference comparison.

I performed repeated measures ANOVA and *post hoc* tests where the emotion conditions were the between-subjects independent variable, and the three intended emotion scores (happiness, anger, and fear) were the within-subjects dependent variable. Figure 3 shows that all three emotion conditions induced the intended emotions, $F(2, 114) = 146.12$, $p < .0001$, $\eta^2 = .70$.

Figure 3. Study 1: Emotion Induction Manipulation Check.



Emotion manipulations were successful based on the overall results of *t* tests and ANOVA.

Valence Model vs. Functional Model

While the valence model (H1a) predicts that negative emotions (fear and anger) are associated with BIS and positive emotion (happiness) is associated with BAS, the functional model (H1b) hypothesizes that inhibition emotion (fear) is associated with BIS and approach emotions (anger and happiness) are associated with BAS.

I first performed repeated measures ANOVA where the emotion conditions were the between-subjects independent variable and the BAS/BIS scores were the within-subjects dependent variable to test H1a and H1b. Figure 4 shows that angry and happy participants reported significantly more BAS than BIS, and fearful participants reported significantly more

Figure 4. Study 1: BAS/BIS as a Function of Discrete Affective Functions.

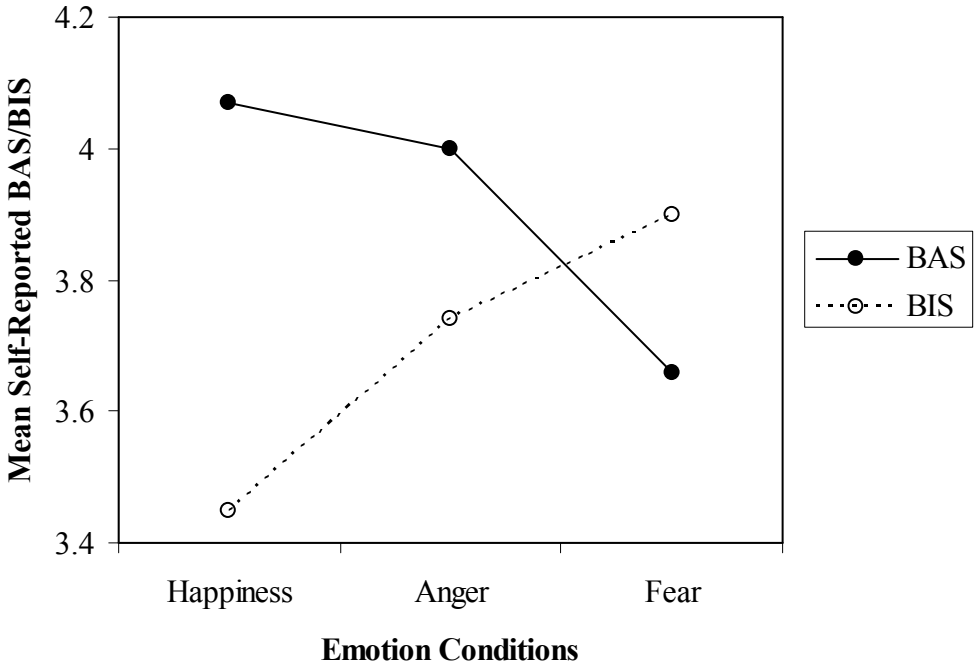


Table 4

Motivational Systems as a Function of Emotions' Behavioral Functions in Study 1: Mean Scores and Standard Deviations of Self-Reported BAS/BIS Scores in Different Emotion Conditions

Emotion Conditions		Motivational Systems	
		BAS	BIS
Happiness	*M*	4.07_a	3.45_b
	SD	0.37	0.67
Anger	*M*	4.00_a	3.74_b
	SD	0.34	0.47
Fear	*M*	3.66_b	3.90_a
	SD	0.46	0.38

Note. $n = 117$. BAS/BIS scores were measured on 5-point scales (1 = *strongly disagree*, 5 = *strongly agree*). Means in the same row that do not share subscripts differ at $p < .05$ in the Tukey honestly significant difference comparison.

BIS than BAS, F (2, 114) = 19.38, $p < .0001$, $\eta^2 = .23$ (see also Table 4).

Self-reported BAS and BIS scores of participants were respectively regressed on all self-reported emotions including happiness, anger, fear, sadness, surprise, guilt, and contentment (see Table 5). Fear was not positively associated with BIS, $\beta = .20$, $p = .08$, F (7, 109) = 2.27, $p < .05$, adjusted $R^2 = .07$; anger, $\beta = .26$, $p < .01$; and happiness, $\beta = .37$, $p < .01$, both had a significant positive relationship with BAS, F (7, 109) = 4.75, $p < .0001$, adjusted $R^2 =$

Table 5

Standardized Regression Weights for Self-Reported Emotions as Predictors of BAS/BIS in Study 1

Predictors	Dependent Variables	
	BAS	BIS
Fear	-.02	.20†
Anger	.26**	.20*
Happiness	.37**	-.01
Sadness	-.003	-.003
Surprise	-.21*	.13
Guilt	.07	-.12
Contentment	.02	-.15

Note. n = 117. When BAS was the dependent variable, F (7, 109) = 2.27, $p < .05$, Adjusted R^2 = .07. When BIS was the dependent variable, F (7, 109) = 4.75, $p < .0001$, Adjusted R^2 = .18.

†: $p < .10$. *: $p < .05$. **: $p < .01$. ***: $p < .001$. ****: $p < .0001$.

.18. Unpredicted significant associations including an anger-BIS positive relationship, $\beta = .20$, $p < .05$, and a surprise-BAS negative relationship, $\beta = -.21$, $p < .05$.

Based on the overall results of the ANOVA and regression tests, H1b was supported while H1a was rejected.

Emotion Framing Interaction

While the valence model (H2a) predicts that negative emotions (fear and anger) couple

with loss frame and positive emotion (happiness) couples with gain frame, the functional model (H2b) hypothesizes that inhibition emotion (fear) couples with loss frame; approach emotions (anger and happiness) couple with gain frame.

MANOVA tests where emotion and framing were the independent variables and attitude and intention were the dependent variables were performed to test H2a and H2b. A significant framing main effect was observed for attitude, F (1, 111) = 4.73, p = .03, η^2 = .03. The loss frame yielded more favorable attitude (M = 4.06, SD = 0.73) than did the gain frame (M = 3.75, SD = 0.88).

Significant emotion by framing interactions were observed for attitude, F (2, 111) = 10.78, $p < .0001$, η^2 = .16, and intention, F (2, 111) = 3.04, p = .05, η^2 = .05. Figures 5 and 6 illustrate the interactions (see also Tables 6 and 7). Participants in the fearful emotion and loss framing condition, the angry emotion and gain framing condition, and the happy emotion and gain framing condition respectively reported more favorable attitudes than those in the fearful emotion and gain framing condition, the angry emotion and loss framing condition, and the happy emotion and loss framing condition.

While the fearful emotion and loss framing condition yielded more favorable intentions than the fearful emotion and gain framing condition, no significant differences of intentions were observed between the angry emotion and gain framing condition and the angry emotion and loss framing condition, and the happy emotion and gain framing condition and the happy emotion and loss framing condition.

Figure 5. Study 1: Mean Attitude as a Function of Emotion and Framing.

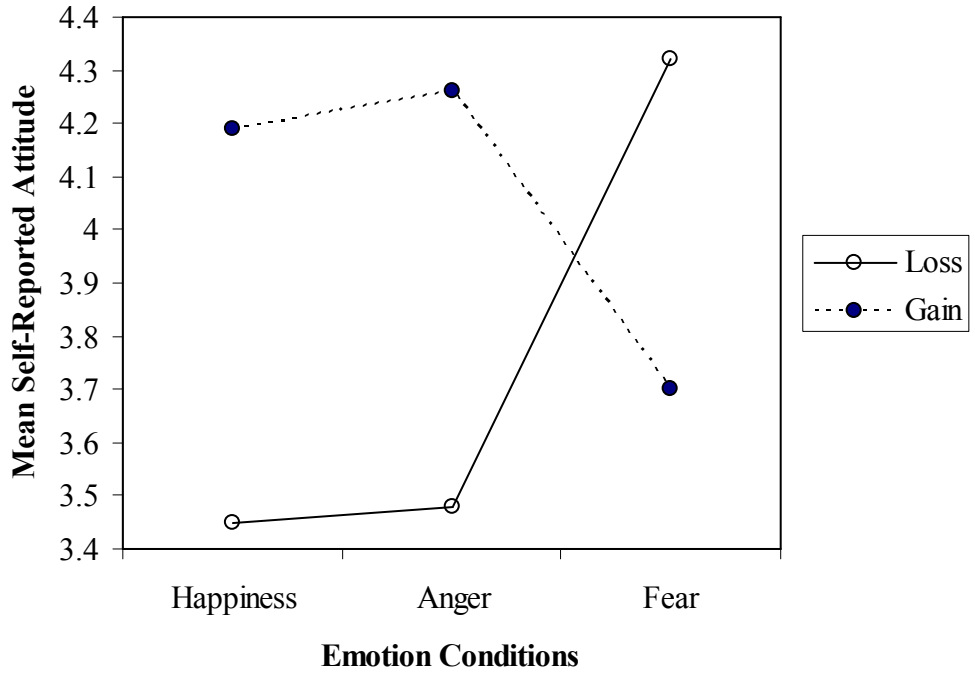


Figure 6. Study 1: Mean Intention as a Function of Emotion and Framing.

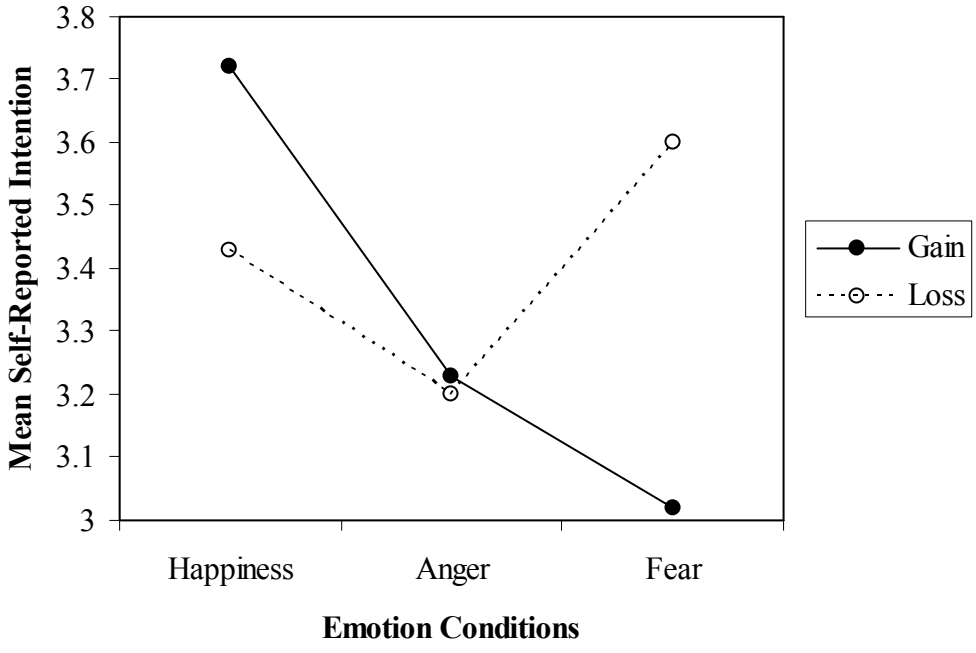


Table 6

Mean Attitude as a Function of Emotion and Framing in Study 1: Mean Scores and Standard Deviations of Self-Reported Attitudes in Different Emotion-Framing Conditions

Emotion Conditions		Framing	
		Gain	Loss
Happiness	*M*	4.19_a	3.45_b
	SD	0.70	0.98
Anger	*M*	4.26_a	3.48_b
	SD	0.83	0.61
Fear	*M*	3.70_b	4.32_a
	SD	0.49	0.80

Note. $n = 117$. Attitude scores were measured on 5-point scales (1 = *strongly disagree*, 5 = *strongly agree*). Means in the same row that do not share subscripts differ at $p < .05$ in the Tukey honestly significant difference comparison.

Table 7

Mean Intention as a Function of Emotion and Framing in Study 1: Mean Scores and Standard Deviations of Self-Reported Intentions in Different Emotion-Framing Conditions

Emotion Conditions		Framing	
		Gain	Loss
Happiness	*M*	3.72_a	3.43_a
	SD	0.83	0.87
Anger	*M*	3.23_a	3.20_a
	SD	0.67	0.90
Fear	*M*	3.02_b	3.60_a
	SD	0.77	0.69

Note. $n = 117$. Attitude scores were measured on 5-point scales (1 = *strongly disagree*, 5 = *strongly agree*). Means in the same row that do not share subscripts differ at $p < .05$ in the Tukey honestly significant difference comparison.

Since the interaction on intention was consistent with the predicted pattern by H2b, a one-tailed independent-sample *t* test was conducted to compare self-reported intentions in the function framing match and mismatch conditions. Participants in the function framing match conditions (happiness–gain, anger–gain, and fear–loss) reported more favorable intention, ($M = 3.50$, $SD = 0.75$), than those in the mismatch conditions (happiness–loss, anger–loss, and fear–gain), ($M = 3.22$, $SD = 0.85$), $t\ (115) = 1.88$, $p = .03$.

