

EFFECTS OF POSITIVE AND NEGATIVE GESTURES  
ON PERCEIVED ATTITUDE CHANGE

by

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## Introduction

In a classic study of attitude change, Festinger and Carlsmith (1959) offered rewards of differing amounts to participants who were required to mislead others about the supposed pleasantness of a tedious task. All participants were required to turn wooden pegs for an extended period of time. Afterward, one half of the participants were given \$1 to tell a future participant that the boring task was very enjoyable, while the other half received \$20. At the conclusion of the experiment, participants who were paid \$20 rated their experience of turning pegs just as negatively as the control group. The students who were paid only \$1, however, rated the original task of peg turning as significantly more pleasant and more enjoyable than both of the other groups. This discrepancy between groups demonstrated that making statements that are inconsistent with one's true opinions or attitudes can create attitude change (Festinger & Carlsmith, 1959).

The question remains, however, when do actions, such as lying to others about a boring task, actually change individuals' attitudes? An important determinant of attitude change might involve perceived authorship. People who pretend to have experimenter-assigned attitudes are more likely to adopt these attitudes when they put more of themselves into the role (Janis & King, 1954), and are thus more likely to feel like the actions' authors. Additionally, people who are induced to act in counter-attitudinal ways are more likely to change their attitudes when they feel personally responsible (Cooper & Fazio, 1984). Furthermore, people who make positive or negative physical movements in the presence of an attitude object can change their attitudes even though they did not explicitly direct their actions toward the attitude object (Cacioppo, Priester, & Berntson, 1993; Priester, Cacioppo, & Petty, 1996; Strack, Martin, & Stepper, 1988; Wells & Petty, 1980). In all of these studies, however, participants were clearly the authors of the attitude-relevant actions. Recent research has shown that people can experience authorship for someone else's actions (Wegner, Sparrow, & Winerman, 2004). Therefore, participants might change their



own attitudes in the direction of another person's attitude-relevant actions if they perceive some authorship for those actions. This hypothesis is suggested by previous research on role playing (Janis & King, 1954; Zimbardo, 1965; Zimbardo & Ebbesen, 1970), insufficient justification (Festinger, 1957), personal responsibility (Cooper & Fazio, 1984), physical actions such as head nodding and shaking, arm extension and flexion, and facial expressions (Cacioppo, et al., 1993; Priester, et al., 1996; Strack et al., 1988; Wells & Petty, 1980), and vicarious agency (Wegner et al., 2004).

### *Role-Playing*

In everyday situations, individuals must sometimes play a social role that might be inconsistent with their private beliefs and convictions. Collegiate debaters, for example, publicly argue for an opinion they do not privately hold but will often accept the very position for which they are arguing. Overtly expressing a particular position in order to conform to societal demands, or role-playing, may indeed influence and change an individual's private opinions and attitudes toward that position (Janis & King, 1954). Role-playing is a blanket term for various procedures where individuals are induced to publicly state opinions with which they privately disagree. Role-playing also involves inducing individuals to endorse the behavior of another person, usually someone who is disliked (Zimbardo, 1965).

Zimbardo (1965) argued that the extent of attitude change from role-playing would be governed by the amount of effort required in the performance of the discrepant behavior. He believed that the greater the effort put forth by the individual for the public statements or behaviors, the greater the attitude change.

Zimbardo's experiment (1965) required some of the participants to improvise a convincing speech from an outline while other participants merely had to read a prepared speech on the same issue. Participants who improvised the speech reported that they expended significantly more energy presenting their speech than reported by participants who merely read

the speech. Furthermore, they changed their attitudes more in the direction advocated by the speech. The results of this experiment suggest that when participants take an active, experimenter-assigned role (i.e., improvising a speech outline), they are likely to create arguments supportive of the advocated position and suppress thoughts that will undermine that position—a type of biased scanning (Janis, 1968). Zimbardo and Ebbesen (1970) extended this study to show that individuals in an effortful role-playing of a discrepant attitude position were also more likely to engage in behavior supportive of that position.

### *Insufficient Justification*

People who are induced to act in counter-attitudinal ways are more likely to change their attitudes when they feel personally responsible. One method for inducing people to change their attitudes is through cognitive dissonance (Festinger, 1957). The basic underlying assumption of dissonance theory is that individuals psychologically strive for consistency in their attitudes and behavior. If a person's behaviors toward a specific group or issue are inconsistent with his or her convictions and attitudes, that person is in a state of cognitive dissonance. This dissonance is psychologically uncomfortable and aversive; therefore the individual will attempt to reduce this state and return to a state of consonance. Furthermore, according to Festinger (1957), people will actively avoid situations that would increase dissonance.

Another key factor in cognitive dissonance theory is volition, or the amount of free choice involved in the decision to behave in an inconsistent manner. According to cognitive dissonance theory, if a person is forced, without a choice, to perform a behavior at odds with his/her personal beliefs or attitudes, he or she will not experience attitude change. A person in this situation can deny responsibility for his or her discrepant behavior. If little to no coercion is involved, and free choice to behave in a conflicting manner is involved, the individual will experience dissonance. In this situation, there is greater attitude change (Brehm & Cohen, 1962).

The Festinger and Carlsmith (1959) study described above is an illustration of insufficient justification. Participants receiving \$1 (i.e., a low reward) had insufficient reason for their behavior of lying to future participants. Participants receiving \$20, in contrast, had sufficient justification because they received a high reward for misleading others. They, therefore, did not experience cognitive dissonance. High reward provided the \$20 participants sufficient justification for their behavior. The \$1 participants, however, did not receive a sufficient reward, and they consequently rated their experience of turning wooden spools as pleasant after misinforming future participants.

### *Personal Responsibility*

The original formula of cognitive dissonance theory has been refined and extended (e.g., Cooper & Fazio, 1984; Linder, Cooper, & Wicklund, 1968). Modern versions of cognitive dissonance theory emphasize personal responsibility for aversive consequences. Merely agreeing to perform an attitude-discrepant behavior produces the same amount of dissonance as actually performing the behavior, as long as the individual could foresee or expect the behavior to produce aversive consequences. When a person agrees to perform a behavior, he or she assumes personal responsibility for the behavior. Researchers have defined this personal responsibility as the internalization of the locus of causation for an event (Cooper, 1971).

Personal responsibility for an event occurs when an individual has the perception that an action taken was unconstrained by environmental forces. As mentioned earlier, the psychological discomfort of cognitive dissonance will cause attitude change as the individual attempts to return to a state of consonance. Dissonance can be avoided if personal responsibility can be attributed to external forces, such as a police officer or experimental researcher, and no attitude change occurs.

According to Cooper and Fazio (1984), the motivation to reduce dissonance occurs only when people believe that they were the cause of an aversive event. People then will try to find the

actual source of responsibility for that event. If an attribution of self-responsibility is uncovered, dissonance will result. Individuals will try to reduce this dissonance by changing attitudes about the outcome of the event. Scher and Cooper (1989) demonstrated that when participants believe that they are responsible for an aversive event (i.e., an increase in college fees), they experience greater dissonance than participants who do not assume responsibility.

### *Physical Actions*

People who act positively or negatively in the presence of an attitude object can change their attitudes even though they did not explicitly direct their actions toward the attitude object. Motor actions, for instance, have a significant effect on the attitudes that individuals hold toward various issues and objects. Petty, Wells, and Brock (1976) hypothesized that attitude change was the result of dominance of one type of response over another type of response. Manipulations that reduce counterarguments or enhance favorable reactions increase attitude change. Conversely, manipulations that interfere with favorable reactions or enhance counterarguments reduce attitude change. Past research has shown that blatant and self-evident actions performed by an individual can facilitate attitude change. Researchers have also demonstrated that various body movements such as head movements, facial expressions, and arm movements can influence attitudes in individuals (Cacioppo et al., 1993; Priester et al., 1996; Strack et al., 1988; Wells & Petty, 1980).

*Head movements.* Wells and Petty (1980) showed that greater attitude change could occur toward the advocated position of an editorial when people made up-and-down versus side-to-side head movements. As the participants listened to a radio editorial about tuition increases or reductions, they were instructed to move their heads in a vertical movement (i.e., head nodding) or a horizontal movement (i.e., head shaking) under the guise of testing a set of headphones. More attitude change in a positive direction occurred when the vertical head movement (i.e., head nodding) was consistent with a proattitudinal message. Furthermore, the counterattitudinal

editorial produced proportionately more horizontal (head shaking) movements than vertical head movements, and the proattitudinal editorial produced proportionately more vertical head movements (head nodding).

*Facial expressions.* Research has also examined the relation between facial expressions and attitude change. Strack et al. (1988) induced participants to use facial muscles specific to smiling or frowning, without participants being aware of the desired emotions. In order to create the appropriate facial expression, participants were asked to hold a pen in their mouth while reading a pre-rated cartoon. If the participant held the pen in his or her teeth, the facial expression would be that of a smile. Conversely, if the pen was held only by the participant's lips, the result would be similar to a frown. The experimenters hypothesized that the participants who held the pen in their lips would rate cartoons as less funny than participants who held the pen in their teeth. The results confirmed the hypothesis. The cartoons that were rated as least funny were the ones viewed by participants who held the pen in their lips, which caused them to be frowning. Furthermore, participants who held the pen in their teeth, and were therefore smiling, rated the cartoons as funnier.

*Arm movements.* Cacioppo et al. (1993) argued for the motor processes hypothesis when examining how motor movement affected attitudes in individuals. To test their hypothesis, they designed three experiments to examine how arm flexion and extension affected participants' attitudes toward neutral Chinese ideographs. They used these body movements because arm extension can be seen as pushing aversive stimuli away, while arm flexion can be viewed as pulling close a desirable object. In an earlier session, participants rated the pleasantness and unpleasantness of 24 Chinese ideographs. During a later session, the experimenter informed them that they were taking part in a health experiment where they would be pressing up on the bottom of a table and later pressing down on the top of a table while they viewed some pictures. The participants were once again shown the Chinese ideographs they had previously rated and were

asked if they liked or disliked the items. Ideographs viewed during arm flexion (i.e., pulling toward) were rated more positively than ideographs viewed during arm extension (i.e., pushing away). Priester et al. (1996) extended this study and examined the effect of arm flexion and extension on pronounceable non-words and neutral words. As with the Cacioppo et al. (1993) study with the Chinese ideographs, the results indicated arm flexion and arm extension affected attitudes.

### *Vicarious Agency*

In all the previously mentioned studies, participants were clearly the authors of the attitude-relevant actions. In contrast to these studies, participants in other studies have demonstrated a perceived sense of authorship over the movements of others, even when it is someone else performing the actions. This phenomenon of vicarious agency—feelings of authorship for the actions of others—was examined by Wegner et al. (2004). Participants watched themselves in a mirror as another participant, unseen standing behind them, performed various hand gestures with arms extended forward on either side of the participant. The experimenter called this pantomime “helping hands.” Because participants usually get a mental preview of their own, but not of the other participant’s actions, the experimenters hypothesized that participants who heard hand gesture instructions over a set of headphones would experience a greater sense of authorship than if they had not heard the instructions in advance.

Participants arrived at the experimental site in unacquainted pairs. One participant was randomly assigned to be the hand helper while the other was assigned to be the “participant.” The participant was instructed to stand in front of a full-length mirror and wear a pair of gloves, a black smock, and a set of headphones. A large piece of cardboard extended from the back of the smock, such that participants could see only themselves in the full-length mirror. The participants were then instructed to keep their hands at their sides. The hand helpers also wore a similar pair of gloves and a set of headphones. They were instructed to stand immediately behind the

participants, behind the cardboard backing. Thus the hand helpers were not visible in the mirror. After the hand helpers were in the proper position, they were instructed to extend their arms forward on each side of the participants. In the mirror, the arms of the hand helpers appeared to belong to the participants. The participants were then instructed to simply watch the mirror and not move their arms.

The hand helpers were told that they would be receiving instructions about particular hand gestures over the headphones, and the participants were told they may or may not hear the instructions. As the hand helpers heard the hand gesture instructions, they were to perform the tasks as requested. The hand gestures included instructions such as “wave hello with your right hand,” and “give an OK sign with both hands.” Participants in the preview condition heard these same instructions over their set of headphones while participants in the no preview condition heard no instructions and thus received no mental preview.

After the session was finished, the participants and hand helpers were asked to rate their experience on various dimensions. Some of the questions were included to check the experimental manipulations; other questions asked about the sense of authorship for the actions viewed in the mirror. Additional questions addressed the feelings experienced by the participants regarding the experiment. Participants in the preview condition reported significantly greater anticipation of the actions than those who were in the no preview condition. They also reported greater feelings of control over the movements.

As these data depended on self-report, the experiment was replicated and included a psychophysiological measure. The procedure was similar to that of Experiment 1, except that the hand helpers wore a rubber band on their wrist approximately 4 cm above the glove. The hand helpers snapped the rubber band against their wrist, and the participants’ skin conductance was measured as the band was snapped. As with the previous study, participants were randomly assigned to a preview and no preview condition.

Participants in the preview condition reported a greater ability to anticipate the movements than the no preview condition, and they also reported a greater sense of control over the movements than the no preview condition. Finally, physiological measures detected a greater reaction to the rubber band snap in the preview condition than in the no preview condition. Vicarious agency—the feeling of authorship over another’s actions—was enhanced through the presence of a preview of the movement. Wegner et al. (2004) believed that the preview allowed an individual to develop a sense of mental causation over the movements of others. No actual authorship was necessary for a person to experience this control. Wegner et al. (2004) stated that this research could be extended to other areas of research, such as neural or cognitive systems. The present experiments attempted to extend the concept of vicarious agency to questions about the impact of perceived authorship on attitude change following attitude-relevant positive and negative movements.

#### *Possible Mechanisms*

Mechanisms exist that may play a role in perceived authorship and attitude change. These mechanisms include self-generated thoughts, Attitude Representation Theory, and vicarious dissonance.

*Better memory for self-generated ideas.* Self-generated thoughts about attitude objects have several advantages over thoughts generated by an experimenter. First, these self-generated thoughts are likely to be remembered better than experimenter-generated thoughts. Slamecka and Graf (1978) examined the “generation effect,” in which participants remember the thought better if they thought of the concept themselves than if they had merely read it. Second, participants are likely to remember thoughts that are self-generated as true. When participants modify a thought about an attitude object, such as gay men, by adding their own ideas, their memories might be distorted in the direction of the modification. Because these modified thoughts better match participants’ self-generated ideas, the memory distortion might increase over time (Higgins &



Rholes, 1978; McIntyre, Lord, Frye, & Lewis, 2003). Third, participants' self-generated thoughts are less at risk than other-generated ideas for rebound effects and psychological reactance, because one's own thoughts do not appear to have been influenced by an outside agent (Mussweiler & Neumann, 2000). Finally, attitude change through persuasive statements often depends more on self-generated thoughts than on what persuasive message the statement actually states (Cacioppo, Petty, & Kao, 1986; Miller & Wozniak, 2001). Perceived authorship of physical actions might similarly render those actions more one's own, and thus more indicative of a true attitude.

*Attitude Representation Theory.* Another mechanism that may be a factor in perceived authorship is concept activation. Research has shown that people selectively activate the most relevant information when required by a specific judgment. Anderson and Pichert (1978) asked students to remember descriptions of homes from the perspectives of potential home buyers versus potential burglars. They found that participants relied on different parts of the provided information to help them in making the "correct" decision. This concept activation can be measured without the use of self-reports. Activation may be measured, for instance, by merely asking participants to interpret ambiguous stimulus material. Higgins and colleagues (1977) demonstrated that participants interpreted a character's adventures more positively if they had initially memorized positive words than if they had memorized negative words.

A standard measure of concept activation is word completions (Tulving, Schacter, & Stark, 1982). According to this measure, participants who have recently read the word *elephant* would have an easier time completing an incomplete word such as E \_ E \_ \_ A \_ T, even if participants do not recall reading *elephant*. Concept activation is not only effective for animals such as lions, tigers, and bears; it is also effective in assessing participants' attitudes toward social groups. In a classic study, participants were more likely to complete S \_ Y as *shy* when they were exposed to an image of an Asian person (Gilbert & Hixon, 1991). Sia, Lord, Blessum,

Thomas, and Lepper (1999, Experiment 2) used this type of concept activation measure to assess participants' social category attitudes. Participants were able to generate several word completions (such as B \_ S H as *Bush*) when they had been initially primed with attitude questions about relevant social categories (such as politicians).

Sia et al.'s (1999) findings are consistent with Attitude Representation Theory, or ART. According to ART, people assess their attitudes by activating one or more aspects of their representation of an attitude object: target identity, target characteristics, behaviors, and contextual factors (Lord & Lepper, 1999). When positive or negative exemplars are activated prior to an attitude assessment, ART states that people will experience attitude change in the corresponding direction (Sia, Lord, Blessum, Ratcliff, & Lepper, 1997). This attitude change will be incorporated into representations that can be activated in a subsequent encounter with that particular attitude object (Lord & Lepper, 1999). Perceived authorship of an attitude-relevant action, then might activate concepts relevant to treating an associated object well or poorly.

*Vicarious Dissonance.* Another potential mechanism for perceived authorship of actions involves vicarious dissonance (Norton, Monin, Cooper, & Hogg, 2003). Vicarious dissonance is described as a type of "vicarious discomfort resulting from imagining oneself in the speaker's position, leading to efforts to restore consonance in ways that mirror the efforts of actors" (Norton et al., 2003, pg. 47). Vicarious dissonance is similar to Festinger's (1957) cognitive dissonance in that people try to reduce their psychological discomfort through attitudinal change. Vicarious dissonance, however, has the added constraint of people not being able to control or influence other's attitudes (Norton et al., 2003).

