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The impact of observed non-verbal cues on message-based persuasion

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University of Iowa

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THE IMPACT OF OBSERVED NON-VERBAL CUES ON MESSAGE-BASED
PERSUASION

by
Abigail Evans

A thesis submitted in partial fulfillment
of the requirements for the Doctor of
Philosophy degree in Psychology (Social Psychology)
in the Graduate College of
The University of Iowa

May 2014

Thesis Supervisor: Assistant Professor Jason K. Clark

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Graduate College
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Iowa City, Iowa

CERTIFICATE OF APPROVAL

PH.D. THESIS

This is to certify that the Ph.D. thesis of

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has been approved by the Examining Committee
for the thesis requirement for the Doctor of Philosophy
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ABSTRACT

Non-verbal communication is a pervasive form of information sharing which has been shown to influence human behavior from infancy. To date, few empirical investigations have explored the mechanism or mechanisms by which the observed non-verbal reactions of an audience can influence message-based persuasion. Within the current dissertation, pilot data suggest that observing different types of non-verbal reactions to a persuasive message can affect attitudes. Four studies then explore two possible mechanisms by which audience non-verbal reactions could influence attitudes in a message-based persuasion paradigm. Results suggest that audience non-verbal reactions can influence attitudes by serving as a cue or heuristic or by biasing how message arguments are interpreted. Results are relevant to parties interested in affecting people's attitudes and behavior; especially as subtle non-verbal cues become more frequently communicated through technology such as network television and videoconferencing.

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CHAPTER 1

THE IMPACT OF OBSERVED NON-VERBAL CUES ON MESSAGE-BASED PERSUASION

Overview

Television producers often use cuts to the reactions of a studio audience as a way of making political speeches more engaging to the viewers at home. Audience reactions were featured prominently during the 2012 Republican primary election. In one dramatic episode, many Americans were shocked to see an angered audience booing for a gay soldier stationed overseas and smiling faces cheering for the controversial executions recently ordered by one candidate. While many journalists and bloggers commented on these displays, the research literature remains extremely vague on the mechanisms by which observed audience reactions influence people's attitudes. In other words, it is unclear how exactly these dramatic displays by the audience might have influenced the opinions of viewers at home toward politicians taking part in the primary or the issues they were discussing. The current research is designed to address this gap.

Although the impact of observed non-verbal reactions on persuasion has received little attention from social psychologists, non-verbal communication is seen as an important topic of study among researchers interested in comparative, developmental, and cognitive psychology. Some have argued that the ability to understand and interpret social information is crucial for human survival (Humphrey, 1976). From the times of our earliest ancestors, nonverbal behavior is one way in which humans have been able to communicate motives, intentions, and emotions. Ambady and Weisbuch (2010), argue that the ability to utilize and communicate nonverbal information lies at the heart of social intellect, which they suggest has allowed the human species to become what it is today.

Among many non-human animals, the nonverbal reactions of conspecifics to stimuli in the environment have been shown to influence the behaviors of an observer. For example, when exposed to new food types or feeding locations, chukar partridge chicks will not eat until their mother gestures to indicate that the food source is acceptable (Avital & Jablonka, 2000). Fathead minnows are also sensitive to the non-verbal reactions of other members of their species, exhibiting fear-reactions of their own after observing the fear-reactions of other minnows upon exposure to a novel scent (Mathis, Chivers, & Smith, 1996). Primates also often utilize the nonverbal reactions of others when forming evaluations of objects in the environment. Chimpanzees use a series of facial expressions to convey emotion much like humans (Parr, Waller, & Vick, 2007) and certain expressions have been shown to influence the behavior of other chimps (Nakayama, 2004). Similarly, baboons will not eat bananas of novel colors after observing other baboons react negatively to those bananas, even weeks after having observed such reactions (Jourventin, Pasteur, & Cambefort, 1976).

Similar to other species, humans begin to understand and utilize non-verbal information at a very early age. Recent investigations suggest that infants first begin to mimic the non-verbal behaviors of adults at as early as six months of age, and mimic progressively more actions as their motor skills improve (Jones, 2007). During this phase of development, infants monitor the reactions of others in the environment as a means by which to understand novel events or objects in a process known as social referencing (Klennert, Campos, Sorce, Emde, & Sveida, 1983). Six month old infants are believed to use social referencing to understand ambiguous situations (Walden & Baxter, 1989). In one classic demonstration of social referencing, 12 month old infants were more likely to traverse an ambiguous visual cliff in order to retrieve a desirable toy after observing happy rather than fearful expressions on the faces of their mothers (Sorce, Emde, Campos, & Klennert, 1985). Similarly, infants who observe fearful expressions from their mother are less likely to approach a novel toy than infants who observe positive

expressions (Mumme, Fernald, & Herrera, 1996). While infants preferentially reference the reactions of their mother (Zarbatany & Lamb, 1985), they will also use the facial expressions of familiarized strangers to determine the appropriate reactions to novel stimuli such as toys (Klinnert, Emde, Butterfield, & Campos, 1986). Thus, the non-verbal reactions of others present in the environment are likely to influence people's attitudes beginning at a very young age.

As children grow into adults, the behaviors of others in the environment continue to influence how people evaluate their surroundings. One non-verbal cue people use to evaluate their environment is the gaze of others present. Adults have been shown to quickly and automatically shift their attention toward an object being looked at by another person (Baron-Cohen, 1995). This phenomenon, known as joint attention, is believed to be an important facilitator of social interactions. Shifting attention in the direction of another person's gaze results in faster responses to stimuli in gazed at locations relative to non-gazed at locations (Frischen & Tipper, 2004). In addition to directing attention, it appears that the expression on a gazers face can influence gaze followers responses to stimuli. Specifically, when a person gazing at an object appears happy, the observer's evaluations of gazed at stimuli become more positive than when the person gazing at the object appears disgusted (Bayliss, Frischen, Fenske, & Tipper, 2007). In addition to influencing attention to and the evaluation of objects, people may spontaneously seek non-verbal cues to evaluate uncertain situations. For example, after hearing an ambiguously racist comment, Caucasians shift their gaze toward an African American when they believe he has also heard the remark (Crosby, Monin, & Richardson, 2008). This may occur because minority-group members are seen as experts in evaluating prejudice (Swim, Cohen, & Hyers, 1998), so such gaze shifts could be a way of seeking information from those most likely to offer an appropriate evaluation of the remark.

While specific non-verbal reactions may help people to evaluate a specific situation, the sum of nonverbal behavior observed in everyday life may also have an impact on broad attitudes toward categories of stimuli such as racial groups. Although overt displays of prejudice have become less common in the last several decades, nonverbal bias, or a systematic pattern of varying ones nonverbal behaviors as a function of the interaction targets group membership, remains prevalent in society today (Hebl & Dovidio, 2005). People have been shown to exhibit less positive nonverbal behavior toward members of stigmatized groups such as African Americans (Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997), the elderly (Harris, Moniz, Sowards, & Krane, 1994), and the obese (King, Shapiro, Hebl, Singletary, & Turner, 2006). Recent work suggests that observing nonverbal bias can have a significant impact on people's ideals and evaluations of stigmatized group members. For example, Weisbuch & Ambady (2009) found that women who watched television shows with greater amounts of anti-obese nonverbal bias reported more anti-obese attitudes and engaged in more dietary restraint than those who watched television shows with lower levels of nonverbal bias.

Observed Nonverbal Cues in Message-Based Persuasion

While there is little doubt that non-verbal cues influence attitudes, few studies have examined the impact of non-verbal cues on message-based persuasion specifically. In one such investigation, Cesario and Higgins (2008) demonstrated that the non-verbal cues of a message source can influence attitudes. In this study, participants watched a video in which an individual presented arguments in favor of a new after school program. The message source manipulated his vocal tone and body language to reflect either eagerness (characterized by “animated, broad opening movements”) or vigilance (characterized by “slower body movement... and slower speech rate.”). Consistent with predictions, participants higher in promotion focus (Grant & Higgins, 2003) reported more favorable attitudes toward the program after watching the “eagerness” video, while

participants higher in prevention focus reported more favorable attitudes after watching the “vigilance” video. Cesario and Higgins (2008) believe that non-verbal cues which align with a person’s regulatory focus lead to regulatory fit, or an experience of feeling right about what one is doing (Cesario, Higgins, & Scholer, 2008; Lee & Aaker, 2004). Cesario & Higgins (2008) suggest that the positive feelings associated with experiencing regulatory fit led to increased perceptions of message effectiveness and thus more favorable attitudes.

While Cesario and Higgins (2008) addressed the impact of message source non-verbal cues on attitudes, to date, only one study has attempted to investigate the impact of audience non-verbal reactions on persuasion. In their investigation, Nabi and Hendriks (2003) presented participants with segments of a television talk show in which a guest presented information to others present in the studio about color therapy; the idea that serious illness can be treated by exposing the afflicted to certain colors. Recordings of the show were edited such that participants viewed either positive or neutral non-verbal reactions from the host and audience. Perceptions of message source credibility, attitudes toward color therapy, and cognitive responses to the message were then measured.

To examine the process by which non-verbal reactions influenced attitudes, Nabi and Hendriks (2003) used structural equation modeling. Their final model suggests that the interaction between audience and host reactions influenced perceptions of source credibility and thought positivity. They suggest that observed non-verbal reactions influence attitudes by creating a “domino-effect” in which positive non-verbal reactions lead to increased perceptions of source trustworthiness, in turn resulting in more positive perceptions of message content and more positive attitudes.

While the “domino-effect” suggested by Nabi and Hendricks (2003) may partly explain the impact of audience reactions on attitudes, elements of this explanation are inconsistent. The model tested by Nabi and Hendricks (2003) suggests that observed reactions influence attitudes indirectly by affecting perceptions of source credibility

which in turn affect thought favorability. However, previous research suggests that variables are only likely to influence attitudes by affecting the valence of cognitive responses when message recipients are both motivated and able to carefully consider information (Chaiken & Maheswaran, 1994). Nabi and Hendricks (2003) selected a message topic which pretesting indicated was of low relevance to college student participants and report no attempts to encourage careful message scrutiny. Further, the authors report no analyses which directly examine the impact of observed reactions on thought favorability or of thought favorability on attitudes. Thus, it is possible that participants in this study were utilizing audience reactions in some other way. For example, perhaps audience reactions influenced the degree to which participants carefully considered the message. Without studies designed specifically to explore the mechanism or mechanisms by which observed non-verbal reactions influence attitudes, no firm conclusions can be drawn.

Thus, while Cesario and Higgins (2008) demonstrate that source cues can influence attitudes and Nabi and Hendricks (2003) demonstrate that observed non-verbal reactions can influence message-based persuasion, the mechanisms by which observed non-verbal cues influence attitudes remain unclear. A wealth of research demonstrates that variables can influence attitudes through different processes in different circumstances. Understanding the mechanisms by which variables such as observed non-verbal reactions influence attitudes is important because the process by which attitude change occurs has significant consequences for the resulting attitude. Specifically, modern multi-process theories of persuasion such as the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1986) and a wealth of research suggest that attitudes formed by more thoughtful processes tend to be stronger, longer lasting, and more predictive of behavior than attitudes formed by less thoughtful processes (Petty & Wegener, 1998). Therefore, it is important to understand not only whether or not observed non-verbal

reactions can influence attitudes in message-based persuasion, but also the process or processes by which non-verbal cues influence attitudes.

The Elaboration Likelihood Model

Multi process models of persuasion such as the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1986) posit that variables present in a persuasion setting can influence attitudes through a number of different mechanisms depending on the motivation and ability of message recipients to carefully consider information. More specifically, the ELM suggests that information is processed along a continuum of thoughtfulness, with very little issue relevant thought occurring at the low end of the continuum and a substantial amount of information relevant thought occurring at the high end. Processes which influence attitudes at the low end of this continuum are termed peripheral route processes and those which influence attitudes at the high end of the continuum central route processes.

The likelihood of a variable affecting attitudes through a given process depends upon the degree to which information is being carefully considered. When people lack the motivation or ability to carefully consider the content of a persuasive message, information can influence attitudes by serving as a heuristic. When motivation to think about a persuasive message is moderate, cues present in the environment can influence the degree to which a message is carefully considered. Finally, when motivation and ability to carefully consider a persuasive message are high, variables present in the environment can bias the interpretation of other information, serve as an argument relevant to the central merits of a message, or influence the degree to which people feel confident in their cognitions regarding a message.

In persuasion settings, it is important to understand the mechanism or mechanisms by which variables influence people's attitudes because this can affect the downstream consequences of the resulting attitude. Attitudes formed by relatively thoughtful means

are more likely to show properties associated with attitude strength (Krosnick & Petty, 1995). Specifically, attitudes which are formed as a result of central route processes have been shown to be more persistent over time (Chaiken, 1980; Haugtvedt & Strathman, 1990), more resistant to counter-persuasion attempts (Haugtvedt & Petty, 1992; Petty, Haugtvedt, Heesacker, & Cacioppo, 1995; Haugtvedt & Wegener, 1994), and more likely to influence behaviors (Sivacek & Crano, 1982; Petty, Cacioppo, & Schumann, 1983) than attitudes formed by less thoughtful means. Thus, within the context of the current research, it is important to understand whether the observed non-verbal reactions of audience members can influence attitudes by both thoughtful and non-thoughtful means. The current research focuses on two mechanisms by which observed nonverbal reactions could potentially influence attitudes in message-based persuasion contexts, one of which requires little thought regarding message content and one of which requires a great deal of thought.

Heuristics

When people are not motivated or able to carefully consider the content of a persuasive appeal, variables present in the environment can influence attitudes by serving as cues or heuristics. Heuristics are simple decision rules that people use to form evaluations without extensive consideration of other available information. For example, because expert sources often deliver accurate and relevant information, people may develop a heuristic that ideas supported by experts are good ideas. Petty, Cacioppo, and Goldman (1981) demonstrated that source expertise is most likely to influence attitudes by serving as a cue or heuristic when people are not motivated to carefully consider the merits of a message. Petty et al. (1981) demonstrated this by presenting college students with a message in favor of a new exam policy which was described as either likely or unlikely to affect them personally. They also described the message as originating from either a Professor of education at Princeton University (high expertise) or a high school

student (low expertise). While the expertise of the message source had no effect on the attitudes of participants for whom the message was personally relevant, participants for whom the message was not personally relevant reported more positive attitudes when the source was described as an expert rather than non-expert.

Perhaps more relevant to the current research, Axsom, Yates, and Chaiken (1987) demonstrated that hearing an audience cheer or boo in response to a persuasive message can also influence attitudes by serving as a cue or heuristic. In this study, college students listened to a recorded message which contained either strong or weak arguments in favor of a new probation program. Before hearing the message, motivation to think about message content was manipulated by telling participants that the experiment was either “crucial” or “just a preliminary test.” While a speaker described the program, an audience could be heard cheering or booing in response to the speaker’s main points. Although audience reaction had no impact on the attitudes of participants who were highly motivated to process the message, participants in the low motivation condition reported more positive attitudes after hearing the cheering audience rather than the booing audience. This suggests that when people were not motivated to think carefully about message content, audience verbal reactions can influence attitudes by serving as a cue or heuristic.

Biased Processing

Even when people are motivated and able to carefully consider the merits of information like a persuasive message, they may not always interpret information in an objective, nonbiased way. A number of factors have been shown to cause people to process subsequent information in a biased manner. One type of information which can bias how other information is interpreted is mood. In two studies Petty, Schumann, Richman, and Strathman (1993), manipulated the mood of participants to be neutral or positive and then presented them with either moderately strong or moderately weak

arguments in favor of commercial products. When participants were motivated to think carefully about message content, they reported more favorable thoughts about the products when in a positive rather than neutral mood, which resulted in more positive attitudes toward the products. This suggests that mood can bias how information present in the environment is interpreted.

Similarly, Chaiken and Maheswaran (1994) demonstrated that when individuals are motivated to process a persuasive message and then encounter content which is not clearly compelling or specious, cues in the persuasion setting can bias how message arguments are interpreted. Chaiken and Maheswaran (1994) presented participants with a message concerning a new commercial product which would soon be available in their area containing strong, weak, or mixed (half strong, half weak) arguments in favor of the product. Participants were also informed that the arguments originated from a high or low credibility source. While unambiguously weak and strong arguments elicited negative and positive attitudes toward the product respectively, regardless of their source, ambiguous arguments elicited more favorable attitudes when the source was described as credible and less favorable attitudes when the source was described as non-credible. In other words, cues about the source of the message biased how the information contained in the message was interpreted.

The Current Work

A myriad of research illustrates that non-verbal cues influence how people perceive the world around them. While some research demonstrates that the observed non-verbal reactions of other people can affect attitudes toward a novel topic (Nabi & Hendricks, 2003), the mechanism or mechanisms by which such information influences message-based persuasion remain unclear. In order to truly understand the impact of observed non-verbal cues on attitudes, it is crucial to understand the mechanism or mechanisms by which cues present in the persuasion setting affect message-based

persuasion. The current research explores two mechanisms by which observed non-verbal cues could plausibly influence persuasion, one which requires little message-related thought and one which relies on a great deal of message-related thought.

Studies 1, 2, and 3 investigated the possibility that when motivation and/or ability to carefully consider a persuasive message are low, audience non-verbal reactions can influence attitudes by serving as a heuristic. In Study 1, participants observed an audience either nodding their heads in apparent agreement or shaking their heads in disagreement while listening to a persuasive message. Study 2 attempted to replicate the results of Study 1 with a minor change to encourage more careful consideration of message content in key conditions. Study 3 was designed to expand upon the findings of Study 1 by investigating the impact of a different type of non-verbal behavior on attitudes. Across these studies, it was anticipated that positive audience non-verbal reactions would lead to more positive attitudes toward the message topic, while negative audience reactions would lead to less positive attitudes among participants who are unlikely to carefully consider substantive information. In Studies 1, 2, and 3, audience non-verbal reactions were not expected to influence the attitudes of participants who were likely to think carefully about the topic.

Study 4 was designed to expand upon the previous studies by exploring the possibility that audience non-verbal reactions could also influence attitudes when people are highly motivated and able to think about a message. I predicted that when people were highly motivated to think about a novel topic, audience non-verbal cues would bias how message arguments are interpreted. This would result in more favorable thoughts and attitudes among participants who saw an audience which appeared to agree with the message and more unfavorable thoughts and attitudes among participants who saw an audience which appeared to disagree with the message. It was unclear whether this effect would only be observable when arguments were ambiguous or whether it would be present across levels of argument quality. Regardless of the specific pattern in relation to

argument quality, I predicted that differences in thought favorability would mediate the effect of audience reaction on post-message attitudes. This would provide evidence that audience reactions can influence attitudes by biasing the interpretation of other information when people are motivated and able to carefully consider a message.

Before specific hypotheses about the mechanisms by which audience non-verbal reactions influence persuasion could be tested, a pilot study was conducted to establish a paradigm in which the effect of audience non-verbal reactions on attitudes could be examined with as few confounding factors as possible. In other words, a Pilot Study was conducted in an attempt to replicate the basic effects of Nabi and Hendericks (2003) within a more controlled paradigm.

CHAPTER 2

INITIAL EVIDENCE THAT OBSERVED NON-VERBAL CUES CAN INFLUENCE ATTITUDES

Pilot Study

While people are able to infer information through non-verbal communications, little research has explored how the non-verbal reactions of audience members influence message-based persuasion. The only study to date which has attempted to examine how audience non-verbal reactions influence persuasion conflated the reactions of audience members with those of a respected talk show host and cues given by the speaker (Nabi & Hendriks, 2003). To determine whether or not the non-verbal reactions of an audience could influence people's attitudes, even in the absence of any cues from the presenter(s) or other sources of information, a pilot study was conducted.

In this initial study, undergraduate research participants were told that they would be watching a recorded video conference between students at a distant university who were learning about a new policy being considered for implementation there. Participants then watched the recorded reactions of three individuals while listening to a persuasive message in favor of a new academic policy and reported their attitudes toward the policy. Because participants were told that this policy was not being considered for implementation at their own university, they likely had little motivation to carefully scrutinize message content. Thus, it was predicted that observed audience non-verbal reactions would influence attitudes by serving as a peripheral cue, similar to how verbal responses have been shown to influence attitudes in previous studies (Axsom et al., 1987). More specifically, it was predicted that participants who observed audience members nodding in agreement with the message would report more positive attitudes toward the topic than participants who observed audience members shaking their heads. However, because non-verbal cues were expected to influence attitudes by low thought

processes, it was predicted that the influence of head movements on attitudes would not be driven differences in thought favorability.

Method

Participants and Design

One hundred eleven University of Iowa undergraduates were recruited for participation in a study purportedly involving different means of communicating information. Students participated in exchange for partial fulfillment of a research requirement in their introductory psychology and research methods classes. All participants were randomly assigned to cells of a 2 (Audience reaction: head shaking vs. head nodding) x 2 (Argument quality: weak vs. strong) between participants design.

Procedure

After being seated at individual computer workstations, participants were informed that they would be taking part in a study about how information is communicated over the internet. Participants were told that they would be watching a video conference between students at Eastern Washington University as they learned about a new exam policy being proposed for their university. Instructions specified to all participants that this policy was not being considered for implementation at the University of Iowa.

All participants then viewed a recording which simulated a video conference. The conference was approximately 3 minutes in length, and featured three college age students (2 females, 1 male) responding to the key arguments of a persuasive message in prescribed ways. While all participants heard the content of the message arguments through their headphones, they could not see the person delivering arguments. After viewing the video conference, participants reported their attitudes toward the policy which had been discussed.