Therefore, H2b was partially supported and H2a was rejected.

Discussion

The Structure of Affect and Motivational Systems

The findings in Study 1 provided convincing evidence supporting the discrete-emotions models and the functional model of BAS/BIS over the dual-systems models and the valence model of BAS/BIS. As supports for H1b indicated, emotions activated distinctive motivational systems based on their unique functions and action tendencies, not their valences.

Moreover, in line with the functional model, partial supports for H2b revealed significant emotion by framing interaction on attitude. Though the predicted interaction on intention was statistically significant only in the one-tailed *t* test, it is very possible that the interaction effect on intention occurred via the mediation of attitudinal changes.

The Persuasion Process

The mediating process via which emotion and framing exert their persuasive effects is of great interest to persuasion researchers at this point. Shen and Dillard (2007) suggested that cognitive and emotional responses to the framed messages are both mediators in the persuasion process. Therefore, Study 2 should include cognitive and emotional responses to the message as mediators in the causal model.

Given that emotions could activate distinctive motivational systems, it is also plausible to expect a dominant motivational system that guides the persuasion process when preexisting emotion of audiences matches the message's framing style. Hence, model comparisons are necessary to identify such a dominant motivational system in each emotion framing match condition.

Chapter 4

STUDY 2

Hypotheses

Replicating Study 1

Study 2 serves multiple purposes. First, to guard against sampling error, it is to replicate the results found in Study 1. Specifically, H1a, H1b, H2a, and H2b will be tested again.

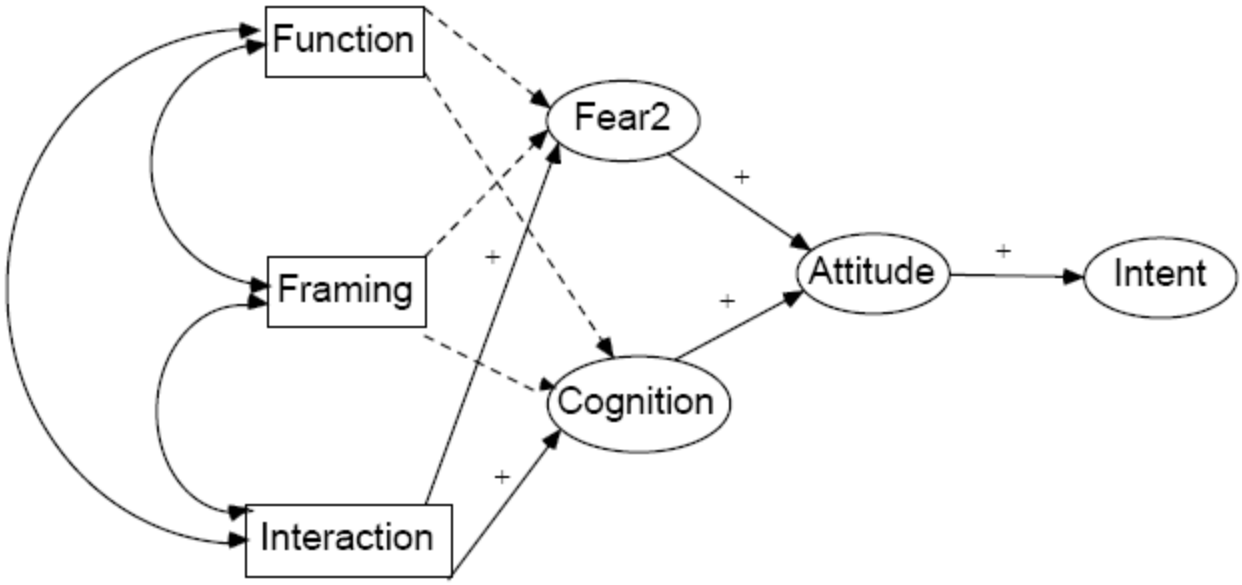
Causal Model for the Interaction Effect

Second, it is to test a causal model in which cognitive responses and message related emotions mediate the emotion by framing interaction effect on attitude and intention. Following the logic of the functional model in H2b, the mediating effects of cognition and message related emotion are only expected to be significant in the conditions where the function of an emotion matches a message's frame.

H3: When fearful participants (inhibition) read the loss frame and angry and happy participants (approach) read the gain frame, they will report more favorable dominant cognition and higher level of message related emotions, which will lead to more favorable attitude and intention.

H3 is conceptualized in Model 1(see Figure 7). The three manifest variables in the model are coded as emotion conditions: - 1 = inhibition (fear) and + 1 = approach (anger and happiness); framing conditions: - 1 = loss and + 1 = gain; interaction terms (the product of emotion conditions and framing conditions): - 1 = mismatch and + 1 = match.

Figure 7. Study 2: Model 1: Conceptual Causal Model for the Interaction Effect.



Note. All dashed lines represent nonsignificant paths. All solid lines represent significant paths.

[+]Positive b-weights.

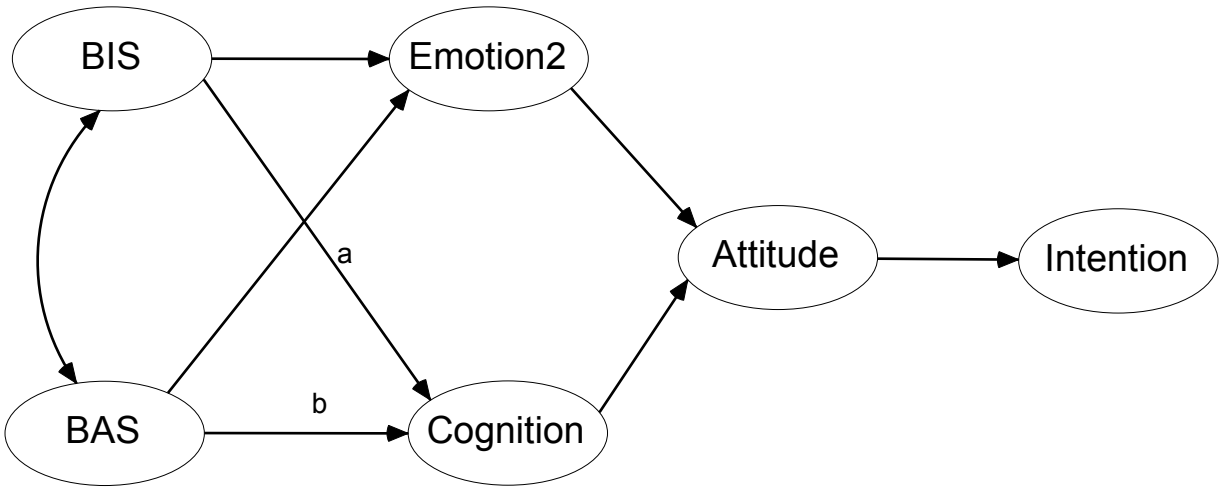
Causal Model for the Match Conditions

Third, according to the functional model, the match conditions, approach-match and inhibition-match, should have different motivational systems accounting for the persuasive effects.

H4: Under the approach-match conditions (anger–gain and happiness–gain), BAS should predict dominant cognition, which in turn mediates BAS's influence on attitude and intention. However, under the inhibition-match condition (fear–loss), BIS should predict dominant cognition, which in turn mediates BIS's influence on attitude and intention.

H4 is conceptualized in Model 2 (see Figure 8).

Figure 8. Study 2: Model 2: Conceptual Causal Model for the Match Conditions.



Note. a: Only significant in the inhibition-match condition. b: Only significant in the approach-match condition.

Methods

The design of Study 2 was different from Study 1 only with regard to the additional cognitive response measure and emotional measures after participants read the message.

Participants

One hundred and eighty-eight undergraduate students enrolled in communications courses at XX University participated in this experiment in exchange for a small amount of extra credit. Of the total sample, 142 (76%) reported their sex as female, 46 (24%) as male; 147 (78%) indicated that they were Caucasian, 10 (5%) African-American, 12 (7%) Asian-American, 6 (3%) Hispanic, 13 (7%) Others. The average age was 21 yr (M = 20.63, SD = 1.85).

Procedure

The procedure of Study 1 was followed, with two exceptions: (a) immediately after reading the message, participants' cognitive responses were measured; and (b) right after the cognitive response measure, participants' emotional responses to the message were assessed.

Measured Variables

Confirmatory factor analyses using AMOS 7.0 indicated that scales used to measure each latent variable in this study were consistent and unidimensional.

Affective responses. I used the emotion scales employed in Study 1 twice. I first measured participants' emotions after the Life Event Inventory Task. I asked participants to indicate how they felt at the moment. Their α coefficients were: *happiness1* (α = .95); *anger1* (α = .94); *fear1* (α = .96); *sadness1* (α = .75); *surprise1* (α = .72); *guilt1* (α = .82); *contentment1* (α = .90). Immediately after the cognitive response measure I instructed participants to indicate how the message made them feel. The α coefficients for this second emotion measure were: *happiness2* (α = .90); *anger2* (α = .90); *fear2* (α = .97); *sadness* (α = .78); *surprise2* (α = .77); *guilt2* (α = .58); *contentment2* (α = .91). I summed and averaged all emotion measures.

Cognitive responses. Immediately after the participants read the framed message I asked them to record their thoughts while reading the message (Petty & Cacioppo, 1977, 1979). Two trained coders who had no prior knowledge of the present study then coded the written cognitive responses.

A total of 50 participants' cognitive responses were set aside for training purposes (25) and a midsession reliability check (25). The coders received about 6 hours of training for the entire coding project. They were trained until they reached a satisfactory level of intercoder reliability (level of agreement ≥ 90% and/or Krippendorff's α ≥ .70). Their reliability at the end of each training session was reported as Reliability1. After training, they each coded half of the remaining data. Reliability was checked again when they were halfway through the remaining data. It was recorded as Reliability2. I instructed the coders to mark all unsure thoughts, discuss and resolve them with each other.

Since the coding process involved multiple steps, one training session was held for each step. The coders did not proceed to the next step until they finished coding all the data for a given step. I performed independent reliability checks for each step.

The coding process consisted of five steps (Shen & Dillard, 2007). First, the coders unitized the cognitive responses as independent thought units or clauses (see Appendix C). Guidelines and examples were offered. Their levels of agreement were 93% (Reliability1) and 94% (Reliability2) for this step.

Second, coders classified each thought unit either as a cognitive or emotional response (see Appendix C). Cognitive responses are thoughts that individuals have in reaction to the message. It could be an evaluation of the message, i.e., "Very important message," or thoughts about themselves or others, i.e., "Can I get it?" and "My uncle had it." Emotional responses are individuals' feelings. The coders were given a list of emotional words as examples, i.e., "Wow!" (surprise) and "I am scared" (fear). The reliabilities were Krippendorff's $\alpha = 1.00$ and 99% of agreement (Reliability1) and Krippendorff's $\alpha = 1.00$ and 99% of agreement (Reliability2) for this step.

Third, the coders identified each cognitive thought either as relevant or irrelevant to the message (see Appendix C). Relevant cognitive responses are thoughts related to the message, the advocacy, or the source of the message. Irrelevant cognitive responses are thoughts unrelated to the message, the advocacy, or the source of the message. For instance, "I need to write a paper tonight" was coded as irrelevant. The reliabilities were Krippendorff's $\alpha = 1.00$ and 96% of agreement (Reliability1) and Krippendorff's $\alpha = 1.00$ and 97% of agreement (Reliability2) for this step.

Fourth, each relevant cognitive thought was coded either as disagreement, neutral, or

agreement (see Appendix C). A disagreement is a thought that reflects an unfavorable evaluation of the message, the advocacy, or the source of the message. For example, “This will never happen to me” was coded as a disagreement. Contrarily, an agreement is a thought that represents a favorable evaluation of the message, the advocacy, or the source of the message. For example, “I want to get the shot” was coded as an agreement. A neutral thought indicates no evaluative information. For instance, “Four million Americans were infected,” a mere restatement of the information in the message and revealed no evaluation, was coded as neutral. The coders were instructed to begin with the assumption that a thought was neutral. Unless there were clear evaluative aspects, a thought should be coded as neutral. The reliabilities were Krippendorff’s α = .86 and 87% of agreement (Reliability1) and Krippendorff’s α = .77 and 90% of agreement (Reliability2) for this step. Each participant’s sum of disagreement was subtracted from the sum of his or her agreement to form an index of dominant cognition.

Fifth, the coders classified emotional responses identified in the second step into one of the provided categories (see Appendix C). The emotions were surprise, anger, fear, sadness, guilt, happiness, contentment, disgust, interest, and other. Whenever an emotional response was coded as other, the coder specified it. The levels of agreement for this step were 100% for both Reliability 1 and Reliability 2.

BAS/BIS. Carver and White’s (1994) 20-item BAS/BIS scales were employed to measure the behavioral inhibition and approach systems. The items use 5-point Likert-type scales anchored at 1 = *Strongly disagree* and at 5 = *Strongly agree*. Sample items of BIS include *I worry about making mistakes* and *Criticism or scolding hurts me quite a bit*. Sample items of BAS include *It would excite me to win a contest* and *When I want something, I usually go all out to get it*. I summed and averaged the 7 BIS items and 13 BAS items. The α coefficients were .76 for

BIS and .80 for BAS.