Group membership is an important factor in attitude confirmation and attitude change (Norton et al., 2003). More importantly, the degree to which individuals identify with a particular group influences their attitudes and behaviors (Tajfel, 1981). If one member of a social group has an attitude that is inconsistent with the other members; then physiological discomfort, and

therefore, vicarious dissonance, will result. More specifically, if the actor undergoes an attitude shift, observers will often change their attitudes in order to match that of the actor. This attitude shift may be the most effective way of coping with others' inconsistencies. The greater the identification with a particular social group, the greater the vicarious dissonance will be (Norton et al., 2003). Because of vicarious dissonance, it is possible that even uninvolved observers might alter their attitudes in the direction of physical actions taken by others, as long as those others belong to their in-group.

### *Present Experiment*

To summarize, an important determinant of attitude change might involve perceived authorship of actions. People who pretend to have experimenter-assigned attitudes are more likely to adopt these attitudes when they put more of themselves into the role, and are thus more likely to feel like the actions' authors. Additionally, people who are induced to act in counter-attitudinal ways are more likely to change their attitudes when they feel personally responsible. Furthermore, people who act positively or negatively in the presence of an attitude object can change their attitudes even though they did not explicitly direct their actions to the attitude object. In all of these studies, however, participants were clearly the authors of the attitude-relevant actions. Recent research has shown that people can experience authorship for someone else's actions. Therefore, participants might change their own attitudes in the direction of even totally dictated attitude-relevant actions if they perceive some authorship for those actions. This hypothesis, suggested by previous research on role playing (Janis & King, 1954; Zimbardo, 1965; Zimbardo & Ebbesen, 1970), insufficient justification (Festinger, 1957), personal responsibility (Cooper & Fazio, 1984), physical actions such as head nodding and shaking, arm extension and flexion, and facial expressions (Cacioppo et al., 1993; Priester et al., 1996; Strack et al., 1988; Wells & Petty, 1980), and vicarious agency (Wegner et al., 2004), was tested in Experiment 1.

## Experiment 1

Experiment 1 attempted to separate who physically performs the desired action from who experiences perceived authorship of the same action. This study also compared perceived authorship and attitude change of those who physically perform an action with perceived authorship and attitude change for those who observe the action being performed.

### Method

#### *Participants*

A total of sixty-six undergraduate students participated for course credit.

#### *Procedure*

Three participants arrived at the experimental site and signed a consent form (Appendix A). They were given a cover story stating that they were in a study of cognitive processing of multiple stimuli, including memory for physical actions, auditory sounds, and visual images. The participants were also told that some of the stimuli would be seen, some would be heard, and some would be felt. After presenting this cover story, the experimenter randomly selected which student was the *director*, which was the *actor*, and which was the *observer*.

After instructing the participants where to sit, the experimenter showed slides of various images one at a time on the wall. There were three slides of sunsets, three slides of cars on various highways, three slides of snakes, three slides of skyscrapers in various cities, and three images of men who were obviously gay, embracing, kissing, and getting married. Before any slides were shown, the experimenter had a stack of photos. Each photo showed a hand gesture, with the appropriate label to describe that gesture. One photo, for example, showed a thumb and index finger making a circle, and the label said “an OK sign.” In the positive condition, the stack of photos contained eight positive gestures (peace sign, pull toward both hands, wave hello (RH), thumbs up (LH), thumbs up (both hands), clap hands, OK sign, and wave hello (LH)), and four

negative gestures (thumbs down with left hand (LH), palms down, chopping motion (RH), and shake fist (LH), eight neutral gestures (spread fingers (RH), touch index fingers, extend little finger (RH), wiggle fingers (LH), spread fingers (LH), palms up, nails toward face, and touch thumb and little finger (LH). In the negative condition, the stack of photos contained the four negative gestures mentioned above in addition to four other negative gestures (shake fist (RH), push away, chopping motion (LH), and thumbs down with both hands), the eight neutral gestures listed above, and four fewer positive gestures (no thumbs up both hands, wave hello (LH), pull toward, clap hands, or OK sign). The actor was also able to see photos of all the gestures with their appropriate labels, as they were placed on an upright black display board.

The director sat to the left of the experimenter while the actor sat directly across from the director on the opposite side of the room. The observer sat behind the experimenter, director, and actor at the back of the room. All participants faced a screen on which the slides were shown. The slides were shown in the following order: snake A, sunset A, road A, gay men A, skyscraper A, road B, sunset B, snake B, skyscraper B, gay men B, skyscraper C, road C, gay men C, sunset C, and snake C. As each slide was shown, the experimenter handed the director as many as four photos of gestures and asked the director to choose one photo. Once the director had chosen the gesture, he or she instructed the actor to make that gesture in the direction of the screen and projected image. Each gesture was only used once. At no point, however, did the experimenter mention any relationship between any of the slides and the hand gestures. For sunsets, the director always chose from positive gestures. For snakes, the director always chose from negative gestures. For the roads and skyscrapers, the director always chose from neutral gestures. Depending on condition, for the slides of the gay men, the director always chose either from gestures that were all positive or from gestures that were all negative. Thus, on the gay men slides, the director chose from a set of either positive or negative gestures and told the actor to

make those particular physical movements. The actor followed the orders and made the physical movements. The observer merely watched the entire process.

When all the slides were finished, the experimenter gave each of the participants a questionnaire intended to assess perceived authorship (Appendix B). The questionnaire asked how much control the participants felt they had over the gestures, to what degree they believed that they made the specific gestures happen for each slide, were personally responsible for the specific gestures that went with each slide, consciously willed the specific gestures to occur for each slide, felt like the specific gestures that were made for each slide belonged to them, felt that the specific gestures that went with each slide originated from them, felt that they were the authors of the specific gestures that accompanied each slide, and felt a sense of ownership for the specific gestures that accompanied each slide.

The experimenter then announced to the participants that, to create a time gap long enough for an accurate memory test, they were to complete an unrelated study that would only take a brief amount of time. The cover story for this “unrelated” study was that other experimenters need data for an experiment but could not be present. The experimenter requested that the participants sign a new consent form (Appendix C) for this “unrelated” study, which was presented as examining how well people can perform two tasks at the same time. The first pages of the new materials (Appendix D) asked for attitudes toward various attitude objects, including the target group of gay men. On the subsequent pages, participants answered 10 items of the Attitudes toward Gay Men Scale (Herek, 1988). To assess accessibility of attitude-relevant actions, the experimenter explained to the participants that, because we were studying simultaneous cognitive processes, attitude questions alternated with word completions, for example, completing D R \_ V \_ \_ G as driving. Participants completed each word stem placed between each question as quickly as possible. The word stems were A C C \_ \_ \_ , P U \_ \_ \_ , A P P \_ \_ \_ , C O N \_ \_ \_ , S M \_ \_ \_ , B L \_ \_ \_ , R E W \_ \_ \_ , S C \_ \_ \_ , S U P \_ \_ \_ , and S H \_

\_\_\_. Relevant positive and negative completions were accept, punch, approve, condemn, smile, blame, reward, scold, support, and shoot. As part of the same questionnaire, participants indicated their behavioral intentions in various scenarios that might involve gay men. Specifically, they were asked how willing they were to engage in various activities with gay men (i.e., sign petitions, giving either approving or disapproving looks, volunteer time for or against gay men, frown or smile at gay men, attempt to keep from or give jobs to gay men, either ignore or pay attention to gay men, raise money for or against gay men, and treat them differently or the same as others). The scales ranged from 1 (*negative*) to 7 (*positive*).

The experimenter then collected the “unrelated study” questionnaire and administered the promised memory test, which asked participants to recall which gestures accompanied each named slide and match a list of slides with a list of gestures (Appendix E). The participants then answered questions designed to measure awareness of the experimental hypotheses (Page, 1969) (Appendix F). They were asked, in order, to state the purpose of the gestures and memory study (Memories for Modalities), the purpose of the simultaneous tasks study (Attitudes and Opinions), any suspicions they had that the gestures and memory study’s purpose might have been different from what the experimenter stated, any suspicions they had that the simultaneous task study’s purpose might have been different from what the experimenter stated, whether they suspected that the two studies might have been connected, and if so, how. No participant articulated the experimental hypothesis. The participants also completed a questionnaire (Appendix G) that asked them to rate their attitudes toward the five attitude objects (i.e., suns, cars, snakes, skyscrapers, and gay men) before and after the experimental manipulation on scales from -5 (*very negative*) to +5 (*very positive*). They were also asked to assess the other participants’ attitudes toward the same images before and after the manipulation.

After administering all the questionnaires, the experimenter conducted a full process debriefing (Aronson, Wilson, & Brewer, 1998; Ross, Lepper, & Hubbard, 1975) in which

participants were told of the experimenter's actual hypothesis—that the gestures, even though scripted by the experimenter might alter attitudes. The experimenter asked participants to estimate how much of their own data supported or failed to support this hypothesis. The experimenter also explained the precise cognitive mechanisms (from Wegner et al., 2004) by which the gestures might influence at least some people's attitudes and explained how understanding these mechanisms would restore even temporarily changed attitudes to their initial levels (Aronson et al., 1998; Ross et al., 1975) (Appendix H). The experimenter then thanked the participants for their help with the research and dismissed them with their course credit.

## Results

### *Perceived Authorship*

As shown in Table 1, a principal components analysis of the perceived authorship questions yielded one factor that explained 61.82% of the variance. All eight questions loaded on that factor at .70 or higher. The eight questions were therefore averaged to calculate a single measure of perceived authorship.



Table 1

*Factor Loadings of Perceived Authorship with Questions (N = 66), Experiment 1.*

Items	Loading
How much control over specific gestures	.699
To what degree you made specific gestures happen	.820
To what degree you were personally responsible	.839
To what degree you consciously willed specific gestures	.755
To what degree specific gestures belonged to you	.770
To what degree specific gestures originated from you	.819
To what degree you were author of specific gesture	.809
To what degree you felt a sense of ownership	.769

A 2 (Gesture: Positive or Negative) X 3 (Role: Director, Actor, or Observer) analysis of variance (ANOVA) of mean perceived authorship showed that role had a significant effect on the amount of perceived authorship reported by the participants,  $F(2, 60) = 83.77, p < .001$ . Neither the effect of gestures nor the interaction was significant,  $F_s < 1$ . According to Tukey's test ( $p < .05$ ), participants who were randomly assigned to the director's role reported the greatest amount of perceived authorship ( $M = 5.02$ ), participants who were randomly assigned to the actor's role reported a moderate amount of perceived authorship ( $M = 3.51$ ), and participants who were

randomly assigned to the observer's role reported the least amount of perceived authorship ( $M = 1.34$ ). The means are shown in Table 2.

Table 2

*Mean Perceived Authorship Reported by Directors, Actors, and Observers, on a scale from 1 = None to 7 = Very Much, Experiment 1.*

Role		
Director ( $N = 22$ )	Actor ( $N = 22$ )	Observer ( $N = 22$ )
5.02 <sup>a</sup>	3.51 <sup>b</sup>	1.34 <sup>c</sup>
(1.02)	(1.08)	(0.60)

Note: Standard deviations are shown in parentheses. Means with different superscripts differed significantly by Tukey's test ( $p < .05$ ).

#### *Perceived Attitude Change*

After the experimental manipulation, all participants were asked to estimate the attitudes that the director, actor, and observer had toward gay men before and after the procedure. Each participant, therefore, reported his/her own perceived attitude before and after the manipulation, as well as an estimate of the other two participants' attitudes before and after the manipulation. To assess perceived attitude change, perceptions of each participant's own before and after attitudes were used as the repeated-measures factor (time) in a 3 (role) X 2 (gesture) X 2 (time) mixed-model ANOVA.

The ANOVA yielded a significant time X gesture interaction,  $F(1, 60) = 6.30, p < .05$ . Participants who saw positive gestures toward the gay men slides reported having more positive attitudes toward gay men after than before the manipulation ( $Ms = 1.03$  before and 1.81 after). Participants who saw negative gestures toward the gay men slides reported having more negative attitudes toward gay men after than before the manipulation ( $Ms = 0.37$  before and 0.27 after).

As shown in Table 3, however, the two-way interaction was qualified by a marginally significant 3-way interaction,  $F(2, 60) = 2.90, p = .06$ . Participants who were randomly assigned to the director's role (on the left of the table) showed no effect of the manipulation on perceived attitudes, simple time X gesture interaction,  $F(1, 60) = 0.85, ns$ . Participants who were randomly assigned to the observer role (on the right of the table) also showed no effect of the manipulation on perceived attitudes, simple time X gesture interaction,  $F(1, 60) = 0.05, ns$ . Participants who were randomly assigned to the actor role (middle of the table) were the only ones who displayed a significant effect of the manipulation on perceived attitudes, simple time X gesture interaction,  $F(1, 60) = 9.82, p < .001$ . Actors who made negative gestures toward the gay men slides reported having changed their attitudes toward gay men 0.40 in a negative direction, whereas actors who made positive gestures toward the gay men slides reported having changed their attitudes 1.75 in a positive direction. According to Tukey's test ( $p < .05$ ), following a one-way ANOVA of perceived attitude change in the direction of the gestures, actors changed their attitudes significantly more ( $M$  directional change = 1.14) than did either directors ( $M$  directional change = 0.32) or observers ( $M$  directional change = -0.05). Because these were *perceptions* of attitudes before and after the manipulation, one might wonder whether actors were biasing their recollections of previously held attitudes so as to create a false impression of having changed. Inspection of the "before" means in Table 3, however, shows that this was not the case. The attitudes that participants reported having held before the experiment displayed no role X gesture interaction,  $F(2, 60) = .55, ns$ .

One might argue, however, that the data were not independent because students participated in groups of three. In that case, it might be better to treat the experimental session as the unit of analysis and role as the repeated measures factor within session. In such a one-way repeated measures ANOVA, using the three roles (i.e., director, actor, and observer) as the within subjects factor, the effects of role was marginally significant,  $F(2, 42) = 3.15, p = .053$ . In a focused comparison that involved just actors and observers, however, the effect of role was significant,  $F(1, 42) = 6.12, p = .017$ . Actors changed more in the direction of the gestures ( $M$  directional change 1.14) than did observers ( $M$  directional change -.05).

Examining only the attitudes that participants reported having after the experiment ended, and focusing specifically on differences between actors and observers, a 2 (role) X 2 (gesture) ANOVA yielded a significant two-way interaction,  $F(1, 40) = 5.21, p = .028$ . As can be seen in Table 3, actors who made positive gestures reported more positive attitudes than actors who made negative gestures, but observers did not.

Table 3

*Mean Perceived Attitude Toward Gay Men Before and After the Experiment, by Role and Gesture, on a Scale from -5 (Extremely Negative) to +5 (Extremely Positive), Experiment 1.*

		Role					
		Director		Actor		Observer	
Gestures		Neg N = 10	Pos N = 12	Neg N = 10	Pos N = 12	Neg N = 10	Pos N = 12
	Before	0.20 (2.62)	0.00 (2.66)	0.10 (2.73)	1.67 (3.34)	0.80 (3.08)	1.42 (2.07)
Time	After	-0.10 (2.88)	0.33 (2.71)	-0.30 (2.95)	3.42 (1.83)	1.20 (2.70)	1.67 (1.92)
	Difference	-0.30	+0.33	-0.40	+1.75	+0.40	+0.25

Note: Standard deviations are shown in parentheses.

### *Behavioral Intentions*

Two participants in the actor condition did not complete the behavioral intention questions. Analyses were performed on the remaining 64 participants. As shown in Table 4, a principal components analysis of the behavioral intentions questions yielded one factor that explained 57.73% of the variance. All eight questions loaded on that factor at .65 or higher. The eight questions were therefore averaged to calculate a single measure of behavioral intentions. A 2 (Gesture: Positive or Negative) X 3 (Role: Director, Actor, or Observer) ANOVA of behavioral intentions yielded no significant effects or interaction, all  $F$ s < 1. The means are shown in Table 5.

Table 4

*Factor Loading of Behavioral Intentions toward Gay Men with Questions (N = 66), Experiment 1.*

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Items	Loading
Sign Petitions--Against or For Gay Men	.691
Give Disapproving or Approving Looks Toward Gay Men	.800
Volunteer Time Against or For Gay Men	.837
Frown or Smile at Gay Men	.813
Prevent or Give Jobs to Gay Men	.760
Tune Out or Pay Attention to Gay Men	.743
Raise Money Against or For Gay Men	.763
Treat Gay Men Different or Same	.652

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Table 5

*Mean Behavioral Intentions of Actions Taken Toward Gay Men, by Role and Gesture, on a Scale from 1 (Not Very Willing) to 7 (Very Willing), Experiment 1.*

Gestures	Role					
	Director		Actor		Observer	
	Neg N = 10	Pos N = 12	Neg N = 8	Pos N = 12	Neg N = 10	Pos N = 12
	4.64	4.79	4.94	5.08	4.73	4.95
	(0.78)	(1.02)	(0.90)	(0.94)	(1.10)	(0.52)

Note: Standard deviations are shown in parentheses

### *Attitude Scales*

One attitude scale involved Herek's Attitudes Toward gay men items (Herek, 1988). The negative items on that scale (items 2, 3, 4, 6, 8, and 9) were reversed scored so that a higher score on each item corresponded with a more positive attitude toward gay men. When the reverse scoring was completed, the 10 items all loaded at least .65 or higher in a principal components analysis. The analysis yielded one factor that explained 70.12 % of the variance. Factor loadings are shown in Table 6. The 10 questions were therefore averaged to calculate a single measure of attitudes toward gay men. A 2 (Gesture: Positive or Negative) X 3 (Role: Director, Actor, or Observer) ANOVA of mean attitudes toward gay men did not yield a significant interaction or significant effects of role or gesture, all  $F_s < 1$ . The means are shown in Table 7.