Independent Variables

Audience Reaction. Participants were randomly assigned to view one of two versions of the video conference. Each version was composed of three separate videos edited to appear simultaneously in a horizontal line across the center of the computer screen. Each video segment featured a college age student actors who had been recorded while sitting in front of a computer wearing headphones and listening to a persuasive message. Actors were instructed to respond to the points made by a speaker delivering the message in prescribed ways. For the clips included in the head shaking condition, actors were asked to shake their heads back and forth horizontally (as if to indicate “no”) whenever the speaker made a point about the policy. In the clips used to create the head nodding condition, actors were asked to move their heads up and down vertically (as if to indicate “yes”) whenever the speaker made a point about the policy.

Argument quality. While watching the video conference, participants heard one of two sets of arguments in favor of an academic policy. Both versions of the message suggested that senior comprehensive exams should be instituted for the benefit of students. The strong version of this message contained a number of compelling reasons for instituting exams, such as higher starting salaries for graduates. The weak version of this message contained specious arguments in favor of the exams, suggesting for example that the exams will lead to increased anxiety among students. The strong and weak versions of this message have been shown to elicit primarily favorable and unfavorable thoughts respectively in previous studies (Petty & Cacioppo, 1979), see Appendix A.

Dependent Measures

Attitudes. After watching the video conference, participants reported their attitudes toward senior comprehensive exams on nine 9-point semantic differentials. For example, participants were asked to indicate to what extent “Senior Comprehensive Exams are: (*Bad / Good; Foolish / Wise; Negative / Positive*).” Responses to these

measures were highly reliable ($\alpha = .97$) and were averaged to form an index of post-message attitudes.

Thought listing. Following the attitude measures, participants engaged in a thought-listing task. During this task, participants were asked to list any thoughts which may have come to mind while hearing the information about Senior Comprehensive Exams (see Wegener, Downing, Krosnick, & Petty, 1995, for complete instructions). After 8 thoughts had been entered or 3 minutes had elapsed, participants were asked to rate their thoughts. The computer displayed each thought listed by participants one at a time, and participants were asked to determine whether each of the thoughts they had listed was *positive, negative, neutral, or unrelated* to the issue of senior comprehensive exams. These ratings were used to create an index of thought favorability by subtracting the number of negative thoughts reported from the number of positive thoughts reported and then dividing by the total number of issue-relevant thoughts listed.

Results

Attitudes

The index of attitudes toward senior comprehensive exams was submitted to a 2-way analysis of variance (ANOVA). As expected, this analysis revealed a significant main effect of head movement $F(1, 107) = 5.46, p = .021, r = .22$. Attitudes toward senior comprehensive exams were more positive when video conference participants were seen nodding their heads in agreement with the message ($M = 5.47, SD = 1.99$) than when they were seen shaking their heads in disagreement ($M = 4.61, SD = 1.96$). A significant main effect of argument quality also emerged $F(1, 107) = 7.13, p = .01, r = .25$, such that attitudes were more positive when participants heard strong ($M = 5.55, SD = 1.88$) rather than weak ($M = 4.57, SD = 1.94$) arguments. The interaction between head movement and argument quality did not approach significance, $F(1, 107) = .08, p = .775$, see Figure 1. These results suggest that both audience reactions and argument quality had an impact

on attitudes. Participants reported more favorable attitudes after seeing actors nod rather than shake their heads. However, participants also reported more favorable attitudes after hearing strong rather than weak arguments.

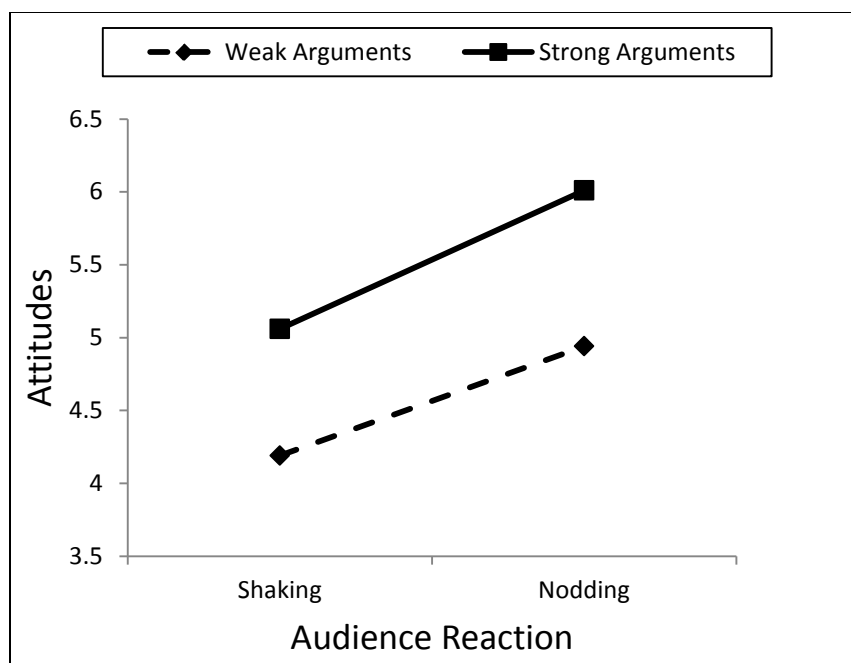


Figure 1. Pilot Study data for post-message attitudes as a function of audience reaction and argument quality.

Thought favorability

An analysis of variance performed on the index of thought favorability revealed a significant main effect of argument quality $F(1, 107) = 5.00, p = .03, r = .21$, such that participants reported more positive thoughts about the message when arguments were strong ($M = .05, SD = .65$) rather than weak ($M = -.22, SD = .62$), See Figure 2. Neither the main effect of head movement ($F[1, 107] = 1.00, p = .32$), nor the interaction between head movement and argument quality ($F[1, 107] = .91, p = .34$) approached significance. These results suggest that although audience reactions influenced attitudes,

they had no impact on the valence of participant's thoughts. This suggests that audience reactions did not influence attitudes through their effect on thought favorability.

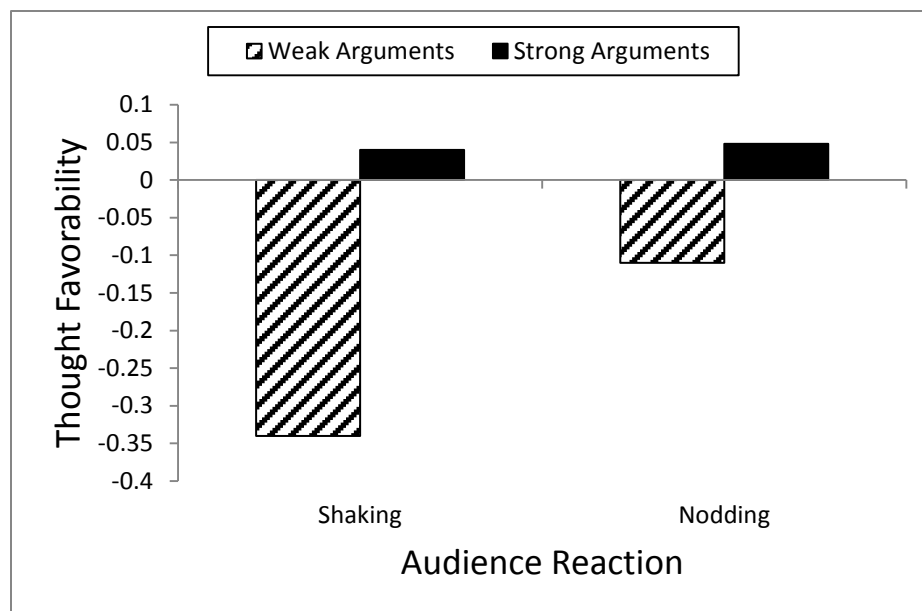


Figure 2. Pilot Study data for the proportion of favorable thoughts listed by participants as a function of argument quality and audience reaction.

Mediation

To further investigate the possibility that differences in post-message attitudes were mediated by differences in thought favorability, mediation analyses were conducted using the procedures outlined by Baron & Kenny (1986). An initial regression revealed that, as in the ANOVA reported above, head movement was a significant predictor of post-message attitudes, $b = .22$, $t(109) = 2.30$, $p = .023$, $r = .22$. Thought favorability was also a significant predictor of post-message attitudes, $b = .67$, $t(109) = 9.99$, $p < .001$, $r = .70$. However, head movement was not a significant predictor of thought favorability, $b = .10$, $t(109) = 1.03$, $p = .31$. Further, when post-message attitudes were simultaneously regressed on head movement and thought favorability, both head movement, $b = .15$, t

(108) = 2.14, $p = .03$, $r = .20$, and thought favorability, $b = .65$, $t(108) = 9.28$, $p < .001$, $r = .67$, remained significant predictors of post-message attitudes. This suggests that differences in thought favorability did not mediate differences in post-message attitudes as a function of audience reaction.

To further assess the possibility that differences in thought favorability could mediate differences in post-message attitudes as a function of audience reaction, bootstrapping analysis was conducted using the procedures outlined by Preacher and Hayes (2008). The bootstrap analysis treated the obtained data as the population and randomly drew 5,000 samples of equal size to the study, with replacement. Estimates of the indirect effect on post-message attitudes were calculated for each bootstrapped sample and these estimates were used to generate a confidence interval for the indirect (mediated) effect. Results of these analyses provided no evidence to indicate that differences in thought favorability mediated the impact of audience reactions on attitudes (estimated mean indirect effect = .25, CI 95: -.2358-.7462).

Discussion

As predicted, participants reported more favorable attitudes toward senior comprehensive exams after viewing a video conference in which actors nodded their heads while learning about the policy than after viewing actors shaking their heads while learning about the topic. Although attitudes were more positive in conditions where strong rather than weak arguments were presented, neither head movement nor the interaction between head movement and argument quality had an effect on the favorability of participant's thoughts about the message. This suggests that within this initial study, head movement influenced attitudes by serving as a peripheral cue, rather than by biasing the interpretation of message arguments or influencing the degree to which message content was carefully considered. This interpretation was further supported by both mediation and bootstrap analyses, each of which demonstrated that the

impact of audience head movement on participant's attitudes was independent from the effect of thought favorability on attitudes.

This study takes an important first step toward demonstrating that the observed non-verbal cues of audience members can influence message-based persuasion, even when isolated from non-verbal cues which originate from the message source or a more knowledgeable individual like a talk show host. Further, results from this pilot study suggest that audience non-verbal reactions served as a cue or heuristic, influencing attitudes without affecting thought positivity. This differs considerably from the "domino effect" account offered by Nabi and Hendricks (2003), in which audience reactions affect perceptions of the message source, in turn leading to biased processing.

While data from this study suggest that observed non-verbal cues served as a heuristic, some might be concerned that participants still reported more positive attitudes after exposure to strong arguments rather than weak arguments. This could be consistent with careful consideration of message content, which is unlikely in the situations where heuristic processing is most often expected to occur. However, it is important to note that differences in message scrutiny are often relative rather than absolute. To draw firm conclusions about the degree to which information is being carefully considered, it is necessary to include comparison conditions in which careful scrutiny of information is likely to occur. To this end, subsequent studies address this limitation by including comparison conditions in which participants are encouraged to engage in effortful scrutiny of message content.

CHAPTER 3

INVESTIGATING THE HEURISTIC IMPACT OF OBSERVED NON- VERBAL CUES ON ATTITUDES

Study 1

Data from the Pilot Study demonstrate that audience non-verbal reactions alone can influence the attitudes of message recipients in a persuasion paradigm and suggest that they may do so by serving as a cue or heuristic. However, firm conclusions about how carefully message content is being considered cannot be drawn without the inclusion of appropriate comparison conditions. Thus, the goal of Study 1 was to replicate the results of the Pilot Study while including conditions in which message recipients were likely to carefully consider message content. The inclusion of these conditions allows for clear conclusions about the mechanism by which audience reactions affect persuasion when careful consideration of message content is unlikely. The key prediction of Study 1 was that when participants are unlikely to carefully consider the content of persuasive message, attitudes should be more favorable after viewing an audience which appears to agree with the message, and less favorable after viewing an audience which appears to disagree with the message. Additionally, I predicted that argument quality effects would be more robust in conditions where careful consideration of message arguments was likely rather than unlikely. In short, Study 1 was designed to provide compelling evidence that when motivation and ability to process a persuasive message are low, audience reactions can influence attitudes by serving as a cue or heuristic.

Method

Participants and Design

207 undergraduates were recruited from the University of Iowa psychology research subject pool. Participants were randomly assigned to cells of a 2 (Processing

likelihood: low vs. high) x 2 (Audience reaction: head shaking vs. nodding) x 2 (Argument quality: weak vs. strong) between-participants design.

Procedure

Upon arriving in the lab, participants were seated at individual computer workstations, visually isolated from one another by partitions. As in the Pilot Study, all participants were informed that they would be watching a video conference in which a group of students at another university learned about a new policy soon to be implemented there (see Appendix A). Processing likelihood was manipulated by asking participants to retain either a 2 or 9 digit number in memory while watching the video conference. After being asked to remember a number, participants watched one of the same videos used in the Pilot Study, wherein 3 college students either shake or nod their heads as strong or weak arguments in favor of senior comprehensive exams are presented by an unseen speaker. Participants then responded to dependent measures and manipulation check items.

Independent Variables

Processing likelihood. To influence the likelihood of careful message scrutiny, personal relevance and processing ability were simultaneously manipulated. Participants in the low processing likelihood condition were told that senior comprehensive exams were not being considered for implementation at their university, Participants in the high processing likelihood condition were told that senior comprehensive exams were being considered for implementation at their university in the near future. These instructions have been used in past research and have been shown to influence the degree to which people are likely to think carefully about the content of a persuasive message (Petty & Cacioppo, 1979)

In addition to the personal relevance manipulation, processing likelihood was also manipulated through a number recall task. Participants were told that the researchers are

interested in how distraction influences the way people interpret information. As part of this cover story, participants were informed that in order to get an idea for how distractions like those present in everyday life influence communication, they would be asked to remember a number while watching the video conference. To limit processing ability, participants in the low relevance, or “low processing likelihood” condition were asked to retain a 9-digit number in memory while watching the video conference. Participants in the high relevance, or “high processing likelihood” condition were asked to remember a 2-digit number. Instructions recommend mentally rehearsing the assigned number throughout the video conference as a way to improve memory. Participants were given as much time as they needed to memorize the number before the video conference began. This manipulation has been shown in previous research to influence participant’s ability to carefully consider information (Gilbert & Hixon, 1991).

Audience Reaction. All participants watched one of the two pre-recorded videos used in the Pilot Study which featured college age actors either nodding or shaking their heads in response to the arguments of a persuasive message.

Argument Quality. While watching the video conference, participants heard one of the two messages in favor of senior comprehensive exams used in the Pilot Study (Petty & Cacioppo, 1979).

Dependent Measures

Attitudes. After watching the video conference and hearing the message about senior comprehensive exams, participants reported their attitudes toward senior comprehensive exams on the same nine 9-point scales used in the Pilot Study. An index of post-message attitudes was created by averaging the nine attitude measures ($\alpha = .97$).

Thoughts. After completing measures assessing attitudes toward senior comprehensive exams, participants completed thought listing and thought rating tasks identical to those used in the Pilot Study.

Manipulation checks. After completing all other dependent measures, participants responded to several items which served as manipulation checks. Participants indicated on 9-point semantic differentials the degree to which senior comprehensive exams were relevant to them, likely to affect them, and important.

Results

Manipulation Checks.

All manipulation check items were submitted to 3-way ANOVAs. Consistent with the anticipated effects of the processing likelihood manipulation, the measure of perceived personal relevance revealed a main effect of Processing Likelihood such that participants in the low processing likelihood condition believed that the issue of senior comprehensive exams was less relevant to them ($M = 5.12$, $SD = 2.40$) than participants in the high processing likelihood condition ($M = 6.54$, $SD = 2.23$), $F(1, 199) = 19.19$, $p < .001$, $r = .30$. No unanticipated main effects or interactions approached significance (all F 's < 1.8).

Also as anticipated, participants in the low processing likelihood condition believed that senior comprehensive exams were less likely to affect them ($M = 4.86$, $SD = 2.43$) than participants in the high processing likelihood condition ($M = 6.34$, $SD = 2.34$), $F(1, 199) = 20.12$, $p < .001$, $r = .30$. An unexpected main effect of argument quality also emerged for this measure, such that participants in the weak arguments condition ($M = 5.98$, $SD = 2.23$) believed that senior comprehensive exams were more likely to affect them than participants in the strong arguments condition ($M = 5.22$, $SD = 2.67$), $F(1, 199) = 4.20$, $p = .04$, $r = .14$. No other unexpected main effects or interactions approached significance (all F 's < 1.8)

Finally, consistent with processing likelihoods anticipated effect on motivation to think about information, participants in the low processing likelihood condition believed that senior comprehensive exams were less important ($M = 5.24$, $SD = 1.80$) than

participants in the high processing ability conditions ($M = 6.29$, $SD = 1.81$), $F(1, 199) = 16.51$, $p < .001$, $r = .28$. No unpredicted main effects or interactions approached significance (all F 's < 1.84). Taken together, these measures suggest that the processing likelihood manipulation led participants in the high processing likelihood condition to believe that senior comprehensive exams were more relevant, likely to affect them, and important than participants in the low processing likelihood condition.

Attitudes.

The index of post-message attitudes was submitted to a 3-way ANOVA. Consistent with predictions, a Processing Likelihood x Audience Reaction interaction emerged, $F(1, 199) = 7.33$, $p = .007$, $r = .19$, see Figure 3. Participants in the low processing likelihood condition reported more favorable attitudes toward senior comprehensive exams after observing participants nodding their heads in response to the message ($M = 5.79$, $SD = 1.73$) rather than shaking their heads ($M = 4.15$, $SD = 1.86$), $F(1, 199) = 22.75$, $p < .001$, $r = .32$. The attitudes of participants in the high processing likelihood condition did not differ as a function of whether audience members nodded ($M = 5.31$, $SD = 1.54$) or shook their heads ($M = 5.03$, $SD = 1.84$) in response to the message, $F(1, 199) = .30$, $p = .58$. A main effect of audience reaction also emerged, such that participants reported less favorable attitudes toward senior comprehensive exams after seeing audience members shake their heads ($M = 4.60$, $SD = 1.89$) than after seeing audience members nod their heads ($M = 5.56$, $SD = 1.65$), $F(1, 199) = 16.28$, $p < .001$, $r = .28$. Finally, the pattern of means suggests that participants tended to report more favorable attitudes after hearing strong ($M = 5.22$, $SD = 1.85$) rather than weak arguments ($M = 4.89$, $SD = 1.82$), $F(1, 199) = 2.14$, $p = .145$. No other main effects or interactions approached significance (all F 's < 1). This suggests that while participants in the low relevance condition utilized non-verbal cues in forming their attitudes, participants in the high relevance condition did not. However, because argument quality did not exert a

different effect on participants in the high vs. low processing likelihood conditions, the attitudes data alone do not allow for conclusions about differences in the degree to which participants engaged in careful consideration of message arguments.

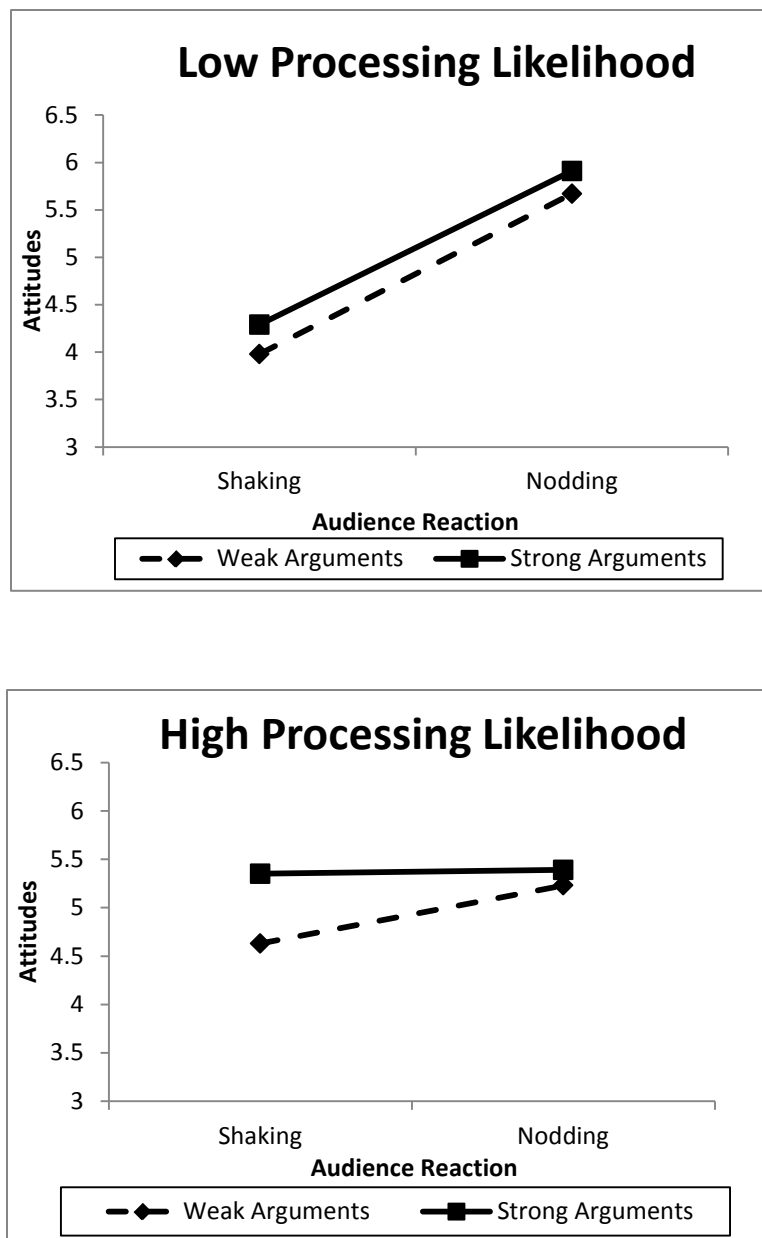


Figure 3. Study 1 attitudes toward senior comprehensive exams as a function of processing likelihood, audience reaction, and argument quality.