Attitude and intention. Participants' attitude and intention at having a hepatitis C test were all composite measures with 5-point response scales anchored at 1 = *Strongly disagree* and at 5 = *Strongly agree*. Their α coefficients were: attitude (α = .87) and intention (α = .88). I summed and averaged all measures.

Perceived frames. Perceived frames of participants were measured using the scale of Pretest 3. The α coefficient was .80. I summed and averaged all measures.

Results

Manipulation Check

Perceived frames. I conducted an emotion by framing a two-way ANOVA for a manipulation check of the perceived frames. No emotion main effect, F (2, 182) = 0.50, p = .61, η^2 = .003, nor emotion by framing interaction effect, F (2, 182) = 1.36, p = .26, η^2 = .01, were reported. However, a significant framing main effect indicated that loss-framed messages were perceived to focus on the losses (M = - 0.73, SD = 1.16), and gain-framed messages were perceived to focus on the gains (M = 1.20, SD = 0.86), F (2, 182) = 166.52, p < .0001, η^2 = .47. The message frames were perceived to be effective.

Emotion induction. Paired-sample t tests were conducted for all pairwise comparisons of all self-reported emotions with the intended emotion (happiness, anger, or fear) in each emotion condition (see Table 8). The results indicated that happy self-reported happiness of participants was significantly higher than all other measured emotions. Angry participants' self-reported anger was significantly higher than all other measured emotions. Fearful participants' self-reported fear was significantly higher than all other measured emotions except contentment. Since fear and contentment share the same valence and have similar inhibition function, such

Table 8

Emotion Manipulation Check in Study 2: Mean Scores and Standard Deviations of Self-Reported Emotions in Different Emotion Conditions

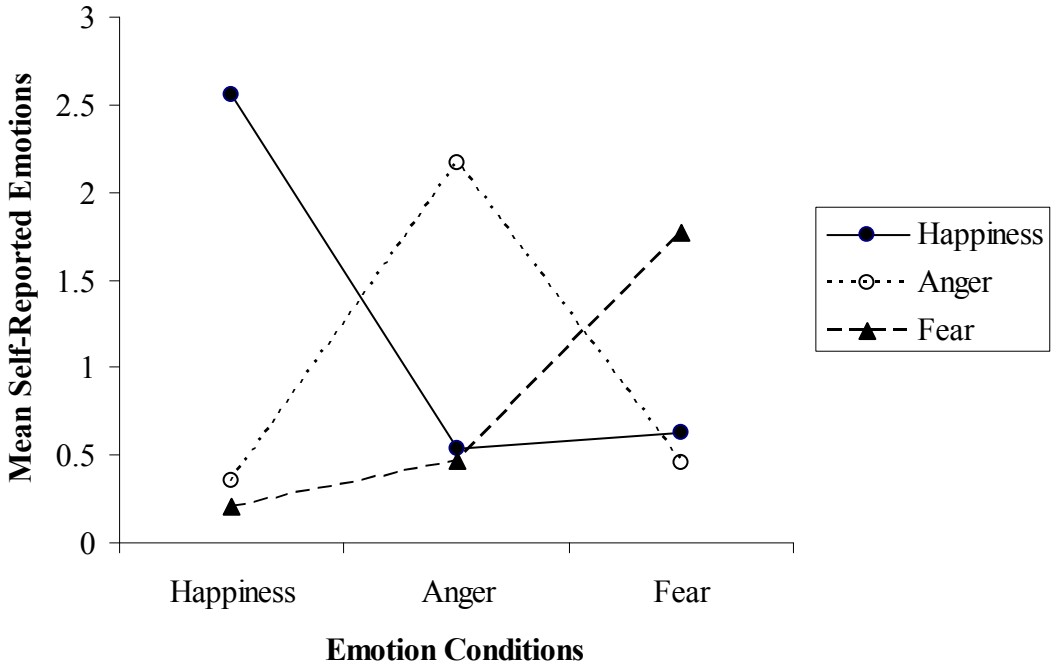
Emotion Conditions		Self-Reported Emotion Scores						
		Happiness	Anger	Fear	Sadness	Surprise	Guilt	Contentment
Happiness	*M*	2.56_a	0.35_b	0.20_b	0.53_b	0.47_b	0.11_b	2.14_b
	SD	0.96	0.56	0.38	0.64	0.63	0.28	0.99
Anger	*M*	0.54_b	2.17_a	0.47_b	0.43_b	0.73_b	0.52_b	1.11_b
	SD	0.80	1.02	0.83	0.50	1.02	0.75	0.98
Fear	*M*	0.63_b	0.46_b	1.77_a	0.98_b	0.79_b	0.81_b	1.98_a
	SD	0.74	0.59	1.30	0.91	1.01	1.13	1.38

Note. $n = 188$. Emotion scores were measured on 5-point scales (0 = *none of this feeling*, 4 = *a great deal of this feeling*). Means in the same row that do not share subscripts with the intended emotion (happiness, anger, or fear) within the condition differ at $p < .05$ in the Tukey honestly significant difference comparison.

non-differences should not confound the persuasive effects of fear.

I performed repeated measures ANOVA and *post hoc* tests where the emotion conditions were the between-subjects independent variable, and the three intended emotion scores (happiness, anger, and fear) were the within-subjects dependent variable. Figure 9 shows that all three emotion conditions induced the intended emotions, $F(2, 185) = 122.22$, $p < .0001$,

Figure 9. Study 2: Emotion Induction Manipulation Check



$\eta^2 = .53$.

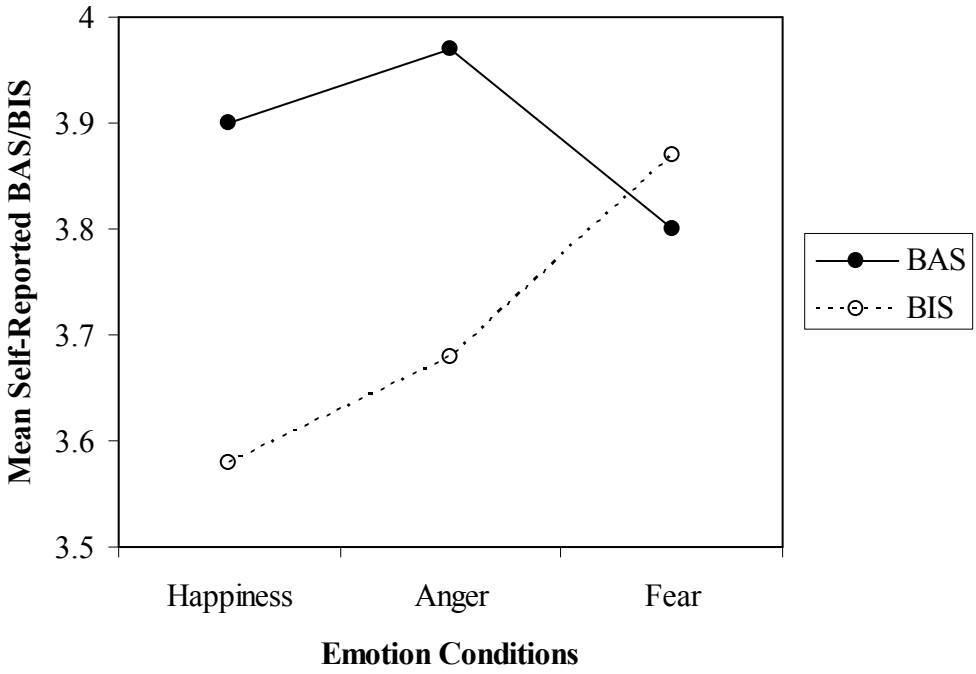
The emotion manipulations were successful based on the overall results of the *t* test and ANOVA.

Valence Model vs. Functional Model

While the valence model (H1a) predicts that negative emotions (fear and anger) are associated with BIS and positive emotion (happiness) is associated with BAS, the functional model (H1b) hypothesizes that inhibition emotion (fear) is associated with BIS and approach emotions (anger and happiness) are associated with BAS.

I first performed repeated measures ANOVA where the emotion conditions were the between-subjects independent variable, and the BAS/BIS scores were the within-subjects dependent variable to test H1a and H1b. Figure 10 shows that angry and happy participants

Figure 10. Study 2: BAS/BIS as a Function of Discrete Affective Functions.



reported significantly more BAS than BIS, and reported BIS scores of fearful participants were not significantly higher than their BAS scores, F (2, 185) = 5.02, $p < .01$, $\eta^2 = .05$ (see also Table 9).

Table 9

Motivational Systems as a Function of Emotions' Behavioral Functions in Study 2: Mean Scores and Standard Deviations of Self-Reported BAS/BIS Scores in Different Emotion Conditions

Emotion Conditions		Motivational Systems	
		BAS	BIS
Happiness	*M*	3.90_a	3.58_b
	SD	0.54	0.67
Anger	*M*	3.97_a	3.68_b
	SD	0.46	0.60
Fear	*M*	3.80_a	3.87_a
	SD	0.63	0.81

Note. $n = 188$. BAS/BIS scores were measured on 5-point scales (1 = *strongly disagree*, 5 = *strongly agree*). Means in the same row that do not share subscripts differ at $p < .05$ in the Tukey honestly significant difference comparison.

Participants' self-reported BIS and BAS scores were respectively regressed on all self-reported emotions including happiness, anger, fear, sadness, surprise, guilt, and contentment (see Table 10). Fear was positively associated with BIS, $\beta = .34$, $p < .0001$, $F(7, 180) = 2.89$, $p < .01$, adjusted $R^2 = .07$; anger, $\beta = .20$, $p < .05$; and happiness, $\beta = .27$, $p < .001$, both had a significant positive relationship with BAS, $F(7, 180) = 4.79$, $p < .0001$, adjusted $R^2 = .12$. Unpredicted significant associations include a contentment-BAS positive relationship, $\beta =$

Table 10

Standardized Regression Weights for All Self-Reported Emotions as Predictors of BAS/BIS in Study 2

Predictors	Dependent Variables	
	BAS	BIS
Fear	.11	.34****
Anger	.27***	.03
Happiness	.20*	-.06
Sadness	-.16*	.002
Surprise	-.02	-.07
Guilt	-.12	-.08
Contentment	.24**	.12

Note. n = 188. When BAS was the dependent variable, F (7, 180) = 4.79, $p < .0001$, Adjust R^2 = .12. When BIS was the dependent variable, F (7, 180) = 2.89, $p < .01$, Adjusteded R^2 = .07. *$p < .05$, **$p < .01$, ***$p < .001$, ****$p < .0001$.

.24, $p < .01$, and a sadness-BAS negative relationship, β = - .16, $p < .05$.

Based on the overall results of the ANOVA and regression tests, H1b was supported and H1a rejected.

Emotion Framing Interaction

While the valence model (H2a) predicts that negative emotions (fear and anger) couple

with loss frame and positive emotion (happiness) couples with gain frame, the functional model (H2b) hypothesizes that inhibition emotion (fear) couples with loss frame; approach emotions (anger and happiness) couple with gain frame.

MANOVA tests where emotion and framing were the independent variables, and attitude and intention were the dependent variables were performed to test H2a and H2b. The emotion by framing interaction was not statistically significant for attitude, F (2, 182) = 0.09, p = .91, η^2 = .001, nor intention, F (2, 182) = 1.61, p = .20, η^2 = .02. Figures 11 and 12 illustrate the interactions (see also Table 11 and Table 12). It is clear that the interaction on intention was in line with the predicted pattern by H2b, though not statistically significant. An additional one-tailed independent-sample t test was conducted to compare self-reported intentions in the function framing match and mismatch conditions. Participants in the function framing match conditions (happiness–gain, anger–gain, and fear–loss) reported more favorable intention, (M = 3.64, SD = 0.98), than those in the mismatch conditions (happiness–loss, anger–loss, and fear–gain), (M = 3.38, SD = 0.91), t (186) = 1.85, p = .03.