Table 6  
*Factor Loading of Herek's Attitudes Toward Gay Men Scale with Questions (N = 66), Experiment 1.*

Item	Loading
Should be allowed to adopt	.860
Are disgusting*	.840
Should not be allowed to teach school*	.711
Is a perversion *	.909
Natural expression of sexuality	.656
Should do everything to overcome homosexual feelings*	.860
Not be upset if son was a gay man	.785
Homosexual behavior is just plain wrong*	.955
Male gay marriages seem ridiculous to me*	.939
Merely a different lifestyle that should not be condemned	.809

Note: Asterisk denotes items that were reverse coded.



Table 7

*Mean Herek's Attitudes Toward Gay Men Scale Reported by Directors, Actors, and Observers, on a Scale from -5 (Extremely Negative) to +5 (Extremely Positive), Experiment 1.*

Gesture	Role					
	Director		Actor		Observer	
	Neg N = 10	Pos N = 12	Neg N = 10	Pos N = 12	Neg N = 10	Pos N = 12
	1.41	-0.38	1.29	1.55	0.87	1.33
	(2.20)	(2.49)	(2.15)	(3.20)	(2.89)	(2.58)

Note: Standard deviations are shown in parentheses.

A second attitude scale involved the one question “What is your attitude toward gay men?” from -7 (Extremely Negative) to +7 (Extremely Positive). A 2 (gesture) X 3 (role) ANOVA of participants’ responses to this attitude scale item yielded no significant effects, all  $F$ s  $< 1$ .

### *Word Completions*

Recall that after each item in Herek’s Attitudes Toward Gay Men scale, we inserted a word completion item. Five of the 10 word completion items were intended to detect the accessibility of positive words (accept, approve, smile, reward, and support), and five were intended to detect the accessibility of negative words (punch, condemn, blame, scold, and shout). Each item was scored as 1 if the participant used the intended word and 0 if not (Appendix I). Thus each participant could get a score of 0 to 5 on the positive words and 0 to 5 on the negative words. These word completions scores were used as the repeated measures factor in a 3 (role) X 2 (gesture) X 2 (word type: positive or negative) mixed-model ANOVA. The ANOVA yielded a significant within-subjects effect of word type. Participants used more positive ( $M = 0.26$ ) than negative ( $M = 0.07$ ) word completions,  $F(1, 60) = 39.55, p < .001$ . The crucial role X gesture X word type interaction was not significant,  $F(2, 60) = 1.59, p = .21$ . The sums of the word completion scores are shown in Table 8.

Table 8

*Number of Positive and Negative Word Completions by Role (Director, Actor, and Observer), Experiment 1.*

Gesture	Role					
	Director		Actor		Observer	
	Negative (N = 10)	Positive (N = 12)	Negative (N = 10)	Positive (N = 12)	Negative (N = 10)	Positive (N = 12)
Positive Words	1.30 (1.16)	1.50 (1.24)	1.10 (0.88)	1.33 (1.07)	1.70 (0.82)	0.92 (1.24)
Negative Words	0.20 (0.42)	0.80 (0.29)	0.70 (0.67)	0.42 (0.51)	0.40 (0.52)	0.33 (0.49)
Difference	1.10	0.70	0.40	0.91	1.30	0.59
Positivity	-0.40		0.51		-0.61	

Note: Standard deviations are shown in parentheses.

### *Free Recall Accuracy*

After the experimental manipulation, all participants were asked to report which three hand gestures went with each of the five groups of projected images (i.e., sunsets, cars, snakes, skyscrapers, and the target group of gay men). Participants could receive a score from 0 if they remembered none of the gestures for a particular group of images (e.g., sunsets) to 3 if they correctly remembered all of the gestures for that same group. These scores were averaged to create a mean number of freely recalled gestures for each of the five groups of images. To assess recall accuracy, the number of gestures freely recalled for each image type was used as the repeated-measures factor in a 3 (role) X 2 (gesture) X 5 (image: sunsets, cars, snakes, skyscrapers, and gay men) mixed-model ANOVA. The ANOVA yielded a significant effect of image  $F(4, 240) = 33.16, p < .001$ . The gestures that accompanied the gay men slides were the best remembered ( $M = 2.18$  out of a possible 3). By Tukey's test ( $p < .05$ ), gay men images produced significantly greater recall than images of sunsets ( $M = 1.59$ ), cars ( $M = 0.88$ ), or skyscrapers ( $M = 1.14$ ), but not snakes ( $M = 1.89$ ). The ANOVA also yielded a marginally significant effect of gesture,  $F(1, 60) = 3.72, p = .059$ . Positive gestures were remembered marginally better ( $M = 1.65$  out of a possible 3) than negative gestures, ( $M = 1.40$  out of a possible 3). Means are shown in Table 9.

Table 9

*Mean Number of Correctly Remembered Hand Gestures Made Toward Images (Sunsets, Cars, Snakes, Skyscrapers, and Gay Men) Freely Recalled by Role (Director, Actor, and Observer), Experiment 1.*

Slide	Role					
	Director		Actor		Observer	
	Negative ( <i>N</i> = 10)	Positive ( <i>N</i> = 12)	Negative ( <i>N</i> = 10)	Positive ( <i>N</i> = 12)	Negative ( <i>N</i> = 10)	Positive ( <i>N</i> = 12)
Sunsets	1.50 (0.97)	1.50 (1.17)	1.20 (0.63)	1.50 (0.52)	2.10 (0.74)	1.75 (0.97)
Cars	0.60 (0.84)	1.08 (1.00)	0.50 (0.85)	0.75 (0.87)	1.30 (0.67)	1.00 (1.04)
Snakes	1.80 (0.79)	2.58 (0.67)	1.30 (0.95)	2.17 (0.58)	1.50 (0.53)	1.83 (1.03)
Skyscrapers	1.00 (0.82)	1.42 (1.00)	0.60 (0.52)	1.33 (0.89)	1.50 (0.53)	0.92 (0.51)
Gay Men	2.00 (0.94)	2.25 (0.75)	1.60 (1.07)	2.67 (0.98)	2.50 (0.53)	2.00 (1.13)

Note: Standard deviations are shown in parentheses  $p < .05$ .

Finally, the ANOVA yielded a significant role X gesture interaction,  $F(2, 60) = 4.50, p = .015$ . Actors remembered more of the positive ( $M = 1.68$ ) than negative gestures ( $M = 1.04$ ),  $F(1, 60) = 8.21, p = .006$ . Directors and observers did not have a significant difference of recall between positive and negative gestures,  $F(1, 60) = 2.77, ns$  for directors and  $F(1, 60) = 1.56, ns$  for observers. This role X gesture interaction occurred also in an analysis of just the recall for the gay men slides  $F(2, 60) = 3.88, p = .026$ . As shown in the bottom row of Table 9, actors remembered more of the positive ( $M = 2.67$ ) than negative gestures toward gay men ( $M = 1.60$ ),  $F(1, 60) = 7.18, p = .01$ . Directors and observers did not have a significant difference of recall between positive and negative gestures,  $F(1, 60) = 0.39, ns$  for directors, and  $F(1, 60) = 1.58, ns$  for observers.

#### *Free Recall Positivity*

To test for a positivity bias in free recall, the gestures that each participant wrote for each type of image were coded as -1 if they were predominantly negative, 0 if they were predominately neutral, or +1 if they were predominantly positive. These positivity scores (for participants who wrote anything for each question) were subjected to a 3 (role) X 2 (gesture) X 5 (type of image) mixed-model ANOVA. The ANOVA yielded a significant effect of image type  $F(4, 204) = 86.42, p < .001$ . Participants' guesses reflected the reality that sunsets were always paired with positive images and snakes were always paired with negative images. The ANOVA also yielded a significant effect of gesture,  $F(1, 51) = 45.36, p < .001$ . As expected, participants who saw positive gestures paired with the gay men slides ( $M = 0.96$ ) wrote more positive guesses overall than participants who saw negative gestures paired with gay men slides ( $M = -0.58$ ). This tendency however, occurred only for the gay men slides, which produced a significant image X gesture interaction  $F(4, 204) = 27.08, p < .001$ . The crucial image X role interaction however, was not significant,  $F(8, 204) < 1.00$ . None of the three roles was more likely to show a positivity bias in free recall for the gay men slides. The means are shown in Table 10.

Table 10

*Mean Positivity Scores of Hand Gestures Made Toward Images (Sunsets, Cars, Snakes, Skyscrapers, and Gay Men) Freely Recalled by Role (Director, Actor, and Observer), Experiment 1.*

Slide	Role					
	Director		Actor		Observer	
	Negative ( <i>N</i> = 10)	Positive ( <i>N</i> = 12)	Negative ( <i>N</i> = 10)	Positive ( <i>N</i> = 12)	Negative ( <i>N</i> = 10)	Positive ( <i>N</i> = 12)
Sunsets	0.63 (0.52)	0.82 (0.40)	0.72 (0.49)	0.91 (0.30)	0.89 (0.74)	0.91 (0.30)
Cars	0.13 (0.83)	0.18 (0.60)	-0.29 (0.76)	-0.09 (0.70)	0.11 (0.60)	-0.18 (0.40)
Snakes	-0.88 (0.35)	-1.00 (0.00)	-0.71 (0.49)	-0.91 (0.30)	-0.89 (0.33)	-0.82 (0.60)
Skyscrapers	0.00 (0.00)	0.18 (0.40)	0.00 (0.58)	0.09 (0.30)	0.11 (0.33)	0.27 (0.47)
Gay Men	-0.50 (0.78)	1.00 (0.00)	-0.43 (0.79)	1.00 (0.00)	-0.78 (0.67)	0.91 (0.30)

Note: Standard deviations are shown in parentheses.

### *Cued Recall Accuracy*

After the free recall, participants were given a list of the 15 images that had been projected and all 24 possible hand gestures, 15 of which had been used in their experimental session. For each of the listed images, they were asked to choose from the list of 24 gestures, the one gesture that had accompanied that particular image. For each type of image, a participant could get an accuracy score from 0 to 3. These accuracy scores were subjected to a 3 (role) X 2 (gesture) X 5 (images: sunsets, cars, snakes, skyscrapers, and gay men) mixed-model ANOVA. The ANOVA yielded a significant effect of image  $F(4, 240) = 8.04, p < .001$ . The gestures that accompanied the gay men slides were the best remembered ( $M = 2.18$  out of a possible 3). By Tukey's test ( $p < .05$ ), gay men images produced significantly greater cued recall than images of sunsets ( $M = 0.79$ ), cars ( $M = 0.44$ ), or skyscrapers ( $M = 0.58$ ), but not snakes ( $M = 0.98$ ). The ANOVA also yielded a marginally significant effect of gesture,  $F(1, 60) = 3.60, p = .062$ . By Tukey's test ( $p < .05$ ), positive gestures were remembered marginally better ( $M = 0.88$ ) than negative gestures, ( $M = 0.63$ ).

In addition, the ANOVA yielded an image X gesture interaction,  $F(4, 240) = 3.24, p = .013$ . More important though, the 3-way interaction was marginally significant,  $F(8, 240) = 1.84, p = .07$ . The means for entire ANOVA are shown in Table 11. For the gay men slides, as shown in bottom row of Table 11, actors who saw positive gestures remembered the image-gesture pairings more accurately than did actors who saw negative gestures,  $F(1, 60) = 4.19, p = .045$ . No such difference occurred for directors or observers, both  $F$ s *ns*.



Table 11

*Mean Accuracy of Cued Recall for Hand Gestures Made Toward Images (Sunsets, Cars, Snakes, Skyscrapers, and Gay Men) by Role (Director, Actor, and Observer), Experiment 1.*

Slide	Role					
	Director		Actor		Observer	
	Negative ( <i>N</i> = 10)	Positive ( <i>N</i> = 12)	Negative ( <i>N</i> = 10)	Positive ( <i>N</i> = 12)	Negative ( <i>N</i> = 10)	Positive ( <i>N</i> = 12)
Sunsets	0.50 (0.71)	1.00 (1.04)	0.30 (0.48)	0.83 (0.72)	1.00 (0.47)	1.00 (0.95)
Cars	0.40 (0.52)	0.50 (0.67)	0.20 (0.42)	0.50 (0.52)	0.10 (0.32)	0.83 (0.94)
Snakes	0.50 (0.85)	1.33 (1.15)	0.70 (0.67)	1.33 (1.07)	0.70 (0.67)	1.17 (1.11)
Skyscrapers	0.90 (0.88)	0.58 (0.90)	0.60 (0.70)	0.33 (0.65)	0.50 (0.52)	0.55 (0.67)
Gay Men	1.20 (1.03)	1.33 (1.30)	0.40 (0.52)	1.33 (1.30)	1.30 (1.06)	0.67 (0.89)

Note: Standard deviations are shown in parentheses

### *Cued Recall Positivity*

To test for a positivity bias in cued recall, the gestures that each participant paired with each image were coded as -1 if they were negative, 0 if they were neutral or +1 if they were positive. Cued recall positivity scores for each type of image could range from -3 to +3. These cued recall positivity scores (for participants who answered the questions) were subjected to a 3 role X 2 (gesture) X 5 (type of image) mixed-model ANOVA. The ANOVA yielded a significant effect of image type  $F(4, 204) = 32.56, p < .001$ . As with the free recall positivity, participants' guesses reflected the reality that sunsets were always paired with positive images and snakes were always paired with negative images. The ANOVA also yielded a significant effect of gesture,  $F(1, 51) = 29.56, p < .001$ . As expected, participants who saw positive gestures paired with the gay men slides made more positive cued recall pairings overall than participants who saw negative gestures paired with gay men slides. This tendency however, occurred only for the gay men slides, which produced a significant image X gesture interaction,  $F(4, 204) = 14.81, p < .001$ . The crucial image X gesture X role interaction, however, was not significant,  $F(8, 204) < 1.00$ . None of the three roles was more likely to show a positivity bias in cued recall for the gay men slides. The means are shown in Table 12.

Table 12

*Mean Positivity Scores of Hand Gestures Made Toward Images (Sunsets, Cars, Snakes, Skyscrapers, and Gay Men) Cued Recalled by Role (Director, Actor, and Observer), Experiment 1.*

Slide	Role					
	Director		Actor		Observer	
	Negative ( <i>N</i> = 10)	Positive ( <i>N</i> = 12)	Negative ( <i>N</i> = 10)	Positive ( <i>N</i> = 12)	Negative ( <i>N</i> = 10)	Positive ( <i>N</i> = 12)
Sunsets	1.38 (1.85)	1.36 (1.80)	0.33 (1.50)	1.70 (0.82)	1.33 (1.00)	1.80 (1.03)
Cars	0.00 (1.20)	-0.55 (0.82)	-0.44 (1.67)	0.10 (0.99)	1.00 (1.22)	-0.20 (0.94)
Snakes	-1.63 (0.92)	-1.92 (1.38)	-0.89 (1.45)	-1.80 (1.14)	-2.00 (1.32)	-1.80 (1.40)
Skyscrapers	0.13 (1.25)	0.55 (0.93)	0.22 (0.97)	0.20 (0.79)	0.22 (1.09)	0.40 (1.07)
Gay Men	-1.38 (1.69)	1.91 (1.22)	-0.78 (2.28)	2.00 (1.49)	-1.44 (2.13)	2.00 (1.89)

Note: Standard deviations are shown in parentheses.

### *Awareness of Attitude Change*

As reported in the “Perceived Attitude Change” section, actors were the only participants who reported that they had changed their attitudes in the direction of the gestures. Neither directors nor observers did so. It would be interesting to know, however, whether all participants believed that the actor had changed the most. This question was addressed by using the estimates that each participant made of all three participants’ attitudes toward gay men before and after the experimental manipulation. These attitude estimates were subjected to a 3 (rater: director, actor, or observer) X 3 (target: director, actor, or observer) X 2 (gestures: positive or negative) X 2 (time: before and after) mixed-model ANOVA with target and time as the repeated measures factors.

The most important significant effect found in that analysis was the four-way target X time X gesture X role interaction,  $F(4, 118) = 3.15, p = .017$ . Table 13 shows the mean attitude change (from before to after the manipulation) attributed to each target by participants in the three different roles who saw either positive or negative gestures. As the difference scores in Table 13 indicate, only actors believed that the gestures had made a difference. They believed that the gestures had made a difference for the director,  $F(1, 118) = 4.18, p = .043$ , for themselves  $F(1, 118) = 13.06, p < .001$ , and for the observer,  $F(1, 118) = 5.28, p = .023$ . Neither directors nor observers made different estimates of attitude change toward the gay men slides for themselves or the others, depending on the gestures, all  $F$ s *ns*.

Table 13

*Mean Perceived Attitude of Directors, Actors, and Observers Toward Gay Men Before and After the Experiment, by Role and Gesture As Reported by the Other Participants (Director, Actor, and Observer), on a Scale from -5 (Extremely Negative) to +5 (Extremely Positive), Experiment 1.*

Rater	Director			Actor			Observer		
	Director	Actor	Observer	Director	Actor	Observer	Director	Actor	Observer
Positive	0.33 (1.23)	0.17 (0.72)	0.17 (0.72)	0.92 (1.62)	1.75 (3.28)	0.67 (1.23)	1.09 (1.70)	0.91 (1.14)	0.27 (0.65)
Negative	-0.30 (0.67)	-0.80 (1.75)	-0.40 (0.97)	-0.30 (0.95)	-0.40 (0.70)	-0.70 (1.57)	-0.10 (0.32)	0.10 (0.88)	0.40 (0.84)
Difference	0.63	0.97	0.57	1.22*	2.15*	1.37*	1.19	0.81	-0.13

Note: Standard deviations are in parentheses.