Thoughts.

As in the Pilot Study, participants ratings of their own thoughts were used to create an index of thought favorability. This index of thought favorability was submitted to a 3-way ANOVA. A main effect of Argument Quality emerged, such that participants identified more of their thoughts as being favorable toward senior comprehensive exams after receiving strong ($M = -.01, SD = .66$) rather than weak ($M = -.23, SD = .88$) arguments in favor of comprehensive exams, $F(1, 199) = 4.46, p = .036, r = .15$, see Figure 4. A main effect of Audience Reaction also emerged, such that participants reported more favorable thoughts after observing conference participants nodding ($M = .01, SD = .67$) rather than shaking their heads ($M = -.23, SD = .85$), $F(1, 199) = 5.94, p = .016, r = .17$. Finally, an unanticipated Processing Likelihood x Audience Reaction emerged, $F(1, 199) = 12.69, p < .001, r = .25$. Participants in the low processing likelihood condition reported more favorable thoughts after seeing audience members nod ($M = .18, SD = .69$) rather than shake their heads ($M = -.43, SD = 1.00$) in response to message arguments, $F(1, 199) = 18.01, p < .001$. However, participants in the high processing likelihood condition reported a similar proportion of favorable thoughts, regardless of whether the actors were nodding ($M = .01, SD = .67$) or shaking ($M = -.04, SD = .62$) their heads, $F(1, 199) = .63, p = .43$. No other main effects or interactions approached significance (all F 's < 1).

Results for the index of thought favorability are inconsistent with the predicted pattern of effects. I predicted that participants in the high processing likelihood condition would report more favorable thoughts in response to strong rather than weak arguments. However, the cognitive responses of participants in the low processing likelihood condition were not expected to vary as a function of audience reaction or argument quality. I did not predict that audience reaction would influence thought favorability. The observed results suggest that participants in the low processing likelihood condition may have formed more favorable thoughts in response to audience members nodding rather

than shaking their heads. They also suggest that there were no differences in the degree to which participants in the high vs. low processing likelihood conditions thought about the substantive content of a persuasive message. This means that mediation analyses were necessary to evaluate how thoughts influenced the attitudes of participants in the high vs. low processing likelihood conditions.

Participant's thoughts were also coded by trained raters blind to experimental condition. These ratings were used to form an index of thought favorability in the same manner that participants ratings of their own thoughts were. This index was then submitted to an ANOVA. Results of this analysis were similar to those obtained through participant's ratings of their own thoughts¹.

¹ Two raters evaluated each thought listed and determined whether each thought was positive, negative, neutral toward or unrelated to phosphate based detergents. Disagreements were settled by a third rater. The content of listed thoughts was lost for 2 participants. An ANOVA on the index of thoughts revealed a pattern in which participants who received weak arguments tended to report more unfavorable thoughts ($M = -.12$, $SD = .62$) than participants who received strong arguments ($M = .01$, $SD = .62$), $F(1, 197) = 2.36$, $p = .126$. A main effect of audience reaction also emerged; participants in the shaking condition reported more unfavorable thoughts ($M = -.13$, $SD = .61$) than participants in the nodding condition ($M = .03$, $SD = .63$), $F(1, 197) = 3.93$, $p = .049$, $r = .13$. A marginal Processing Likelihood x Audience Reaction interaction emerged, $F(1, 197) = 7.78$, $p = .006$. Following a pattern as in participants self-rated thoughts, participants in low Processing Likelihood conditions reported a greater more unfavorable thoughts after seeing conference participants shake ($M = -.22$, $SD = .64$) rather than nod their heads ($M = .18$, $SD = .18$). Participants in high Processing Likelihood conditions did not differ as a function of audience reaction, $M_{shaking} = -.38$, $SD = .57$; $M_{nodding} = -.12$, $SD = .59$. No other main effect or interactions approached significance, all F 's < .5.

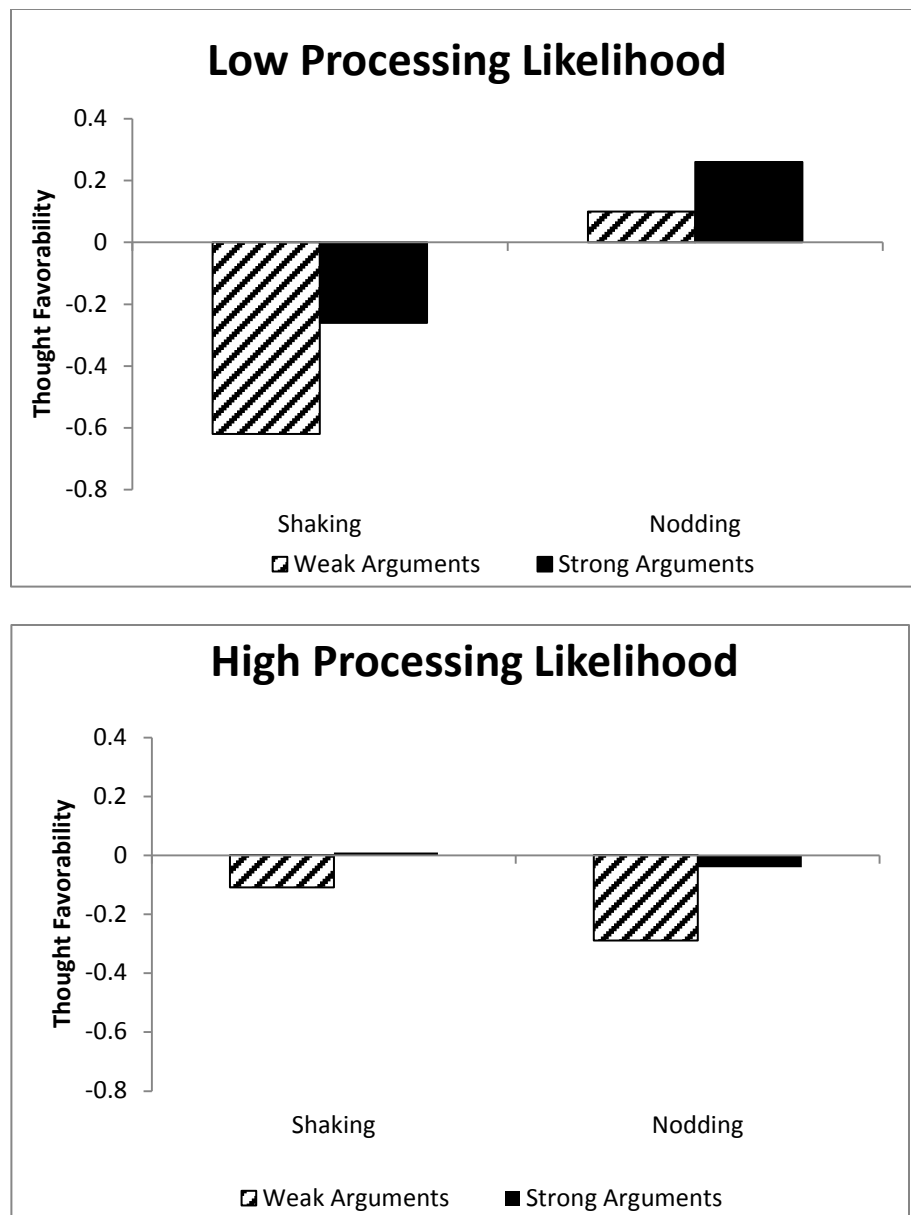


Figure 4. Study 1 thought favorability as a function of processing likelihood, audience reaction and argument quality.

Mediation.

Attitudes that result from high levels of elaboration should be based on participants' assessments of the central merits of the attitude object (Petty & Cacioppo, 1986). Therefore, the favorability of listed thoughts should be influenced by the argument

quality manipulation and post-message attitudes should be based on those thoughts when high, but not low, levels of information scrutiny occurred. Results of the previously reported ANOVAs reveal mixed support for the hypothesized differences in thoughtful processing within Study 1. Therefore, strong conclusions about the mechanism by which audience non-verbal reactions influenced attitudes at different levels of processing likelihood can only be drawn from mediation analysis. When differences in thought favorability mediate the effect of argument quality on attitudes, this suggests that careful consideration of message arguments occurred. When differences in thought favorability fail to mediate differences in attitudes, this suggests careful consideration of message arguments did not occur.

Mediation was assessed separately for participants in the low and high Processing Likelihood conditions. For participants in the high processing likelihood condition, an initial regression of post-message attitudes on argument quality revealed that argument quality did not predict post-message attitudes at a significant level, $b = .43$, $t(102) = 1.29$, $p = .202$. Similarly, argument quality was not a significant predictor of thought favorability, $b = .19$, $t(102) = 1.54$, $p = .13$. However, when post-message attitudes were regressed on thought favorability, thought favorability was a significant predictor of post-message attitudes, $b = 1.93$, $t(102) = 9.97$, $p < .001$, $r = .70$. When attitudes were simultaneously regressed on argument quality and thought favorability, the impact of Argument Quality on post-message attitudes further decreased ($b = .07$, $t[101] = .29$, $p = .774$), while thought favorability remained a robust predictor of attitudes, $b = 1.92$, $t(101) = 9.77$, $p < .001$, $r = .70$. Bootstrapping analyses were also conducted to investigate the indirect effect of argument quality on attitudes through thought favorability following procedures outlined by Preacher & Hayes (2008). Results of these analyses mirrored those of previously reported regressions, see Figure 5. More importantly, bootstrap analyses showed that differences in thought favorability were a marginally significant mediator of the effect of argument quality on post-message

attitudes, estimated mean indirect effect = .36, BC CI 90: .0008 - .7640. This suggests that, consistent with predictions, participants in the high processing likelihood condition utilized their message related cognitions in forming their attitudes toward senior comprehensive exams.

While differences in thought favorability were expected to mediate differences in post-message attitudes for participants in high relevance conditions, this was not expected to be the case for participants in low relevance conditions. Consistent with predictions, an initial regression of post-message attitudes on Argument Quality revealed that argument quality was not a significant predictor of post-message attitudes, $b = .23$, $t(101) = .60$, $p = .552$. Argument Quality was also not a significant predictor of Thought Favorability, $b = .24$, $t(101) = 1.36$, $p = .177$. However, thought favorability was a significant predictor post-message attitudes, $b = 1.46$, $t(101) = 9.2$, $p < .001$, $r = .68$. When attitudes were simultaneously regressed on argument quality and thought favorability, the impact of argument quality on post-message attitudes did not change $b = -.13$, $t(100) = -.43$, $p = .66$, and thought favorability remained a robust predictor of post-message attitudes, $b = 1.47$, $t(100) = 9.14$, $p < .001$, $r = .67$. Again, bootstrapping analyses were also conducted to investigate the indirect effect of argument quality on attitudes through thought favorability following procedures outlined by Preacher & Hayes (2008). Results of these analyses mirrored those of previously reported regressions, see Figure 6. These analyses revealed that differences in thought favorability did not mediate the effect of argument quality on post-message attitudes, estimated mean indirect effect = .349, BC CI 90: -.1058 - .7227. This suggests that, as predictions, participants in the low processing likelihood condition formed their attitudes without carefully considering the substantive content of the message. This pattern of effects is consistent with heuristic processing.

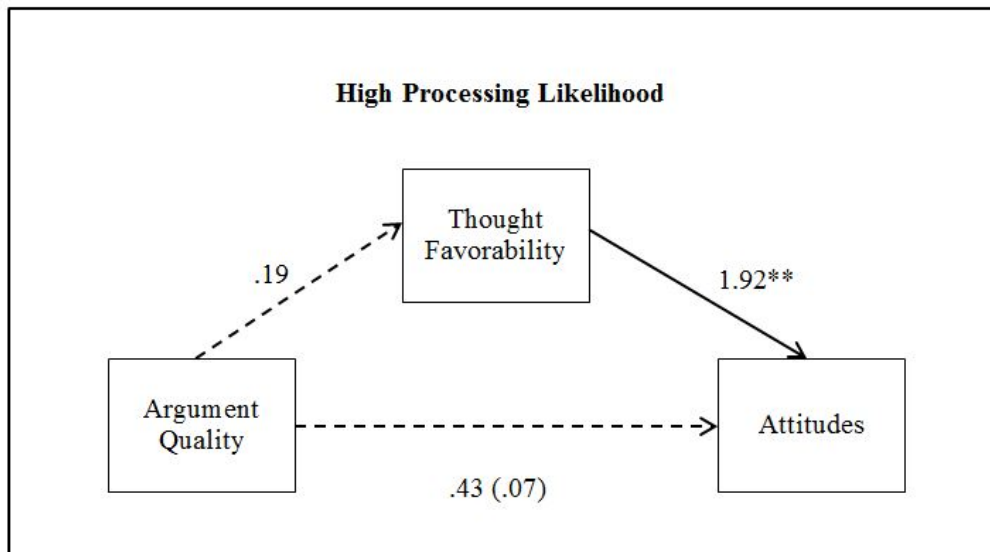


Figure 5. Study 1 relations among the argument quality manipulation, thought favorability, and attitudes for participants high in motivation/ability to process information.

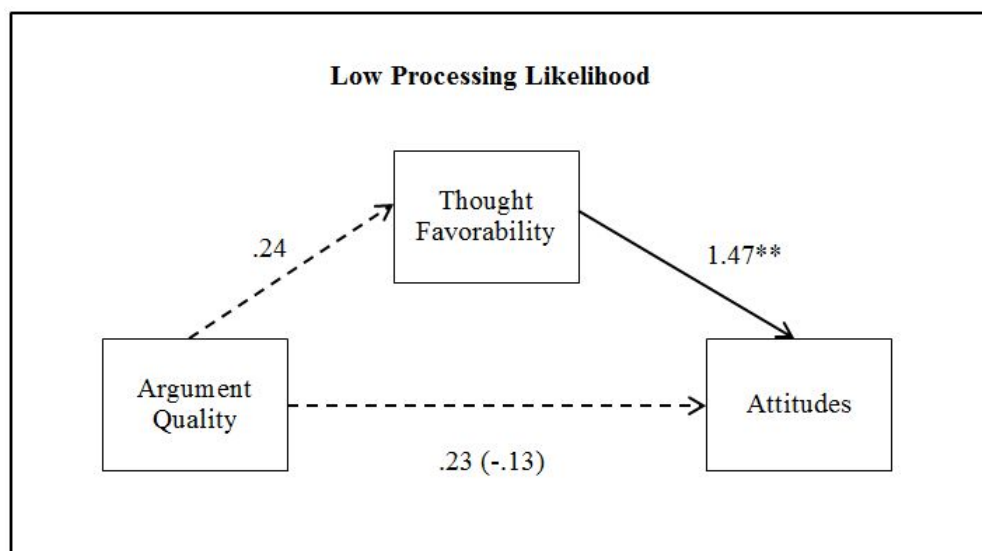


Figure 6. Study 1 relations among the argument quality manipulation, thought favorability, and attitudes for participants low in motivation/ability to process information.

Discussion.

The primary goal of Study 1 was to provide a compelling demonstration that when people are not motivated or able to process the substantive content of a persuasive message, the non-verbal reactions of an observed audience can influence attitudes by serving as a cue or heuristic. The results of Study 1 provide support for this hypothesis. Among participants in low processing likelihood conditions, post-message attitudes were influenced by audience reactions, such that participants who had seen audience members nodding their heads up and down rather than shaking their heads back and forth reported more favorable attitudes toward senior comprehensive exams. While measures of thought favorability were affected by argument quality, the effect of argument quality on post-message attitudes was not mediated by differences in thought favorability for participants in the low processing likelihood condition. This suggests that observed audience non-verbal reactions influenced attitudes by serving as a cue or heuristic when careful consideration of message arguments was unlikely.

Although the data from Study 1 support for the key prediction that observed non-verbal reactions can influence attitudes by serving as a cue or heuristic, the data provide much more limited support for the secondary hypothesis that non-verbal cues do not influence attitudes when people are highly motivated and able to carefully consider a persuasive message. Participants in the high processing likelihood condition did not report differences in post-message attitudes or thought favorability as a function of audience reaction. However, a rich history of research on attitudes and persuasion suggests that when people are highly motivated and able to process a persuasive message, attitudes are more likely to be influenced by the substantive quality of message arguments. Within the current study, only mean level trend toward a main effect of argument quality emerged. The anticipated interaction between argument quality and processing likelihood condition is absent. While the effect of argument quality on post-message attitudes is indeed mediated by differences in thought favorability for

participants in the high processing likelihood condition, the lack of more robust evidence for the impact of argument quality on post-message attitudes among these participants is puzzling.

There are a number of plausible reasons why the post-message attitudes of participants in the high processing likelihood condition might not have shown the effects of argument quality reported elsewhere in the literature. One such reason is that message arguments were relatively complex. Past research has shown that while audio-visual formats are the most persuasive for simple messages, written formats tend to be the most persuasive for complex messages (Chaiken & Eagly, 1976). This is believed to be the case because people are less able to remember information that is presented audio-visually than information presented in text (Wilson, 1974; Furnham, Gunter, & Green, 1990). Thus, it may have been difficult for participants to recall the information presented in the message when forming their attitudes toward the topic.

Another plausible explanation is that asking participants to remember a 2-digit number might have unexpectedly induced cognitive load. In their original implementation of this procedure, Gilbert and Hixon (1991) used the number memorization task to examine stereotype activation and found that participants who were not “cognitively busy” showed evidence of stereotype activation, while participants who were “cognitively busy” did not. Gilbert and Hixons’ (1991) data suggest that people were able to recognize stereotype-relevant information, but were not able to compensate for it. This could be the case because these participants were still too “cognitively busy” to compensate for social desirability. Thus, it is plausible that participants in the high processing likelihood conditions recognized that message content in the strong arguments condition was more compelling, but they had difficulty incorporating these arguments into their attitudes. Study 2 was designed to address this possibility by using procedures very similar to those used in Study 1 for participants in the low processing likelihood

conditions, but attempting to further reduce cognitive load among participants in the high processing likelihood conditions.

CHAPTER 4
A CLOSER EXAMINATION OF THE IMPACT OF NON-VERBAL
CUES ON HIGH THINKING PARTICIPANTS

Study 2

While Study 1 provides evidence that non-verbal reactions can influence attitudes by serving as a cue or heuristics, the goal of Study 2 was to clarify an important lingering question. Study 1 failed to provide an unambiguous demonstration that people who are highly motivated to carefully consider the content of a persuasive message will not rely on non-verbal cues in forming their attitudes. One reason for this may be that participants in high processing likelihood condition of Study 1 still experienced some amount of cognitive load. Thus, Study 2 was designed to more thoroughly investigate the impact of non-verbal cues in conditions where careful consideration of message arguments is unlikely vs. likely.

It was anticipated that Study 2 would replicate the key finding of Study 1. I predicted that, as in Study 1, participants who lacked the cognitive capacity to carefully consider information would rely on observed non-verbal cues in evaluating a novel topic rather than substantive content of a persuasive message. In addition to replicating the key findings of Study 1, Study 2 was designed to demonstrate that when processing likelihood is high, attitudes will not be influenced by non-verbal cues, but will instead be based primarily on the substantive content of information. In order to improve participants ability to carefully consider the substantive content of a persuasive message, procedural adjustments were made to the number memorization task used in Study 1.

Method

Participants and design.

180 undergraduates were recruited from the University of Iowa psychology research subject pool. Participants were randomly assigned to cells of a 2 (Processing likelihood: low vs. high) x 2 (Audience reaction: head shaking vs. nodding) x 2 (Argument quality: weak vs. strong) between-participants design.

Procedure.

The procedure and materials used in Study 2 mirrored those used in Study 1 with the following exceptions. As in Study 1, before to exposure to the video conference, participants in the high processing likelihood condition were told that senior comprehensive exams were being considered for implementation at the University of Iowa in the near future. However, unlike in Study 1, participants in the high processing likelihood condition received no information about distraction and were not asked to memorize any number. As in Study 1, participants in the low processing likelihood condition were told that senior comprehensive exams were not being considered at the University of Iowa. They were also told that the researchers were interested in real-world distraction and were asked to retain a 9-digit number in memory while watching the video conference.

Participants watched video conferences identical to those used in previous studies and responded to identical dependent measures, including attitude measures, thought listing and thought rating tasks, and manipulation check items. After completing study procedures, all participants completed the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988). This measure assess mood by asking participant to respond to 20 items using 5-point scales which indicate their current positive and negative affect (*e.g.* “Indicate to what extent you feel irritable.” [*not at all / extremely*]).