Figure 11. Study 2: Mean Attitude as a Function of Emotion and Framing

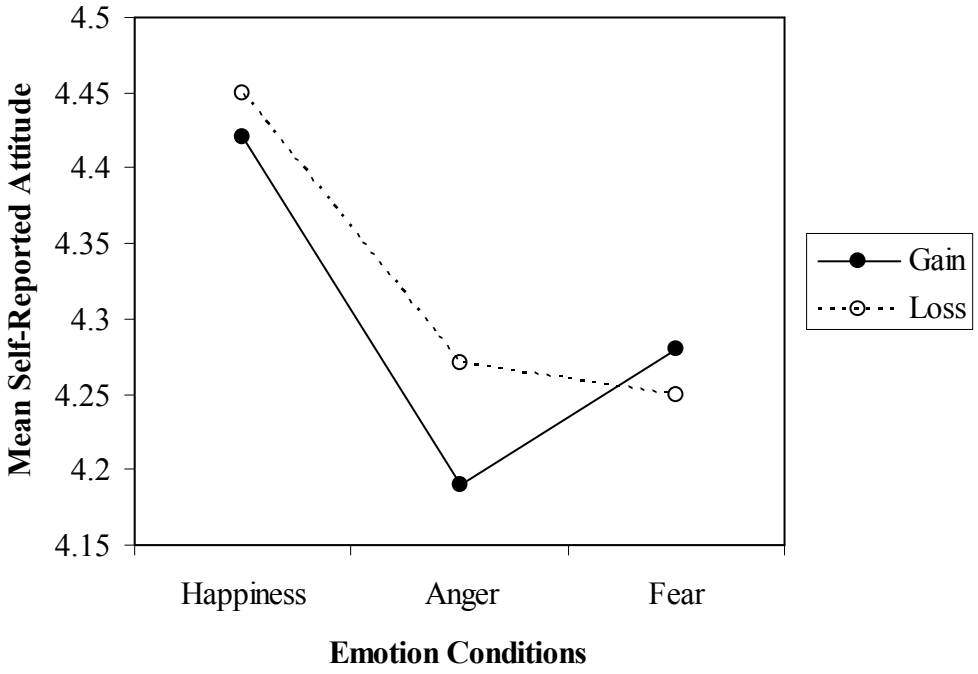


Figure 12. Study 2: Mean Intention as a Function of Emotion and Framing

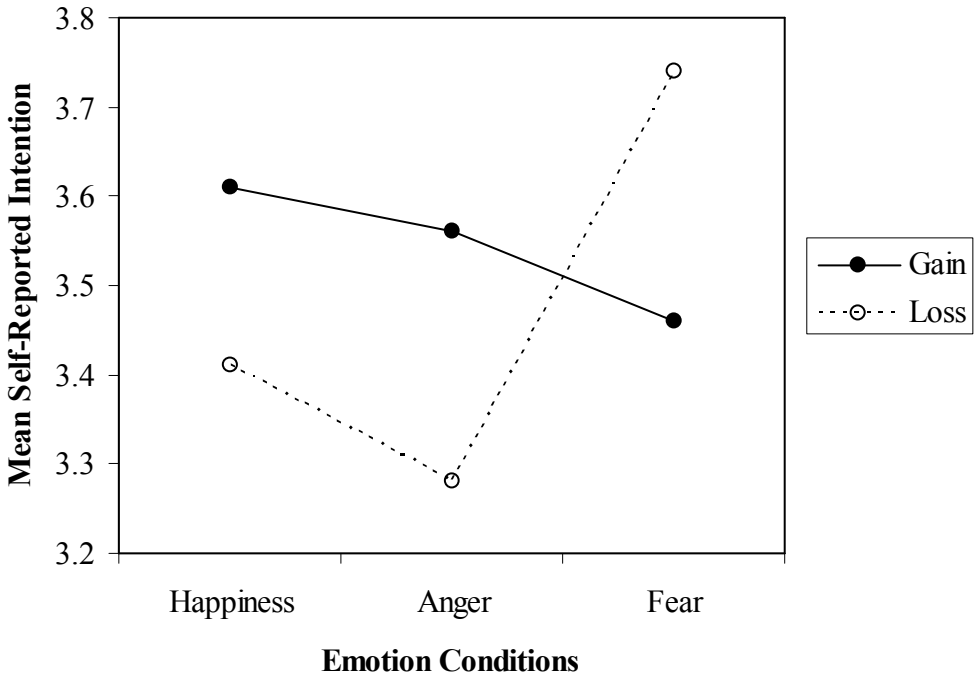


Table 11

Mean Attitude as a Function of Emotion and Framing in Study 2: Mean Scores and Standard Deviations of Self-Reported Attitudes in Different Emotion-Framing Conditions

Emotion Conditions		Framing	
		Gain	Loss
Happiness	*M*	4.42	4.45
	SD	0.78	0.45
Anger	*M*	4.19	4.27
	SD	0.99	0.65
Fear	*M*	4.28	4.25
	SD	0.70	0.76

Note. $n = 188$. Attitude scores were measured on 5-point scales (1 = *strongly disagree*, 5 = *strongly agree*). None of the means in the same row differ at $p < .05$.

Table 12

Mean Intention as a Function of Emotion and Framing in Study 2: Mean Scores and Standard Deviations of Self-Reported Intentions in Different Emotion-Framing Conditions

Emotion Conditions		Framing	
		Gain	Loss
Happiness	*M*	3.61	3.41
	SD	0.91	0.65
Anger	*M*	3.56	3.28
	SD	0.83	1.15
Fear	*M*	3.46	3.74
	SD	0.91	1.19

Note. n = 188. Attitude scores were measured on 5-point scales (1 = *strongly disagree*, 5 = *strongly agree*). None of the means in the same row differ at $p < .05$.

Therefore, H2b was partially supported while H2a was rejected.

A Priori Standards for Model Evaluations

I employed structural equation modeling (SEM; AMOS 7.0) to evaluate the associations specified in Models 1 and 2 and adopted SEM over simple path analysis for two reasons. First, it allows testing all the relationships of the interested variables completely and simultaneously. Second, according to Joreskog (1971), causal models in SEM are necessary for the proposed model comparisons. To evaluate goodness of fit, I followed the following criteria: Chi-square,

CFI greater than .90 (Bentler, 1990), Rho greater than .85 (called TLI in AMOS 7.0; Bentler & Bonett, 1980), and RMSEA less than .10 (Browne & Cudeck, 1993). I employed parcels as single-item indicators of the latent variable and set the error variances of the parcels to $(1 - \alpha)(\sigma^2)$ to account for the measurement error of the scales (Bollen, 1989).

Also, to determine which message related emotions should be included in the causal model, I regressed attitude and intention on all self-reported message related emotions (Emotion2). Only fear predicted attitude, $\beta = .32$, $p < .001$, $F(7, 180) = 2.75$, $p < .01$, adjusted $R^2 = .06$. Thus, Fear2 was included in the predicted causal models replacing "Emotion2" in Models 1 and 2.

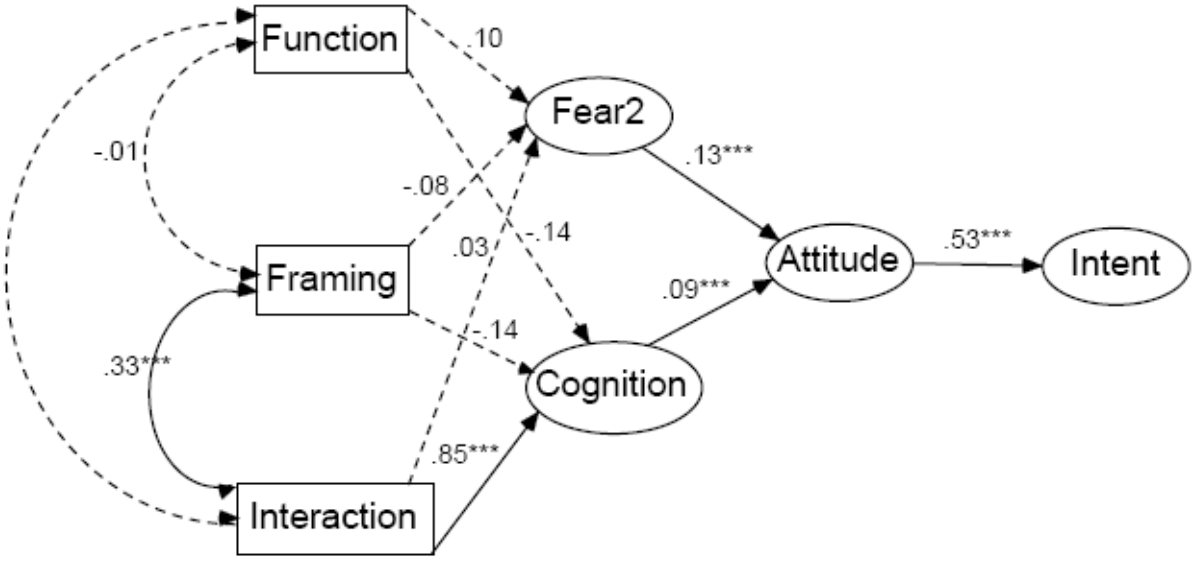
Causal Model for the Interaction Effect

H3 (Model 1) predicts no main effects for Function and Framing, but significant Function by Framing interaction effect on attitude and intention, which is mediated by cognition and message related emotion (Fear2).

The proposed causal model for the interaction effect, Model 3, fit the data satisfactorily, $\chi^2 = 21.00$, $df = 12$, $p = .05$, Rho = .88, CFI = .93, RMSEA = .06.

As illustrated in Figure 13, there were no significant paths from Motivation and Framing, which indicates no significant main effect for motivation and framing. There were significant paths from Framing to Interaction, Interaction to Cognition, Cognition to Attitude, Attitude to Intention, and Fear2 to Attitude. Hence, the function-by-framing interaction had significant indirect effects on attitude and intention via dominant cognition, and the predicted Interaction-Fear2 path was nonsignificant. H3 was partially supported.

Figure 13. Study 2: Model 3: Proposed Causal Model for the Interaction Effect.



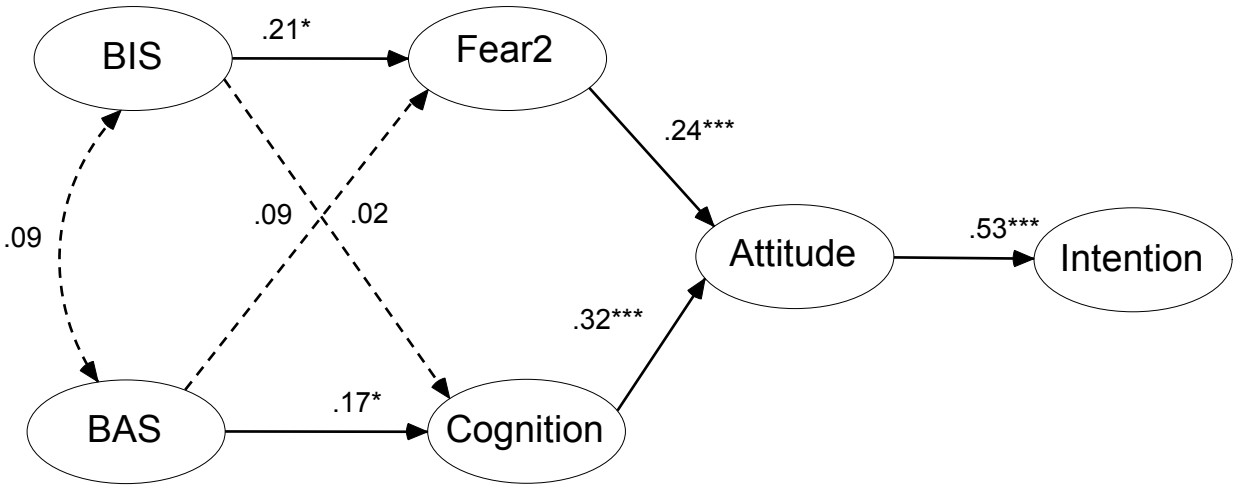
Note. n = 188. All dashed lines represent nonsignificant paths. All solid lines represent significant paths.

*$p < .05$. **$p < .01$. ***$p < .001$.

A few notes should be taken for the significant Framing-Interaction path. The relationship between Framing and Interaction is purely due to the coding method of Function and Framing and the unequal sample size in the two interaction conditions. While roughly half of the total sample are in each framing condition (- 1: loss; 1: gain), there are twice as many participants in the approach emotion condition (anger and happiness; coded as 1) as in the inhibition emotion condition (fear; coded as - 1). Since there are more participants in the approach emotion condition (coded as 1), as the product of Function and Framing, Interaction is bound to be positively correlated with Framing.

Causal Model for the Match Conditions

Figure 14. Study 2: Model 4a: Proposed Causal Model for BAS/BIS in All Conditions.



Note. n = 188. All dashed lines represent nonsignificant paths. All solid lines represent significant paths.

*$p < .05$. **$p < .01$. ***$p < .001$.

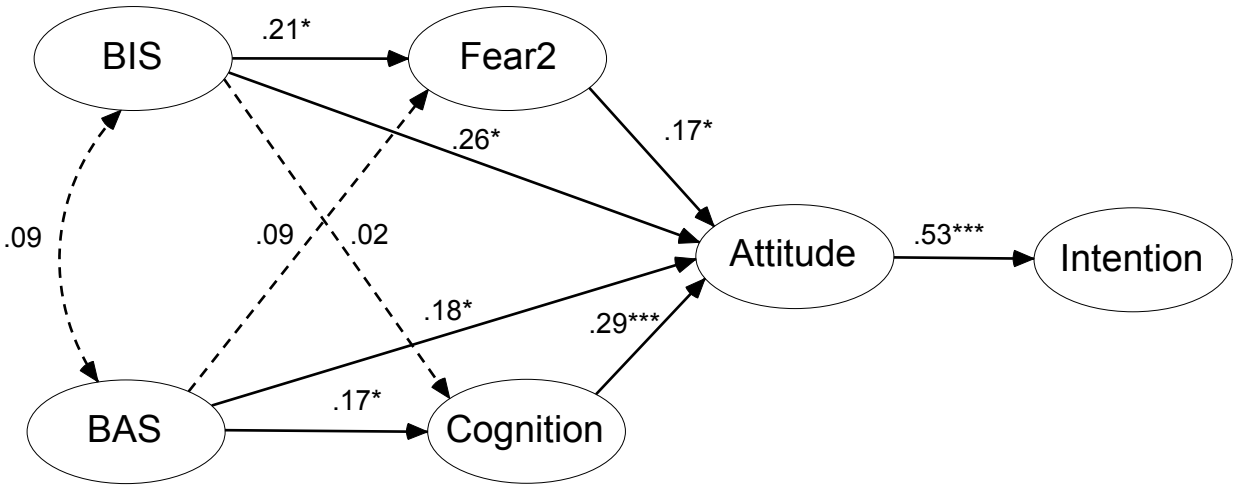
H4 hypothesizes that in the BAS/BIS causal model (Model 2), BAS predicts dominant cognition in the approach-match condition and BIS predicts dominant cognition in the inhibition-match condition.