### *Mediational Analyses*

In a focused analysis of covariance (ANCOVA) that involved only actors and observers, the effect of role on perceived attitude change remained significant when controlling for perceived authorship,  $F(1, 41) = 5.98, p = .019$ , word completion positivity  $F(1, 41) = 3.94, p = .054$ , free recall accuracy  $F(1, 41) = 4.32, p = .044$ , free recall positivity  $F(1, 40) = 4.17, p = .048$ , cued recall accuracy  $F(1, 41) = 4.43, p = .041$ , and cued recall positivity  $F(1, 41) = 4.22, p = .046$ . The effect of role on perceived attitude change, therefore, was not mediated by any of these variables.

### *Relationships among Dependent Measures*

Appendices J through M show correlations among the dependent measures for all participants, and separately for directors, actors, and observers. Looking first at Appendix J, which shows the correlations for all participants, the only notable correlation was that perceived attitude change in the direction of the gestures was more likely for participants who reported relatively negative attitudes toward gay men on Herek's scale ( $r = -.30, p = .014$ ). As expected, Herek scores were highly correlated with behavioral intentions ( $r = .568, p < .001$ ), and free and cued recall accuracy were highly correlated ( $r = .673, p < .001$ ) as were free and cued recall positivity ( $r = .57, p < .001$ ).

For directors, as shown in Appendix K, the notable correlations were that participants who showed a free recall positivity bias toward gay men were also those who most likely to report changing their attitudes in a positive direction ( $r = .453, p = .034$ ) and most likely to perceive authorship of the gestures ( $r = .45, p = .036$ ). For actors, as shown in Appendix L, the correlation coefficients give no hint as to why they were the participants most likely to change in the direction of the randomly assigned gestures, other than that the manipulation was most effective for actors who reported the most negative attitudes on the Herek scale ( $r =$

-.667,  $p = .001$ ). Finally, for the observers, as shown in Appendix M, there were no significant correlations that involved attitude change in the direction of the assigned gestures.

## Discussion

Experiment 1 showed that people can assume responsibility for positive and negative gestures that they are directed to make. Even though they are only “going through the motions,” they feel some sense of personal control and authorship, and they also claim to change their attitudes in the direction of the gestures. Experiment 2 was designed to test whether these effects can be extended to gestures that only *appear* to be made by the individual. Specifically, the study was designed to compare perceived authorship and attitude change by participants who physically performed an action with perceived authorship and attitude change by participants who have an illusion of performing the action, and with passive observers.

## Experiment 2

### Method

#### *Participants*

A total of ninety-nine undergraduate college students participated for course credit.

#### *Procedure*

Three participants arrived at the experimental site and signed a consent form (Appendix N). As in Experiment 1, they were given a cover story stating that the following experiment was a study in the cognitive processing of multiple stimuli, including memory for physical actions, auditory sounds, and visual images. The participants were also told that some of the stimuli would be seen, some would be heard, and some would be felt. After presenting this cover story, the experimenter randomly selected which student was the *perceiver*, which was the *hand helper*, and which was the *observer*.

From this point on, the experimental procedure almost exactly replicated that of Wegner et al. (2004), except that an additional participant was used as an observer. Additionally, the perceivers

could see themselves in a mirror, plus slides projected just to the side of the mirror, while the observers could see the perceiver, the hand helper, mirror, and the projected images. In further contrast to the Wegner et al. (2004) study, none of the participants wore headphones, because the experimenter read the instructions aloud. Furthermore, the hand gestures in the Wegner et al. (2004) study were not deliberately of any particular valence, whereas the important hand gestures in the present experiment were either positive or negative.

After the experimenter randomly selected the perceiver, the hand helper and the observer, the perceiver and the hand helper both put on a pair of white gloves. The perceiver put on a plain black smock with a hard cardboard backing that extended up the perceiver's back and three feet above the perceiver's head. The perceiver was then told to stand with hands at side facing a full-length mirror. The perceiver only saw his or her own face. The hand helper was then instructed to insert his or her arms from behind, in the black smock's side openings. Because the hand helper also wore white gloves, but otherwise was hidden from view by the cardboard backing, the perceiver then saw a pair of hands extending from his or her body in the mirror.

The experimenter showed slides of various images one at a time on the wall next to the perceiver's mirror, and the images were presented for approximately five seconds each. In random order, the images included three slides of sunsets, three slides of cars on various highways, three slides of snakes, three slides of skyscrapers in various cities, and three slides of men who were obviously gay (e.g., embracing, kissing, and getting married). The order of the slides remained constant throughout the experiment. As each slide was shown, the experimenter instructed the hand helper to make a specific hand gesture. Three positive gestures (peace sign/right hand, pull toward/both hands, and wave hello/left hand) accompanied the three slides of the sunsets. Three neutral gestures (spread fingers/left hand, palms up, and nails toward face) accompanied the cars on highways. Three negative gestures (push away/both hands, palms down/both hands, and chopping motion/left hand) accompanied the images of snakes. Three other neutral gestures (spread



fingers/right hand, extend little finger/right hand, and rotate thumbs/both hands) accompanied the skyscrapers.

The experimental manipulation was that the three gestures that accompanied the three pictures of gay men were either all positive (thumbs up/both hands, wave hello/right hand, and OK sign/left hand) or all negative (shaking fist/right hand, chopping motion/right hand, and thumbs down/both hands). At no point, however, did the experimenter mention any relationship between any of the slides and the hand gestures.

As each image was projected, the hand helper made hand gestures as instructed by the experimenter. Although the perceiver heard the instructions, he or she did not make any gestures. For one-half of the participants, the hand helper was instructed to make three positive hand gestures when the three images of gay men were projected. For the other half of the participants, the hand helper was instructed to make three negative hand gestures when the three images of the gay men were shown. Appendix O shows which gestures accompanied each slide in the positive and negative conditions.

When all the slides had been projected, the experimenter instructed the perceiver and the hand helper to remove the gloves and the smock. The experimenter then gave all of the participants the same packet of questionnaires. One questionnaire, intended to assess perceived authorship, asked how much control the participants felt they had over the arms, to what degree they believed they were consciously willing the arms to move, to what degree the arms looked like theirs in the mirror, and to what degree the arms felt like they belonged to the participant, plus the eight control questions from Experiment 1 (Appendix P).

The experimenter then announced to each participant that, to create a time gap long enough for an accurate memory recall test, the participants needed to complete an “unrelated study” that only took a brief amount of time. The cover story for this “unrelated study” was that other experimenters needed data for an experiment but could not be present because of their class schedules. The

experimenter requested that the participants sign a new consent form (Appendix Q) for this “unrelated study”, which was presented as examining how well people can perform two tasks at the same time. The first pages of the new materials asked for attitudes toward various attitude objects, including the target group of gay men. This questionnaire was similar to the attitude assessment the participants received in the first session. On the subsequent pages, participants answered the 10 items of the Attitudes toward Gay Men Scale (Herek, 1988). To assess accessibility of attitude-relevant actions, the experiment explained that because we were studying simultaneous cognitive processes, attitude questions alternated with word completions, for example, completing D R \_ V \_ \_ G as driving. Participants completed the word stem placed between each question as quickly as possible. The word stems were A C C \_ \_ \_ , P U \_ \_ \_ , A P P \_ \_ \_ \_ , C O N \_ \_ \_ \_ , S M \_ \_ \_ , B L \_ \_ \_ , R E W \_ \_ \_ , S C \_ \_ \_ , S U P \_ \_ \_ \_ , and S H \_ \_ \_ . Relevant positive and negative completions were accept, punch, approve, condemn, smile, blame, reward, scold, support, and shoot. As part of the same questionnaire, participants indicated their behavioral intentions in various scenarios that might involve gay men (Appendix R).

The experimenter then collected the “unrelated” study questionnaire and administered the promised memory recall tests, which asked participants to recall which gestures accompanied each named slide and to match a list of slides with a list of gestures (Appendix S). The participants then answered questions designed to measure awareness of the experimental hypotheses (Page, 1969) (Appendix T). They were asked, in order, to state the purpose of the gestures and memory study, the purpose of the simultaneous tasks study, any suspicions they had that the gestures and memory study’s purpose were different from what the experimenter stated, any suspicions they had that the simultaneous task study’s purpose was different from what the experimenter stated, whether they suspected that the two studies were actually related, and if so, how. No participant articulated the experimental hypothesis. Participants were also rated attitudes toward the five attitude objects before and after the experimental manipulation, on scales from -5 (*very negative*) to +5 (*very positive*). As in

Experiment 1, they were also asked to assess the attitudes of the other participants towards the images on the same scale (Appendix U).

After administering all the questionnaires, the experimenter conducted a full process debriefing (Aronson, et al., 1998; Ross et al., 1975) in which participants were told of the experimenter's actual hypothesis—that the gestures, even though scripted by the experimenter, (and, for the perceiver, being performed by someone else) might alter attitudes. The experimenter asked participants to estimate how much of their own data supported or failed to support this hypothesis. The experimenter also explained the precise cognitive mechanisms (from Wegner et al., 2004) by which the gestures might influence at least some people's attitudes and explained how understanding these mechanisms would restore even temporarily changed attitudes to their initial levels (Aronson, et al., 1998; Ross et al., 1975) (Appendix V). The experimenter then thanked the participants for their help with the research and dismissed them with their course credit.

## Results

### Experiment 2

#### *Perceived Authorship*

As shown in Table 14, a principal components analysis of the perceived authorship questions yielded one factor that explained 63.39% of the variance. All 12 questions loaded on that factor at .40 or higher. The 12 questions were therefore averaged to calculate a single measure of perceived authorship.

Table 14

*Factor Loading of Perceived Authorship with Questions (N = 99), Experiment 2.*

Items	Loading
How much control did you feel that you had over arm's movements	.788
To what degree did you consciously will arms to move	.747
To what degree did the arms look like they belonged to you	.433
To what degree did the arms feel like they belonged to you	.834
How much control did you feel that you had over specific gestures	.734
To what degree did you feel that you made specific gestures happen	.826
To what degree did you feel that you were personally responsible	.884
To what degree did you feel that you consciously willed specific gestures	.788
To what degree did you feel that specific gestures belonged to you	.861
To what degree did you feel that specific gestures originated from you	.848
To what degree did you feel that you were the author of specific gestures	.822
To what degree did you feel a sense of ownership for specific gestures	.887

A 2 (Gesture: Positive or Negative) X 3 (Role: Perceiver, Hand Helper, or Observer) ANOVA of mean perceived authorship showed that role had a significant effect on the amount of perceived authorship reported by participants,  $F(2, 93) = 99.00, p < .001$ . Neither the effect of gestures nor the interaction were significant,  $F_s < 1.04$ . According to Tukey's test ( $p < .05$ ), participants who were randomly assigned to the hand helper's role reported the greatest amount of perceived authorship ( $M = 4.79$ ), participants who were randomly assigned to the perceiver's role reported a moderate amount of perceived authorship ( $M = 2.30$ ), and participants who were randomly assigned to the observer's role reported the least amount of perceived authorship ( $M = 1.34$ ). Note that the perceiver perceived greater authorship than the observer, even though neither made any gestures. The means are shown in Table 15.

Table 15

*Mean Perceived Authorship Reported by Perceivers, Hand Helpers, and Observers, on a scale from 1 = None to 7 = Very Much, Experiment 2.*

	Role		
	Perceiver ( $N = 33$ )	Hand Helper ( $N = 33$ )	Observer ( $N = 33$ )
	2.30 <sup>a</sup>	4.79 <sup>b</sup>	1.34 <sup>c</sup>
	(0.92)	(1.42)	(0.55)

Note: Standard deviations are shown in parentheses. Means with different superscripts differed significantly by Tukey's test ( $p < .05$ ).

*Perceived Attitude Change*

After the experimental manipulation, all participants were asked to estimate the attitudes that the perceiver, hand helper, and observer had toward gay men before and after the procedure. Each participant reported his/her own perceived attitude before and after the manipulation, as well as an estimate of the other two participants' attitudes before and after the manipulation. To assess perceived attitude change, perceptions of each participant's own before and after attitudes

were used as the repeated-measures factor (time) in a 3 (role) X 2 (gesture) X 2 (time) mixed-model ANOVA.

The ANOVA yielded a significant role X gesture X time interaction,  $F(2, 93) = 4.57, p = .013$ . Participants who were randomly assigned to the perceiver role (left side of Table 16) were the only ones who displayed a significant effect of the manipulation on perceived attitudes, simple time X gesture interaction  $F(1, 93) = 11.59, p < .001$ . Perceivers who saw negative gestures toward the gay men slides reported having changed their attitudes toward gay men .50 in a negative direction, whereas perceivers who saw positive gestures toward the gay men slides reported having changed their attitudes .47 in a positive direction. Neither hand helpers nor observers reported changing their attitudes significantly in the direction of the manipulation, simple time X gesture interactions,  $F_s < 1$ . According to Tukey's test ( $p < .05$ ), following a one-way ANOVA of perceived attitude change in the direction of the gestures, perceivers changed their attitudes toward gay men significantly more ( $M$  directional change = 0.48) than did either hand helpers ( $M$  directional change = -0.03) or observers ( $M$  directional change = -0.06). Because these were *perceptions* of attitudes before and after the manipulation, one might wonder whether perceivers were biasing their recollections of previously held attitudes so as to create a false impression of having changed. Inspection of the "before" means Table 16, however, shows that this was not the case. The attitudes that participants reported having held before the experiment displayed no role X gesture interaction,  $F(2, 93) = 1.79, ns$ .

As with Experiment 1, one might argue, however that the data were not independent because students participated in groups of three. In that case, it might be better to treat the experimental session as the unit of analysis and role as a repeated measures factor within the session. In such a one-way repeated measures ANOVA, using the three roles (i.e., perceiver, hand helper, and observer) as the within subjects factor, the effect of role was significant,  $F(2, 64) = 4.99, p < .01$ . In a focused comparison that involved just perceivers and observers, the effect of role was significant,  $F(1, 64) =$

7.89,  $p < .001$ . Perceivers changed more in the direction of the gestures ( $M$  directional change = 0.48) than did observers ( $M$  = directional change = -0.06).

Examining only the attitudes that participants reported having after the experiment ended, and focusing specifically on differences between perceivers and observers, a 2 (role) X 2 (gesture) ANOVA yielded a significant two-way interaction,  $F(1, 60) = 3.23, p = .044$ . As can be seen in Table 16, perceivers who made positive gestures reported more positive attitudes than perceivers who made negative gestures, but observers did not.

Table 16

*Mean Perceived Attitude toward Gay Men Before and After the Experiment, by Role and Gesture, on a Scale from -5 (Extremely Negative) to +5 (Extremely Positive), Experiment 2.*

Time	Role of Participant					
	Perceivers		Hand Helpers		Observers	
	Neg (N = 16)	Pos (N = 17)	Neg (N = 16)	Pos (N = 17)	Neg (N = 16)	Pos (N = 17)
Before	0.75 (2.91)	0.71 (2.42)	0.94 (2.72)	-0.06 (2.93)	2.12 (2.90)	-0.53 (3.08)
After	0.25 (3.19)	1.18 (2.38)	0.88 (2.63)	-0.18 (2.88)	2.06 (2.93)	-0.71 (3.57)
Change	-0.50	+0.47	-0.06	-0.12	-0.06	-0.18

Note: Standard deviations are shown in parentheses.



### *Behavioral Intentions*

As shown in Table 17, a principal components analysis of the behavioral intentions questions yielded one factor that explained 61.06% of the variance. All eight questions loaded on that factor at .59 or higher. The eight questions were therefore averaged to calculate a single measure of behavioral intentions. A 2 (Gesture: Positive or Negative) X 3 (Role: Perceiver, Hand Helper, or Observer) ANOVA of behavioral intentions yielded neither a gesture X role interaction,  $F(2, 91) = 1.23, ns$ , nor a significant effect of role,  $F(2, 91) = 0.33, ns$ . There was, however, a main effect for gesture,  $F(1, 91) = 4.33, p < .05$ . Participants who saw negative gestures toward the gay men slides reported having more positive behavioral intentions toward gay men ( $M = 5.09$ ) than did participants who saw positive gestures toward the gay men slides ( $M = 4.67$ ). The means are shown in Table 18.

Table 17

#### *Factor Loading of Behavioral Intentions toward Gay Men with Questions (N = 99), Experiment 2.*

Items	Loading
Sign Petitions--Against or For Gay Men	.805
Give Disapproving or Approving Looks Toward Gay Men	.885
Volunteer Time Against or For Gay Men	.880
Frown or Smile at Gay Men	.845
Prevent or Give Jobs to Gay Men	.586
Tune Out or Pay Attention to Gay Men	.716
Raise Money Against or For Gay Men	.794
Treat Gay Men Different or Same	.691

Table 18

*Mean Behavioral Intentions of Actions Taken Toward Gay Men, by Role and Gesture, on a Scale from 1 (Not Very Willing) to 7 (Very Willing), Experiment 2.*

Gestures	Role					
	Perceiver		Hand Helper		Observer	
	Neg N = 16	Pos N = 16	Neg N = 16	Pos N = 17	Neg N = 16	Pos N = 16
	4.99	4.89	4.91	4.60	5.36	4.93
	(0.79)	(0.81)	(0.83)	(1.16)	(0.97)	(1.24)

Note: Standard deviations are shown in parentheses.

### *Attitude Scale Scores*

As in Experiment 1, the negative items for Herek's Attitudes toward Gay Men Scale were reversed scored so that a higher score on each item corresponded with a more positive attitude toward gay men. When the reverse scoring was completed, the 10 items all loaded at least .73 or higher in a principal components analysis. The analysis yielded one factor that explained 69.16% of the variance. The factor loadings are shown in Table 19. The 10 questions were therefore averaged to calculate a single measure of attitudes toward gay men. A 2 (Gesture: Positive or Negative) X 3 (Role: Perceiver, Hand Helper, or Observer) ANOVA of attitudes toward gay men yielded only a marginally significant effect of gesture,  $F(1,93) = 3.33, p = .071$ . Participants who saw negative gestures had marginally more positive Herek scores ( $M = 1.50$ ) than did participants who saw positive gestures ( $M = 0.49$ ). The means are shown in Table 20.