Consistent with the authors instructions, positive ($\alpha = .90$) and negative ($\alpha = .87$) affect scores were computed and analyzed separately.

Results

Manipulation Checks.

All manipulation check items were subjected to 3-way ANOVAs. Consistent with predictions, the measure of perceived personal relevance revealed only a main effect of Processing Likelihood such that participants in the low processing likelihood condition believed that the message was less relevant to them ($M = 4.94, SD = 2.42$) than participants in the high processing likelihood condition ($M = 6.22, SD = 2.53$), $F(1, 172) = 13.88, p < .001, r = .27$. An unanticipated trend toward a Processing Likelihood x Audience Reaction ($F [1, 172] = 2.48, p = .117$) interaction also approached significance. No other unanticipated main effects or interactions approached significance (all F 's < 1).

Similarly, participants in the low processing likelihood condition believed that senior comprehensive exams were less likely to affect them ($M = 4.58, SD = 2.56$) than participants in the high processing likelihood condition ($M = 6.03, SD = 2.57$), $F(1, 172) = 17.61, p < .001, r = .30$. An unanticipated main effect of argument quality also emerged, such that participants tended to believe that senior comprehensive exams were more likely to affect them in the strong arguments condition ($M = 5.68, SD = 2.70$) than in the weak arguments condition ($M = 4.94, SD = 2.58$), $F(1, 172) = 5.65, p = .019, r = .18$. Finally, an uninterpretable, marginal 3-way Processing Likelihood x Audience Reaction x Argument Quality interaction also emerged, $F(1, 172) = 3.26, p = .073$.

Participants in the high processing likelihood condition tended to believe that senior comprehensive exams were more important ($M = 5.90, SD = 2.28$) than participants in the low processing likelihood condition ($M = 5.48, SD = 2.06$), $F(1, 172) = 2.93, p = .089$. A main effect of argument quality also emerged, such that participants in the strong arguments condition believed that senior comprehensive exams were more

important ($M = 6.17, SD = 2.15$) than participants in the weak arguments condition ($M = 5.25, SD = 2.11$), $F(1, 172) = 9.80, p = .002, r = .23$. Mean patterns consistent with an unanticipated, uninterpretable, 3-way Processing Likelihood x Audience Reaction x Argument Quality interactions also emerged, $F(1, 172) = 2.511, p = .115$. No other unpredicted main effects or interactions approached significance (all F 's < 1.4).

Taken together, these items suggest that the processing likelihood manipulation was, by and large, working as intended. Across measures, participants in the high processing likelihood condition reported feeling that the issue of senior comprehensive exams was more relevant and important than participants in the low processing likelihood condition.

Participant's responses to the PANAS subscales were summed to create measures of positive and negative affect. For the positive affect scale, a main effect of Processing Likelihood emerged, such that participants in high processing likelihood condition reported more positive affect ($M = 26.27, SD = 8.32$) than participants in the low processing likelihood condition ($M = 23.89, SD = 8.33$), $F(1, 172) = 4.96, p = .027, r = .16$. An unanticipated Audience Reaction x Argument Quality interaction also emerged, $F(1, 172) = 5.00, p = .027, r = .17$, along with a trend toward a main effect of Argument Quality, $F(1, 172) = 2.85, p = .093$. The measure of negative affect revealed a main effect of argument quality, such that participants in the strong arguments condition tended to report more negative affect ($M = 17.04, SD = 7.00$) than participants in the weak arguments condition ($M = 15.15, SD = 5.53$), $F(1, 172) = 4.44, p = .037, r = .15$. A main effect of audience reaction also emerged, such that participants reported more negative affect after seeing audience members shake ($M = 16.92, SD = 6.61$) rather than nod their heads ($M = 15.13, SD = 6.97$), $F(1, 172) = 4.83, p = .029, r = .17$. No other main effects or interactions approached significance (all F 's < 1.3). This suggests that the processing likelihood manipulation may have had some impact on participant's mood. Specifically, participants in the low processing likelihood condition reported less positive

affect and more negative affect than participants in the high processing likelihood condition.

Attitudes.

As in previous studies, attitude measures were combined to form a single index ($\alpha = .97$). This index was then submitted to a 3-way ANOVA. A main effect of Audience Reaction emerged, such that participants reported more favorable attitudes after seeing audience members nod ($M = 5.71, SD = 1.78$) rather than shake ($M = 4.62, SD = 1.95$) their heads, $F(1, 172) = 13.57, p < .001, r = .27$. A main effect of Argument Quality also emerged, such that participants reported more favorable attitudes after hearing strong ($M = 5.62, SD = 1.97$) rather than weak ($M = 4.77, SD = 1.83$) arguments, $F(1, 172) = 8.68, p = .004, r = .21$. No other main effects or interactions, including the predicted Processing Likelihood x Argument Quality or Processing Likelihood x Audience Reaction interactions, approached significance, all F 's $< .8$, see Figure 7.

The main effect of Argument Quality in the absence of a qualifying Processing Likelihood x Argument Quality interaction suggests that, across conditions, participants may have engaged in careful scrutiny of message arguments. Further, the main effect of Audience Reaction which was not qualified by the predicted Processing Likelihood x Audience Reaction interaction suggests that participants were relying on audience non-verbal cues, regardless of the degree to which they were carefully scrutinizing message content. This pattern is significantly different from that observed in Study 1, where participants only utilized non-verbal cues in forming their attitudes when they were unlikely to carefully consider message arguments.

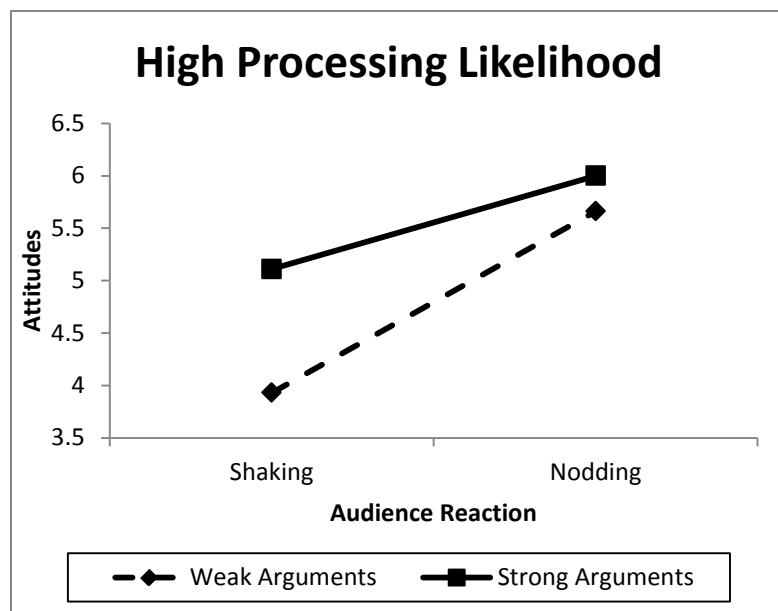
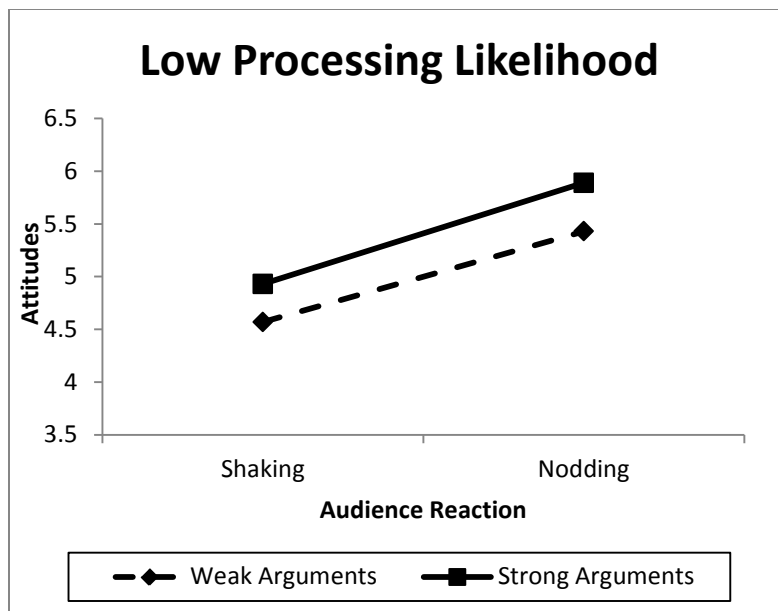


Figure 7. Study 2 attitudes toward senior comprehensive exams as a function of processing likelihood, audience reaction, and argument quality.

Thought Favorability.

As in previous studies, an index of thought favorability was formed for each participant by subtracting the number of negative thoughts listed from the number of positive thoughts listed, then dividing by the total number of issue relevant thoughts listed. When submitted to a 3-way ANOVA, this index revealed main effects of Audience Reaction and Argument Quality. Participants reported more favorable thoughts after seeing audience members nod ($M = .10, SD = .63$) rather than shake ($M = -.19, SD = .68$) their heads, $F(1, 172) = 8.01, p = .005, r = .21$. Participants also reported more favorable thoughts after hearing strong ($M = .09, SD = .71$) rather than weak ($M = -.17, SD = .61$) arguments, $F(1, 172) = 6.16, p = .014, r = .19$, see Figure 8. No other main effects or interactions, including the predicted Processing Likelihood x Argument Quality interaction, approached significance (all F 's < .6).

In the absence of a qualifying Processing Likelihood x Argument Quality interaction, the main effect of Argument Quality on thought favorability suggests that participants may have been utilizing the substantive content of message arguments in forming their evaluations of senior comprehensive exams, regardless of their processing likelihood condition. This runs contrary to the predicted pattern of effects, in which argument quality should only influence the favorability of cognitive responses among participants in the high processing likelihood condition. The main effect of Audience Reaction suggests that seeing actors nod vs. shake their heads influenced the thoughts participants formed across conditions.

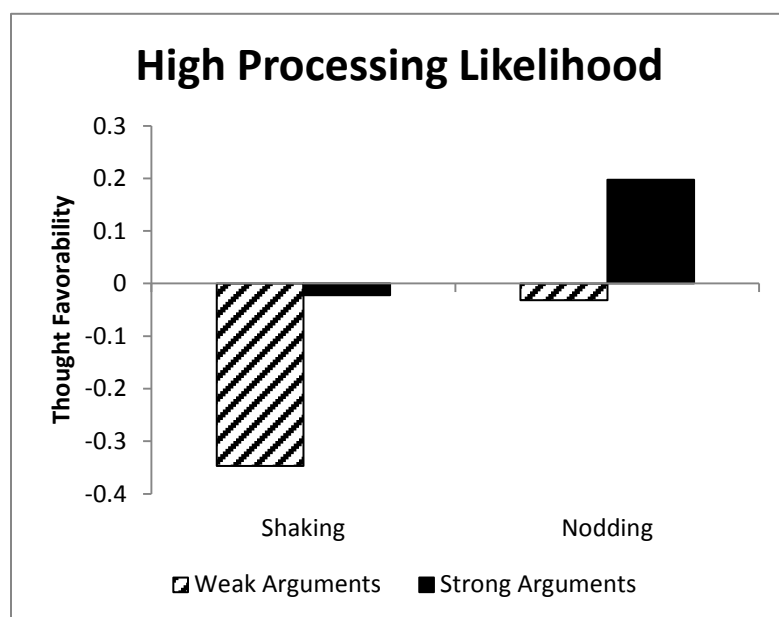
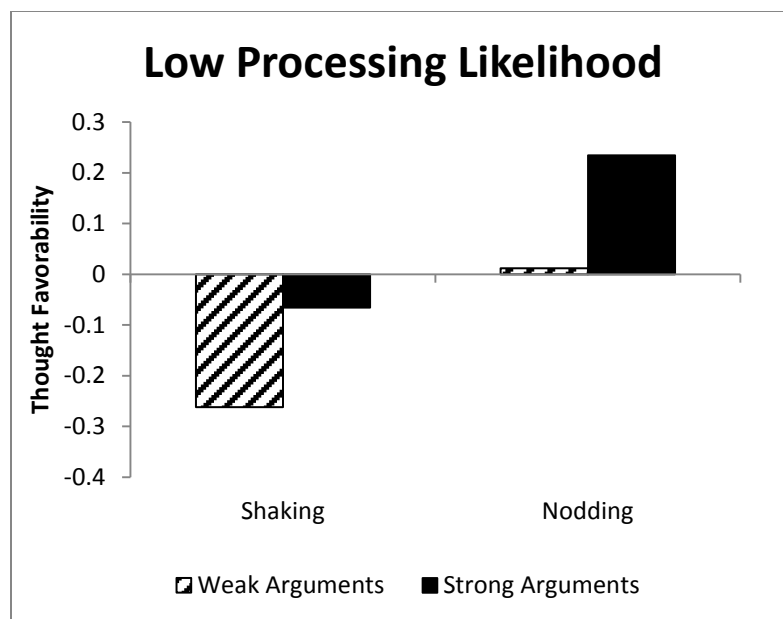


Figure 8. Study 2 thought favorability as a function of processing likelihood, audience reaction, and argument quality.

Discussion

Study 2 was designed to replicate the heuristic effect of audience reactions on attitudes observed in the low processing likelihood condition of Study 1, and also to investigate the possibility that the established effect of argument quality on post-message attitudes did not emerge in Study 1 because participants in the high processing likelihood condition may have still been more cognitively busy than was ideal. Unfortunately, Study 2 was unable to rule out any role that cognitive busyness may have played in Study 1, and indeed, was unable to even replicate the basic findings of Study 1. Instead, the main effects of argument quality on attitudes and thought favorability, which were not qualified by the predicted interaction between processing likelihood and argument quality, suggest that participants engaged in careful consideration of message content regardless of their processing likelihood condition.

Manipulation check data provide one plausible explanation for why the processing likelihood manipulation did not influence the degree to which participants engaged in effortful scrutiny of message content in Study 2. Results of the PANAS scales (Watson et al., 1988) suggest that participants in the low processing likelihood condition experienced less positive affect and more negative affect than participants in the high processing likelihood condition. According to the Feelings as Information account (Schwarz, 1990), negative affective states signal to an individual that there is a problem in the environment which needs to be solved. This can lead to more careful processing of persuasive communications (Bless, Bohner, Schwarz, & Strack, 1990). Thus, it is plausible that the negative mood experienced by participants in the low processing likelihood actually encouraged more careful message scrutiny. While information about the affect experienced by participants in Study 1 is not available, it is possible that remembering a 2-digit number may have also caused participants to experience more negative and/or less positive affect than participants in the high processing likelihood

condition of Study 2 did. This could have substantially decreased differences in processing which arise from differences in mood.

It is also interesting that, across processing likelihood conditions, participants in Study 2 appear to have utilized observed non-verbal cues in evaluating information about senior comprehensive exams. In Study 1, only participants in the low processing likelihood conditions utilized this information in forming their attitudes. One possible explanation for this is that, while participants in both the low and high processing ability conditions may have used non-verbal cues in forming their evaluations, this information could have affected attitudes through different processes. For example, participants in the low processing likelihood condition may have experienced some form of classical conditioning (Staats & Staats, 1958). It is plausible that, for these participants, their thoughts about the message may have been reinforced by head nodding or head shaking. This simple associative process may have led to more favorable attitudes after seeing participants nod rather than shake their heads. The attitudes of participants in the high processing likelihood condition may have been influenced by head nodding vs. shaking in a more thoughtful way. For example, perhaps head nodding led participants in the high processing likelihood condition to form more favorable thoughts, and participants in the head shaking condition to form less favorable thoughts regarding message content. The possibility that audience reactions can bias how message arguments are interpreted is explored further in Study 4.

In summary, while Study 2 did not replicate the key effect of Study 1 (that participants in the low, but not high processing likelihood conditions relied on audience non-verbal reactions as a heuristic cue in forming attitudes toward senior comprehensive exams) there are a number of plausible reasons why this may have occurred. Although beyond the scope of the current work, future studies which explicitly aim to investigate the impact of mood on the degree to which people utilize non-verbal cues may be insightful. Within the current work, Study 4 addresses the possibility that audience

reactions can influence attitudes when careful consideration of message arguments is likely to occur. Rather than continuing to investigate the possibility that head nodding vs. shaking can influence attitudes by different mechanisms as a function of motivation and ability to carefully consider message arguments, Study 3 attempts to expand upon the findings of Studies 1 and 2 by investigating the possibility that a different type of observed non-verbal cue can also influence attitudes.

CHAPTER 5
THE IMPACT OF AUDIENCE SMILING VS. FROWNING ON
OBSERVER ATTITUDES

Study 3

While the previous studies provide an initial investigation into how observed non-verbal reactions can influence attitudes, the generalizability of these studies is somewhat limited by the fact that only one type of audience non-verbal reaction was manipulated. Head nodding vs. shaking was selected as the audience reaction to manipulate partly because nodding vs. shaking our own heads has been shown to influence persuasion (Wells & Petty, 1980; Briñol & Petty, 2003). However, head nodding vs. shaking is not the only non-verbal behavior that can influence attitudes. For example, sitting upright vs. reclining (Petty, Wells, Heesacker, Brock, & Cacioppo, 1983), making approach vs. avoidance gestures (Priester, Cacioppo, & Petty, 1996), and utilizing muscles associates with smiling (Strack, Martin, & Stepper, 1988) can also affect attitudes. The goal of Study 3 was to expand upon the findings of Studies 1 and 2 by investigating the impact of another type of audience non-verbal cue on attitudes. Specifically, Study 3 was designed to investigate the impact of audience smiling vs. frowning on attitudes.

Throughout the human lifespan, smiling is an important tool for communicating motives and affect. Human infants begin to smile in response to caregivers and stimuli in the environment at about two months of age (Wolff, 1963). Among adults, smiling communicates many different types of information. For example, in situations associated with having little social power, people engage in more smiling than they do in high power situations (Deutsch, 1990). This could be because smiling leads to increased perceptions of attractiveness, sociability, and competence (Reis, Wilson, Monestere, & Bernstein, 1990) or it could be because people who smile are more likely to receive help than people who do not smile (Vrugt & Vet, 2009).

Smiles might be a particularly useful cue for communicating information because smiling faces are identified more quickly than neutral faces (Williams, Moss, Bradshaw & Mattingly, 2005). Additionally, smiles lead to more positive mood among those who see them than neutral expressions (Kleinke & Walton, 1982). This increase in positive mood has been shown to influence behavior (Guégen & De Gail, 1993). For example, smiling employees in customer service positions have been shown to increase customer satisfaction (Barger & Grandey, 2006). Further, waitresses who smile at their customers or draw smiling faces on their checks have been shown to receive better tips than waitresses who do not (Rind & Bordia, 2006).

While it is clear that smiles can influence perceptions and behavior in situations with direct interaction, it remains unclear how a smiling vs. frowning audience might influence attitudes within a persuasion context where no direct interaction takes place. Study 3 investigated how audience smiles vs. frowns influence the attitudes of message recipients.

Predictions for Study 3 mirrored those of Studies 1 and 2. Specifically, I predicted that when participants are unlikely to carefully consider the content of a persuasive message, audience smiling vs. frowning could influence behavior by serving as a cue or heuristic. In other words, I predicted that participants who are unlikely to carefully consider the content of a persuasive message would report more favorable attitudes after seeing audience members smile rather than frown. Further, for these participants, I predicted that attitudes would not differ as a function of argument quality and differences in attitudes would not be mediated by differences in thought favorability. On the other hand, I predicted that audience smiling vs. frowning would not influence the attitudes of participants who were likely to carefully consider message arguments. I predicted that, among these participants, attitudes would only differ as a function of argument quality, and that differences in attitudes would be mediated by differences in thought favorability.

Method

Participants and design.

206 University of Iowa undergraduates were recruited from the introductory psychology subject pool and completed this study in exchange for course credit. Participants were randomly assigned to cells of a 2 (Processing likelihood: low vs. high) x 2 (Audience reaction: frowning vs. smiling) x 2 (Argument quality: weak vs. strong) between-participants design.

Procedure.

The procedure for Study 3 was nearly identical to that of Study 1, with the exception of the audience reactions featured in the video conference. All participants were told that they would be watching a video conference in which students at another university learned about senior comprehensive exams. As in Study 1, participants in the low processing likelihood condition were asked to retain a 9-digit number in memory while watching the video conference. Participants in the high processing likelihood condition were asked to retain a 2-digit number in memory while watching the video conference.

The key difference between Study 1 and Study 3 was the audience reactions featured in the video conference that participants watched. The video conference participants viewed in Study 3 featured the same student actors used in the previous studies. However, rather than nodding or shaking their heads in response to message arguments, in these videos, the actors were instructed to either smile or frown in response to message arguments. During the video conference, participants heard the same strong or weak arguments in favor of senior comprehensive exams used in previous studies. After watching the video conference, participants responded to dependent measures and manipulation checks identical to those used in Study 2. Specifically, participants reported their attitudes toward senior comprehensive exams ($\alpha = .96$), recorded and rated any

thoughts which may have come to mind while watching the video conference, and then completed manipulation checks and the PANAS scale (Watson et al, 1988).

Results

Manipulation Checks.