Finding the causal model. Before comparing the two match conditions, we need to first obtain a causal model that best fits the data.

To ensure adequate statistical power, Model 2 with Fear2 replacing Emotion2 was first fit with the entire data set including all four conditions. The proposed model, Model 4a, did not yield satisfactory goodness of fit for the data, $\chi^2 = 25.15$, $df = 7$, $p < .001$, Rho = .61, CFI = .82, RMSEA = .12 (see Figure 14).

The modification indices suggested new paths from BIS to Attitude and from BAS to Attitude. I added them. The modified model, Model 4b, provided a good fit to the data, $\chi^2 = 8.38$,

Figure 15. Study 2: Model 4b: Modified Causal Model for BAS/BIS in All Conditions.



Note. n = 188. All dashed lines represent nonsignificant paths. All solid lines represent significant paths.

*p < .05. **p < .01. ***p < .001.

df = 5, p = .14, Rho = .90, CFI = .97, RMSEA = .06. As illustrated in Figure 15, there were significant paths from BIS to Fear2, BIS to Attitude, Fear2 to Attitude, Attitude to Intention, BAS to Attitude, BAS to Cognition, and Cognition to Attitude. It is notable that since we are fitting the model with both match and mismatch conditions, the significance of regression weights for the paths is not the major concern at this point. The focus is on the overall goodness of fit for the causal model so that I could obtain a template for the subsequent model comparisons within the match conditions.

Model comparison: Invariance in anger-match and happiness-match. With Model 4b fitting the data well, I could now conduct model comparisons. Before comparing the BIS-Cognition and BAS-Cognition path coefficients in the two function-by-framing match conditions (approach-match and inhibition-match), however, I need to first establish invariance

of the causal model between the two approach-match conditions (anger–gain and happiness–gain). Joreskog's (1971) rules for examining factor structure in two groups were followed to achieve this goal.

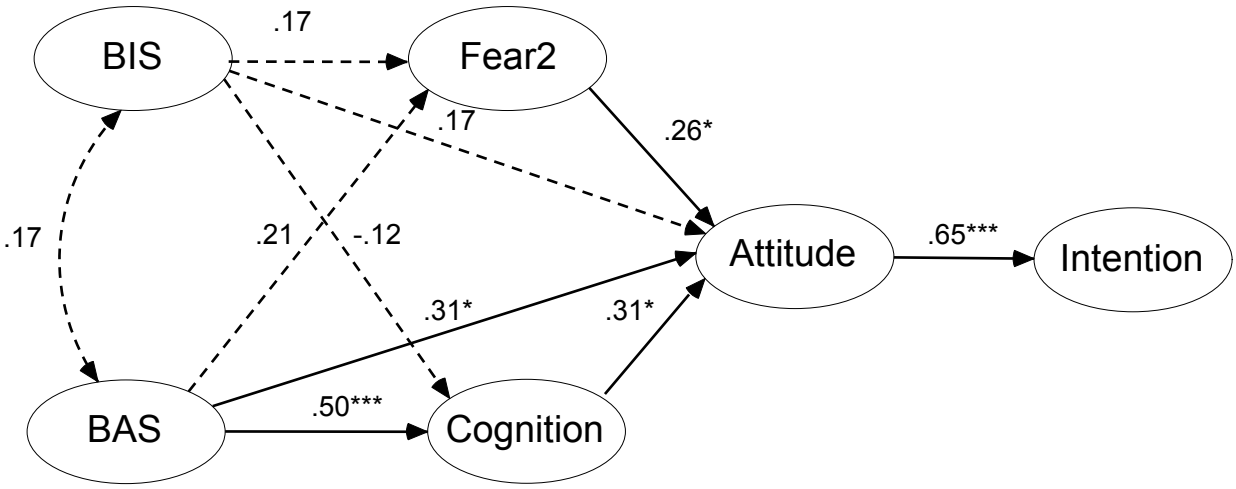
First, I tested a two-group version of Model 4b (Model 5a) where all parameters were estimated separately in anger–gain and happiness–gain conditions. The model produced good fit for the data within the two approach-match conditions, $\chi^2 = 12.23$, $df = 10$, $p = .27$, Rho = .90, CFI = .97, RMSEA = .06.

Next, I tested a new two-group model of Model 4b (Model 5b) where all b-weights were constrained to be equal in the two groups. The goodness of fit indices indicated that Model 5b also fit the data well, $\chi^2 = 23.86$, $df = 19$, $p = .20$, Rho = .90, CFI = .97, RMSEA = .06. In fact, comparing to Model 5a, Model 5b fit no worse, $\Delta\chi^2 = 11.46$, $\Delta df = 10$, nonsignificant at $\alpha = .05$. I could conclude that the causal model, Model 4b, fit the two approach-match conditions no differently.

Model comparison: Approach-match vs. inhibition-match. In preparation for the two-group model comparison between approach-match and inhibition-match, anger–gain and happiness–gain conditions were combined to form the approach-match condition.

Following Joreskog's (1971) rules for examining factor structure in two groups, I first tested a two-group version of Model 4b (Model 6a) where all parameters were estimated separately in the approach-match and the inhibition-match conditions. The model produced good fit for the data within the two match conditions, $\chi^2 = 15.34$, $df = 10$, $p = .12$, Rho = .83, CFI = .94, RMSEA = .08 (see Figures 16 and 17).

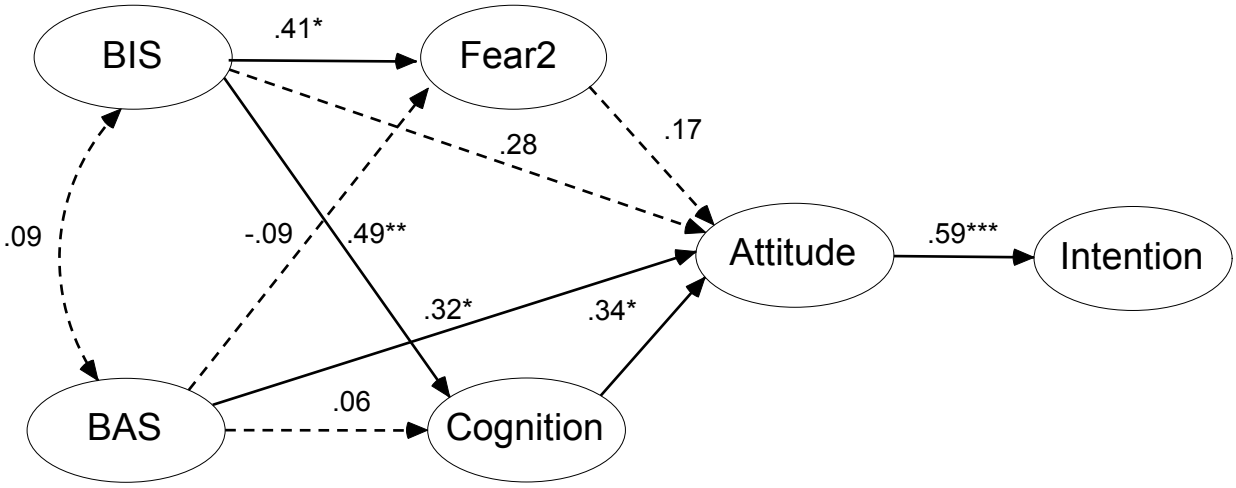
Figure 16. Study 2: Model 6a-Causal Model for BAS/BIS in the Approach-Match Condition.



Note. n = 62. All dashed lines represent nonsignificant paths. All solid lines represent significant paths.

*p < .05. **p < .01. ***p < .001.

Figure 17. Study 2: Model 6a-Causal Model for BAS/BIS in the Inhibition-Match Condition.



Note. n = 31. All dashed lines represent nonsignificant paths. All solid lines represent significant paths.

*p < .05. **p < .01. ***p < .001.

Next, I tested a new two-group model of Model 4b (Model 6b) where all b-weights except the BIS-Cognition and BAS-Cognition paths were constrained to be equal in the two function-by-framing match groups. The goodness of fit indices indicated that Model 6b (χ^2 = 19.60, df = 18, p = .36) fit no worse than Model 6a, $\Delta\chi^2$= 4.26, Δdf = 9, nonsignificant at α = .05. Hence, none of the constrained b-weights are significantly different across groups. I could proceed to test BIS-Cognition and BAS-Cognition b-weights one at a time.

I tested a new two-group model of Model 4b (Model 7a) where all b-weights except the BIS-Cognition path were constrained to be equal in the two function-by-framing match conditions. The goodness of fit indices indicated that Model 6b fit worse than Model 7a (χ^2 = 25.20, df = 19, p = .15), $\Delta\chi^2$ = 5.60, Δdf = 1, p < .05. Therefore, the BIS-Cognition path differs between the approach-match and the inhibition-match conditions.

Moreover, a new two-group model of Model 4b (Model 7b) where all b-weights except the BAS-Cognition path were constrained to be equal was tested in the two function-by-framing match groups. The goodness of fit indices indicated that Model 6b fit worse than Model 7b (χ^2 = 25.60, df = 19, p = .14), $\Delta\chi^2$ = 6.00, Δdf = 1, p < .05. Therefore, the BAS-Cognition path differs between the approach-match condition and the inhibition-match condition.

Hence, the BIS-Cognition and the BAS-Cognition paths differ between the approach-match and the inhibition-match conditions and H4 was supported.

Discussion

In conclusion, the functional model (H1b) was supported and the valence model (H1a) was rejected. As predicted by the functional model, the emotion framing interaction was partially supported for intention (H2b) while H2a was rejected. The causal models were either partially supported (H3) or fully supported (H4). Message related dominant cognition mediated the

interaction effect (H3). BAS led to dominant cognition in the approach-match condition while BIS predicted dominant cognition in the inhibition-match condition (H4). Table 13 summarizes fit statistics for the causal models for the interaction effect and the BAS/BIS. Table 14 summarizes fit statistics for model comparisons.

In addition, there were two unpredicted significant paths. First, the BAS-Attitude path was significant in both the approach-match and the inhibition-match conditions. This could be due to the nature of the health issue selected in this project. Hepatitis C detection test is a proscriptive advocacy according to Yan et al.'s (2008) classification. Thus, BAS would fit with such an approach oriented advocacy and predict attitude.

Second, the BIS-Fear2 path was significant in the inhibition-match condition. BIS is known to causally contribute to the experience of negative emotions, such as fear (Watson, Wiese, Vaidya, & Tellegen, 1999). Moreover, BIS was activated by the premessage fear in the inhibition-match condition, therefore, the BIS-Fear2 association could be simply the carryover effects of premessage fear.

Table 13

Fit Statistics for the Causal Models

	χ^2	*df*	*p*	Rho	CFI	RMSEA
Model 3*	21.00	12	.05	.88	.93	.06
Model 4a	25.15	7	<.001	.61	.82	.12
Model 4b[a*]	8.38	5	.14	.90	.97	.06

Note. n = 188.

*This model met our a priori standards for the fit statistics.

[a]This model had two paths added from BIS to Attitude and from BAS to Attitude.

Table 14

Fit Statistics for Model Comparisons

	χ^2	*df*	*p*	Rho	CFI	RMSEA	$\Delta\chi^2$	*Δdf*	*p*
Model 5a[a]	12.23	10	.27	.90	.97	.06			
Model 5b[b]	23.86	19	.20	.90	.97	.06			
5b vs. 5a							11.63	9	NS
Model 6a[a]	15.34	10	.12	.83	.94	.08			
Model 6b[c]	19.60	18	.36	.97	.98	.03			
6b vs. 6a							4.26	9	NS
Model 7a[d]	25.20	19	.15	.90	.94	.06			
7a vs. 6b							5.60	1	$p < .05$
Model 7b[e]	25.60	19	.14	.89	.93	.06			
7b vs. 6b							6.00	1	$p < .05$

Note. $n = 188$. NS = Nonsignificant at $\alpha = .05$.

[a]All parameters were estimated in this model.

[b]All b-weights were constrained to be equal in this model.

[c]All b-weights except the BIS-Cognition and BAS-Cognition paths were constrained to be equal in this model.

[d]All b-weights except the BIS-Cognition paths were constrained to be equal in this model.

[e]All b-weights except the BAS-Cognition paths were constrained to be equal in this model.