Table 19

*Factor Loading of Herek's Attitudes toward Gay Men Scale with Questions (N = 99), Experiment 2.*

Item	Loading
Should be allowed to adopt	.802
Are disgusting*	.846
Should not be allowed to teach school*	.730
Is a perversion *	.876
Natural expression of sexuality	.744
Should do everything to overcome homosexual feelings*	.835
Not be upset if son was a gay man	.818
Homosexual behavior is just plain wrong*	.939
Male gay marriages seems ridiculous to me*	.934
Merely a different lifestyle that should not be condemned	.765

Note: Asterisk denotes items that were reverse coded.

Table 20

*Mean Herek's Attitudes toward Gay Men Scale Reported by Perceiver, Hand Helpers, and Observers, on a Scale from -5 (Extremely Negative) to +5 (Extremely Positive), Experiment 2.*

Gesture	Role					
	Perceiver		Hand Helper		Observer	
	Neg (N = 16)	Pos (N = 17)	Neg (N = 16)	Pos (N = 17)	Neg (N = 16)	Pos (N = 17)
	1.56	1.29	0.68	-0.05	2.26	0.23
	(2.85)	(2.41)	(2.71)	(2.33)	(2.76)	(2.77)

Note: Standard deviations are shown in parentheses.

A 3 (role) x 2 (gesture) ANOVA was also performed on participants' responses to the single item attitude scale "What is your attitude toward gay men?" on which answers could range from -7 (Extremely Negative) to +7 (Extremely Positive). The analysis yielded only a main effect of gesture,  $F(1, 93) = 6.58, p = .012$ . Participants who saw negative gestures paired with the gay men slides reported more positive attitudes on this scale ( $M = 1.52$ ) than did participants who saw positive gestures ( $M = -0.33$ ).

#### *Word Completions*

As in Experiment 1, a word completion item was inserted after each item of Herek's Attitudes toward Gay Men Scale. Five of the 10 word completion items were intended to detect the accessibility of positive words (i.e., accept, approve, smile, reward, and support), and five were intended to detect the accessibility of negative words (i.e., punch, condemn, blame, scold, and shout). Each item was scored as 1 if the participant used the intended word, and 0 if not (Appendix W). Thus each participant could get a score of 0 to 5 on the positive words and 0 to 5 on the negative words. These word completions scores were used as the repeated measures factor in a 3 (role) X 2 (gesture) X 2 (word type: positive or negative) mixed-model ANOVA. The ANOVA yielded a significant within-subjects effect for word type,  $F(1, 93) = 97.69, p < .001$ . As in Experiment 1, participants used more positive ( $M = 1.38$ ) than negative ( $M = 0.32$ ) word completions. The crucial role X gesture X word type interaction was not significant,  $F(2, 93) = 0.19, ns$ . The sums of the word completion scores are shown in Table 21.

Table 21

*Number of Positive and Negative Word Completions by Role (Perceiver, Hand Helper, and Observer), Experiment 2.*

Gesture	Role					
	Perceiver		Hand Helper		Observer	
	Negative N= 16	Positive N= 17	Negative N= 16	Positive N= 17	Negative N= 16	Positive N= 17
Positive Word Type	1.50 (0.89)	1.35 (1.00)	1.38 (1.09)	1.29 (1.05)	1.50 (1.10)	1.29 (1.27)
Negative Word Type	0.25 (0.45)	0.41 (0.62)	0.38 (0.62)	0.35 (0.51)	0.38 (0.62)	0.18 (0.39)
Difference	1.25	0.94	1.00	0.94	1.12	1.11
Positivity	-0.31		-0.06		-0.10	

Note: Standard deviations are shown in parentheses.

### *Free Recall Accuracy*

After the experimental manipulation, all participants were asked to report which three hand gestures went with each of the five groups of projected images (i.e., sunsets, cars, snakes, skyscrapers, and the target group of gay men). Participants could receive a score from 0 if they remembered none of the gestures for a particular group of images (e.g., sunsets) to 3 if they correctly remembered all of the gestures for that same group. These scores were averaged to create a mean number of freely recalled gestures for each of the five groups of images. To assess recall accuracy, the number of gestures freely recalled for each image type was used as the repeated-measures factor in a 3 (role) X 2 (gesture) X 5 (images: sunsets, cars, snakes, skyscrapers, and gay men) mixed-model ANOVA.

The ANOVA yielded a significant effect of image  $F(4, 372) = 40.28, p < .001$ . The gestures that accompanied the gay men slides were the best remembered ( $M = 1.64$  out of a possible 3). By Tukey's test ( $p < .05$ ), gay men images produced significantly greater recall than images of sunsets ( $M = 1.01$ ), cars ( $M = 0.69$ ), skyscrapers ( $M = 0.77$ ), or snakes ( $M = 1.33$ ). The ANOVA also yielded a significant effect of role,  $F(1, 93) = 21.66, p < .001$ . By Tukey's test,  $p < .05$ , perceivers ( $M = 1.33$ ) and observers ( $M = 1.37$ ) remembered more of the hand gestures that accompanied the slides than the hand helpers ( $M = 0.56$ ), which is not surprising given that the hand helpers could not see the projected images. Finally, the ANOVA yielded a significant role x image interaction,  $F(8, 372) = 5.58, p < .001$ . For most of the image types, perceivers and observers remembered the gestures equally and also remembered the gestures better than did hand helpers. For the gay men images, however, the three roles differed significantly,  $F(2, 372) = 54.07, p < .001$ . By Tukey's test,  $p < .05$ , observers remembered the gestures that went with the gay men images best ( $M = 2.30$ ), perceivers next best ( $M = 1.85$ ), and the hand helpers remembered the least ( $M = 0.76$ ). The crucial image X gesture X role interaction was not significant,  $F < 1$ . Means are shown in Table 22.



Table 22

*Mean Number of Correctly Remembered Hand Gestures Made Toward Images (Sunsets, Cars, Snakes, Skyscrapers, and Gay Men) Freely Recalled by Role (Perceiver, Hand Helper, and Observer), Experiment 2.*

Slide	Role					
	Perceiver		Hand Helper		Observer	
	Negative ( <i>N</i> = 16)	Positive ( <i>N</i> = 17)	Negative ( <i>N</i> = 16)	Positive ( <i>N</i> = 17)	Negative ( <i>N</i> = 16)	Positive ( <i>N</i> = 17)
Sunsets	1.31 (1.01)	1.35 (0.86)	0.69 (0.87)	0.35 (0.61)	1.38 (0.86)	1.00 (0.79)
Cars	0.75 (0.77)	0.76 (0.66)	0.44 (0.63)	0.41 (0.71)	0.88 (0.72)	0.88 (0.60)
Snakes	1.62 (0.81)	1.82 (0.64)	0.56 (0.73)	0.76 (0.97)	1.44 (0.63)	1.76 (0.83)
Skyscrapers	0.88 (0.62)	1.06 (0.75)	0.44 (0.63)	0.47 (0.72)	0.75 (0.58)	1.00 (0.79)
Gay Men	1.69 (1.14)	2.00 (0.71)	0.69 (1.08)	0.82 (1.07)	2.31 (0.60)	2.30 (0.77)

Note: Standard deviations are shown in parentheses  $p < .05$ .

### *Free Recall Positivity*

To test for a positivity bias in free recall, the gestures that each participant wrote for each type of image were coded as -1 if they were predominantly negative, 0 if they were predominately neutral, or +1 if they were predominantly positive. These positivity scores (for participants who wrote anything for each question) were subjected to a 3 (role) X 2 (gesture) X 5 (type of image) mixed-model ANOVA. The ANOVA yielded a significant effect of image type  $F(4, 280) = 58.38, p < .001$ . Participants' guesses reflected the reality that sunsets were always paired with positive images and snakes were always paired with negative images. The ANOVA also yielded a significant effect of gesture,  $F(1, 70) = 31.85, p < .001$ . As expected, participants who saw positive gestures paired with the gay men slides ( $M = 0.74$ ) wrote more positive guesses overall than participants who saw negative gestures paired with gay men slides, ( $M = -0.78$ ). This tendency however, occurred only for the gay men slides, which produced a significant image X gesture interaction  $F(4, 280) = 19.27, p < .001$ . Participants guessed in line with the images for the gay men slides ( $M_s = 0.73$  vs.  $-0.76$ , simple effects  $F(1, 85) = 119.94, p < .001$ . There was no such effect of gesture for any of the other image types, all  $F$ s non-significant. The crucial image X gesture X role interaction however, was not significant,  $F(8, 280) < 1.70$ . None of the three roles was more likely to show a positivity bias in free recall for the gay men slides. The means are shown in Table 23.

Table 23

*Mean Positivity Scores of Hand Gestures Made Toward Images (Sunsets, Cars, Snakes, Skyscrapers, and Gay Men) Freely Recalled by Role (Perceiver, Hand Helper, and Observer), Experiment 2.*

Slide	Role					
	Perceiver		Hand Helper		Observer	
	Negative ( <i>N</i> = 16)	Positive ( <i>N</i> = 17)	Negative ( <i>N</i> = 16)	Positive ( <i>N</i> = 17)	Negative ( <i>N</i> = 16)	Positive ( <i>N</i> = 17)
Sunsets	0.58 (0.79)	0.93 (0.26)	0.70 (0.67)	0.36 (0.67)	0.87 (0.35)	0.85 (0.38)
Cars	-0.33 (0.65)	0.27 (0.80)	0.00 (0.67)	0.00 (0.89)	-0.27 (0.70)	0.00 (0.91)
Snakes	-0.75 (0.62)	-1.00 (0.00)	-0.70 (0.67)	-0.55 (0.82)	-1.00 (0.00)	-1.00 (0.00)
Skyscrapers	0.17 (0.58)	0.07 (0.70)	0.10 (0.74)	0.27 (0.65)	0.00 (0.76)	0.04 (0.69)
Gay Men	-0.83 (0.39)	0.87 (0.52)	-0.40 (0.97)	0.45 (0.82)	-1.00 (0.00)	0.85 (0.55)

Note: Standard deviations are shown in parentheses.

### *Cued Recall Accuracy*

After the free recall, participants were given a list of the 15 images that had been projected and all 24 possible hand gestures, 15 of which had been used in their experimental session. For each of the listed images, they were asked to choose from the list of 24 gestures, the one gesture that had accompanied that particular image. For each type of image, a participant could get an accuracy score from 0 to 3. These accuracy scores were subjected to a 3 (role) X 2 (gesture) X 5 (images: sunsets, cars, snakes, skyscrapers, and gay men) mixed-model ANOVA.

The ANOVA yielded a significant effect of image  $F(4, 372) = 4.90, p = .001$ . The gestures that accompanied the snake slides were the best remembered ( $M = 0.59$  out of a possible 3). By Tukey's test ( $p < .05$ ), snake images produced significantly greater recall than images of cars ( $M = 0.28$ ), or skyscrapers ( $M = 0.32$ ), but not gay men ( $M = 0.45$ ) or sunsets ( $M = 0.49$ ). The ANOVA also yielded a significant effect of role,  $F(1, 93) = 10.49, p < .001$ . By Tukey's test,  $p < .05$ , perceivers ( $M = 0.49$ ) and observers ( $M = 0.58$ ) remembered more of the hand gestures that accompanied the slides than the hand helpers ( $M = 0.21$ ), which is not surprising given that the hand helpers could not see the projected images. In addition, the ANOVA yielded an image X role interaction,  $F(4, 372) = 2.61, p = .009$ . The crucial three-way image X gesture X role interaction was not significant,  $F(8, 372) = 0.57, ns$ . The means for entire ANOVA are shown in Table 24.

Table 24

*Mean Cued Recall for Hand Gestures Made Toward Images (Sunsets, Cars, Snakes, Skyscrapers, and Gay Men) by Role (Perceiver, Hand Helper, and Observer), Experiment 2.*

Slide	Role					
	Perceiver		Hand Helper		Observer	
	Negative ( <i>N</i> = 16)	Positive ( <i>N</i> = 17)	Negative ( <i>N</i> = 16)	Positive ( <i>N</i> = 17)	Negative ( <i>N</i> = 16)	Positive ( <i>N</i> = 17)
Sunsets	0.81 (0.66)	0.39 (0.49)	0.44 (0.63)	0.12 (0.33)	0.75 (0.58)	0.53 (0.80)
Cars	0.31 (0.60)	0.29 (0.59)	0.06 (0.25)	0.12 (0.33)	0.50 (0.63)	0.41 (0.62)
Snakes	0.75 (0.77)	0.65 (0.86)	0.19 (0.40)	0.29 (0.59)	1.00 (0.73)	0.65 (0.61)
Skyscrapers	0.50 (0.52)	0.35 (0.49)	0.31 (0.48)	0.35 (0.49)	0.25 (0.58)	0.18 (0.39)
Gay Men	0.31 (0.60)	0.59 (0.80)	0.13 (0.34)	0.12 (0.49)	0.75 (0.86)	0.82 (1.01)

Note: Standard deviations are shown in parentheses.

### *Cued Recall Positivity*

To test for a positivity bias in cued recall, the gestures that each participant paired with each image were coded as -1 if they were negative, 0 if they were neutral or +1 if they were positive. Cued recall positivity scores for each type of image could range from -3 to +3. These cued recall positivity scores (for participants who answered the questions) were subjected to a role X 2 (gesture) X 5 (type of image) mixed-model ANOVA. The ANOVA yielded a significant effect of image type  $F(4, 328) = 60.10, p < .001$ . As with the free recall positivity, participants' guesses reflected the reality that sunsets were always paired with positive images and snakes were always paired with negative images. The ANOVA also yielded a significant effect of gesture,  $F(1, 82) = 28.00, p < .001$ . As expected, participants who saw positive gestures paired with the gay men slides made more positive cued recall pairings overall than participants who saw negative gestures paired with gay men slides. This tendency however, occurred only for the gay men slides, which produced a significant image X gesture interaction,  $F(4, 328) = 34.64, p < .001$ . Most important, the crucial image X gesture X role interaction was significant,  $F(8, 328) = 4.34, p < .001$ , but only because hand helpers showed no effect of gestures they could not see. The means are shown in Table 25.

Table 25

*Mean Positivity Scores of Hand Gestures Made Toward Images (Sunsets, Cars, Snakes, Skyscrapers, and Gay Men) Cued Recalled by Role (Perceiver, Hand Helper, and Observer), Experiment 2.*

Slide	Role					
	Perceiver		Hand Helper		Observer	
	Negative ( <i>N</i> = 16)	Positive ( <i>N</i> = 17)	Negative ( <i>N</i> = 16)	Positive ( <i>N</i> = 17)	Negative ( <i>N</i> = 16)	Positive ( <i>N</i> = 17)
Sunsets	1.73 (1.03)	1.27 (1.49)	0.83 (1.53)	0.79 (1.42)	1.80 (0.86)	1.00 (1.11)
Cars	0.13 (1.13)	-0.60 (1.40)	-0.08 (0.99)	-0.43 (1.45)	0.27 (1.28)	-0.06 (1.56)
Snakes	-1.73 (1.28)	-2.40 (0.74)	-1.08 (1.66)	-1.21 (1.25)	-2.00 (0.75)	-2.29 (0.85)
Skyscrapers	0.53 (0.83)	0.13 (0.99)	0.42 (0.79)	0.57 (1.01)	0.47 (1.13)	0.24 (1.09)
Gay Men	-2.40 (1.06)	2.13 (1.25)	-0.17 (2.08)	0.79 (1.85)	-2.60 (0.51)	2.06 (1.56)

Note: Standard deviations are shown in parentheses.

### *Awareness of Attitude Change*

Perceivers were the only participants who reported that they had changed their attitudes in the direction of the gestures. Neither hand helpers nor observers did so. It would be interesting to know, however, whether all participants believed that the perceiver had changed the most. This question was addressed by using the estimates that each participant made of all three participants' attitudes toward gay men before and after the experimental manipulation. These attitude estimates were subjected to a 3 (rater: perceiver, hand helper, or observer) X 3 (target: perceiver, hand helper, or observer) X 2 (gesture: positive or negative) X 2 (time: before and after) mixed-model ANOVA with target and time as the repeated measures factors. The most important significant effect found in that analysis was the four-way target X time X gesture X role interaction,  $F(4, 180) = 3.34, p = .012$ . Table 26 shows the mean attitude change (from before to after the manipulation) attributed to each target by participants in the three different roles who saw either positive or negative gestures. As the difference scores in Table 30 indicate, only perceivers and observers believed that the gestures had made a difference to anyone. Hand helpers did not think that the gestures made a difference for any of the participants. Perceivers believed that the gestures had made a difference for themselves,  $F(1, 180) = 17.18, p < .001$ , for hand helpers  $F(1, 180) = 8.36, p = .004$ , and for the observers,  $F(1, 180) = 24.96, p < .001$ . Observers believed that the gestures had made a difference for perceivers,  $F(1, 80) = 40.22, p < .001$ , and hand helpers,  $F(1, 80) = 30.89, p < .001$ , but not for themselves,  $F < 1$ .



Table 26

*Mean Perceived Attitude of Perceivers, Hand Helpers, and Observers Toward Gay Men Before and After the Experiment, by Role and Gesture As Reported by the Other Participants (Perceivers, Hand Helpers, and Observer), on a Scale from -5 (Extremely Negative) to +5 (Extremely Positive), Experiment 2.*

Rater	Perceiver			Hand Helper			Observer		
	Perceiver	H. Helper	Observer	Perceiver	H. Helper	Observer	Perceiver	H. Helper	Observer
Positive	0.50 (1.26)	0.50 (1.26)	0.56 (0.72)	0.41 (0.87)	-0.12 (0.49)	-0.06 (0.83)	0.24 (1.30)	0.18 (1.14)	-0.18 (1.01)
Negative	-0.50 (0.97)	-0.19 (0.75)	-0.62 (1.31)	0.28 (0.83)	0.00 (0.39)	-0.36 (1.08)	-1.25 (1.91)	-1.12 (1.59)	-0.06 (0.25)
Difference	1.00*	0.69*	1.18*	0.13	-0.12	0.30	1.49*	1.30*	-0.12

Note: Standard deviations are in parentheses.