A 3-way ANOVA revealed that, consistent with predictions, participants in low processing likelihood conditions reported that senior comprehensive exams were less relevant to them ($M = 5.10, SD = 2.24$), than participants in the high processing likelihood conditions ($M = 6.01, SD = 2.07$), $F(1, 198) = 7.90, p = .005, r = .20$. While mean level differences suggested an interaction between Audience Reaction and Argument Quality, $F(1, 198) = 2.37, p = .126$, no other significant main effects or interactions emerged, all F 's $> .35$.

Also consistent with predictions, participants in the low processing likelihood conditions reported that senior comprehensive exams were less likely to affect them ($M = 4.62, SD = 2.35$) than participants in high processing likelihood conditions ($M = 6.15, SD = 2.43$), $F(1, 198) = 20.30, p < .001, r = .30$. Mean differences also emerged which suggest that participants in frowning conditions may have viewed senior comprehensive exams as being more likely to affect them ($M = 5.67, SD = 2.45$), than participants in smiling conditions ($M = 5.16, SD = 2.54$), $F(1, 198) = 2.52, p = .114$. No other main effects or interactions approached significance, all F 's > 1.77 .

Participants in low processing likelihood conditions tended to report that the issue of senior comprehensive was less important ($M = 5.54, SD = 1.61$) than participants in the high processing likelihood conditions ($M = 5.92, SD = 1.80$), $F(1, 198) = 3.58, p = .06$. Mean differences also suggest that participants tended to believe that the issue of senior comprehensive exams was more important when arguments were weak ($M = 5.87, SD = 1.60$) rather than strong arguments conditions ($M = 5.48, SD = 1.84$), $F(1, 198) = 2.90, p = .09$. Finally, an unexpected and uninterpretable Processing Likelihood x Audience

Reaction x Argument Quality interaction emerged, $F(1, 198) = 5.89, p = .016, r = .17$ on the measures of perceived importance. No other main effects or interaction approached significance, all F 's > 1.43 .

Participant's responses to the PANAS subscales were summed to create measures of positive ($\alpha = .89$) and negative ($\alpha = .84$) affect. As anticipated, when submitted to a 3-way ANOVA, the positive affect scale revealed no main effects or interactions which approached significance, F 's < 1.8 . The measure of negative affect revealed only a mean pattern consistent with a main effect of argument quality, such that participants who heard weak arguments tended to report more negative affect ($M = 15.49, SD = .52$) than participants who heard strong arguments ($M = 14.37, SD = .53$), $F(1, 198) = 2.19, p = .14$. No other main effects or interactions approached significant, all F 's < 1 .

Taken together, these measures suggest that the processing likelihood manipulation had the predicted effect on variables relevant to motivation to carefully process information. Additionally, neither the manipulation of Audience Reaction or Processing Likelihood had a significant impact on participants' mood.

Attitudes.

While Processing Likelihood x Audience Reaction and Processing Likelihood x Argument Quality interactions were predicted, no evidence for either of these effects emerged in the data. After submitting the index of post-message attitudes to a 3-way ANOVA, the only significant difference in attitudes across conditions was a main effect of Argument Quality, $F(1, 198) = 9.12, p = .003, r = .21$. Participants in weak arguments condition reported less favorable attitudes toward senior comprehensive exams ($M = 5.02, SD = 1.78$) than participants in strong arguments condition ($5.71, SD = 1.57$). No other main effects or interactions approached significance, all F 's > 1.5 , see Figure 9. This means that, across conditions, participants were more persuaded by strong rather

than weak arguments. However, neither Audience Reaction nor Processing Likelihood Condition exerted any meaningful effect on post-message attitudes.

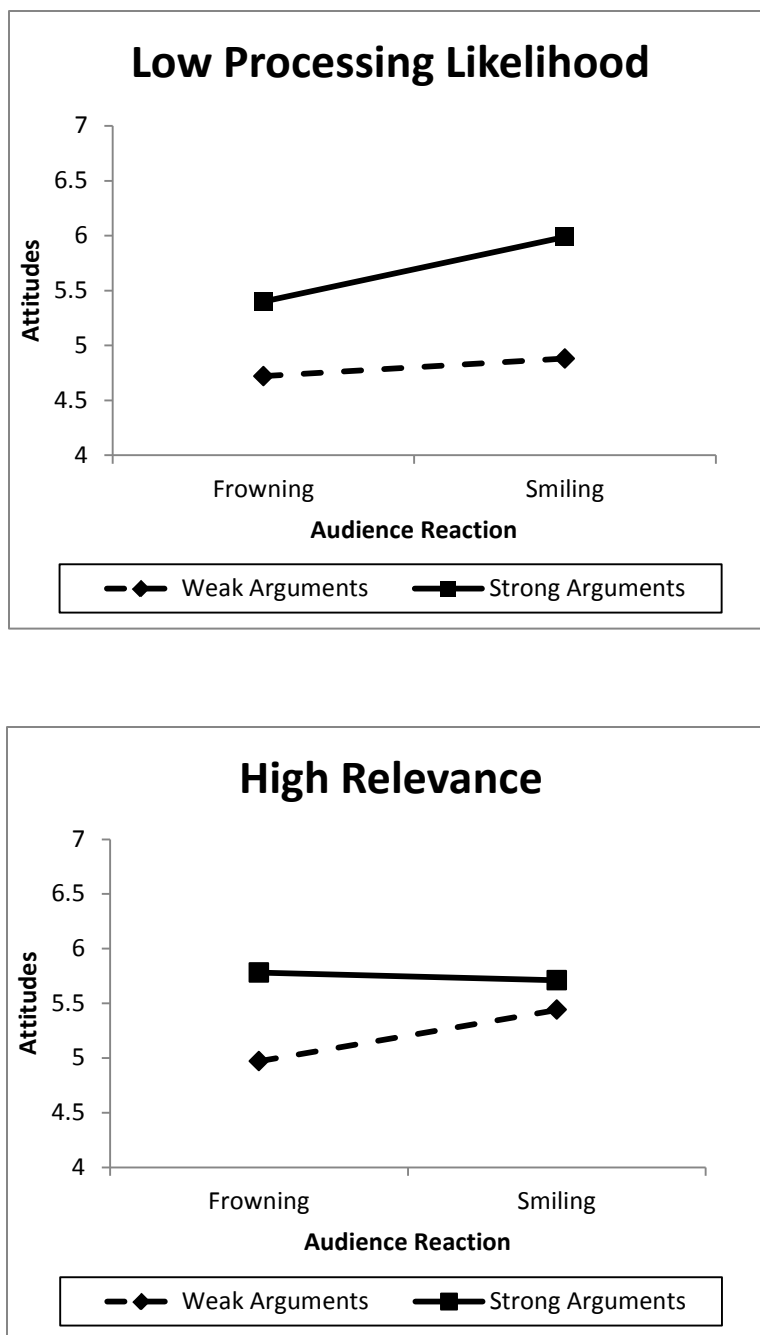


Figure 9. Study 3 attitudes toward senior comprehensive exams as a function of processing likelihood, audience reaction, and argument quality.

Thought favorability.

As in previous studies, participants ratings of their own thoughts were used to form an index of thought favorability. While a significant Processing Likelihood x Argument Quality interaction was predicted, such that participants would generate more favorable thoughts in response to strong arguments rather weak arguments in the high but not low processing likelihood condition, this effect did not emerge. The only significant difference on thought favorability across conditions was a main effect of Argument Quality, $F(1, 198) = 6.24, p = .013, r = .17$, see Figure 10. Participants in weak argument conditions identified a greater proportion of the thoughts they listed as being negative ($M = -.09, SD = .64$) than participants in strong argument conditions ($M = .12, SD = .57$). No other main effects or interactions approached significance, all F 's < 2.03 . This suggests that, across conditions, participants were engaged in careful scrutiny of message content. The absence of any effect of Audience Reaction on thought favorability suggests that smiling vs. frowning had no impact on participants' cognitive responses to the message.

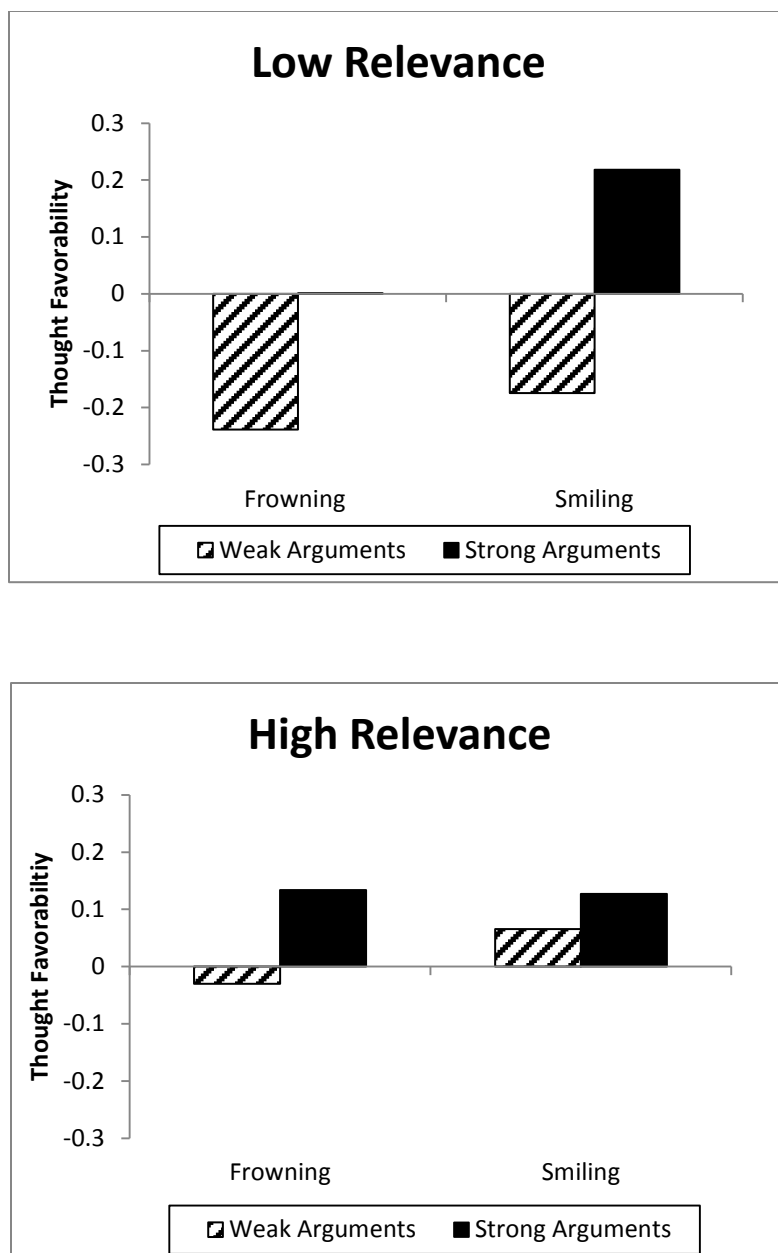


Figure 10. Study 3 thought favorability as a function of processing likelihood, audience reaction and argument quality.

Discussion

The results of Study 3 suggest that the effect of head nodding vs. head shaking on the evaluation or persuasive messages found in the Pilot Study and Study 1 may not

generalize to a different manipulation of audience reaction. In Study 3, Processing Likelihood did not interact with Audience Reaction to influence attitudes or thought favorability. While participants reported more favorable thoughts and attitudes toward senior comprehensive exams after watching a video conference which featured strong rather than weak arguments, this effect was not qualified by any of the predicted interactions. Thus, Study 3 does not provide additional support for the key hypothesis that audience reactions can influence attitudes by serving as a cue or heuristic when people are unlikely to carefully consider the content of a persuasive message.

One reason that Study 3 may have failed to replicate the key findings of previous studies is because participants could have viewed the actors smiling vs. frowning as being less directly related to the message than head nodding vs. shaking. Having participants nod vs. shake their heads while listening to a persuasive message has been shown to influence persuasion in a number of different ways (Briñol & Petty, 2003; Wells & Petty, 1980), however, evidence that smiling vs. frowning can influence persuasion is somewhat less robust (Strack, Martin, & Stepper, 1988). This could be because, while head nodding vs. shaking clearly indicate agreement vs. disagreement with message content, smiling vs. frowning may indicate other things. For example, participants might have inferred that actors in the video conference were smiling at one another because of affiliation goals (Hess, Adams, & Kleck, 2005). Alternatively, frowning participants might have looked like they were struggling to understand message content rather than disagreeing with it (Cannon, Hayes, & Tipper, 2010). Given the potential variation in meanings associated with smiling vs. frowning, the effect of this manipulation on attitudes may have been substantially weaker than the effect of head nodding vs. shaking. Future research might benefit from utilizing a larger sample to investigate this effect, or using instruction sets which make the association between smiling and agreement/ frowning and disagreement more salient.

Interestingly, although seeing people smile has been shown to increase positive mood in past research (Kleinke & Walton, 1982), participants in Study 3 did not report more positive mood after seeing actors smile rather than frown. This could be because participants did not notice the extent to which the actors were smiling or frowning. While many participants may not have noticed these more subtle cues, some people may be more likely to notice such cues than others. For example, women tend to be more accurate judges of non-verbal behavior than men (Hall & Andrzejewski, 2008), adults are better at quickly evaluating judging non-verbal cues than children (Rosenthal, Hall, DiMatteo, Rogers, Archer, 1979), and people with autism spectrum disorders tend to be worse at understanding non-verbal behavior than the general population (Baron-Cohen, 2005).

Differences in social-cognitive motives might also influence the degree to which people attend to non-verbal cues. For example, it is plausible that individuals who are high in self-monitoring (Snyder, 1974), an individual difference in the degree to which people are motivated to fit in with their peers vs. behave in a manner consistent with their beliefs, could be more sensitive to non-verbal cues than participants who are low in self-monitoring. In Study 3, self-monitoring was measured on a 25-item scale (Snyder, 1974; Petty & Wegener, 1998) as part of an unrelated experiment. Although Study 3 is underpowered to investigate a 4-way interaction, participants who scored above the sample median show a mean pattern consistent utilizing non-verbal cues in forming their attitudes senior comprehensive exams, $F(1, 89) = 2.21, p = .14$. When high self-monitoring participants saw actors smiling, they tended to report more favorable attitudes toward senior comprehensive exams ($M = 5.53, SD = 1.62$) than when they saw actors frowning ($M = 5.00, SD = 1.74$). This was not the case for participants low in self-monitoring, $F(1, 100) = .19, p = .668$. This suggests that individual differences may influence the degree to which people utilize non-verbal cues in forming their attitudes.

Future research should further investigate the impact of self-monitoring, as well as other social cognitive motives on the degree to which people attend to non-verbal cues.

Although the predicted effects of audience reaction on attitudes did not emerge in Study 3, this study is still informative because it identifies possible boundary conditions for when non-verbal reactions will influence attitudes. While some research suggests that subtle primes may be more likely to influence self-reported attitudes and behavior for certain people (Petty, DeMarree, Briñol, Horcajo, & Strathman, 2008), this study suggests that if non-verbal cues are too subtle they may not influence attitudes. Further, this study tentatively suggests that social cognitive motives like individual differences in Self-Monitoring (Snyder, 1974) can influence the degree to which people utilize non-verbal cues in forming their attitudes. These topics should be explored more thoroughly in future research.

CHAPTER 6
THE IMPACT OF OBSERVED NON-VERBAL CUES WHEN
CAREFUL CONSIDERATION OF INFORMATION IS LIKELY

Study 4

While the Studies 1, 2, and 3 sought to investigate the impact of observed non-verbal cues on attitudes when people are unlikely to think about a message, Study 4 was designed to explore the possibility that observed non-verbal cues could also influence attitudes when people are likely to think about a persuasive message. Multi process models of persuasion such as the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1986) posit that variables present in a persuasion setting can influence attitudes through a number of different mechanisms depending on the motivation and ability of message recipients to carefully consider information. Studies 1, 2, and 3 sought to explore the possibility that when people lack the motivation and ability to carefully consider the content of a persuasive message, audience non-verbal reactions can influence attitudes by serving as a cue or heuristic. In other words, these studies investigated the possibility that non-verbal cues relevant to audience agreement vs. disagreement could serve as a simple decision rules which can be used to form attitudes without carefully considering message content. Study 4 sought to explore the possibility that audience reactions can still influence attitudes when people are highly motivated and able to carefully consider the content of a persuasive message.

Biased processing is when one piece of information colors how people interpret other pieces of information. For example, Chaiken and Maheswaran (1994) told participants that they were going to be reading a message about a new consumer product which would soon be available in their area. They told participants that this information originated from either a credible or non-credible source. When message information was not clearly compelling or specious, participants reported more favorable attitudes if they

had been told this information originated from a credible source, and less favorable attitudes if they had been told the information originated from a non-credible source. In other words, the source of message information biased how participants interpreted the subsequent message. Related research suggests that variables are most likely to bias how message arguments are interpreted when people are both motivated and able to think about the content of a persuasive message (Petty, Schumann, Richman, & Strathman, 1993) and message arguments are not clearly strong or weak (Chaiken & Maheswaran, 1994).

Study 4 explored the possibility that when people are motivated and able to carefully consider the merits of a persuasive message, observed non-verbal reactions can still influence attitudes by biasing how message arguments are interpreted. Specifically, Study 4 investigated the possibility that non-verbal cues can bias how information is interpreted. I originally predicted that observed non-verbal cues would be most likely to bias how information is interpreted when arguments are not clearly strong or weak (Chaiken & Maheswaran, 1994). However, other research suggests that cues present in the persuasion setting can also bias how relatively unambiguous information is interpreted (Clark & Wegener, 2008). Thus, either a main effect of audience reaction or an interaction between audience reaction and argument quality could indicate the occurrence of biased processing, provided that attitudes which result from differences in audience reaction are mediated by differences in thought favorability.

Method

Participants and Design.

363 participants from the United States were compensated for completing a study about “communicating information” through Amazon’s Mechanical Turk. Data obtained via MTurk demonstrates psychometric properties similar to those obtained in laboratory samples (Buhrmester, Kwang, & Gosling, 2011). Data was dropped for 22 participants

who admitted to not watching the video and 12 additional participants who failed a key manipulation check item. Participants were randomly assigned to cells of a 2 (Audience reaction: head shaking vs. head nodding) x 3 (Argument quality: Weak vs. Strong vs. Ambiguous) between participants design.

Procedure.

After being directed to the study, all participants were informed that they would be learning about phosphate based detergents, a new type of commercial product being introduced across the country, see Appendix C. Participants were told that they would be watching a video conference in which consumers learned about and prepared to discuss these detergents. To encourage careful message scrutiny across conditions, all participants were told that in addition to learning how information is communicated online, a second goal of our research was to gather information regarding opinions of phosphate based detergents from a small group of consumers. This instruction set has been used in past research and has been shown to encourage careful message scrutiny among research participants (Tormala, Briñol & Petty, 2006).

After being asked to pay close attention to the upcoming information, participants then watched a brief video conference featuring the same actors used in previous studies. Participants viewed the same footage of actors either nodding or shaking their heads in response to message arguments. However, the footage was edited to align with a recorded persuasive message in favor of phosphate detergents. This message was approximately 1 minute 45 seconds in length and featured either weak, strong, or mixed arguments in favor of phosphate based detergents (see Appendix D). After watching the video conference, participants responded to filler items, attitude measures, and a brief thought listing task before being thanked and debriefed. After debriefing and receiving their payment code, participants were given an opportunity to indicate the degree to which

they complied with experimental procedures and to report any technical difficulties which may have occurred.

Independent Variables

Audience Reaction.

All participants were asked to watch a video conference which featured footage of the same actors nodding or shaking their heads used in the Pilot Study, Study 1, and Study 2. This footage was edited so that actor head movements aligned with the arguments of a new persuasive message. As in previous studies, actors appeared to nod their heads vertically or shake their heads horizontally in response to arguments read by an unseen speaker.

Argument Quality.

While watching the video conference, all participants heard one of 3 versions of a persuasive message which argued in favor of phosphate based laundry detergents (Briñol, Petty, & Tormala, 2004; see Appendix D). The strong argument version of this message contained a number of compelling reasons that one might favor phosphate based detergents, for example, stating that phosphate detergents are significantly less expensive and more environmentally friendly than non-phosphate detergents. The weak arguments version of this message contained less compelling reasons one might favor phosphate detergents, for example, stating that they are unscented and come in more attractive packaging than non-phosphate detergents. The mixed arguments version of this message contained a mix of strong and weak arguments in favor of phosphate detergents.

Dependent Measures

Manipulation checks.

Immediately after watching the video conference, participants responded to a manipulation check item which asked “Which of the following happened in the video?” Response options were: “*The female on the left waved her hand overhead occasionally / The female in the middle waved her hand overhead occasionally / The male on the right waved his hand overhead occasionally / All of the above / None of the above.*” Data was dropped for participants who answered this question incorrectly ($N = 12$). All participants also completed a number of filler items. Embedded in these filler items was a second manipulation check which asked participants “To what extent did participants in the video conference appear to agree with the message content?” (*strongly disagree-strongly agree*).

Attitudes.

Participants responded to six items which assessed their attitudes toward phosphate detergents on 9-point scales taken from past research (Evans & Clark, 2013). These items were “Overall, how positive or negative would you say phosphate detergents are?” (*negative-positive*), “To what extent are phosphate detergents good or bad?” (*good-bad*), “How favorable or unfavorable is your attitude toward phosphate detergents?” (*unfavorable-favorable*), “Are you against or in favor of phosphate detergents?” (*against-in favor*), “How harmful or beneficial do you think phosphate detergents are?” (*harmful-beneficial*), “To what extent are phosphate detergents wise or foolish?” (*foolish-wise*). These measures were combined to form a single measure of attitudes toward phosphate detergents ($\alpha = .98$).