Chapter 5

GENERAL DISCUSSION

The Structure of Affect

The overarching theme of the findings lends strong support for the functional model. H1b was supported in both Studies 1 and 2. Like the happiness-BAS and sadness-BIS relationships found in Yan et al.'s (2008) study, the happiness-BAS and fear-BIS associations in the present project could be interpreted as evidence for either the valence model or the functional model. Since sadness and fear have negative valence and inhibition function, their associations with BIS are predicted by both models.

Nevertheless, the anger-BAS association clearly identified the functional model as the appropriate structural model for affect. Our findings are not alone. Experimentally induced anger was found to cause increased relative left frontal cortical activity, which was previously known as the positive-affect cortical area under the valence model (Harmon-Jones & Sigelman, 2001; Harmon-Jones, Sigelman, Bohlig, & Harmon-Jones, 2003; Jensen-Campbell, Knack, Waldrip, & Campbell, 2007). It seems that Lang's (1995) proposal that "two motive systems exist in the brain – appetitive and aversive – accounting for the primacy of the valence dimension" (p. 374) should be revised. The two motivational systems actually account for the primacy of the functional dimension of affect.

The mixed findings in previous mood framing studies (Chang, 2007; Keller et al., 2003; Mitchell, 2001) could be attributed to their inappropriate structural model of affect, i.e. the valence model. In fact, in these studies the experimentally induced affects were directed at a particular stimulus, a video clip (Mitchell, 2001) or a recall of a life event (Chang, 2007; Keller et al., 2003). They are discrete emotions rather than moods. By treating them as simply positive

and negative mood states and utilizing the valence model, these studies missed the chance of uncovering the unique yet complex persuasive effects of the stimulated dominant discrete emotions.

Emotion-Framing Interaction

Direct Effects

Nevertheless, the mixed findings of the emotion-by-framing interaction effect on attitude and intention may cast some doubts on the utility of the functional model for predicting persuasion: H2b was partially supported in Studies 1 and 2.

One of the possible reasons for the nonsignificant interaction effect in Study 2 could be its skewed sample. Studies 1 and 2 do not share the same sampling characteristics. While Study 1 included mainly juniors and seniors, Study 2 had mostly freshmen. Participants in Study 2 (mean age = 20.36, SD = 1.19) are significantly younger than those in Study 1 (mean age = 21.56, SD = 0.90), F (1, 303) = 90.72, $p < .0001$, $\eta^2 = .23$. They also indicated significantly more favorable attitude (mean attitude = 4.31, SD = 0.71) than those who attended Study 1 (mean attitude = 3.91, SD = 0.82), F (1, 303) = 20.46, $p < .0001$, $\eta^2 = .06$. On a 5-point scale ranging from 1 to 5, participants' attitude toward the advocacy was extremely high in Study 2. Due to such an exceptionally high level of susceptibility to the message across conditions, the unique persuasive effects of emotion and framing could be very hard to detect among them.

However, it seems that when it comes to changing behavioral intention, emotion and framing appear to wield influences. Unlike the attitudinal differences between the two groups, participants reported similar moderate intention scores in both Study 1 (M = 3.37, SD = 0.81) and Study 2 (M = 3.51, SD = 0.95), F (1, 303) = 1.85, p = .18, $\eta^2 = .01$. Moreover, as the significant one-tailed t-test results revealed, the direction of mean differences for intention in Study 2 was in

line with H2b (also see Table 12 and Figure 12). Since we tend to become more cynical as we age and behavioral intention is harder to change than attitude, we could speculate that emotion and framing interaction effect were particularly potent when participants had moderate level of resistance to persuasion, i.e. older and more hesitant to make a commitment.

Moreover, H2b was supported when the data in Studies 1 and 2 were pooled together: for attitude, F (1, 299) = 3.03, $p < .05$, $\eta^2 = .02$; for intention, F (1, 299) = 3.78, $p < .05$, $\eta^2 = .03$. I need to concede that given the small effect sizes and the sampling issue, however, the results are vulnerable to random errors.

Mediated Effects

Support for H3 found in Study 2 revealed that in addition to the mixed direct effects the emotion-by-framing interaction had indirect effect on attitude and intention via dominant cognition and message related fear. Therefore, emotion sensitized participants to a particular message frame. And we know that such a fit at least led to more favorable thoughts. This dominant cognition then yielded heightened concerns about getting the disease and eventually led to attitudinal and intentional changes. So, like the Yan et al. (2008) study, we know that emotion and framing at least had interaction effects during the early process of persuasion.

Motivational Systems

The results backing H4 in Study 2 revealed that there was indeed a dominant motivational system in the brain when the function of an emotion matched a particular frame. Specifically, when the approach emotions (anger and happiness) were induced, BAS guided the persuasion process. Contrastively, when the inhibition emotion (fear) was stimulated, BIS directed the persuasion process. Our findings suggest that emotion and motivation are not only associated with some common cortical areas in the brain (Harmon-Jones, Sigelman, Bohlig, &

Harmon-Jones, 2003; Tomarken, Davidson, Wheeler, & Doss, 1992), but also share similar sensitivities to message features. Both approach emotions and BAS predisposed individuals to gain frame; inhibition emotions and BIS sensitized individuals to loss frame. These results are consistent with the BAS-gain-frame vis-à-vis BIS-loss-frame associations (Mann et al., 2004; Sherman et al., 2006; Updegraff et al., 2007) and the gain-frame-BAS vis-à-vis loss-frame-BIS associations (Shen & Dillard, 2007) found in previous studies.

Practical Implications

Supports for the functional model offer new directions for health message design and planning. Yan et al. (2008) argued gain-framed messages would be more effective when executed within positive media programs and loss-framed messages should be more potent when coupled with negative media programs. Since the happiness-BAS-gain and fear-BIS-loss relationship in their studies could be accounted for by both the valence model and the functional model, their claims are premature. In fact, we now know that the functional model accounted for the emotion-by-framing interaction. Consequently, media planning and execution for health campaigns should consider the functional fit of emotion and message features, not the valence match. Specifically, when designing health messages and planning media executions, instead of considering the valence of the affective context, researchers and practitioners should pinpoint the dominant discrete emotion associated with the message and the media plan. The strategic framing of the message should fit the emotion's function and be consistent with its related motivational system. For instance, following Yan et al.'s (2008) recommendation, loss frame would be most effective for a show that induces anger. However, we now know that it should be the opposite frame instead.

In addition, the fact that a dominant motivational system guided the persuasion process in

the match conditions suggests that health campaign managers should think beyond the emotional context of a media program and consider the motivational states of the audiences. Motivational systems could be activated by factors other than emotion. For instance, BAS is associated with the appetitive system. Therefore, dining time seems to correlate with BAS and gain-framed messages should be more appropriate.

With the advent of the Internet, online message customization has become a reality. The fits among emotion, motivational systems, and framing found in the present project offer a general guideline for tailoring online health messages to Internet users. For example, when a user watches a comedy video on YouTube, a banner ad with a gain frame should be deployed. Moreover, since most Internet service providers can track the time of a user's login, a pop-up ad for a health issue could be customized to fit the users' motivational state at the moment.

Limitations and Directions for Future Study

Emotions

Although using three emotions is parsimonious for testing the two competing structural models of affect, other emotions should be considered to test the functional model further. If the functional model holds, a symmetric design to the current project should also yield results consistent with the model. For instance, such a design could include a negative approach emotion, a positive approach emotion, and a positive inhibition emotion.

Though the emotion induction technique was valid and reliable in the present project, future studies should consider new emotion induction methods, especially via media stimuli. Using real or simulated media stimuli to induce emotions would add important additional external validity to the present project.

Experiment Design

The mixed findings for the emotion-by-framing interaction call for replications of the current project. An important note researchers should take is sampling. Future studies should include a heterogeneous sample. The differences observed between young and senior college students call for further analysis of the underlying psychological variations between the two groups, which may explain the miscellaneous persuasive effects of emotion and framing.

In addition, the lack of variability of attitude in Study 2 suggests needs for a better attitude measure. Though, in general, young college students in Study 2 expressed high levels of agreement with the advocacy, there could still be subtle attitudinal differences caused by the emotion framing interaction. The self-reported paper-and-pencil measure in the current project may lack the ability to detect such nuances. Thus, indirect psychophysiological measures, such as reaction time, seem to be desirable. For instance, reaction-time-measured attitudes differ in milliseconds, which may provide a larger variance than the 5-point scale used in the self-reported paper-and-pencil measure in the present project.

The experimental stimuli were delivered in text messages. However, given the rising popularity of multimedia and the Internet, future research should develop multimedia or web based messages to test the findings in the present project. Multimedia and Internet messages tend to be more arousing than text messages. Thus, it would be interesting to explore the interaction of premessage emotion and message related arousal. In addition, from a medium perspective, text messages require more cognitive involvement than multimedia and Internet messages. Could such differences in cognitive involvement lead to difference effects? If the medium is the message, it is critical for future studies to replicate the present project with multimedia and Internet messages.

The fact that only one health issue was adopted in the present project limits the generalizability of the findings. Framing effects have been found to differ for various health issues, e.g., prevention and detection issues (Meyerowitz & Chaiken, 1987; Rothman & Salovey, 1997) or prescriptive or proscriptive advocacies (Yan et al., 2008). Hepatitis C detection test is a detection issue or a proscriptive advocacy. Future studies should replicate the present project with prevention issues or prescriptive advocacies.

Last, the small sample sizes diminished the statistical power in the project. Some of the effect sizes for the endogenous variables are small, i.e. $\eta^2 < .10$. However, even with the limited statistical power the findings in this project bear valuable contributions to the present research on emotion and strategic health communication campaign.

In addition, the small sample size should bring some cautions about interpreting the fit statistics for the SEM. With a small sample size, the statistical power for fit tends to be small as well, so it is relatively easy for the model to fit the data (MacCallum, Browne, & Sugawara, 1996). Such an issue becomes particularly problematic for the model comparisons in the present project. Each condition in the model comparisons has a very small sample size, viz., n = 32 in the inhibition-match condition. Therefore, it is no surprise that the model fit the data. Nevertheless, the crux of model comparisons is the change in Chi-square. Despite the small sample sizes, the significant changes in Chi-square in model comparisons indicate that BAS and BIS each dominated the persuasion process under the approach-match and the inhibition-match conditions respectively.

Directions for Future Study

Where would this project take us? The answers are twofold. The first part deals with emotion. Despite the clear support for the functional model found in this project, it is unknown

whether the model would predict emotional responses to media programs. Unlike the Life Event Inventory Task, which could experimentally induce a specific emotion, media programs tend to trigger a range of emotions. For example, after watching a horror movie, an individual may feel fearful due to the violent content yet happy because of the enjoyment of the movie. In such a case, it is unknown which motivational system will be activated. Therefore, as a future study, it is important to explore the structural model for mixed emotions. It seems that there are a number of possibilities. First, there might be a dominant emotion that determines the activation of the motivational system at the moment. Such a dominant emotion could be either the net outcome of comparing the intensity of each induced emotion or the valence/function of the media genre. Second, the sequence of induced emotions may also predict the activation of motivational systems. For instance, as emotional responses to horror movies, happiness following fear may activate BAS whereas fear following happiness could induce BIS.

In addition to the structural model of mixed emotions, emotion decay needs to be explored as well. Discrete emotions are known to be short-lived and could interrupt a free-floating mood and change it afterward (Frijda, 1986). Thus, it would be interesting to know the possible changes in motivational systems after the experience of a discrete emotion dissipates. Although the effects of experimentally induced emotions appeared to last for the entire period of studies in the present project, they would eventually disappear and individuals would retain a particular mood state. Given the bipolar structure of mood states, it seems possible for the emotion activated motivational system, which is consistent with the function of that emotion, to change in accordance with the valence of the subsequent mood state. If this is true, the valence model should not be completely abandoned. Instead, the functional and the valence models both could have utilities. While the functional model could predict momentary activations of emotion

and motivational systems, the valence model might still remain useful in understanding the effects of prolonged affective states. Of course, the results could be otherwise. If no changes in motivational systems are observed, the functional model seems to predict both momentary and prolonged activations of motivational systems.

The second part of future directions focuses on motivational systems. One of the main arguments in this project is that experimentally induced emotions could activate motivational systems. However, the observed relationships between emotion and motivational systems showed some variations between Study 1 and Study 2, though the overall patterns were consistent with the predictions. The standardized regression weights for self-reported emotions as predictors of BAS/BIS were not highly consistent in Study 1 (see Figure 5) and in Study 2 (see Figure 10). This raises questions about the validity of Carver and White's (1994) 20-item BAS/BIS scales as measures of the behavioral inhibition and approach systems.

The scale was originally developed to measure motivational systems as stable personality traits, though later studies (Hagemann et al., 2005; Yan et al., 2008) suggested that occasion-specific fluctuations could also account for activations and changes in BAS/BIS. Therefore, future studies may consider using different measures of motivational systems. For instance, reaction time measures seem to be plausible. Since BAS sensitizes individuals to rewards and nonpunishment, individuals in such a motivational state should respond faster to rewarding and nonpunishing words. On the contrary, BIS predisposes individuals to punishment and non-rewards. Therefore, individuals in the inhibition state would react faster to punishing and non-rewarding words.