### *Mediational Analyses*

In a focused analysis of covariance (ANCOVA) that involved only perceivers and observers, the effect of role on perceived attitude change remained significant when controlling for perceived authorship,  $F(1,63) = 3.79, p = .056$ , word completion positivity  $F(1, 63) = 5.56, p = .022$ , free recall accuracy  $F(1, 63) = 6.26, p = .015$ , free recall positivity  $F(1, 63) = 5.31, p = .024$ , cued recall accuracy  $F(1, 63) = 6.43, p = .014$ , and cued recall positivity  $F(1, 63) = 5.50, p = .022$ . The effect of role on perceived attitude change, therefore, was not mediated by any of these variables.

### *Relationships among Dependent Measures*

Appendices X through AA show correlations among the dependent measures for all participants, and separately for perceivers, hand helpers, and observers. Looking first at Appendix X, which shows correlations for all participants, attitude change in the direction of the assigned gesture, was greater for participants who had greater free recall accuracy ( $r = .214, p = .033$ ). This correlation is what one would expect if the manipulation was most effective for participants who paid most attention to the gestures, and therefore, could remember them more accurately. It is also interesting to note, however, that the more participants perceived themselves as authors of the gestures, the less accurate they were in both their free recall ( $r = -.429, p < .001$ ) and their cued recall ( $r = -.363, p < .001$ ). These correlations suggest that feelings of control over the gestures might have interfered with paying attention to them, or at least with remembering which gestures were paired with gay men. Finally, participants who reported the most perceived authorship over the gestures were those who reported the most negative attitudes toward gay men on the Herek scale ( $r = -.241, p = .016$ ).

Appendix Y shows the correlations for perceivers, who were the only participants to report attitude change. For them, surprisingly, perceiving attitude change in a positive direction was correlated with a marginally significant negatively bias in both free and cued recall ( $r_s = -.312, p = .077$  and  $-.301, p = .088$ ). In addition, the more that perceivers felt in control of the gestures, the more they displayed a positivity bias in free recall of the gay men gestures ( $r = .419, p = .015$ ). The correlations for hand helpers are included in Appendix Z for the sake of completeness, but they are not particularly informative because the hand helpers could not see which gestures were paired with which slides. Perhaps the only interesting correlation in Appendix Z is the negative relationship between perceived authorship of the gestures and scores on the Herek scale. Even though the hand helpers could not see the slides while they were making the gestures, those with negative attitudes toward gay men were most likely to report that they felt in control of the gestures ( $r = -.466, p = .006$ ). Finally, for observers as shown in Appendix AA, those who responded most to the experimental manipulation by changing their attitudes in the direction of the gestures were also those who recalled the gestures most accurately ( $r = .463, p = .007$ ). This is exactly what one would expect and it is surprising that this correlation was not significant for perceivers. In short, the intercorrelations shown in Appendices X through AA did not prove to be of great help in explaining the effects of role on perceived attitude change in Experiment 2.

### General Discussion

Experiment 1 showed that people, who physically perform attitude-relevant gestures, even though they have no choice, are more likely to perceive authorship of the gestures and to change their attitudes in the direction of the gestures than are mere observers. This result added to the findings of Cacioppo et al. (1993), Strack et al. (1988), Wells & Petty (1980), all of whom demonstrated similar effects of physical motions, but without an uninvolved observer control condition. Having an uninvolved observer control condition reduced the probability that those previous results occurred merely because positive or negative gestures had been associated with the attitude object. The results

of the present study suggest that it is not simply the co-occurrence of evaluative gestures and an attitude object that alters attitudes, but instead at least some sense that the gestures are active and self-generated.

Experiment 2 showed that the sense that gestures are active and self-generated can occur even under conditions where someone else physically performs the gestures, but only if the setting is arranged so as to provide a perceptual illusion of self-generated movement. Observers in Experiment 2 were not given the illusion of self-generated movement and they did not change their attitudes, even though they were students at the same university as the perceiver participants and thus might have experienced at least some degree of vicarious dissonance (Norton et al., 2003). Experiment 2 also extended the previous work of Wegner and his colleagues (2004). In their research, they instilled in participants a sense of control over hand movements that were not their own, but the hand movements in question were not evaluatively loaded and were not directed at any specific attitude object. In the present research, the gestures toward gay men were all highly evaluative and coincided with images of gay men being presented on a screen. The results replicated Wegner et al.'s (2004) results, in that participants reported a significant amount of control over another person's gestures, but went beyond those earlier results in showing that the amount of perceived control was greater than that of an uninvolved observer, and also in showing that the gestures could lead to attitude change.

### *Limitations*

It is important to note that the attitude change measure in both experiments involved post-hoc estimates of participants' attitudes before and after the experimental manipulation. Neither experiment included a baseline measure of attitudes taken immediately before the manipulation. The term "attitude change" when applied to the present results, therefore, refers to a different concept than is usually investigated in studies of attitude change through persuasive messages. The measure of attitude change in the present experiment left open the possibility that participants might have

distorted their recollections in a way that would create an appearance of attitude change even when attitudes had not really changed. This alternative explanation of the results was discounted to some degree by analyses showing that the attitudes reported for before the manipulation did not differ by role or gesture. Even so, it would be preferable to obtain baseline attitudes from all participants immediately prior to and immediately after the experimental manipulation.

Another limitation of the present experiment was that perceived authorship did not mediate the attitude change results. The manipulation in Experiment 1 caused actors to perceive more authorship of the gestures and more attitude change than an uninvolved observer, but perceived authorship and attitude change were not correlated, either for the entire sample or specifically for participants who were assigned to the actor role. Similarly, in Experiment 2, the manipulation caused perceivers, who saw gestures that looked like their own in a mirror, to perceive significantly more authorship and to change their attitude significantly more than uninvolved observers, but again perceived authorship was not correlated with, and could not have mediated, the attitude change results. In fact, none of the other possible mediators, including assessability of positive versus negative actions, positivity bias in free or cued recall, and accuracy in free and cued recall, proved to be a significant mediator of the attitude change results. Either the actual mediator was not measured in the present experiments or the insertion of the Herek scales, word completions, behavioral intentions, and memory measures distracted participants sufficiently that the cognitive link between perceived authorship and attitude change was broken. It would be advisable; therefore, in future research to focus exclusively on perceived authorship and actual, not perceived, attitude change.

#### *Possible Embodiment Effects*

The present results might be viewed as exploring the limits of embodiment effects. Niedenthal, Barsalou, Winkielman, Krauth-Gruber, and Ric (2005) described the notion of embodied mind. The embodiment account holds that sensory, somatic, and motor responses are necessary for encoding and interpreting information. In contrast to theories of amodal architecture, in which mental

representations involve symbolic translations that are similar to computer software that could be “run” on either biological or mechanical hardware, embodied mind theories describe knowledge as grounded in bodily states.

In theories of embodied mind, people perceive and represent other people and objects through their own physical operations, whether in vivo or in imagination. Perceivers who move their own arms, for instance, are better at detecting changes in another person’s arm than leg position, whereas perceivers who move their own legs are better at detecting changes in another person’s leg than arm position (Reed & Farah, 1995). Similarly, people who make a fist more automatically process words related to power (Schubert, 2004). In one study by Chen and Bargh (1999), participants had to decide whether a word was positive or negative by pulling a lever toward them or pushing the lever away from them. They responded faster when they had to pull the lever for positive words and push it for negative words than when they had to push the lever away for positive words and pull it toward them for negative words. In another study by Förster and Strack (1998), participants had to generate the names of famous people while pulling a table toward them or pushing it away from them. They generated more names of people they liked when they were pulling the table toward them than when they were pushing it away from them.

In the realm of attitudes, bodily responses during interaction with various objects have been shown to influence later attitudes toward those objects. As described in the introduction, Wells and Petty (1980) showed that participants who nod their heads while listening to a persuasive message agree with the message more than do those who shake their heads while listening. Cacioppo et al. (1993) showed that participants who pulled a table toward them while watching Chinese ideographs came to like the ideographs more than did participants who pushed the table away. Strack et al. (1988) showed that participants who held their faces in a smile liked cartoons better than participants who held their faces in a frown. In every case, bodily movements that usually occur in response to liked versus disliked stimuli influenced attitudes toward those stimuli.

The present Experiment 1 added to these previous demonstrations of embodiment effects a manipulation in which the sense of embodiment was deliberately held to a minimum. Actors in Experiment 1 might have performed the gestures with their own physical bodies, but the experimental situation made clear that they were little more than puppets. It was obvious to everyone present that the actor was not choosing which gesture to perform toward each image, because the director was very publicly making those choices. Actors merely followed orders, and had very little leeway even in the precise way to hold their hands while making the gestures, because they were told to hold their hands exactly as shown in the relevant photographs. Even so, when compared to observers who neither chose nor physically enacted the gestures, actors reported at least a little sense that in some small way they were controlling what happened. More important, actors reported that during the experiment they had changed their attitudes in the direction of the gestures that their own hands had created. Directors, who chose the physical movements and ordered them to be carried out, had no such perception of attitude change, nor had the uninvolved observers. Thus Experiment 1 showed that a minimal but still detectable sense of embodiment is all it takes for an actor's physical movements to create a perception of attitude change.

The present Experiment 2 added to previous demonstrations of embodiment effects a different way to create minimal but detectable embodiment effects, this time without any physical movement, but only the illusion of physical movement. Adopting the procedures of Wegner et al. (2004), perceivers saw themselves and some hands that looked like theirs, but were clearly not theirs, performing positive or negative gestures when slides of gay men were projected on a screen. Even though it was obvious to everyone present that the perceiver was neither choosing nor performing the gestures, when compare to uninvolved observers, perceivers reported at least a little sense of controlling the gestures, just as they did in Wegner et al.'s (2004) results. More important, perceivers reported that during the experiment they had changed their attitudes in the direction of the gestures that someone else's hands had created. Uninvolved observers, who looked on but without the illusion

that the hands were extensions of their own bodies, reported no such attitude change. Thus Experiment 2 showed that even the illusion of embodiment can create the perception of attitude change following physical movements associated with an attitude object.

### *Future Directions*

Wegner et al. (2004) discussed seven cues to perceived authorship. People tend to assume authorship for physical movements when their bodies are in the physical orientation necessary to make those movements (Dijksterhuis & Bargh, 2001), their proprioceptive and kinesthetic sensations suggest movement (Georgieff & Jeannerod, 1998), signals from brain to body predict their sensory consequences (Blakemore & Frith, 2003), sensory feedback indicates movement (Daprati et al. 1997), the movement seems agentic rather than compulsory (Milgram, 1974), the actions have consequences (Jones & Davis, 1965), and the action is preceded by action-relevant thoughts (Wegner & Wheatley, 1999). Wegner et al.'s (2004) experiments focused on the seventh of those cues, having action-relevant thoughts just prior to the action. Using a procedure very similar to the present Experiment 2, they showed that perceivers who get a mental preview and know that gestures are about to occur experience greater perceived authorship than perceivers who do not know what gestures are coming.

The present Experiment 2 used only what Wegner et al. (2004) called a mental preview condition. It included no perceivers who did not know which gestures were coming. The present Experiment 2 therefore might have failed to detect any influence of perceived authorship on attitude change because it did not include the necessary comparison or control group. The impact of perceived authorship on attitude change might be more apparent if some perceivers knew in advance which gestures the hands in the mirror were about to make and other perceivers did not. One important future direction for the present research involves including a no preview control group of perceivers who see hands that appear to be theirs making positive or negative gestures toward slides of gay men but are prevented from knowing in advance what gestures the hands are about to make.



In addition, it would be interesting to examine what would happen to perceived authorship and attitude change if Wegner et al.'s (2004) mental preview condition were to be augmented. Their mental preview condition involved only having perceivers hear the directions through headphones. A perceiver in their experiments, for example, would either hear or not hear through the headphones instructions such as "Give the okay sign with both hands." Then the hands would make that gesture. Suppose however, that one was to augment this mental preview manipulation by giving perceivers instructions through the headphones such as "Vividly imagine both hands making the okay sign," after which the hands actually did make an okay sign. Previous research has shown that people who sit quietly and imagine making physical movements produce electromyographic potentials similar to those of people who actually performed the actions (Jacobson, 1932). Imaging doing something and then seeing it happen might produce an even stronger sense of authorship than merely overhearing through headphones someone else being told to make the gestures. By adding mental rehearsal to the present Experiment 2's procedure, it might be possible to increase both perceived authorship and its link with perceived attitude change.

### *Concluding Remarks*

In the final analysis, the present experiments demonstrated that gestures can alter people's perceptions of their own attitudes, even when ownership of the gestures remains open to debate. As a prominent Czechoslovakian author and critic observed,

"A gesture cannot be regarded as the expression of an individual, as his creation (because no individual is capable of creating a fully original gesture, belonging to nobody else), nor can it even be regarded as that person's instrument: on the contrary, it is gestures that use us as their instruments, as their bearers and incarnations" (Kundera, 1991, pt. 1. ch.2).

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Appendix A  
**STATEMENT OF CONSENT – Fall 2005**

I, the undersigned, do hereby give my informed consent to my participation in the

**Memory for Multiple Modalities Study.**

I have been informed about each of the following:

- The purpose of the study is to recall various modalities as they are presented in the experiment.
- During the experiment, I may be asked to do one or more of the following:
  - Make or watch various hand gestures
  - Listen to instructions given by the experimenter
  - View slides or other images
  - Be tested on my memory for spoken words and visual sights
- The benefits of the study include the opportunity to be involved in psychological experiments like the ones I've learned about in class.
- The risks of the study are negligible. After the completion of the study, the experimenter will answer any questions that I may have about the procedures.
- I understand that I will receive credit for this experiment at its completion and I cannot receive credit for participation in the current experiment more than once.

I understand that I may withdraw at any time before or during the experiment at my option.

Recognizing the importance of avoiding bias in the results of this experiment, I agree not to discuss any of the details of the procedure with other participants. I understand that all of the research and evaluation materials will be confidentially maintained. The means used to maintain confidentiality are:

1. My data will be given a code number for research identification, and my name will be kept anonymous.
2. Data, along with consent forms, will be kept in a locked file cabinet.
3. Only the investigators will have access to my identification data.

I understand that if I have questions concerning the research, I can call the following persons:

Cheryl A. Taylor, Charles G. Lord – Principal Investigators  
Department of Psychology  
257-7414

Jan Fox, TCU Coordinator  
Research and Sponsored Projects  
257-7515

Dr Don Dansereau  
Chair, Department of Psychology  
Human Subjects Committee  
257-7410

Dr. Timothy Hubbard  
TCU Committee on Safeguards  
of Human Subjects – Psychology  
257-7410

\_\_\_\_\_  
Participant's Name (PLEASE PRINT)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Participant's Signature

\_\_\_\_\_  
Phone Number

\_\_\_\_\_  
Participant's TCU Student ID#

\_\_\_\_\_  
Professor

Appendix B  
**Memories and Modality Study**

Please circle your answers for each of the following questions.

1. How much control did you feel that you had over which specific gestures went with each slide?

1	2	3	4	5	6	7
Not at All						Very Much

2. To what degree did you feel that you made the specific gesture happen for each slide?

1	2	3	4	5	6	7
Not at All						Very Much

3. To what degree did you feel that you were personally responsible for the specific gestures that went with each slide?

1	2	3	4	5	6	7
Not at All						Very Much

4. To what degree did you consciously will the specific gestures to occur for each slide?

1	2	3	4	5	6	7
Not at All						Very Much



5. To what degree did you feel like the specific gestures that were made for each slide belonged to you?

1	2	3	4	5	6	7
Not at All						Very Much

6. To what degree did you feel that the specific gestures that went with each slide originated from you?

1	2	3	4	5	6	7
Not at All						Very Much

7. To what degree did you feel as though you were the author of the specific gestures that accompanied each slide?

1	2	3	4	5	6	7
Not at All						Very Much

8. To what degree did you feel a sense of ownership for the specific gestures that accompanied each slide?

1	2	3	4	5	6	7
Not at All						Very Much

Appendix C  
**STATEMENT OF CONSENT – Fall 2005**

I, the undersigned, do hereby give my informed consent to my participation in the

**Attitudes and Opinions Study.**

I have been informed about each of the following:

- The purpose of the study is to ask my attitudes and opinions about various social groups.
- During the experiment, I may be asked to do the following:
- Accurately and honestly report my attitudes and opinions on a variety of current topics.
- Answer word completion questions.
- The benefits of the study include the opportunity to be involved in psychological experiments like the ones I've learned about in class.
- The risks of the study are negligible. After the completion of the study, the experimenter will answer any questions that I may have about the procedures.
- I understand that I will receive credit for this experiment at its completion and I cannot receive credit for participation in the current experiment more than once.

I understand that I may withdraw at any time before or during the experiment at my option.

Recognizing the importance of avoiding bias in the results of this experiment, I agree not to discuss any of the details of the procedure with other participants. I understand that all of the research and evaluation materials will be confidentially maintained. The means used to maintain confidentiality are:

4. My data will be given a code number for research identification, and my name will be kept anonymous.
5. Data, along with consent forms, will be kept in a locked file cabinet.
6. Only the investigators will have access to my identification data.