Thought-listing.

After hearing the message and reporting their attitudes, participants were asked to list any thoughts which may have come to mind while watching the video conference. Participants were given space to record up to six thoughts in separate text entry boxes. After entering any thoughts which may have come to mind, on the next screen, participants were presented with each thought they had listed and asked to rate each thought as being either positive, negative, neutral toward or unrelated to phosphate detergents. These ratings were used to form an overall index of thought favorability as in previous studies.

Results

Manipulation Check.

Data from participants who failed to indicate that none of the actors waved their hands above their head during the video conference ($N = 12$) were not included in any of the subsequent analyses. All dependent measures were submitted 2-way ANOVAs. The manipulation check item in which assessed the degree to which conference participants were perceived as agreeing with message revealed a significant main effect of audience reaction, such that conference participants were perceived to agree with the message more when they nodded ($M = 6.93$, $SD = 1.47$) rather than shook ($M = 2.5$, $SD = 1.79$) their heads, $F(1, 323) = 615.44$, $p < .001$, $r = .81$. An unexpected, uninterpretable, Audience Reaction x Argument Quality interaction also emerged, $F(2, 323) = 4.35$, $p = .014$, $r = .11$.

Attitudes.

Consistent with the pattern of biased processing observed in Clark & Wegener (2008), a significant main effect of Audience Reaction emerged, such that participants reported more favorable attitudes after viewing conference participants nodding ($M =$

6.45, $SD = 2.06$) rather than shaking ($M = 5.13$, $SD = 2.04$) their heads, $F(1, 323) = 34.12$, $p < .001$, $r = .31$, see Figure 11. A marginal main effect of Argument Quality also emerged $F(2, 323) = 2.82$, $p = .061$. Post hoc comparisons indicated that participants report more favorable attitudes after hearing strong ($M = 6.05$, $SD = .19$) rather than mixed ($M = 4.40$, $SD = 2.87$) arguments. Post hoc comparisons also suggest that participants tended to report more favorable attitudes after hearing strong ($M = 6.05$, $SD = .19$) rather than weak ($M = 5.43$, $SD = .19$) arguments. Further consistent with the form of biased processing reported by Clark & Wegener (2008), the interaction between Audience Reaction and Argument Quality did not approach significance, $F < 1$.

The main effect of Audience Reaction demonstrates that participants formed more favorable attitudes toward phosphate detergents when they saw actors nodding rather than shaking their heads as they listened to the message. The marginal main effect of argument quality is consistent with participants carefully considering the content of message arguments across conditions. Taken together, these effects suggest that, while participants were attempting to carefully scrutinize message content, they were processing message information in a biased manner.

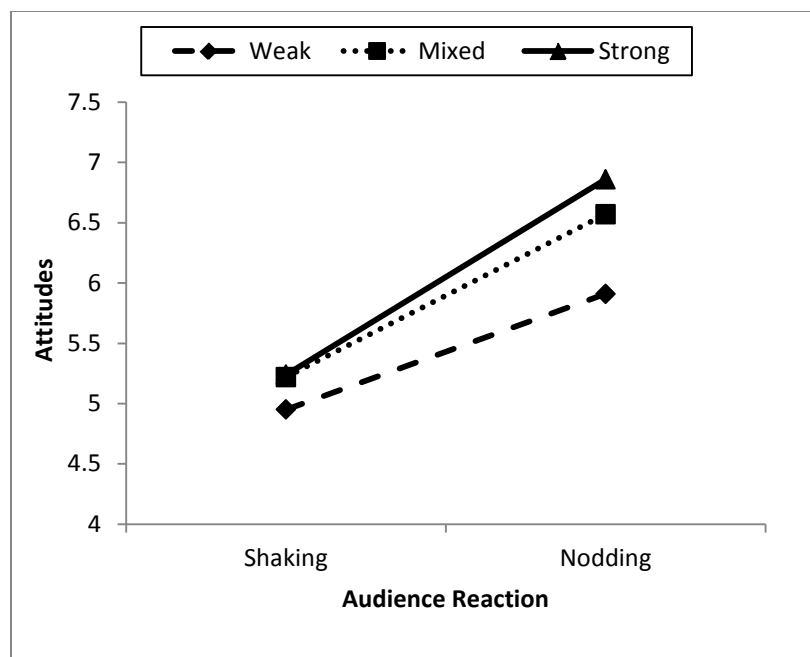


Figure 11. Study 4 attitudes toward phosphate detergents as a function of audience reaction and argument quality.

Thought Favorability.

Also consistent with the pattern of biased processing observed in Clark & Wegener (2008), a main effect of Audience Reaction emerged, such that participants reported more favorable thoughts after seeing conference participants nod ($M = .15$, $SD = .67$) rather than shake ($M = -.07$, $SD = .64$) their heads, $F(1, 323) = 8.44$, $p = .004$, $r = .16$, see Figure 12. A marginal main effect of Argument Quality also emerged, $F(2, 323) = 2.66$, $p = .071$. Post hoc tests suggest that while participants tended to reported more favorable thoughts after hearing strong ($M = .16$, $SD = .67$) rather than weak arguments ($M = -.34$, $SD = .68$), mixed arguments ($M = .00$, $SD = .07$) produced a pattern of thoughts which was not significantly different from either strong or weak arguments. No Audience Reaction x Argument Quality interaction emerged for the index of thought favorability, $F < 1.3$.

The marginal main effect argument quality on thought favorability suggests that participants were attempting to carefully scrutinize message content. However, the main effect of audience reaction suggests that participants formed very different cognitions as a function of whether they saw conference participants nodding or shaking their heads. When taken together, these effects suggest that although participants were paying attention to message content, they were forming different evaluations of that content as a function of non-verbal cues. This is consistent with the notion of biased processing.

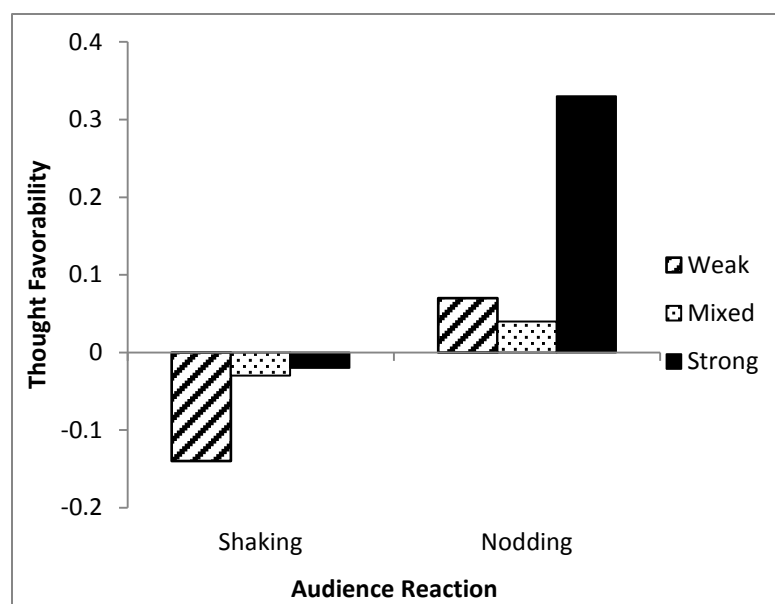


Figure 12. Study 4 thought favorability data as a function of audience reaction and argument quality.

Mediation.

The primary goal of Study 4 was to investigate the possibility that when people are motivated and able to carefully consider the merits of a persuasive message, audience reactions can bias how message arguments are interpreted. This could have taken either of two forms. Biased processing could have occurred only when arguments are not

clearly strong or weak (Chaiken & Maheswaran, 1994, Petty et al. 1993) or across conditions (Clark & Wegener, 2008). The main effects of Audience Reaction on both attitudes and thought favorability which are not qualified by interactions with argument quality suggest that participants engaged in biased processing. This is consistent with the form of biased processing which was found by Clark & Wegener (2008). If differences in attitudes which result from having seen audience members nodding rather than shaking their heads were mediated by differences in thought favorability, this would provide further evidence that thoughtful biased processing occurred rather than non-thoughtful heuristic processing.

To investigate the possibility that differences in thought favorability mediated the effect of Audience Reaction on post-message attitudes, mediation analyses were conducted. An initial regression revealed that Audience Reaction was a significant predictor of post-message attitudes, $b = 1.33$, $t(327) = 5.87$, $p < .001$, $r = .31$. Audience Reaction was also a significant predictor of thought favorability, $b = .22$, $t(327) = -1.32$, $p = .002$, $r = .07$. Finally, thought Favorability was also a significant predictor of post-message attitudes, $b = .2.10$, $t(327) = 15.40$, $p < .001$, $r = .65$. When post-message attitudes were simultaneously regressed on Audience Reaction and Thought Favorability, both Audience Reaction ($b = .89$, $t[326] = 5.01$, $p < .001$, $r = .27$) and Thought Favorability ($b = 1.99$, $t[326] = 14.90$, $p < .001$, $r = .64$) remained robust predictors of post-message attitudes.

To further investigate the indirect effect of audience reaction on attitudes through thought favorability, bootstrapping analyses were conducted following the procedures outlined by Preacher & Hayes (2008). The bootstrap analysis treated the obtained data as the population and randomly drew 5000 samples of equal size to the study, with replacement. Estimates of the direct and indirect effects of audience reaction on post-message attitudes were calculated for each bootstrapped sample and these estimates were used to generate a confidence interval for the indirect (mediated) effect. These analyses

produced results which mirrored those observed in regression based analyses (see Figure 13). Further, they demonstrated that the indirect effect of audience reaction on attitudes through thought favorability is highly significant, estimated mean indirect effect = .4387, BC CI 99: .0852 - .8285.

Regression based mediation analyses were also used to investigate the indirect effect of argument quality on attitudes through thought favorability. Consistent with the earlier ANOVA findings, Argument Quality was a significant predictor of post-message attitudes, $b = .34$, $t(327) = 2.36$, $p = .017$, $r = .13$. Argument Quality was also a significant predictor of Thought Favorability, $b = .13$, $t(327) = 2.32$, $p = .021$, $r = .13$. Further, as previously reported, Thought Favorability was a significant predictor of post-message attitudes, $b = 2.10$, $t(327) = 15.40$, $p < .001$, $r = .71$. When attitudes were simultaneously regressed on Argument Quality and Thought Favorability, the effect of Argument Quality decreased to non-significance ($b = .13$, $t[326] = 1.17$, $p = .243$), while Thought Favorability remained a robust predictor of attitudes, $b = 2.08$, $t(326) = 15.13$, $p < .001$, $r = .64$. Bootstrap analyses were once again conducted to further investigate the indirect effect of argument quality on attitudes through thought favorability. Bootstrap analyses revealed an identical pattern of effects, see Figure 14. These analyses demonstrate that the indirect effect of audience reaction on attitudes through thought favorability is also highly significant, estimated mean indirect effect = .2084, BC CI 95: .0381 - .4131.

The analyses which demonstrate that differences in thought favorability mediate the effect of audience reaction on attitudes provide key evidence that audience reactions influenced attitudes by biasing how participants interpreted the content of message arguments. As illustrated in Figure 13, participants formed more favorable thoughts when they saw actors nodding rather than shaking their heads while listening to message arguments. These differences in thought favorability in turn influenced attitudes, which suggests that participants were thinking about message arguments while watching the

video conference and used these thoughts in forming their attitudes. Differences in thought favorability mediating the effect of audience reaction on attitudes suggests that thoughtful biased processing rather, than non-thoughtful heuristic processes, occurred in Study 4.

The analyses which demonstrate that differences in thought favorability also mediate the effect of argument quality on attitudes provides further evidence that participants were engaged in careful consideration of message arguments. As illustrated in Figure 14, the participants tended to generate more favorable thoughts in response to strong rather than weak or mixed arguments. These differences in thought favorability mediated the effect of argument quality on attitudes, providing further evidence that participants were attempting to carefully consider the content of the message rather than relying on non-thoughtful heuristics to form their attitudes.

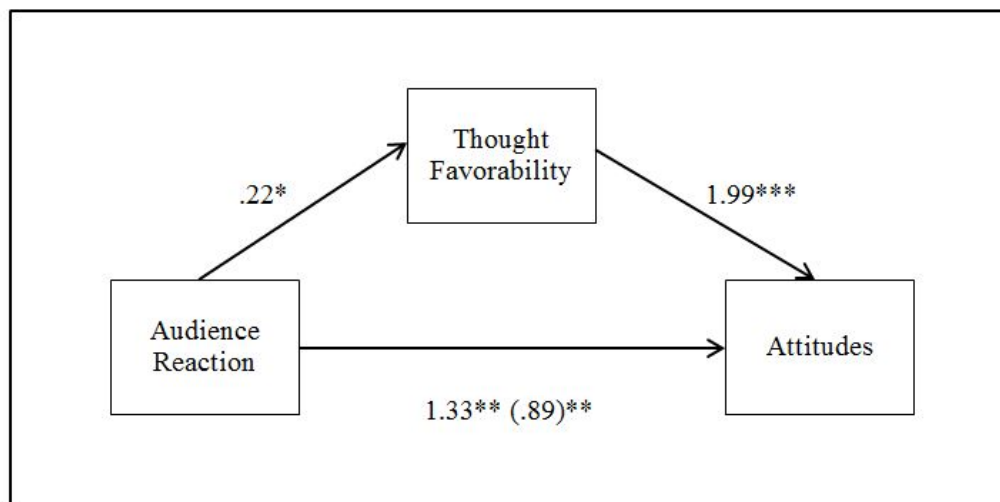


Figure 13. Study 4 relations among the audience reaction manipulation, thought favorability, and attitudes.

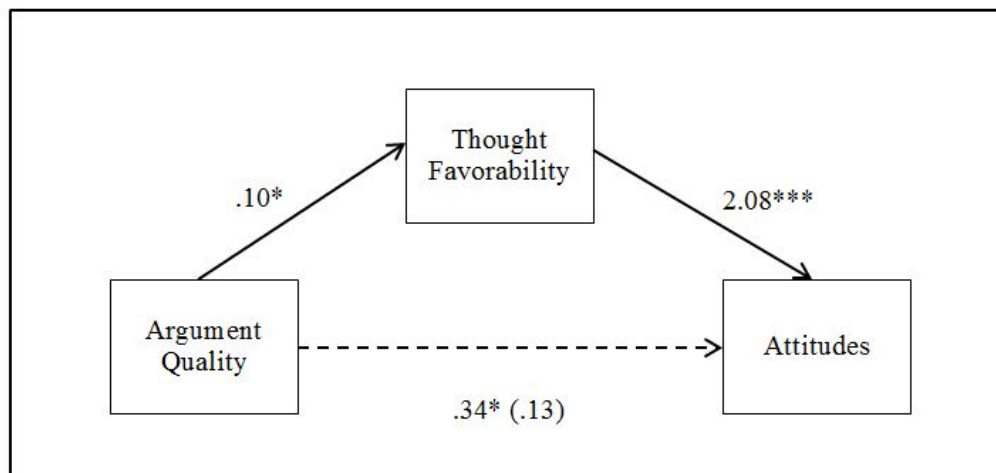


Figure 14. Study 4 relations among the argument quality manipulation, thought favorability, and attitudes.

Discussion

The primary goal of Study 4 was to investigate the possibility that when people are highly motivated and able to think about the content of a persuasive message, audience reactions can bias how message arguments are interpreted. The data suggest that regardless of argument quality, when people are motivated and able to think about the content of a persuasive message, audience reactions bias the thoughts people generate in response to a persuasive message. Across conditions, thoughts and attitudes tended to be more favorable among participants who observed audience members nodding rather than shaking their heads. Mediation analyses suggest that differences in thought favorability which arise from seeing actors nod vs. shake their heads have a significant effect on post-message attitudes.

A mixed arguments condition was included in Study 4 because past work (Chaiken & Maheswaran, 1994) and theory (Petty & Wegener, 1999) suggest that biased processing is most likely to occur when motivation to carefully consider information is high and the information available is ambiguous or mixed. However, some investigations

have also found that cues can lead to biased processing even when information is not objectively ambiguous. For example, Clark & Wegener (2008) found that outcome desirability can bias impression formation. In this study, participants who were motivated to get along with a stranger in order to win a desirable prize formed positive impressions of that person, regardless of the valence of information provided about the individual. Similarly, Wegener, Clark, & Petty (2006, Study 3) found that stereotypes about socioeconomic status can affect the thoughts participants form while viewing a child's test performance. In this study, participants who were able to think carefully formed more favorable cognitive responses while viewing a child's test results when they believed the child was of high rather than low SES, regardless of whether test performance was weak, moderate, or strong. These differences in thought favorability mediated the effect of SES on participants' perceptions of test performance and ability ratings, suggesting that biased processing occurred.

The stimuli used in the Study 4 are similar to those used by Clark & Wegener (2008) and Wegener et al. (2006) in that the information being evaluated was somewhat ambiguous across conditions. While participants tended to report more favorable attitudes in response to strong rather than mixed or weak arguments, the degree to which certain features of phosphate detergents are viewed as positive may still vary from person to person, making the arguments somewhat ambiguous. For example, one argument in the weak version of the message states that phosphate detergents are unscented. While this is presented as an argument in favor of the detergents, other factors could influence the degree to which this is perceived as positive. For example, compared to detergents which smell bad, an unscented detergent may be viewed very favorably. However, compared to a detergent which smells good, an unscented detergent may be viewed unfavorably. Because the message arguments in study 4 were still somewhat ambiguous, it is plausible that audience reactions could have influenced the types of comparisons participants make implicitly, leading to biased processing across levels of argument quality.

Although they failed to provide true evidence of process, Nabi & Hendricks (2003) suggested that non-verbal cues biased how participants in their study interpreted the information presented by a talk show guest. It was important to determine whether or not this could have truly been the case because attitudes formed as the result of careful message scrutiny tend to be stronger, longer lasting, and more likely to influence behavior than attitudes formed by less thoughtful means. Using non-verbal cues to influence attitudes in situations where people are likely to carefully scrutinize information may be particularly valuable approach for individuals and organizations interested in selling products to motivated consumers or promoting healthy behavior to individuals interested in changing their habits. Study 4 provides initial evidence which might be particularly useful to such parties.

CHAPTER 7

GENERAL DISCUSSION

Non-verbal cues are an important source of information for humans and animals alike. However, few empirical investigations have explored how observed non-verbal cues can influence attitudes. Some research suggests that repeated exposure to non-verbal bias through media programming can influence our attitudes toward social groups (Weisbuch & Ambady, 2009). Other research suggests that seeing positive non-verbal cues from a talk show host can interact with other pieces of information to influence attitudes toward a novel topic (Nabi & Hendricks, 2003). However, no research has yet explored the processes by which observed non-verbal cues can influence attitudes. According to modern multi-process theories of attitude change such as the Elaboration Likelihood Model (Petty & Cacioppo, 1986), variables present in the persuasion setting can influence attitudes by multiple different processes depending on the degree to which message recipients are motivated and able to carefully consider the content of a persuasive message. It is important to understand the processes by which variables influence attitudes because attitudes formed by more thoughtful means tend to be longer lasting (Krosnik & Petty, 1995), more resistant to counter-persuasion (Haugtvedt & Petty, 1992), and more likely to guide behavior (Sivacek & Crano, 1982) than attitudes formed by less thoughtful means.

The current research provides the first evidence that audience non-verbal reactions can influence attitudes by both thoughtful and non-thoughtful processes. While past research has conflated non-verbal cues from different sources with one another (Nabi & Hendricks, 2003), the Pilot Study in the current research provides the first empirical evidence that observed reactions from an audience of one's peers alone can influence attitudes. To investigate the process by which non-verbal cues influence attitudes, Study 1 manipulated the degree to which participants were motivated and able to carefully consider the content of a persuasive message. Participants who were unlikely to carefully

consider message contents reported more favorable attitudes after seeing conference participants nod rather than shake their heads. Differences in post-message attitudes were not mediated by differences in thought favorability. Thus, the results of Study 1 provide the first available evidence that audience reactions can influence attitudes by serving as a cue or heuristic when people lack the motivation and ability to carefully consider the content of a persuasive message. In this study, observed audience reactions did not influence attitudes when participants were motivated and able to carefully consider message content.

In addition to exploring how audience reactions can influence attitudes when people are unlikely to think about a persuasive message, this research also investigates how observed non-verbal cues can influence attitudes when people are likely to carefully consider the content of a persuasive message. In Study 4, all participants were instructed to pay close attention to an upcoming message about a new consumer product. Participants then reported more favorable thoughts and attitudes toward the product after seeing an audience nod rather than shake their heads. Differences in attitudes were mediated by differences in thought favorability, which suggests that participants engaged in biased processing (Chaiken & Maheswaran, 1994, Petty et al., 1993). In other words, participants interpreted message arguments differently as a function of the non-verbal cues they saw while listening to the message. This represents the first empirical evidence that observed non-verbal cues can influence attitudes when people are engaged in effortful scrutiny of message content.

Limitations

While the current research makes an important contribution to the literature by demonstrating that audience non-verbal reactions can influence attitudes through both thoughtful and non-thoughtful processes, findings from the current research are limited by certain issues in the data and the procedures used. These issues should be addressed in

future research to build a better understanding of how observed non-verbal cues influence attitudes.