In addition to the measurement issue of BAS/BIS, the approach–inhibition dichotomy of motivational systems could also be problematic. Approach implies being proactive toward new

desirable states, yet retaining existing desirable states could also belong to the same motivational system. Similarly, inhibition implies avoidance of undesirable states, yet withdrawing from undesirable states could also belong to the same motivational system. Therefore, future studies should explore the possible differences between approach and retention, and inhibition and withdrawal. For instance, would contentment (retention) exhibit the same association with BAS as happiness (approach)?

To conclude, the points outlined here for future studies should serve as rudimentary plans for future inquiries of affect and motivational systems. Contrary to Plato's concern about the dangerous influence of feelings on rational thinking, we are now on our way to understanding the intriguing impact of affect on thinking and behavior.

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APPENDICES

Appendix A

Correlations, Means and Standard Deviations of the Variables in the Function-Framing Match/Mismatch Conditions in Study 2

	Mean[a]	SD[a]	1	2	3	4	5	6	7	SD[b]	Mean[b]
1. Function	0.33	0.95		1.00**	---	-.13	.02	.04	-.08	0.95	0.33
2. Framing	0.33	0.95	-1.00**		---	-.13	.02	.04	-.08	0.95	0.33
3. Interaction	-1.00	0.00	---	---		---	---	---	---	0.00	1.00
4. Cognition	0.70	1.96	.003	-.003	---		.20†	.48**	.30**	2.12	2.30
5. Fear2	1.67	1.24	.06	-.06	---	.18†		.35**	.36**	1.22	1.67
6. Attitude	4.33	0.61	-.06	.06	---	.21*	.16		.53**	0.80	4.29
7. Intention	3.38	0.91	.13	-.13	---	.10	-.02	.40**		0.98	3.64

a. Lower diagonal = Mismatch (n = 95)

b. Upper diagonal = Match (n = 93)

--- Cannot be computed because at least one of the variables is constant.

†$p < .10$. *$p < .05$. **$p < .01$.

Appendix B

Correlations, Means and Standard Deviations of the Variables in the Function-Framing Approach-Match/Inhibition-Match Conditions in Study 2

	Mean[a]	SD[a]	1	2	3	4	5	6	SD[b]	Mean[b]
1. BIS	3.83	0.82		.13	-.04	.18	.21†	.15	0.58	3.45
2. BAS	3.72	0.68	.08		.42**	.18	.45**	.30*	0.45	3.93
3. Cognition	2.68	2.22	.46**	.10		.27*	.47**	.40**	2.06	2.11
4. Fear2	1.65	1.31	.37*	-.05	.10		.39**	.45**	1.19	1.69
5. Attitude	4.25	0.76	.46**	.32†	.52**	.27		.56**	0.83	4.31
6. Intention	3.74	1.19	.44*	.38*	.16	.25	.52**		0.86	3.59

c. Lower diagonal = Inhibition-Match (n = 31)

d. Upper diagonal = Approach-Match (n = 62)

--- Cannot be computed because at least one of the variables is constant.

†$p < .10$. *$p < .05$. **$p < .01$.

Appendix C
Coding Rules in Study 2

Coding Procedure

1. Thought Units:
   Code the open-ended responses as thought units.

2. Cognitive vs. Emotional:
   Code each thought unit either as a cognitive response (1) or an emotional response (0).

3. Relevant vs. Irrelevant:
   Code each cognitive response either as a relevant (1) or an irrelevant response (0). Ignore the emotional responses.

4. Cognitive Valence:
   Code each relevant cognitive response as disagreement (1), neutral (2), or agreement (3). Ignore the irrelevant cognitive responses.

5. Emotional Responses:
   Code each emotional response as happiness (1), anger (2), fear (3), sadness (4), surprise (5), guilt (6), contentment (7), disgust (8), interest (9), or other (10).

All examples in this guideline are individuals' responses to a message advocating getting a hepatitis C detection test.

Step 1: Coding Thought Units

A thought unit is "the minimum meaningful utterance having a beginning and an end. It is typically operationalized as a simple sentence or independent clause in which the subject and predicate may be expressed or implied" (Hatfield & Weider-Hatfield, 1978, p. 46). Put differently, a thought unit is an idea that stands alone.

1. Sometimes an utterance will consist of only one clause.

Example: "He is grateful for what we are doing./"

In this case, just put a forward slash at the end of the sentence to indicate that it is to be counted as a thought unit.

2. But a sentence may contain two or more units of this kind.

Example: "He was scheduled to go to the calisthenics class./ This raised the questions of gym equipment,/ as he would need money for this./"

3. When breaking sentences up into thought units, it is often necessary to supply missing words.

Example: He is more comfortable/ (and he is) happier away from them, too./

Just for purpose of consistency, always put the conjunction with the second clause (as above), not the first.

4. The general sense of the utterance in the context of the sentence or conversation is a good guideline as to whether to separate compound predicates. In the example below "bread and milk" go together because they are both found at the store. "The movies" is a different destination and conceptually unrelated to the first clause. Therefore:

"I went to the store for bread and milk/ and (I went) to the movies./"

5. Sometimes you will have to infer more than conjunctions. The utterance above is another example of having to fill in words. The sentence really means:

"I went to the store for bread and milk/ and (I went) to the movies./"

6. You should separate dependent clauses such as gerund phrases, adverbial clauses containing because, if, when, and prepositional clauses, and all phrases with direct objects.

Example: "Whenever people can't get through,/ they feel terrible frustration./"

Example: "I was hungry/because I hadn't eaten all day./"

Example: "I will return,/ if you will wait for me./"

7. Phrases/words that call attention to the speaker or to establish a turn are divided from previous and subsequent thought units.

Example: “Listen,/ let’s get back to work./”

Example: “Tell you what,/ you wash the dishes/ and I’ll vacuum./”

8. Code one-word replies as independent thought units.

Example: “Yeah./”

Example: “Okay,/ I will do it./”

Example: “Right,/ gotcha./”

9. When several okays or you knows occur consecutively, then they should be treated as one unit.

10. If a parenthetical clause can stand alone without distorting the meaning of the sentence, then code it as a separate unit. Thus:

Example: “Dr. Fritz, who was trained at the University of Indiana,/ feels that the evidence is compelling./”

11. Code hesitations and nonfluencies as one unit.

Example: “Uh, yeah, well,/ then I guess I will do it.”

Step 2: Coding Cognitive Responses or Emotional Responses

Cognitive Responses

Cognitive responses are thoughts that individuals have in reaction to the message.

1. It could be evaluations of the message.

   Example: “What a great idea!”

   Example: “I don’t think it’s true.”

2. It could be thoughts about themselves or others.

   Example: “I never heard of such a disease.”

   Example: “My uncle had it.”

3. It could be a single word or a question.

   Example: “No!”

   Example: “What’s the cure?”

Emotional Responses

Emotional responses are feelings that individuals experience at the moment.

1. It could be related to the message.

   Example: “I am surprised by the message.”

   Example: “I feel sad about the ending.”

   Example: “Gross! (disgust)”

   Example: “Wow! (surprise)”

   Example: “Intrigued (interest)”

2. It could be unrelated to the message.

   Example: “I am happy.”

   Example: “I feel depressed.”

Step 3: Coding Relevant or Irrelevant Thoughts

Relevant Thoughts

Relevant cognitive responses are thoughts that are related to the message, the advocacy, or the source of the message.

Example: “I like the idea.”

Example: “I should get tested.”

Example: “Need a more interesting introduction.”

Irrelevant Thoughts

Irrelevant cognitive responses are thoughts that are unrelated to the message, the advocacy, or the source of the message.

Example: “I am hungry.”

Example: “Where are my glasses?”

Example: ‘I need to write a paper tonight.”

Step 4: Coding Message-Relevant Cognitive Responses

Types of Codes

There are only three types of codes. They are:

1 = Disagreement/Counterarguments: Any thought that represents a negative evaluation of the message, the advocacy, or the source of the message.

Example: "What a stupid idea."

2 = Neutral: Thoughts that lack any evaluation aspect. Often, such thoughts describe some aspect of the message.

Example: "The title was highlighted."

3 = Agreement/Supporting Arguments: Any thought that represents a positive evaluation of the message, the advocacy, or the source of the message.

Example: "The message makes an excellent point."

The Default Code: Neutral

Begin with the assumption that a response is neutral. There are many reasons to move a response out of this category, but if you can't apply one or more of the reasons discussed below, then code the response as neutral.

The Evaluation Rule

Some responses are clearly evaluative and therefore easy to recognize as Disagreements or Agreements. But, there are many different aspects to the message with which a respondent could show disagreement or agreement.

Disagreements/Counterarguments

Example: "I don't trust the NIH." (NIH was cited as an information source for a message. Source-Oriented Disagreement)
Example: "I just tune out messages on hepatitis." (Topic-Oriented Disagreement)
Example: "I do not want to know if I have hepatitis." (Advocacy-Oriented Disagreement)

Agreements/Supporting Arguments

Example: "The message was very convincing." (Argument-Oriented Agreement)
Example: "Great introduction!" (Delivery-Oriented Agreement)
Example: "The NIH says so!" (NIH was cited as an information source for a message. Source-Oriented Agreement)

The Context Rule

Sometimes the evaluative aspects may not be crystal clear. In such cases, the overall tone of the responses should be considered. It is important to note that the context rule is to aid judgments within other rules. Therefore, the context rule will be explained in conjunction with other rules.

The Impact Rule

Generally, responses that indicate that the message had an impact on the participant can be coded as Agreement. Of course, the impact should be congruent with the intended impact of the message, i.e. to comply with the advocacy.

If a participant indicates that s/he learned something that is relevant to the advocacy of the message, the unit should be considered within the context of the responses' overall tone (the Context Rule). A simple learning statement does not necessarily indicate agreement with the advocacy. If the overall tone is supportive of the advocacy, the learning thought should be coded as Agreement. However, if the overall tone opposes the advocacy, the learning thought should be coded as Disagreement.

Example: "Wow,/ this is serious./I never knew it took 10 years to see symptoms./ Can I have this?/ This is scary./" The third unit is a learning thought. It should be coded as Agreement because the overall tone is in support of the advocacy.

Example: "The first sentence was written in a confusing way./ I didn't know Hep. C is this serious./ Is this true?/ Probably they just made it up./" The second unit is a learning statement. It should be coded as Disagreement because the overall tone opposes the advocacy.

Also, just knowing something is not sufficient to count as an Agreement. The example below would be coded Neutral.

Example: "I knew what it was for."

Instances in which participants express comprehension problems (the inverse of learning) should be coded as Disagreements.

Example: "What is this message for?"

The Identification Rule

Expressions that show identification with the message or the people in the message are coded as Agreements. However, such expressions must meet two additional criteria.

1. The response must indicate that the respondent, him or herself, identifies with the message. Friends and relatives don't count. Thus, the first example below would be coded as Agreement whereas the second would not.

Example: “I could get hepatitis C.”
Example: “My uncle had hepatitis.”

2. The unit must show identification with the main idea of the message or the advocacy. If the identification is too far afield or is trivial vis-à-vis the thrust of the persuasive message, then it should be coded as Neutral. The first example below would be coded as Agreement whereas the second would not.

Example: “I am at risk for hepatitis C.”
Example: “I thought of a blood test I had last week.”

Lack of identification should be coded as Disagreement.
Example: “I felt it didn’t apply to me.”

Ambiguously-Valenced Words

Respondents often provide one-word responses that are difficult to evaluate because the word has more than one meaning. For example, “Terrible!” might mean that s/he felt the message was terribly written (a negative evaluation) or it might mean that s/he thought that the consequences of not getting a hepatitis C detection test would be terrible (a positive evaluation). In such cases, the context rule should be applied. If the overall tone supports the advocacy, the ambiguously-valent word should be coded as Agreement. However, if the overall tone opposes the advocacy, the ambiguously-valent word should be coded as Disagreement.

The Question Rule

It is not uncommon for participants to express themselves in questions. In general, we much assume that they are wondering about some factual issue and, therefore, should code them as Neutral.

Example: “What was the sponsor of this message?”

However, there are some exceptions to this general rule and rhetorical questions are one. Sometimes we see rhetorical questions used to express contempt toward the message or the advocacy. Thus, they should be coded as Disagreements. In other instances, respondents use rhetorical questions to express disbelief that anyone would not agree with advocacy (Agreement). Coding of rhetorical questions should be considered in conjunction with the Context Rule. If the overall tone supports the advocacy, the question should be coded as Agreement. However, if the overall tone opposes the advocacy, the question should be coded as Disagreement.

Example: “The first sentence was written in a confusing way./ I didn’t know Hep. C is this serious./ Is this true?/ Probably they just made it up./Why haven’t I been exposed to this info before?/ It must be uncommon./ Article seems repetitive./ Doesn’t seem to be written by a medically well-informed person./” The third and fifth units, two questions, should be coded as Disagreement because the overall tone opposes the advocacy.

Example: “Wow,/ this is serious./Why shouldn’t everyone get tested? I need to get one./” The third unit, a question, should be coded as Agreement because the overall tone is in support of the advocacy.