I understand that if I have questions concerning the research, I can call the following persons:

Cheryl A. Taylor, Charles G. Lord – Principal Investigators  
Department of Psychology  
257-7415

Jan Fox, TCU Coordinator  
Research and Sponsored Projects  
257-7515

Dr Don Dansereau  
Chair, Department of Psychology  
Human Subjects Committee  
257-7410

Dr. Timothy Hubbard  
TCU Committee on Safeguards  
of Human Subjects – Psychology  
257-7410

\_\_\_\_\_  
Participant's Name (PLEASE PRINT)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Participant's Signature

\_\_\_\_\_  
Phone Number

\_\_\_\_\_  
Participant's TCU Student ID#

\_\_\_\_\_  
Professor

Appendix D  
Attitudes and Opinion Study

Instructions:

**Please answer the following questions using the scale below:**

-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	
							Neutral								
Extremely Unfavorable														Extremely Favorable	

- What is your attitude toward politicians? \_\_\_\_\_
- What is your attitude toward professors? \_\_\_\_\_
- What is your attitude toward gay men? \_\_\_\_\_
- What is your attitude toward former mental patients? \_\_\_\_\_
- What is your attitude toward welfare? \_\_\_\_\_
- What is your attitude toward abortion? \_\_\_\_\_
- What is your attitude toward exercising? \_\_\_\_\_
- What is your attitude toward lawyers? \_\_\_\_\_
- What is your attitude toward newscasters? \_\_\_\_\_
- What is your attitude toward professional athletes? \_\_\_\_\_
- What is your attitude toward studying? \_\_\_\_\_
- What is your attitude toward sunsets? \_\_\_\_\_
- What is your attitude toward snakes? \_\_\_\_\_
- What is your attitude toward capital punishment? \_\_\_\_\_
- What is your attitude toward cars? \_\_\_\_\_
- What is your attitude toward lesbians? \_\_\_\_\_
- What is your attitude toward buildings? \_\_\_\_\_









Answer the following questions about gay men. Please place one X on each of the scales below to indicate how willing you would be (if asked) to participate in each of the activities with gay men. The direction toward which you check, of course, depends upon which of the two ends of the scale you are more willing to participate in.

Sign A Lot of Petitions Against Their Group	Sign A Moderate Amount of Petitions Against Their Group	Sign A Few Petitions Against Their Group	Sign No Petitions For or Against Their Group	Sign A Few Petitions For Their Group	Sign A Moderate Amount of Petitions For Their Group	Sign A Lot of Petitions For Their Group
---	---	--	--	--	---	---

Give them a lot of Disapproving looks	Give them a moderate amount of Disapproving looks	Give them a few Disapproving Looks	Give them no Disapproving or Approving looks	Give them a few Approving looks	Give them a moderate amount of Approving looks	Give them a lot Approving looks
--	---	--	--	------------------------------------	--	------------------------------------

Volunteer A lot of time against them	Volunteer a Moderate amount of time Against them	Volunteer a little time against them	Volunteer no time for or against them	Volunteer a little time for them	Volunteer a Moderate amount of time	Volunteer A lot of of time for them for them
---	--	---	--	-------------------------------------	--	--

Frown a lot at them	Frown a moderate amount at them	Frown a little at them	Neither smile nor frown at them	Smile a little at them	Smile a moderate amount at them	Smile a lot at them
---------------------	------------------------------------	---------------------------	------------------------------------	---------------------------	------------------------------------	---------------------



Attempt to keep them from a lot of jobs	Attempt to keep them from a moderate amount of jobs	Attempt to keep them from a few jobs	Neither get them or keep them from jobs	Attempt to get them a few jobs	Attempt to get them a moderate amount of jobs	Attempt to get them a lot of jobs
---	---	--------------------------------------	---	--------------------------------	---	-----------------------------------

Tune them out a lot	Tune them out a moderate amount	Tune them out a little	Neither tune them out or pay attention	Pay a little attention to them	Pay a moderate amount of attention	Pay a lot of attention to them
---------------------	---------------------------------	------------------------	--	--------------------------------	------------------------------------	--------------------------------

Raise a lot of money against them	Raise a moderate amount of money against them	Raise a little money against them	Raise no money for or against them	Raise a little money for them	Raise a moderate amount of money for them	Raise a lot of money for them
-----------------------------------	---	-----------------------------------	------------------------------------	-------------------------------	---	-------------------------------

Treat them different from others a lot	Treat them different From others a moderate amount	Treat them different from others a little	Treat them neither different nor the same	Treat them the same as others a little	Treat them the same as others a moderate amount	Treat them the same as others a lot
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Appendix E  
Recall of Modalities Task

Please complete the following questionnaires regarding the projected images and hand gestures presented during the experiment.

1. Which three hand gestures accompanied the three pictures of sunsets?

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2. Which three hand gestures accompanied the three pictures of the cars on highways?

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3. Which three hand gestures accompanied the three pictures of the snakes?

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---

---

4. Which three hand gestures accompanied the three pictures of the skyscrapers?

---

---

---

5. Which three hand gestures accompanied the three pictures of the gay men?

---

---

---

Please match the following images with the hand gesture made by the actor. Write the appropriate number of the hand gesture in the space provided.

- |   |                                     |
|---|-------------------------------------|
| a. Bull Snake Sunning on a Rock _____     | 1. thumbs down both hands           |
| b. Sunset on Lake Charles, LA _____       | 2. chopping motion left hand        |
| c. Cars Driving in the City _____         | 3. push away both hands             |
| d. Two Gay Men Embracing _____            | 4. shake fist right hand            |
| e. Skyscrapers in Singapore _____         | 5. wave hello left hand             |
| f. Cars on Kentucky Highway _____         | 6. thumbs up both hands             |
| g. Lake Sunset with Cirrus Clouds _____   | 7. okay sign                        |
| h. Timber Rattlesnake _____               | 8. clap hands                       |
| i. Skyscrapers at Dawn _____              | 9. nails toward face                |
| j. Gay Men Kissing _____                  | 10. touch thumb and little finger   |
| k. Pittsburgh Skyscrapers _____           | 11. palms up both hands             |
| l. Cars Driving on Mountain Highway _____ | 12. spread fingers left hand        |
| m. Gay Men Getting Married _____          | 13. thumbs down left hand           |
| n. Sunset on Ocean _____                  | 14. shake fist left hand            |
| o. Honduran Milk Snake _____              | 15. chopping motion right hand      |
|   | 16. palms down both hands           |
|   | 17. peace sign                      |
|   | 18. thumbs up left hand             |
|   | 19. wave hello right hand           |
|   | 20. pull toward both hands          |
|   | 21. spread fingers right hand       |
|   | 22. extend little finger right hand |
|   | 23. touch index fingers together    |
|   | 24. wiggle fingers left hand        |

Appendix F  
Post-Experimental Assessment Questionnaire

Debriefing Questions:

Questions about the **Memory for Multiple Modalities (MMM) study**:

What do you think was the purpose of the MMM study?

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What were the researchers trying to prove in the MMM study?

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Questions about the **Attitudes & Opinions (A&O) study**:

What do you think was the purpose of the A&O study?

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What were the researchers trying to prove in the A&O study?

---

---

If the **Memories for Multiple Modalities** study was about anything other than or in addition to what the experimenter shared with you, what might else might it have been about?

---

---

If the **Attitudes & Opinions** study was about anything other than or in addition to what the experimenter shared with you, what might else might it have been about?

---

---

Is there any way that the two studies could have been connected with each other? If they were, what might that connection have been?

---

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If the **Memories for Multiple Modalities** study and the **Attitudes & Opinions** study were connected with each other in one big study, what do you think the purpose of that study would have been?

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If the **Memories for Multiple Modalities** study and the **Attitudes & Opinions** study were connected with each other in one big study, what might the researchers for that study have been trying to prove?

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## Appendix G

Please answer the following questions on the following pages regarding others' attitudes toward various objects. Circle the appropriate number on an 11 point scale with -5 being *very negative* and +5 being *very positive*. Please also indicate which role you were in the preceding experiment by circling the appropriate category below.

Director

Actor

Observer

1. What was the director's attitude toward sunsets *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

2. What was the director's attitude toward sunsets *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

3. What was the director's attitude toward cars on a highway *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

4. What was the director's attitude toward cars on a highway *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

5. What was the director's attitude toward snakes *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

6. What was the director's attitude toward snakes *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

7. What was the director's attitude toward skyscrapers *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive



8. What was the director's attitude toward skyscrapers *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

9. What was the director's attitude toward gay men *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

10. What was the director's attitude toward gay men *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

11. What was the actor's attitude toward sunsets *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

12. What was the actor's attitude toward sunsets *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

13. What was the actor's attitude toward cars on a highway *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

14. What was the actor's attitude toward cars on a highway *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

15. What was the actor's attitude toward snakes *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

16. What was the actor's attitude toward snakes *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

17. What was the actor's attitude toward skyscrapers *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

18. What was the actor's attitude toward skyscrapers *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

19. What was the actor's attitude toward gay men *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

20. What was the actor's attitude toward gay men *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

21. What was the observer's attitude toward sunsets *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

22. What was the observer's attitude toward sunsets *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

23. What was the observer's attitude toward cars on a highway *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

24. What was the observer's attitude toward cars on a highway *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

25. What was the observer's attitude toward snakes *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

26. What was the observer's attitude toward snakes *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

27. What was the observer's attitude toward skyscrapers *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

28. What was the observer's attitude toward skyscrapers *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

29. What was the observer's attitude toward gay men *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

30. What was the observer's attitude toward gay men *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

## Appendix H Debriefing

The two experiments were actually related to each other. We were wondering whether the gestures that people make or observe might affect their own attitudes and opinions. You might have noticed that the Attitudes & Opinions part of the study had questions about some of the types of objects and people that were shown in the slides. We thought that the gestures that accompanied these slides might have altered people's subsequent attitudes and opinions. If you made or saw positive gestures when that type of object or person was shown on the screen, for instance, we thought that might affect the attitudes that you later reported having toward that type of object or person. We included the questions about control over the arms because we thought attitudes might change more if people felt responsible for the gestures than if they did not, and we included the memory test because we thought that attitudes might not change if people could not remember which gestures went with which slides.

Do you think that the experiment will work? Do you think that the average person will change his or her attitudes in the (positive or negative) direction of the gestures that accompanied the objects and people shown on the slides?

Yes    No

If you circled yes, please explain why you think it will work. If you circled no, please explain why you think it will not work.

---

---

Do you think it worked for you? Do you think you changed your attitudes in the (positive or negative) direction of the gestures that accompanied the objects and people shown on the slides?

Yes    No

If you circled yes, please explain why you think it worked for you. If you circled no, please explain why you think it did not work for you.

---

---

Appendix I

*Number of Words Correctly or Incorrectly Completed by Role and Condition, Experiment 1.*

Expected Word	Role					
	DIRECTOR		ACTOR		OBSERVER	
	Negative (N= 10)	Positive (N= 12)	Negative (N = 10)	Positive (N = 12)	Negative (N= 10)	Positive (N = 12)
A C C _ _ _	ACCENT(2)	ACCENT(2)	ACCENT(3)	ACCUSE(3)	ACCUSE(2)	ACCULT(1)
	ACCENT(1)	ACCEPT(5)	ACCUSE(2)	ACCORD(2)	ACCOMP(1)	ACCENT(3)
	ACCEPT(3)	ACCUSE(2)	ACCORD(1)	ACCOST(1)	ACCEPT(2)	ACCORD(1)
	ACCUSE(1)	ACCESS(1)	ACCOST(1)	ACCEPT(6)	ACCORN(1)	ACCUSE(2)
	ACCESS(1)	ACCORD(1)	ACCEPT(3)		ACCORD(2)	ACCESS(1)
	ACCORD(1)				ACCENT(2)	ACCEPT(2)
						ACCETED(1)



Expected Word	Role					
	DIRECTOR		ACTOR		OBSERVER	
	Negative (N= 10)	Positive (N= 12)	Negative (N = 10)	Positive (N = 12)	Negative (N= 10)	Positive (N = 12)
P U _ _ _	PURE(1)	PULLS(4)	PULLY(1)	PUNKS(1)	PUNCH(1)	PULLS(4)
	PUCKS(1)	PUPPY(3)	PUKED(1)	PUPPY(1)	PURSE(1)	PUFFY(1)
	PURGE(1)	PURGE(1)	PUNTS(3)	PULLS(3)	PUTTY(2)	PURGE(1)
	PUNCH(1)	PUNCH(1)	PUCKS(1)	PUMPS(2)	PUPPY(1)	PUSHY(1)
	PUNTS(1)	PUNKS(1)	PUNCH(1)	PUNCH(1)	PULLS(2)	PUNCH(1)
	PULSE(3)	PUKED(1)		PURSE(1)	PUPIL(1)	PURSE(1)
	PUTTY(1)	PURSE(1)		PUNTS(1)	PUNTS(1)	PULSE(2)
	PUKED(1)			PULLY(1)	PULLY(1)	

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Expected Word	Role					
	DIRECTOR		ACTOR		OBSERVER	
	Negative (N= 10)	Positive (N= 12)	Negative (N = 10)	Positive (N = 12)	Negative (N= 10)	Positive (N = 12)
APP_ _ _ _	APPROVE(1)	APPROVE(3)	APPEARS(2)	APPOINT(5)	APPOINT(3)	APPEALS(4)
APPROVE	APROVE(1)	APPEALS(1)	APPEALS(2)	APPERAL(1)	APPLATE(1)	APPEASE(1)
	APPEALS(2)	APPEARS(3)	APPEASE(2)	APPEARS(2)	APPEALS(2)	APPOINT(3)
	APPOINT(1)	APPLIES(1)	APPOINT(2)	APPEALS(1)	APPROVE(1)	APPLAUD(1)
	APPLIED(3)	APPEASE(1)		APPLAUD(1)	APPLAUS(1)	APPLIED(2)
	APPEASE(1)	APPLAUD(1)			APPLIES(1)	APPEARS(1)
		APPLEALS(1)			APPLIED(1)	

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Expected Word	Role					
	DIRECTOR		ACTOR		OBSERVER	
	Negative (N= 10)	Positive (N= 12)	Negative (N = 10)	Positive (N = 12)	Negative (N= 10)	Positive (N = 12)
CON_ _ _ _	CONTACT(2)	CONTACT(1)	CONTACT(1)	CONFESS(1)	CONTROL(2)	CONNERS(1)
CONDONE	CONTENT(1)	CONCERT(1)	CONNECT(4)	CONDUCT(1)	CONTEND(1)	CONSENT(1)
CONDEMN	CONCEPT(3)	CONTROL(1)	CONTEST(1)	CONDEMN(1)	CONNECT(3)	CONSUME(2)
	CONNECT(1)	CONSIST(1)	CONSENT(1)	CONCEPT(1)	CONSILE(1)	CONFUSE(1)
	CONDUCT(1)	CONNECT(2)	CONTAIN(1)	CONSTUE(1)	CONTACT(1)	CONDUCE(1)
	CONSANT(1)	CONDUCT(1)	CONCEPT(2)	CONSENT(2)	CONJURE(2)	CONDEMN(1)
	CONSENT(1)	CONCEPT(1)		CONNECT(3)		CONTROL(1)
		CONTENT(1)		CONFIDE(1)		CONSOLE(1)
		CONVICT(2)		CONTENT(1)		CONTENT(1)
		CONCISE(1)				CONNECT(2)

Expected Word	Role					
	DIRECTOR		ACTOR		OBSERVER	
	Negative (N= 10)	Positive (N= 12)	Negative (N = 10)	Positive (N = 12)	Negative (N= 10)	Positive (N = 12)
SM_ _ _	SMALL(4)	SMART(2)	SMALL(3)	SMALL(7)	SMART(1)	SMALL(5)
SMILE	SMART(2)	SMALL(4)	SMART(5)	SMELL(1)	SMELL(2)	SMILE(3)
	SMILE(2)	SMELL(2)	SMILE(2)	SMILE(1)	SMALL(2)	SMART(3)
	SMELL(1)	SMILE(3)		SMART(3)	SMILE(5)	SMITE(1)
	SMOKE(1)	SMITH(1)				

Expected Word	Role					
	DIRECTOR		ACTOR		OBSERVER	
	Negative (N= 10)	Positive (N= 12)	Negative (N = 10)	Positive (N = 12)	Negative (N= 10)	Positive (N = 12)
BL_ _ _	BLIND(2)	BLAST(2)	BLAME(1)	BLAME(2)	BLUNT(3)	BLUES(2)
BLAME	BLING(1)	BLOOD(1)	BLANK(1)	BLACK(1)	BLADE(1)	BLANK(1)
	BLINK(1)	BLIND(2)	BLACK(3)	BLESS(2)	BLACK(3)	BLOCK(1)
	BLOOD(1)	BLISS(1)	BLIND(1)	BLOCK(2)	BLANK(2)	BLISS(1)
	BLUES(2)	BLACK(2)	BLINK(1)	BLANK(2)	BLAME(1)	BLOND(1)
	BLESS(1)	BLUNT(1)	BLESS(1)	BLUSH(1)		BLACK(1)
	BLOCK(1)	BLOWS(1)	BLAST(1)	BLIND(1)		BLIND(2)
	BLISS(1)	BLUES(1)	BLUNT(1)	BLUNT(1)		BLOOD(1)
						BLAME(1)
						BLAND(1)

Expected Word	Role					
	DIRECTOR		ACTOR		OBSERVER	
	Negative (N= 10)	Positive (N= 12)	Negative (N = 10)	Positive (N = 12)	Negative (N= 10)	Positive (N = 12)
RE_ _ _ _	REWIND(4)	REWIND(8)	REWIND(4)	REWIND(5)	REWARD(5)	REWIND(6)
REWARD	REWORD(1)	REWARD(3)	REWARD(6)	REWARD(7)	REWIND(3)	REWARD(3)
	REWARD(4)				REVIEW(1)	REVIEW(1)
	REWEAR(1)				REWORD(1)	REWORK(1)
						REWIRE(1)