The primary purpose of Study 1 was to investigate the possibility that when people are unlikely to carefully consider the content of a persuasive message, audience non-verbal reactions can influence attitudes by serving as a cue or heuristic. While the data support this hypothesis, it is curious that differences in argument quality did not influence the thoughts and attitudes of participants who were likely to carefully consider message content in a more immediately obvious way. One plausible explanation for this finding was that participants in the high processing likelihood condition of Study 1 were still too “cognitively busy” remembering a 2-digit number to notice the quality of message arguments. Study 2 was conducted to investigate this possibility. The procedures for Study 2 were identical to those of Study 1, except that participants in the high processing likelihood condition were not asked to remember a number. While the attitudes of participants in Study 2 were affected by differences in Argument Quality, Study 2 failed to replicate the key effect of Study 1, in which audience reactions influenced attitudes by serving as a cue or heuristic. This makes it more difficult to draw inferences about Study 1 from Study 2. Further, participants in the high processing likelihood condition of Study 3 were also asked to remember a 2-digit number while watching a video conference. Argument quality effects still emerged across participants, regardless of processing likelihood, in Study 3. Another plausible explanation is that Study 1 involved communicating relatively complicated information through audiovisual channels, which are more effective at communicating simple information (Chaiken & Eagly, 1976). However, the robust effects of argument quality on thoughts and attitudes in Studies 2 and 3 (which present an identical message in the same format) makes this explanation also seem unlikely. Thus, it remains unclear why argument quality did not have a greater impact on the thoughts or attitudes in the high processing likelihood condition of Study 1.

Another limitation of the present work is that only one observed non-verbal cue was shown to influence attitudes. The Pilot Study, as well as Studies 1, 2, and 4 all investigated the impact of observed head nodding vs. shaking on attitudes. While three out of four of these investigations demonstrate that head nodding vs. head shaking can influence persuasion, the one study which investigated the impact of a different non-verbal cue failed to demonstrate that this cue can also influence attitudes. As previously discussed, smiling vs. frowning may not have influence attitudes because it is less clearly related to message arguments than head nodding vs. shaking, or because the average participant was unlikely to notice this subtle behavior. Future research should expand upon the current investigations by exploring the impact of other observed non-verbal cues on persuasion.

More broadly, these studies focused on audience non-verbal cues relevant to apparent approval vs. disapproval. These cues were chosen as a starting point for investigating how observed non-verbal reactions can influence attitudes because they parallel audience verbal and non-verbal cues which have been shown to influence attitudes in past research (Axsom et al., 1987; Nabi & Hendricks, 2003). However, it is likely that audience non-verbal cues which parallel verbal cues less closely could also influence attitudes. For example, audience members who demonstrate their interest by sitting on the edges of their seats, eagerly awaiting upcoming arguments, versus audience members who appear disinterested, staring off into space, gazing at their phones, or falling asleep could also have an impact on attitudes. This should be explored in future investigations.

Finally, the current investigations only compare the impact of one type of non-verbal cue to the impact of another type of non-verbal cue, making it difficult to discern the direction in which audience reactions are affecting attitudes. This means that the data do not show whether the effects of Studies 1 and 4 are due to head nodding leading to more favorable evaluations, head shaking leading to less favorable evaluations, or both.

Future research should include a control group to more precisely investigate how audience reactions affect attitudes. However, it is interesting to consider what would make an appropriate control group for the current research. One possible control condition would be to have participants listen to a recorded message without watching any kind of video conference. However, this would be problematic because participants who only listened to an audio message would have less information to process than participants watching a video conference. Thus, participants in an audio message only condition would be less “cognitively busy” than participants in video conference conditions. Another possibility is that actors could be recorded sitting still and watching the video conference without giving any clear indications of approval or disapproval. However, this too could be problematic, as people are slower to identify neutral faces than faces expressing positive affect (Williams et al., 2005). Future investigations may benefit from explicitly investigating what makes an appropriate control condition. Utilizing such a control condition would allow for a more nuanced understanding of how non-verbal cues affect attitudes.

Future Directions

Other attitude change processes. These studies provide the first available evidence that observed audience non-verbal reactions can influence attitudes through both thoughtful and non-thoughtful processes. Future research should explore the possibility that observed non-verbal cues could influence attitudes through processes which were not explored in the current research. For example, it is possible that in some situations, non-verbal cues could lead people to engage in more careful scrutiny of message arguments. This might be more likely to occur for some individuals than others. DeBono and Harnish (1988) found that individuals who are low in self-monitoring (Snyder, 1974) are more likely to carefully scrutinize a persuasive message when it is presented by an expert rather than an attractive source. It is plausible that individuals who

are low in self-monitoring might also be more likely to carefully consider the content of a persuasive message when they observe experts responding favorably rather than unfavorably to that message.

It is also plausible that audience non-verbal reactions could influence attitudes by affecting the degree to which people feel confident in their thoughts about a persuasive message. According to the Self-Validation Hypothesis (Petty, Briñol, & Tormala, 2002), when people feel more confident in thoughts about a persuasive message, they are more likely to rely on those thoughts in forming their attitudes. While past research suggests that variables present in the persuasion setting are most likely to influence attitudes by affecting thought confidence when motivation and ability to carefully consider information are high and the potentially validating factor is not introduced until after arguments have been considered (Briñol & Petty, 2009), some research suggests that this is not always the case. For example, Briñol, Petty, Wagner (2009) found that sitting in an upright rather than slumped posture while listing ones best or worst qualities led to greater differences in self-evaluations. Similarly, when people nod rather than shake their heads while listening to a persuasive message, they tend to feel more confident in their thoughts and rely on those thoughts more in forming attitudes (Briñol & Petty, 2003). Within the context of observed non-verbal cues, it is plausible that validation could occur in a similar, online process. For example, if people are generating favorable cognitive responses to a message, and observed non-verbal cues led them to believe that others agree rather than disagree with these responses, observed non-verbal cues could cause people to feel more confident in their thoughts.

Individual Differences. It is likely that a number of individual differences moderate the effects of observed non-verbal cues on attitudes. Supplementary analyses from Study 3 provide some initial evidence that self-monitoring (Snyder, 1974) might be one such individual difference. While high self-monitors seek to fit in with their peers, low self-monitors are motivated to behave in a manner that is consistent with their

internal beliefs and values. Supplemental analyses from Study 3 suggest that the attitudes of participants above the median level of self-monitoring showed mean level differences consistent with forming more favorable attitudes after seeing audience members smile rather than frown. However, this was not the case for participants below the median level of self-monitoring. Thus, it is plausible that individuals high in self-monitoring are generally more sensitive to social cues, and are thus more likely to notice differences in non-verbal behavior than individuals low in self-monitoring. Assuming that individuals higher in self-monitoring are more likely to notice audience reactions, such reactions may have a greater chance of influencing their attitudes.

Another individual difference which could influence the degree to which people utilize non-verbal cues in forming their attitudes is Need for Cognition (NC, Cacioppo & Petty, 1982). Need for cognition refers to individual differences in the degree to which people engage in and enjoy effortful thought. Individuals high in NC engage in more careful consideration of the arguments in persuasive messages and put more mental effort into a variety of tasks (for a review, see Cacioppo, Petty, Feinstein, & Jarvis, 1996). Individuals low in NC tend to be “cognitive misers” who prefer to avoid engaging in effortful thought. It is plausible that, when motivation and ability to think about the content of a persuasive message is not constrained to be high or low, individuals low in NC would be more likely to rely on observed reactions in forming their attitudes because such reactions might serve as a cue or heuristic which could spare them the burden of having to more closely consider information. Further, it is possible that when motivation and ability to carefully consider message arguments are high across all participants, individuals high in NC might be more likely to use observed non-verbal cues as an argument relevant to the central merits of a message.

Matching effects. Future research might benefit from exploring the possibility that individual differences could moderate the degree to which certain specific types of non-verbal cues influence attitudes. Cesario and Higgins (2008) found that participants who

are high in promotion focus (Grant & Higgins, 2003) reported more favorable attitudes after watching a video in a speaker used “eager” rather than “vigilant” non-verbal cues while delivering a message. Conversely, participants higher in prevention focus were more persuaded by a speaker who used “vigilant” cues. It seems likely that observing similar non-verbal cues from an audience listening to a persuasive message could also influence attitudes in different ways as a function of prevention vs. promotion focus. For example, seeing an audience engage in “vigilant” displays such as sitting in a defensive posture with arms crossed, alert for danger, could cause participants who are high in prevention focus to pay more attention to the content of a persuasive message. On the other hand, perhaps seeing an audience sitting on the edge of their seats, eager to learn about the topic at hand could cause participants high in promotion focus to pay more careful attention to message arguments.

Individual differences in self-monitoring (Snyder, 1974) might also lead to matching effects within the context of observed non-verbal cues. People who are high in self-monitoring are motivated by their desire for social approval and inclusion. Thus, it is possible that these individuals might be more attentive to non-verbal cues in some situations, but not in others. For example, high-self-monitors might be more likely to attend to and utilize non-verbal cues in forming their attitudes when they believe those cues originate from their in-group, as knowing the attitudes of relevant social others might allow them to better fit in with their peers. However, high self-monitors might not be less likely to attend to and utilize non-verbal cues from out group members, since these cues are unlikely to facilitate social inclusion.

Social influence and situation effects. In addition to individual differences, it is plausible that certain situational cues could affect the degree to which people to rely on observed non-verbal cues in responding to information. Cialdini & Goldstein (2004) assert that one of the most fundamental motives for human beings is to create and maintain social relationships with others. Some research suggests that people are more

likely to comply with a request made by a stranger when brief interactions cause the stranger to seem more like a friend or acquaintance (Dolinski, Newrat, & Rudak, 2001). It is plausible that engaging in brief interactions, or apparent interaction, with audience members would make people more likely to rely on their non-verbal cues in forming attitudes. Within the video conference paradigm, it is possible that leading participants to believe they are actually part of the video conference would increase reliance on non-verbal cues in attitude formation.

Another key concept from the social influence literature which may be relevant to future research is that people seek to maintain and enhance their self-concept by behaving in a consistent manner (Cialdini & Trost, 1998). In the studies reported here, participants were not asked to report their attitudes toward message topics either publicly or privately before watching a video conference which featured audience reactions to a persuasive message about the topic. If participants were first asked to state their attitude toward a topic, and then exposed to a source of social influence like other people's reactions to relevant information, they may have been less likely to utilize non-verbal cues in forming their attitudes. Public commitment could be a particularly potent moderator of the effects observed in the current research (Burger & Cornelius, 2003).

Practical Implications

Although the current research uses a laboratory paradigm to investigate the influence of observed non-verbal cues on attitudes, this research could have a number of implications for persuasion practitioners. For example, individuals and organizations looking to to increase product sales may find that exposing potential customers to the non-verbal cues of others can influence the attitudes people form toward products. If consumers see other people responding favorably to a novel product, they may form more favorable evaluations of that product than if they see other people responding negatively. Marketing techniques which encourage consumers to carefully consider information

about a product might become more successful in generating sales if they include audience non-verbal reactions. Assuming marketers can get consumers to engage in thoughtful biased processing, the attitudes which result from such persuasion attempts are more likely to guide behavior than attitudes based on less thoughtful processes (Sivacek & Crano, 1982; Petty et al., 1983).

The current research could also have implications for organizations interested in promoting healthy behaviors. While organizations which seek to promote public health might benefit from utilizing audience reactions to shape public opinions about health behaviors, these organizations should also consider the potentially deleterious effects of audience reactions on their formative research. Organizations interested in creating public health campaigns often rely on focus groups when evaluating materials prior to their dissemination. Focus groups are a qualitative form of data collection, in which a group of 5 to 10 people led by a skilled interviewer engage in a planned discussion about an area of interest (Krueger & Casey, 2009). In such groups, participants are often exposed to different types of material, such television public service announcements or written materials being prepared for distribution. In such situations, it is seemingly inevitable that focus group participants will be exposed to the non-verbal reactions of those around them before reporting their attitudes. Thus, it is plausible that observed non-verbal cues can influence the attitudes that focus group participants report during formative research. This could be problematic, as the at-home viewers of a public service announcements are unlikely to see these same non-verbal cues when evaluating the material. Individuals and organizations which use focus groups as a research technique should work toward ensuring that they also evaluate materials without this potential biasing influence.

Summary

While non-verbal cues are an important source of information for humans and animals alike, past research has provided little evidence of the mechanisms by which

observed non-verbal cues can influence attitudes in message-based persuasion. The current research provides evidence that observed non-verbal reactions can influence attitudes by both thoughtful and non-thoughtful means. When careful consideration of message arguments is unlikely, audience reactions can influence attitudes by serving as a cue or heuristic. When careful consideration of message arguments is likely to occur, observed audience reactions can bias how message arguments are interpreted. It is my hope that this research will serve as a starting point for future investigations which further explore when and how observed non-verbal cues can influence attitudes.

REFERENCES

- Ambady, N. & Weisbuch, M., (2010). Nonverbal behavior. In S. T. Fiske, D.T. Gilbert & G. Lindzey (Eds.), *Handbook of Social Psychology*, 464 -497.
- Axsom, D., Yates, S. & Chaiken, S. (1987). Audience response as a heuristic cue in persuasion. *Journal of Personality and Social Psychology*, 9, 162-166.
- Barger, P. B. & Grandey, A. A. (2006). Service with a smile and encounter satisfaction: Emotional contagion and appraisal mechanisms. *Academy of Management Journal*, 49, 1229-1238.
- Baron-Cohen, S. (1995). How to build a baby that can read minds: Cognitive mechanisms in mindreading. *Cashiers de Psychologie Cognitive/ Current Psychology of Cognition*, 13, 513-552.
- Baron-Cohen, S. (2005). The empathizing system A revision of the 1994 version of the mind-reading system. In B. Ellis & D. Bjoklund (Eds.) *Origins of the social mind* (pp. 468-492). New York: Guilford Press.
- Baron, R. M. & Kenny, D. A. (1986). The moderator-mediator variable distinction is social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.
- Bayliss, A. P., Frischen, A., Fenske, M. J., & Tipper, S. P. (2007). Affective evaluations of objects are influenced by observed gaze direction and emotional expression. *Cognition*, 104, 644-653.
- Bless, H., Bohner, G., Schwarz, N., & Strack, F. (1990). Mood and persuasion: A cognitive response analysis. *Personality and Social Psychology Bulletin*, 16, 331-345.
- Briñol, P. & Petty, R.E. (2003). Overt head movements and persuasion: A self-validation analysis. *Journal of Personality and Social Psychology*, 84, 1123-1139.
- Briñol, P. & Petty, R. E. (2009). Persuasion: Insights from the self-validation hypothesis. In Zanna, M. P. (Ed.) *Advances in Experimental Social Psychology*, 41, 69-118.
- Briñol, P., Petty, R. E. & Tormala, Z. L. (2004). Self-validation of cognitive responses to advertisements. *Journal of Consumer Research*, 30, 559-573.
- Briñol, P., Petty, R. E., Wagner, B. (2009). Body posture effects on self-evaluation: a self-validation approach. *European Journal of Social Psychology*, 39, 1053-1064.
- Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's Mechanical Turk: A new source of inexpensive, yet high quality data? *Perspectives on Psychological Science*, 6, 3-5.
- Burger, J. & Cornelius, T. (2003). Raising the price of agreement: Public commitment and the lowball compliance procedure. *Journal of Applied Social Psychology*, 33, 923-934.

- Cacioppo, J. T., & Petty, R.E. (1982). The need for cognition. *Journal of Personality and Social Psychology*, 42, 116-131.
- Cacioppo, J. T., Petty, R. E., Feinstein, J. A. & Jarvis, W. B. G. (1996). Dispositional differences in cognitive motivation: The life and times of individual varying in need for cognition. *Psychological Bulletin*, 119, 197-253.
- Cannon, P. R., Hayes, A. E., & Tipper, S. P. (2010). Sensorimotor fluency influences affect: Evidence from electromyography. *Cognition and Emotion*, 24, 681-691.
- Chaiken, S. (1980). Heuristic vs. systematic information processing in the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology*, 45, 241-256.
- Chaiken, S. & Eagly, A. H. (1976). Communication modality as a determinant of message persuasiveness and message comprehensibility. *Journal of Personality and Social Psychology*, 34, 605-614.
- Chaiken, S. & Maheswaran, D. (1994). Heuristic processing can bias systematic processing: Effects of source credibility, argument ambiguity, and task importance on attitude judgment. *Journal of Personality and Social Psychology*, 66, 460-473.
- Cesario, J. & Higgins, E. T. (2008). Making message recipients "feel right:" How nonverbal cues can increase persuasion. *Psychological Science*, 19, 415-420.
- Cesario, J., Higgins, E. T. & Scholer, A. A. (2008). Regulatory fit and persuasion: Basic principles and remaining questions. *Social and Personality Psychology Compass*, 2, 444-463.
- Cialdini, R. B. & Goldstein, N. J. (2004). Social Influence: Compliance and Conformity. *Annual Review of Psychology*, 55, 591-621.
- Cialdini, R. B. & Trost, M. R. (1998). Social influence: Social norms, conformity and compliance. In Gilbert, D. T., Fiske, S. T., & Gardner, L. (Eds.) *The handbook of social psychology*, Vols. 1 and 2. (pp. 151- 192). New York, NY: McGraw-Hill.
- Clark, J. K., & Wegener, D. T. (2008). Unpacking outcome dependency: Differentiating effects of dependency and outcome desirability on the processing of goal-relevant information. *Journal of Experimental Social Psychology*, 44, 586-599.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ, Earlbaum.
- Crosby, J. R., Monin, B., & Richardson, D. (2008). Where do we look during potentially offensive behavior? *Psychological Science*, 19, 226-228.
- DeBono, K. G. & Harnish, R. J. (1988). Source expertise, source attractiveness, and the processing of persuasive information: A functional approach.
- Deutsch, F. (1990). Status, sex and smiling: The effect of smiling in men and women. *Personality and Social Psychology Bulletin*, 16, 531-540.
- Dolinski, D., Newrat, M., & Rudak, I. (2001). Dialog involvement as a social influence technique. *Journal of Experimental Social Psychology*, 78, 34, 27-50.

- Dovidio, J., Kawakami, K., Johnson, C., Johnson, B., & Howard, A. (1997). On the nature of prejudice: Automatic and controlled processes. *Journal of Experimental Social Psychology*, 33, 510-540.
- Evans, A. T. & Clark, J. K. (2013). Source characteristics and persuasion: The role of self-monitoring in self-validation. *Journal of Experimental Social Psychology*, 48, 383-386.
- Frischen, A. & Tipper, S. P. (2004). Orienting attention via observed gaze shift evokes longer term inhibitory effects: Implications for social interactions, attention, and memory. *Visual Cognition*, 14, 351-364.
- Furnham, A., Gunter, B., & Green, A. (1990). Remembering science: The recall of factual information as a function of the presentation mode. *Applied Cognitive Psychology*, 4, 203-212.
- Gilbert, D. T., & Hixon, J. G. (1991). The trouble of thinking: Activation and application of stereotypic beliefs. *Journal of Personality and Social Psychology*, 60, 509-517.
- Grant, H., & Higgins, E. T. (2003). Optimism, promotion pride, and prevention pride as predictors of quality of life. *Personality and Social Psychology Bulletin*, 29, 1521-1532.
- Guégen, N. & De Gail, M. A. (1993). The effect of smiling on helping behavior: Smiling and good Samaritan behavior. *Communication Reports*, 16, 133-139.
- Hains, S. M. J. & Muir, D. W. (1996). Effects of stimulus contingency in infant-adult interactions. *Infant Behavior & Development*, 19, 49-61.
- Hall, J. A. & Andrzejewski, S. A. (2008). Who draws accurate first impressions? Personal correlates of sensitivities to non-verbal cues. In Ambady, N. & Skowronski, J. E. (Eds.) *First Impressions* (pp. 87- 105). New York, NY, US: Guilford Publications.
- Harris, M. J., Moniz, A. J., Sowards, B. A., & Krane, K. (1994). Mediation of interpersonal expectancy effects: Expectancies about the elderly. *Social Psychology Quarterly*, 57, 36-48.
- Haugtvedt, C. P. & Petty, R. E. (1992). Personality and persuasion: Need for cognition moderates the persistence and resistance of attitude changes. *Journal of Personality and Social Psychology*, 63, 308-319.
- Haugtvedt, C. P. & Strathman, A. (1990). Situational personal relevance and attitude persistence. *Advances in Consumer Research*, 21, 205-218.
- Haugtvedt, C. P. & Wegener, D. T. (1994). Message order effects in persuasion: An attitude strength perspective. *Journal of Consumer Research*, 17, 766-769.
- Heatherton, T. F., Herman, C. P., Polivy, J., King, G. A., & McGree, S. T. (1988). The (mis)measurement of restraint: An analysis of conceptual and psychometric issues. *Journal of Abnormal Psychology*, 97, 19-28.
- Hebl, M. R. & Dovidio, J. F. (2005). Promoting the "Social" in the examination of social stigmas. *Personality and Social Psychology Review*, 9, 156-182.