Step 5: Coding Emotional Responses

Here are some possible words for each emotional category.

Surprise: Surprised, Startled, Astonished

Anger: Irritated, Angry, Annoyed, Aggravated

Fear: Fearful, Afraid, Scared,

Sadness: Sad, Dreary, Dismal

Guilt: Guilty, Ashamed

Happiness: Happy, Elated, Cheerful, Joyful

Contentment: Contented, Peaceful, Mellow, Tranquil

Disgust: Revulsed, Disgusted, Gross

Interest: Interested, Intrigued, Engaged

Other: Please specify.

Appendix D
Experiment Questionnaire and Stimuli

Instructions:

You are about to participate in two separate studies. They are combined in one session in order to be time efficient. Your participation in both is completely confidential and voluntary.

Please complete the booklet one page at a time in the sequence it is presented. Please do not go forward in your booklet until you have completed a page and do not go back to prior pages that you have already completed. Thank you for participating in this research project.

Remember a specific social event that has occurred in your life that has made you feel very happy/angry/fearful…imagine the situation as vividly as you can. Picture the event actually happening to you. Try to experience all the details of the situation…think through the thoughts that occurred to you…feel the same feelings you felt…describe the event you remembered as vividly as you can including all the important details in the space proved on this page. (You have 5 minutes to reflect on and write down your experience.)

Please indicate your level of agreement with each statement:

a. My memory of the event I just described was clear.

Strongly disagree←----------→Strongly agree

1 2 3 4 5 6 7

b. My memory of the event I just described was vivid.

Strongly disagree←----------→Strongly agree

1 2 3 4 5 6 7

c. My memory of the event I just described made me feel as if I was living it again.

Strongly disagree←----------→Strongly agree

1 2 3 4 5 6 7

d. My memory of the event I just described was hazy.

Strongly disagree←----------→Strongly agree

1 2 3 4 5 6 7

Please indicate how you feel now.

0 = None of this feeling…….4 = A great deal of this feeling

a. Surprised	0	1	2	3	4
b. Startled	0	1	2	3	4
c. Astonished	0	1	2	3	4
d. Irritated	0	1	2	3	4
e. Angry	0	1	2	3	4
f. Annoyed	0	1	2	3	4
g. Aggravated	0	1	2	3	4
h. Fearful	0	1	2	3	4
i. Afraid	0	1	2	3	4
j. Scared	0	1	2	3	4
k. Sad	0	1	2	3	4
l. Dreary	0	1	2	3	4
m. Dismal	0	1	2	3	4
n. Guilty	0	1	2	3	4
o. Ashamed	0	1	2	3	4
p. Happy	0	1	2	3	4
q. Elated	0	1	2	3	4
r. Cheerful	0	1	2	3	4
s. Joyful	0	1	2	3	4
t. Contented	0	1	2	3	4
u. Peaceful	0	1	2	3	4
v. Mellow	0	1	2	3	4
w. Tranquil	0	1	2	3	4

For each of the statements below, please indicate your level of agreement with each statement about you. If you strongly disagree with the statement about you, please write a "1" to the left of the question; if you strongly agree with the statement about you, please write a "5" next to the question. And, of course, use the numbers in the middle, "3", if you fall between the extremes. Please keep the following scale in mind as you rate each of the statement below.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

_____ 1. It would excite me to win a contest.

_____ 2. I worry about making mistakes.

_____ 3. If I think something unpleasant is going to happen I usually get pretty "worked up."

_____ 4. When good things happen to me, it affects me strongly.

_____ 5. When I'm doing well at something, I love to keep at it.

_____ 6. When I want something, I usually go all out to get it.

_____ 7. When I go after something, I use a "no holds barred" approach.

_____ 8. I have very few fears compared to my friends.

_____ 9. I feel worried when I think I have done poorly at something.

_____ 10. If I see a chance to get something I want, I move on it right away.

_____ 11. Even if something bad is about to happen to me, I rarely experience fear or nervousness.

_____ 12. I often act on the spur of the moment.

_____ 13. Criticism or scolding hurts me quite a bit.

_____ 14. I will often do things for no other reason than that they might be fun.

_____ 15. I go out of my way to get things I want.

_____ 16. I feel pretty worried or upset when I think or know somebody is angry at me.

_____ 17. When I see an opportunity for something I like, I get excited right away.

_____ 18. When I get something I want, I feel excited and energized.

_____ 19. I crave excitement and new sensations.

_____ 20. I'm always willing to try something new if I think it will be fun.

Now you have completed the first study. Please close the booklet and put it in front of you. Please raise your hand and let the experimenter know. He or she will give you further instructions.

You are about to read a health related message. It is a rough draft developed for a local health organization and we are now seeking your opinions. Please attend to it as you would normally read a newspaper article.

Please complete the booklet one page a time in the sequence it is presented. Please do not go forward in your booklet until you have completed a page. Please follow the specific instructions on each page.

Please go to the next page to read the article.

Gain-framed message

Hepatitis C Virus Detection: The Benefits of Taking a Detection Test

With a detection test, every year, hepatitis C virus gets identified for millions and infected persons avoid becoming a source of transmission to others and reduce their risk for chronic liver disease or other related chronic disease. Since many may not experience symptoms for more than 10 years after initial infection, taking a hepatitis C virus test would benefit early treatment and become life-saving.

Hepatitis C virus is a viral infection transmitted through infected blood and blood products and leads to liver inflammation. Many infections are "community-acquired" and may have been caused by unnoticed or forgotten exposure from cuts or wounds. Unlike hepatitis A and B, there is no vaccine against hepatitis C virus. According to the National Institutes of Health, approximately 4 million Americans have been infected with hepatitis C virus and about 35 thousand new cases are estimated to occur in the United States each year.

Hepatitis C virus detection test has saved many lives in the United States. Studies indicate that people with early detection respond to treatment better and the survival rate for early treatment is 40% higher than late treatment. Approximately 2.8 million Americans have benefited from taking the hepatitis C virus detection test and about 24,000 more are estimated to have the blood test each year.

With a detection test, hepatitis C virus could be detected and treated early and it may save your life. Ask your doctor for a hepatitis C virus blood test.

Please go to the next page

Loss-framed message

Hepatitis C Virus Detection: The Costs of Not Taking a Detection Test

Without the detection test, every year, hepatitis C virus goes undetected for millions and infected persons become a source of transmission to others and are at high risk for chronic liver disease or other related chronic disease. Since many may not experience symptoms for more than 10 years after initial infection, not taking a hepatitis C virus test would delay treatment and become life-threatening.

Hepatitis C virus is a viral infection transmitted through infected blood and blood products and leads to liver inflammation. Many infections are "community-acquired" and may have been caused by unnoticed or forgotten exposure from cuts or wounds. Unlike hepatitis A and B, there is no vaccine against hepatitis C virus. According to the National Institutes of Health, approximately 4 million Americans have been infected with hepatitis C virus and about 35,000 new cases are estimated to occur in the United States each year.

Studies indicate that 40% of chronic liver disease is hepatitis C virus related, resulting in over 10,000 deaths per year. Deaths due to hepatitis C virus are estimated to increase over the next 10 years to approximately 30,000 per year. Hepatitis C virus associated end-stage liver disease is the most frequent indication for liver transplantation among adults. It is estimated that 51% of all liver transplants are due to hepatitis C virus infection.

Without a detection test, hepatitis C virus could go undetected and untreated and it may cost your life. Ask your doctor for a hepatitis C virus blood test.

Please go to the next page

We are interested in what you were thinking **while reading the hepatitis C virus test message**. In the boxes provided below, please write down all of the thoughts that came to mind while reading the message. Please state all of your thoughts and ideas concisely…a phrase or a short sentence is sufficient. Ignore spelling, grammar, and punctuation. There are no right or wrong answers. You will have up to two and a half minutes to write your thoughts. If you need more space, you may write on the back of this page.

Please go to the next page

1. **Please indicate how the message made you feel.**

	0 = None of this feeling……			**……4 = A great deal of this feeling**
a. Surprised	0	1	2	3	4
b. Startled	0	1	2	3	4
c. Astonished	0	1	2	3	4
d. Irritated	0	1	2	3	4
e. Angry	0	1	2	3	4
f. Annoyed	0	1	2	3	4
g. Aggravated	0	1	2	3	4
h. Fearful	0	1	2	3	4
i. Afraid	0	1	2	3	4
j. Scared	0	1	2	3	4
k. Sad	0	1	2	3	4
l. Dreary	0	1	2	3	4
m. Dismal	0	1	2	3	4
n. Guilty	0	1	2	3	4
o. Ashamed	0	1	2	3	4
p. Happy	0	1	2	3	4
q. Elated	0	1	2	3	4
r. Cheerful	0	1	2	3	4
s. Joyful	0	1	2	3	4
t. Contented	0	1	2	3	4
u. Peaceful	0	1	2	3	4
v. Mellow	0	1	2	3	4
w. Tranquil	0	1	2	3	4

2. The next set of questions asks you to make judgments about <u>the message</u> that you just read.

a. I support what the message was trying to accomplish.
Strongly disagree 1 2 3 4 5 Strongly agree

b. I agree with the position promoted in the message.
Strongly disagree 1 2 3 4 5 Strongly agree

c. I am favorable towards the main point of the message.
Strongly disagree 1 2 3 4 5 Strongly agree

d. I intend to behave in ways that are consistent with the message.
Strongly disagree 1 2 3 4 5 Strongly agree

e. I plan to act in ways that are compatible with the position promoted by the message.
Strongly disagree 1 2 3 4 5 Strongly agree

f. I am going to make an effort to do what the message urged me to do.
Strongly disagree 1 2 3 4 5 Strongly agree

3. Please indicate your level of agreement with the following statements.

a. I am confident that I could take part in testing for hepatitis C virus if it were offered to me.
Very unsure if I could - 3 - 2 - 1 0 + 1 + 2 + 3 Very sure I could

b. For me to take part in testing for hepatitis C virus, if it were offered to me, would be:
Very difficult -3 -2 -1 0 +1 +2 +3 Very easy

c. For me to take part in testing for hepatitis, if it were offered to me, would be:

Totally outside of my control — - 3 - 2 - 1 0 + 1 + 2 + 3 — Totally under my control

4. Please indicate your evaluation of the message.

Overall, the message I just viewed was:

a. Not at all persuasive 1 2 3 4 5 Very persuasive

b. Not at all effective 1 2 3 4 5 Very Effective

c. Not at all convincing 1 2 3 4 5 Very convincing

d. Not at all compelling 1 2 3 4 5 Very compelling

e. Not at all credible 1 2 3 4 5 Very credible

f. Not at all believable 1 2 3 4 5 Very believable

g. Not at all clear 1 2 3 4 5 Very clear

5. The next set of questions asks you to make judgments about the message that you just read.

a. I paid attention to the contents of the message.
Strongly disagree 1 2 3 4 5 Strongly agree

b. When I read the article, I expended efforts thinking of the contents of the article.
Strongly disagree 1 2 3 4 5 Strongly agree

c. When I read the message, I could follow through the message smoothly.
Strongly disagree 1 2 3 4 5 Strongly agree

d. When I read the message, I felt the message was easy to comprehend.
Strongly disagree 1 2 3 4 5 Strongly agree

6. Please answer the following questions by circling the appropriate number on each line.

a. The information in the article has a tone that is:
Negative - 3 - 2 - 1 0 + 1 + 2 + 3 Positive

b. Did the article emphasize the benefits associated with taking a hepatitis C virus test or the costs of not taking the test?
Costs - 3 - 2 - 1 0 + 1 + 2 + 3 Benefits

c. Did the article emphasize the gains associated with taking a hepatitis C virus test or the losses of not taking the test?
Losses - 3 - 2 - 1 0 + 1 + 2 + 3 Gains

d. I am very worried or concerned about having hepatitis C virus.
Strongly disagree 1 2 3 4 5 Strongly agree

e. I am at high risk of having hepatitis C virus.
Strongly disagree 1 2 3 4 5 Strongly agree

f. I think the issue of having a hepatitis C virus test is very relevant to me.
Strongly disagree 1 2 3 4 5 Strongly agree

g. I think the issue of having a hepatitis C virus test is very important to me.
Strongly disagree 1 2 3 4 5 Strongly agree

7. Have you had a hepatitis C virus test in the last two years?
A. Yes B. No

8. How would you describe your knowledge of hepatitis C virus test prior to reading the article in this study?
Know nothing 0 1 2 3 4 Very Knowledgeable

9. In which year were you born? _____

10. Please circlee your gender. 1. Male 2. Female

11. Please indicate your ethnic background.
1. African-American 2. Asian-American 3. Caucasian 4. Hispanic 5. Others

Stop! This is the end of the booklet. Please return the booklet to the experimenter.

Thank you!

Vita

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SELECTED PUBLICATIONS

Yan, C. (2008). The persuasive effects of discrete emotions, functions of motivational systems, and health message framing. *Proceedings of the 2008 National Communication Association Doctoral Honors Seminar*. University of Alabama, Tuscaloosa, Alabama.

Yan, C., Dillard, P. J., & Shen, F. (2008). *The effects of mood, framing, and behavioral advocacy on persuasion*. Revise and resubmit at the *Journal of Communication*.

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