- Hess, U., Adams, J. R., & Kleck, R. E. (2005). Who may frown and who should smile? Dominance, affiliation, and the display of happiness and anger. *Cognition and Emotion, 19*, 515-536.
- Humprey, N. K. (1976). The social function of intellect. In P. P. G. Bateson & R. A. Hinde (Eds.), *Growing points in ethology* (pp. 303-317). Cambridge, England: Cambridge University Press.
- Jones, S. (2007). Imitation in infancy: The development of mimicry. *Psychological Science, 18*, 593-599.
- Jourventin, P., Pasteur, G., & Cambefort, J. P. (1976). Observational learning of baboons and avoidance of mimics: Exploratory tests. *Evolution, 31*, 21-28.
- King, E. B., Shapiro, J. R., Hebl, M. R., Singletary, S. L., & Turner, S. (2006). The stigma of obesity in customer service: A mechanism for remediation and bottom-line consequences of interpersonal discrimination. *Journal of Applied Psychology, 91*, 579-593.
- Kleinke, C. L. & Walton, J. H. (1982). Influence of reinforced smiling on affective responses in an interview. *Journal of Personality and Social Psychology, 42*, 557-565.
- Klinnert, M.D., Campos, J. J., Sorce, J. F., Emde, R. N., & Sveida, M. (1983). Emotions as behavior regulators: Social referencing in infancy. *Emotion: Theory, research, and experience, 2*, 57-86.
- Klinnert, M.D., Emde, R. N., Butterfield, P., & Campos, J. J. (1986). Social referencing: The infants use of emotional signals from a friendly adult with mother present. *Developmental Psychology, 22*, 427-432.
- Krueger, R. A. & Casey, M. A. (2009). Focus Groups. London, UK: SAGE Publications Inc.
- Krosnick, J. A. & Petty, R. E. (1995). Attitude strength: An overview. In Petty, R. E. & Krosnick, J. A. (Eds.) *Attitude Strength: Antecedents and Consequences* (pp. 1-24). Mahwah, NJ: Erlbaum Associates.
- Lee, A. Y. & Aaker, J. L. (2004). Bringing the frame into focus: The influence of regulatory fit on processing fluency and persuasion. *Journal of Personality and Social Psychology, 86*, 205-218.
- Mathis, A., Chivers, D. P., & Smith, R. J. F. (1996). Cultural transmission of predator recognition in fishes: Intraspecific and interspecific learning. *Animal Behaviour, 15*, 185-201.
- Mumme, D. L., Fernald, A. & Herrera, C. (1996). Infants responses to facial and vocal emotional signals in a social referencing paradigm. *Child Development, 67*, 3219-3237.
- Nabi, R. L. & Hendriks, A. (2003) The persuasive effect of host and audience reaction shots in television talk shows. *Journal of Communication, 53*, 527-543.

- Nakayama, K. (2004). Observing conspecifics scratching induces a contagion of scratching in Japanese monkeys (*Macaca fuscata*). *Journal of Comparative Psychology*, *118*, 20-24.
- Parr, L. A., Waller, B. M., & Vick, S. J. (2007). New developments in understanding emotional facial signals in chimpanzees. *Current Directions in Psychological Science*, *16*, 117-122.
- Petty, R. E., Briñol, P., & Tormala, Z. L. (2002). Thought confidence as a determinant of persuasion: The self-validation hypothesis. *Journal of Personality and Social Psychology*, *82*, 722-741.
- Petty, R.E. & Cacioppo, J. T. (1979). Issue-involvement can increase or decrease persuasion by enhancing message-relevant cognitive responses. *Journal of Personality and Social Psychology*, *37*, 1915-1926.
- Petty, R. E. & Cacioppo, J. P. (1986). The Elaboration Likelihood Model of Persuasion. In L. Berkowitz (Ed.) *Advances in experimental social psychology* (Vol. 19, pp. 123-205). New York: Academic.
- Petty, R. E., Cacioppo, J. T. & Goldman, R. (1981). Personal involvement as a determinant of argument-based persuasion. *Journal of Personality and Social Psychology*, *4*, 847-855.
- Petty, R. E., Cacioppo, J. T., & Schumann, D.W. (1983). Central and peripheral routes to advertising effectiveness: The moderating role of involvement. *Journal of Consumer Research*, *10*, 135-146.
- Petty, R. E., DeMarree, K. G., Briñol, P., Horcajo, J., & Strathman, A. J. (2008), Need for cognition can magnify or attenuate priming effects in social judgment. *Personality and Social Psychology Bulletin*, *34*, 900-912.
- Petty, R. E., Haugtvedt, C. P., Heesacker, M. & Cacioppo, J. T. (1995). *Message elaboration as a determinant of attitude strength: Persistence and resistance of persuasion*. Unpublished manuscript, Ohio State University, Columbus.
- Petty, R. E. & Krosnick, J. A. (1995). *Attitude Strength: Antecedents and consequences*, vol. 4. Hillsdale, NJ, Erlbaum.
- Petty, R. E., Schumann, D. W., Richman, S. A., & Strathman, A. J. (1993). Positive mood and persuasion: Different roles for affect under high- and low-elaboration conditions. *Journal of Personality and Social Psychology*, *64*, 5-20.
- Petty, R. E. & Wegener, D. T. (1998). The elaboration likelihood model: Current status and controversies. In Chaiken, S. & Trope, Y. (Eds.) *Dual-process theories in social psychology* (pp. 37-72). New York, NY: Guilford Press.
- Petty, R. E., Wells, G. L., Heesacker, M., Brock, T., & Cacioppo, J. T. (1983). The effects of recipient posture on persuasion: A cognitive response analysis. *Personality and Social Psychology Bulletin*, *9*, 209-222.
- Preacher, K. J. & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments & Computers*, *36*, 717-731.

- Priester, J. R., Cacioppo, J. T., & Petty, R. E. (1996). The influence of motor processes on attitudes toward novel versus familiar semantic stimuli. *Personality and Social Psychology Bulletin*, 22, 442-447.
- Reis, H.T., Wilson, I. M., Monestere, C., Bernstein, S. (1990). What is smiling is beautiful and good. *European Journal of Social Psychology*, 20, 259-267.
- Rind, B. & Bordia, P. (2006). Effect of restaurant tipping of male and female servers drawing a happy smiling face on the backs of customers' checks. *Journal of Applied Social Psychology*, 26, 218-225.
- Rosenthal, R., Hall, J. A., DiMatteo, M. R., Rogers, P. L. & Archer, D. (1979). *Sensitivity to nonverbal communication*. Baltimore, MD, US.: Johns Hopkins University Press.
- Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective states. In Higgins, E. T. & Sorrentino, R. M. (Eds.) *Handbook of motivation and cognition: Foundations of social behavior*, Vol. 2. (pp. 527 – 561). New York, NY, US: Guilford Press.
- Sivacek, J. & Crano, W. D. (1982). Vested interest as a moderator of attitude-behavior consistency. *Journal of Personality and Social Psychology*, 43, 210-221.
- Snyder, M. (1974). Self-monitoring. In L. Berkowitz (Ed.) *Advances in experimental social psychology* (vol. 12). New York, NY, US: Academic Press.
- Sorce, J. F., Emde, R. N., Campos, J., & Klinnert, M. D. (1985). Maternal emotional signaling: Its effect on the visual cliff behavior of 1-year-olds. *Developmental Psychology*, 21, 195-200.
- Staats, A. W. & Staats, C. (1958). Attitudes established by classical conditioning. *Journal of Abnormal and Social Psychology*, 67, 159-167.
- Strack, F., Martin, L. L., & Stepper, S. (1988). Inhibiting and facilitating conditions of the human smile: A non-obtrusive test of the facial feedback hypothesis. *Journal of Personality and Social Psychology*, 54, 768-777.
- Swim, J. K., Cohen, L. L., & Hyers, L. L. (1998). Experiencing everyday prejudice and discrimination. In Swim, J. K. and Stangor, C. (Eds.) *Prejudice: The target's perspective*, (pp. 37-60). San Diego, CA, US: Academic Press, xiv, 332 pp.
- Tormala, Z. L., Briñol, P. & Petty, R. E. (2006). The malleable meaning of subjective ease. *Psychological Science*, 17, 200-206.
- Tormala, Z. L., & Petty, R. E. (2004). Resistance to persuasion and attitude certainty: The moderating role of elaboration. *Personality and Social Psychology Bulletin*, 30, 1446-1457.
- Vrugt, A. & Vet, C. (2009). Effects of a smile on mood and helping behavior. *Social Behavior and Personality*, 37, 1251-1258.
- Walden, T. A. & Baxter, A. (1989). The effect of context and age on social referencing. *Child Development*, 60, 1511-1518.

- Watson, D., Clark, L. A., & Tellegen, A. (1988) Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54, 1063-1070.
- Webb, T. L. & Sheeran, P. (2006). Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. *Psychological Bulletin*, 132, 249-268.
- Wegener, D. T., Clark, J. K., & Petty, R. E. (2006). Not all stereotyping is created equal: differential consequences of thoughtful vs. non-thoughtful stereotyping. *Journal of Personality and Social Psychology*, 90, 42-59.
- Wegener, D. T., Downing, J., Krosnick, J. A. & Petty, R. E. (1995). Measures and manipulations of strength-related properties of attitudes: Current practice and future directions. In Petty, R. E., & Krosnick, J. A. (Eds.) *Attitude Strength: Antecedents and consequences*. (455-487). Hillsdale, NJ, England: Erlbaum Associates.
- Wells, G. L., & Petty, R. E. (1980). The effect of overt head movements on persuasion: Compatibility and incompatibility of responses. *Basic and Applied Social Psychology*, 1, 219-230.
- Weisbuch, M. & Ambady, A. (2009). Unspoken cultural influence: Exposure to and influence of non-verbal behavior. *Journal of Personality and Social Psychology*, 96, 1104-1119.
- Williams, M. A., Moss, S. A., Bradshaw, J. L., & Mattingly, J. B. (2005). Look at me, I'm smiling: Visual search for threatening and nonthreatening facial expressions. *Visual Cognition*, 12, 29-50.
- Wilson, E. C. (1974). The effect of medium on loss of information. *Journalism Quarterly*, 51, 111-116.
- Wolff, (1963). Observations on the early development of smiling. In B. M. Foss (Ed.), *Determinants of infant behavior* (Vol. 2, pp. 113-138). New York: Wiley.
- Zarbatany, L. & Lamb, M. E. (1985). Social referencing as a function of information source: Mothers vs. strangers. *Infant Behavior & Development*, 8, 25-33.

APPENDIX A: INSTRUCTIONS FOR STUDIES 1, 2, AND 3

Screen 1 – Identical Across Conditions

“Today you will be completing a study which investigates how information is communicated over the internet. Video-conferencing is one way in which many businesses and universities are trying to use technology to improve communication. However, it is unclear how people perceive different types of information in such technology intensive settings. In this experiment, you will be watching a recorded video conference in which participants learned about a new policy.”

Screen 2 – Low Processing Likelihood Condition

“During the video conference you will be watching today, you will hear a segment recorded from a campus radio program at another university. This describes a new graduation requirement which is being implemented at Eastern Washington University known as “Senior Comprehensive Exams.” The video conference participants that you will see are students at Eastern Washington University. However, this program is **not** being considered here at the University of Iowa.”

Screen 2 – High Processing Likelihood Condition

“During the video conference you will be watching today, you will hear a segment recorded from a campus radio program at another university. This describes a new graduation requirement which is being implemented at Eastern Washington University known as “Senior Comprehensive Exams.” The video conference participants that you will see are students at Eastern Washington University. You should pay close attention to this message, as the board of regents plans to implement senior comprehensive exams here at the University of Iowa in the near future.”

Screen 3 – Low Processing Likelihood Condition

“Before you watch the video conference, you should know that the researchers involved with this study are interested in how distractions can influence the way people perceive information. In order to simulate real world distractions, you will be asked to remember a 9-digit number while you are watching the video conference. This number will appear on the next page. To remember this number, it may help to mentally rehearse it by repeating the number again in and again in your head as you watch the videoconference.”

Screen 3 – High Processing Likelihood Condition (Studies 1 and 3 only)

“Before you watch the video conference, you should know that the researchers involved with this study are interested in how distractions can influence the way people perceive information. In order to simulate real world distractions, you will be asked to remember a 2-digit number while you are watching the video conference. This number will appear on the next page. To remember this number, it may help to mentally rehearse it by repeating the number again in and again in your head as you watch the videoconference.”

Screen 4 – Low Processing Likelihood Condition

“Please take a close look at the number below and keep it in mind while watching the video conference. You will be asked to repeat this number after the video conference. Mentally rehearsing, or repeating this number over and over in your head while watching the video conference may help you to remember it. Please be sure to memorize this number before moving on to the next page.

Your number is: 643 – 871 – 620”

Screen 4 – High Processing Likelihood Condition (Studies
1 and 3 Only)

“Please take a close look at the number below and keep it in mind while watching the video conference. You will be asked to repeat this number after the video conference. Mentally rehearsing, or repeating this number over and over in your head while watching the video conference may help you to remember it. Please be sure to memorize this number before moving on to the next page.

Your number is: 43”

APPENDIX B: SENIOR COMPREHENSIVE EXAM MESSAGES

Weak Arguments Message

Some colleges and universities are considering the adoption of senior comprehensive exams. With the program, seniors would be required to pass a general exam in their major area before receiving their college degree. If exams were required, it seems likely that a number of good things would happen.

Students would work harder. The National Scholarship Achievement Board recently conducted a five-year study on the effectiveness of comprehensive exams at Duke University. The results of the study showed that since the comprehensive exams have been introduced at Duke, the anxiety of undergraduates has increased by 31%. At comparable schools without the exams, anxiety increased by only 8% over the same period. The Board reasoned that anxiety over the exams, or fear of failure, would motivate students to study more in their courses while they were taking them. It is likely that this increase in anxiety observed at Duke could also be observed and be of benefit at other universities that adopt the exam policy.

Graduate students have always had to take a comprehensive exam in their major area before receiving their degrees, and it is only fair that undergraduates should have to take them also. As the Dean of the Harvard Business School said, "If a comprehensive exam is considered necessary to demonstrate competence for a graduate degree, it should not be excluded as a requirement for an undergraduate degree. What administrators don't realize is that this is discrimination just like discrimination against minority groups. There would be trouble if universities required only some minority groups to take comprehensive exams. Yet many universities do the same thing by requiring graduate students but not undergraduates to take the exams." Comprehensive exams could be as useful for undergraduates as they have been for graduate students.

Data from the University of Virginia show that some students favor the senior comprehensive exam policy. For example, one faculty member asked his son to survey his fellow students at the school since it recently instituted the exams. Over 55% of his son's friends agreed that in principle, the exams would be beneficial. Of course, they didn't all agree but the fact that most did proves that undergraduates want the exams. As Saul Siegel, a student whose father is a vice-president of IBM, said: "Comprehensive exams sound like something the ancient Greeks would have done. If comprehensive exams were to be instituted, we would be following their example." Another benefit is that the exams provide a means through which students would compare their accomplishments with students at other schools. Data from the Educational Testing Service confirms that students are eager to compare grades with one another when they are in the same classes. Senior comprehensive exams would allow such a comparison even across universities.

Strong Arguments Message

Some colleges and universities are considering the adoption of senior comprehensive exams. With the program, seniors would be required to pass a general exam in their major area before receiving their college degree. If exams were required, it seems likely that a number of good things would happen.

Students and faculty would work harder. The National Scholarship Achievement Board recently conducted a five-year study on the effectiveness of comprehensive exams at Duke University. The results of the study showed that since the comprehensive exams have been introduced at Duke, the grade point average of undergraduates has increased by 31%. At comparable schools without the exams, grades increased by only 8% over the same period. The prospect of a comprehensive exam clearly seems to be effective in challenging students to work harder and faculty to teach more effectively. It is likely that

the benefits observed at Duke University could also be observed at other universities that adopt the exam policy.

Students from institutions with comprehensive exams are more likely to be accepted into good graduate programs. Graduate schools and law and medical schools are beginning to show clear and significant preferences for students who receive their undergraduate degrees from institutions with comprehensive exams. As the Dean of the Harvard Business School said: “Although Harvard has not and will not show preferences based on aspects of student records not under their control, we do show a strong preference for applicants who have demonstrated their expertise in an area of study by passing a comprehensive exam at the undergraduate level.” Admissions officers of law, medical, and graduate schools have also endorsed the comprehensive exam policy and indicated that students at schools without the exams would be at a significant disadvantage in the very near future. Thus, the institution of comprehensive exams would be an aid to those who seek admission to graduate and professional schools after graduation.

In recent years, starting salaries of students from institutions with comprehensive exams have been, on average, \$3,000 to \$4,000 higher than starting salaries for students graduating from comparable institutions. As Saul Siegel, a vice-president of IBM put it in Business Week recently, “We are much quicker to offer the large salaries and executive positions to these students because by passing their area exam, they have proven to us that they have expertise in their area rather than being people who may or may not be dependable and reliable.” Another benefit is that universities with the exams attract larger and more well-known corporations to campus to recruit students for their open positions. The end result is that students at schools with comprehensive exams have a 55% greater chance of landing a top job than students at schools without the exams.

APPENDIX C: STUDY 4 INSTRUCTIONS

Screen 1

“Today you will be completing a study which investigates how information is communicated over the internet. Video-conferencing is one way in which many businesses and universities are trying to use technology to improve communication. However, it is unclear how people perceive different types of information in such technology intensive settings. In this experiment, you will be watching a recorded video conference in which participants learned about a new product.”

Screen 2

“During the video conference, you will learn about an issue which has received some attention: phosphate based detergents. As you may already know, legislators in many states are currently reviewing proposals designed to encourage the production and use of phosphate based detergents. These proposals would provide incentives for companies to manufacture phosphate based detergents and for consumers to purchase them. A secondary purpose of our research is to gather information from consumers regarding their opinions toward phosphate based detergents.

Because you are part of a small group of individuals participating in important policy research, your careful consideration of the issue at hand is absolutely critical. Please pay close attention to this important information regarding phosphate based detergents.”

APPENDIX D: PHOSPHATE DETERGENT MESSAGES

Weak Arguments Message

Among the various brands of laundry detergents currently on the market, it appears that those containing phosphates are the only ones to buy. To begin with, phosphate detergents are less expensive than traditional detergents. This is because manufacturers are offering mail-in rebates, ranging in value from 10 to 15 cents, depending on the size of the purchase. That translates into savings of up to 1.4%! These rebates usually arrive within a few months of being mailed. In addition, the packaging of phosphate detergents is specifically designed to be more visually appealing, often containing bright colors and modern patterns. This enhances the appearance of detergent containers, meaning you no longer have to find cabinet space to store them. In fact, you might leave them out in the open as pieces of art.

How effective are phosphate detergents? Well, they excel in this department too. Phosphate detergents have been found to be useful in cleaning a wide range of materials! In fact, phosphate detergents have been shown in clinical tests to help reduce stains. Another feature of these detergents is that they have no scent, so your clothes will always smell like you. Bolstering these facts are results from recent surveys conducted at supermarkets around the country. At one store, 7 out of 10 shoppers said they would take a free sample of phosphate detergents to try at home. One woman, Cynthia Thompson, remarked, "That's a pretty good deal. I'll give it a try." Mrs. Thompson's husband, a middle school math teacher, shared her enthusiasm. "If it ends up working," he said, "I'll recommend it to parents."

Strong Arguments Message

Among the various brands of laundry detergents currently on the market, those containing phosphates are far and away the best. To begin with, phosphate detergents are considerably less expensive than non-phosphate detergents. This is partly because they

are cheaper to make, and also packaged more efficiently, which decreases consumer cost. Furthermore, phosphate detergents are vastly superior in cleaning power to other detergents. They clean clothes more thoroughly and leave them smelling much better compared to other forms of detergent. As a result, they allow clothes to be cleaned less frequently, which further reduces detergent costs and extends the life of clothing. Perhaps because phosphate detergents are cheaper and more effective, they have consistently topped the charts in consumer satisfaction over the past few years.

Perhaps more important, phosphate detergents are significantly less harmful to the environment than non-phosphate detergents. Indeed, for ordinary household use, it is now widely accepted that phosphate detergents are the cleanest and safest type of detergent on the market. In fact, non-phosphate detergents typically contain EDTA, a chemical additive associated with harmful environmental consequences even in small amounts. Thus, it is wisest to use phosphate detergents for household laundry.

Mixed Arguments Message

Among the various brands of laundry detergents currently on the market, it appears that those containing phosphates are the only ones to buy. To begin with, phosphate detergents are less expensive than traditional detergents. This is because manufacturers are offering mail-in rebates, ranging in value from 10 to 15 cents, depending on the size of the purchase. These rebates usually arrive within a few months of being mailed. Furthermore, phosphate detergents are vastly superior in cleaning power to other detergents. They clean clothes more thoroughly and leave them smelling much better compared to other forms of detergent. As a result, they allow clothes to be cleaned less frequently, which further reduces detergent costs and extends the life of clothing.

How effective are phosphate detergents? Well, they excel in this department too. Phosphate detergents have been found to be useful in cleaning a wide range of materials!

For ordinary household use, it is now widely accepted that phosphate detergents are the cleanest and safest type of detergent on the market. Bolstering these facts are results from recent surveys conducted at supermarkets around the country. At one store, 7 out of 10 shoppers said they would take a free sample of phosphate detergents to try at home. One woman, Cynthia Thompson, remarked, "That's a pretty good deal. I'll give it a try." Mrs. Thompson's husband, a middle school math teacher, shared her enthusiasm. "If it ends up working," he said, "I'll recommend it to parents."