Expected Word	Role					
	DIRECTOR		ACTOR		OBSERVER	
	Negative (N= 10)	Positive (N= 12)	Negative (N = 10)	Positive (N = 12)	Negative (N= 10)	Positive (N = 12)
SC_	SCALE(5)	SCARS(1)	SCORE(5)	SCARS(3)	SCARE(3)	SCOUT(2)
SCORN	SCONE(1)	SCARY(1)	SCORN(1)	SCARE(3)	SCOOT(1)	SCENT(1)
	SCORE(2)	SCRAP(1)	SCARE(1)	SCORE(1)	SCORE(3)	SCARE(2)
	SCENE(1)	SCORE(1)	SCALE(1)	SCOUT(2)	SCOLE(1)	SCARS(1)
	SCUBA(1)	SCARE(2)	SCARD(1)	SCARF(1)	SCALE(1)	SCOTS(1)
	SCRAM(1)	SCALE(2)	SCOLD(1)	SCENT(1)	SCANT(1)	SCUMB(1)
		SCOUT(1)		SCRUB(1)		SCAMS(1)
		SCOPE(1)				SCONE(1)
						SCORE(1)
						SCOLD(1)

Expected Word	Role					
	DIRECTOR		ACTOR		OBSERVER	
	Negative (N= 10)	Positive (N= 12)	Negative (N = 10)	Positive (N = 12)	Negative (N= 10)	Positive (N = 12)
SUP_ _ _ _	SUPREME(2)	SUPPORT(4)	SUPPOSE(3)	SUPPERS(2)	SUPRISE(2)	SUPPERS(3)
SUPPORT	SUPPORT(2)	SUPLANT(1)	SUPRISE(4)	SUPRISE(5)	SUPPRESS(2)	SUPPRESS(1)
	SUPPOSE(1)	SUPPERS(2)	SUPPRESS(1)	SUPPORT(3)	SUPPORT(4)	SUPPOSE(2)
	SUPRISE(4)	SUPREME(1)		SUPPOSE(2)	SUPREME(1)	SUPPORT(3)
	SUPERIL(1)	SUPRISE(1)				SUPRISE(3)



Expected Word	Role					
	DIRECTOR		ACTOR		OBSERVER	
	Negative (N= 10)	Positive (N= 12)	Negative (N = 10)	Positive (N = 12)	Negative (N= 10)	Positive (N = 12)
SH_ _ _	SHOUT(1)	SHORT(2)	SHARE(1)	SHAVE(1)	SHARE(1)	SHIRT(2)
SHOOT	SHITE(1)	SHAME(1)	SHAME(1)	SHIPS(1)	SHOUT(2)	SHARE(1)
	SHIRT(2)	SHOWS(2)	SHOUT(4)	SHALL(1)	SHOOT(2)	SHARP(1)
	SHINE(1)	SHOWN(1)	SHORT(1)	SHOUT(1)	SHINE(1)	SHAME(1)
	SHOWS(1)	SHALL(1)	SHOES(1)	SHAME(1)	SHAKE(1)	SHACK(1)
	SHARE(1)	SHADE(2)	SHINE(1)	SHIRT(1)	SHORE(1)	SHIPS(2)
	SHOOT(1)	SHIFT(2)	SHALL(1)	SHOOT(2)	SHORT(1)	SHOOT(1)
	SHORT(1)	SHARE(1)		SHAKE(1)	SHALE(1)	SHILD(1)
	SHAPE(1)			SHARE(2)		SHAWL(1)
				SHORT(1)		SHORT(1)

Appendix J

*Correlation Matrix of Perceived Attitude Change, Mean Perceived Authorship, Behavioral Intentions, Herek Scale Scores, Word Completions, Free Recall Accuracy, Free Recall Positivity, Cued Recall Accuracy, Cued Recall Positivity, and Attitudes for Gay Men at Time 2 for all Participants (Director, Actor, and Observer), Experiment 1.*

Correlations		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Perc. Att. Chg.	Pearson Corr. Sig. N	1.000 .000 66	.796** .000 66	-.075 .551 66	-.200 .113 64	-.370** .002 66	-.175 .159 66	.083 .506 66	.172 .170 65	.047 .710 66	.217 .080 66	-.200 .108 66
Perc. Dir. Chg.	Pearson Corr. Sig. N	.796** .000 66	1.000 .000 66	.028 .825 66	-.146 .251 64	-.300* .014 66	-.176 .158 66	-.052 .676 66	.101 .425 65	-.009 .940 66	.173 .165 66	-.168 .178 66
Perc. Auth.	Pearson Corr. Sig. N	-.075 .551 66	.028 .825 66	1.000 .000 66	.013 .917 64	-.120 .337 66	.218 .079 66	-.013 .920 66	.098 .436 65	.024 .846 66	.040 .751 66	-.126 .313 66
Beh. Intent.	Pearson Corr. Sig. N	-.200 .113 64	-.146 .251 64	.013 .917 64	1.000 .000 64	.568** .000 64	.207 .101 64	-.001 .991 64	.179 .161 63	.029 .817 64	-.037 .770 64	.629** .000 64
Herek Scale Scores	Pearson Corr. Sig. N	-.370** .002 66	-.300* .014 66	-.120 .337 66	.568** .000 64	1.000 .000 66	-.079 .530 66	-.060 .635 66	-.084 .507 65	-.015 .905 66	-.037 .769 66	.673** .000 66

Correlations

		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Word Comp. Pos.	Pearson											
	Corr.	-.175	-.176	.218	.207	-.079	1.000	.084	.136	-.061	.134	.166
	Sig.	.159	.158	.079	.101	.530	.	.502	.279	.625	.284	.183
	N	66	66	66	64	66	66	66	65	66	66	66
Free Recall Acc.	Pearson											
	Corr.	.083	-.052	-.013	-.001	-.060	.084	1.000	.323**	.673**	.269*	.033
	Sig.	.506	.676	.920	.991	.635	.502	.	.009	.000	.029	.792
	N	66	66	66	64	66	66	66	65	66	66	66
Free Recall Pos.	Pearson											
	Corr.	.172	.101	.098	.179	-.084	.136	.323**	1.000	.269*	.570**	.158
	Sig.	.170	.425	.436	.161	.507	.279	.009	.	.030	.000	.210
	N	65	65	65	63	65	65	65	65	65	65	65
Cued Recall Acc.	Pearson											
	Corr.	.047	-.009	.024	.029	-.015	-.061	.673**	.269*	1.000	.245*	.010
	Sig.	.710	.940	.846	.817	.905	.625	.000	.030	.	.048	.938
	N	66	66	66	64	66	66	66	65	66	66	66
Cued Recall Pos.	Pearson											
	Corr.	.217	.173	.040	-.037	-.037	.134	.269*	.570**	.245*	1.000	.081
	Sig.	.080	.165	.751	.770	.769	.284	.029	.000	.048	.	.520
	N	66	66	66	64	66	66	66	65	66	66	66
Att. Toward GM T2	Pearson											
	Corr.	-.200	-.168	-.126	.629**	.673**	.166	.033	.158	.010	.081	1.000
	Sig.	.108	.178	.313	.000	.000	.183	.792	.210	.938	.520	.
	N	66	66	66	64	66	66	66	65	66	66	66

\*\*Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

## Appendix K

*Correlation Matrix of Perceived Attitude Change, Mean Perceived Authorship, Behavioral Intentions, Herek Scale Scores, Word Completions, Free Recall Accuracy, Free Recall Positivity, Cued Recall Accuracy, Cued Recall Positivity, and Attitudes for Gay Men at Time 2 for Directors, Experiment 1.*

Correlations		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Perc. Att. Chg.	Pearson Corr. Sig. N	1.000 .005 22	.581** .005 22	.089 .695 22	.033 .885 22	-.111 .624 22	-.083 .712 22	.015 .946 22	.453* .034 22	.084 .709 22	.285 .199 22	.090 .690 22
Perc. Dir. Chg.	Pearson Corr. Sig. N	.581** .005 22	1.000 .005 22	.034 .881 22	-.195 .384 22	-.263 .237 22	.081 .721 22	-.102 .650 22	.353 .107 22	-.050 .826 22	.152 .501 22	-.036 .875 22
Perc. Auth.	Pearson Corr. Sig. N	.089 .695 22	.034 .881 22	1.000 .005 22	.323 .143 22	-.035 .878 22	.361 .099 22	.037 .871 22	.353 .107 22	-.050 .826 22	.152 .501 22	-.036 .875 22
Beh. Intent.	Pearson Corr. Sig. N	.033 .885 22	-.195 .384 22	.323 .143 22	1.000 .005 22	.323 .143 22	.137 .543 22	-.091 .686 22	.226 .312 22	-.066 .771 22	-.379 .082 22	.499* .018 22
Herek Scale Scores	Pearson Corr. Sig. N	-.111 .624 22	-.263 .237 22	-.035 .878 22	.323 .143 22	1.000 .005 22	-.082 .718 22	-.341 .120 22	-.327 .137 22	-.199 .374 22	-.361 .099 22	.558** .007 22

Correlations

		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Word Comp. Pos.	Pearson											
	Corr.	-.083	.081	.361	.137	-.082	1.000	-.107	.272	-.233	.321	.175
	Sig.	.712	.721	.099	.543	.718	.	.635	.222	.297	.145	.435
	N	22	22	22	22	22	22	22	22	22	22	22
Free Recall Acc.	Pearson											
	Corr.	.015	-.102	.037	-.091	-.341	-.107	1.000	.336	.792**	.202	-.201
	Sig.	.946	.650	.871	.686	.120	.635	.	.127	.000	.367	.370
	N	22	22	22	22	22	22	22	22	22	22	22
Free Recall Pos.	Pearson											
	Corr.	.453*	.353	.450*	.226	-.327	.272	.336	1.000	.213	.465*	.230
	Sig.	.034	.107	.036	.312	.137	.222	.127	.	.341	.029	.303
	N	22	22	22	22	22	22	22	22	22	22	22
Cued Recall Acc.	Pearson											
	Corr.	.084	-.050	.035	-.066	-.199	-.233	.792**	.213	1.000	.119	-.216
	Sig.	.709	.826	.877	.771	.374	.297	.000	.341	.	.599	.335
	N	22	22	22	22	22	22	22	22	22	22	22
Cued Recall Pos.	Pearson											
	Corr.	.285	.152	-.006	-.379	-.361	.321	.202	.465*	.119	1.000	-.009
	Sig.	.199	.501	.979	.082	.099	.145	.367	.029	.599	.	.968
	N	22	22	22	22	22	22	22	22	22	22	22
Att. Toward GM T2	Pearson											
	Corr.	.090	-.036	-.120	.499*	.558**	.175	-.201	.230	-.216	-.009	1.000
	Sig.	.690	.875	.594	.018	.007	.435	.370	.303	.335	.968	.
	N	22	22	22	22	22	22	22	22	22	22	22

\*\*Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

## Appendix L

*Correlation Matrix of Perceived Attitude Change, Mean Perceived Authorship, Behavioral Intentions, Herek Scale Scores, Word Completions, Free Recall Accuracy, Free Recall Positivity, Cued Recall Accuracy, Cued Recall Positivity, and Attitudes for Gay Men at Time 2 for Actors, Experiment 1.*

Correlations		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Perc. Att. Chg.	Pearson Corr. Sig. N	1.000 . 22	.926** .000 22	-.153 .497 22	-.384 .095 20	-.614** .002 22	-.307 .164 22	.207 .355 22	.117 .604 22	.062 .784 22	.308 .163 22	-.387 .075 22
Perc. Dir. Chg.	Pearson Corr. Sig. N	.926** .000 22	1.000 . 22	-.253 .256 22	-.412 .071 20	-.667** .001 22	-.315 .154 22	.084 .711 22	.015 .946 22	.029 .898 22	.205 .361 22	-.394 .070 22
Perc. Auth.	Pearson Corr. Sig. N	-.153 .497 22	-.253 .256 22	1.000 . 22	-.070 .771 20	-.023 .918 22	.133 .556 22	.004 .987 22	.221 .323 22	.046 .839 22	.174 .438 22	-.082 .718 22
Beh. Intent.	Pearson Corr. Sig. N	-.384 .095 20	-.412 .071 20	-.070 .771 20	1.000 . 20	.794** .000 20	.281 .230 20	.164 .489 20	.369 .109 20	.159 .502 20	.101 .671 20	.814** .000 20
Herek Scale Scores	Pearson Corr. Sig. N	-.614** .002 22	-.667** .001 22	-.023 .918 22	.794** .000 20	1.000 . 22	.386 .076 22	.003 .991 22	.174 .439 22	.051 .821 22	.092 .684 22	.849** .000 22

Correlations

		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Word Comp. Pos.	Pearson Corr.	-.307	-.315	.133	.281	.386	1.000	.202	.293	.112	.233	.468*
	Sig.	.164	.154	.556	.230	.076	.	.367	.186	.619	.297	.028
	N	22	22	22	20	22	22	22	22	22	22	22
Free Recall Acc.	Pearson Corr.	.207	.084	.004	.164	.003	.202	1.000	.470*	.666**	.212	.181
	Sig.	.355	.711	.987	.489	.991	.367	.	.027	.001	.343	.421
	N	22	22	22	20	22	22	22	22	22	22	22
Free Recall Pos.	Pearson Corr.	.117	.015	.221	.369	.174	.293	.470*	1.000	.419	.611**	.228
	Sig.	.604	.946	.323	.109	.439	.186	.027	.	.052	.029	.308
	N	22	22	22	20	22	22	22	22	22	22	22
Cued Recall Acc.	Pearson Corr.	.062	.029	.046	.159	.051	.112	.666**	.419	1.000	.413	.180
	Sig.	.784	.898	.839	.502	.821	.619	.001	.052	.	.056	.422
	N	22	22	22	20	22	22	22	22	22	22	22
Cued Recall Pos.	Pearson Corr.	.308	.205	.174	.101	.092	.233	.212	.611**	.413	1.000	.160
	Sig.	.163	.361	.438	.671	.684	.297	.343	.003	.056	.	.476
	N	22	22	22	20	22	22	22	22	22	22	22
Att. Toward GM T2	Pearson Corr.	-.387	-.394	-.082	.814**	.849**	.468*	.181	.228	.180	.160	1.000
	Sig.	.075	.070	.718	.000	.000	.028	.421	.308	.422	.476	.
	N	22	22	22	20	22	22	22	22	22	22	22

\*\*Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

## Appendix M

*Correlation Matrix of Perceived Attitude Change, Mean Perceived Authorship, Behavioral Intentions, Herek Scale Scores, Word Completions, Free Recall Accuracy, Free Recall Positivity, Cued Recall Accuracy, Cued Recall Positivity, and Attitudes for Gay Men at Time 2 for Observers, Experiment 1.*

### Correlations

		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Perc. Att. Chg.	Pearson Corr. Sig. N	1.000 .000 22	-.227 .310 22	.086 .703 22	-.308 .163 22	-.390 .073 22	.081 .720 22	.053 .814 22	.005 .984 21	.163 .468 22	-.021 .926 22	-.350 .111 22
Perc. Dir. Chg.	Pearson Corr. Sig. N	-.227 .310 22	1.000 .000 22	-.052 .817 22	.405 .062 22	.385 .077 22	-.140 .535 22	-.116 .608 22	.117 .612 21	.140 .533 22	.192 .392 22	.209 .351 22
Perc. Auth.	Pearson Corr. Sig. N	.086 .703 22	-.052 .817 22	1.000 .000 22	.058 .796 22	-.240 .281 22	.318 .149 22	.182 .418 22	.192 .404 21	-.095 .673 22	.359 .101 22	.222 .321 22
Beh. Intent.	Pearson Corr. Sig. N	-.308 .163 22	.405 .062 22	.058 .796 22	1.000 .000 22	.565** .006 22	.306 .166 22	.005 .983 22	-.136 .558 21	.073 .748 22	.110 .627 22	.597** .003 22
Herek Scale Scores	Pearson Corr. Sig. N	-.390 .073 22	.385 .077 22	-.240 .281 22	.565** .006 22	1.000 .000 22	-.378 .082 22	.249 .264 22	-.125 .590 21	.185 .411 22	.063 .779 22	.586** .004 22



Correlations

		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Word Comp. Pos.	Pearson											
	Corr.	.081	-.140	.318	.306	-.378	1.000	.129	-.129	-.084	-.027	-.026
	Sig.	.720	.535	.149	.166	.082	.	.567	.577	.710	.905	.909
	N	22	22	22	22	22	22	22	21	22	22	22
Free Recall Acc.	Pearson											
	Corr.	.053	-.116	.182	.005	.249	.129	1.000	.090	.487*	.458*	.288
	Sig.	.814	.608	.418	.983	.264	.567	.	.697	.021	.032	.194
	N	22	22	22	22	22	22	22	21	22	22	22
Free Recall Pos.	Pearson											
	Corr.	.005	.117	.192	-.136	-.125	-.129	.090	1.000	.219	.674**	-.139
	Sig.	.984	.612	.404	.558	.590	.577	.697	.	.340	.001	.547
	N	21	21	21	21	21	21	21	21	21	21	21
Cued Recall Acc.	Pearson											
	Corr.	.163	.140	-.095	.073	.185	-.084	.487*	.219	1.000	.281	.238
	Sig.	.468	.533	.673	.748	.411	.710	.021	.340	.	.205	.285
	N	22	22	22	22	22	22	22	21	22	22	22
Cued Recall Pos.	Pearson											
	Corr.	-.021	.192	.359	.110	.063	-.027	.458*	.674**	.281	1.000	.059
	Sig.	.926	.392	.101	.627	.779	.905	.032	.001	.205	.	.793
	N	22	22	22	22	22	22	22	21	22	22	22
Att. Toward GM T2	Pearson											
	Corr.	-.350	.209	.222	.597**	.586**	-.026	.288	-.139	.238	.059	1.000
	Sig.	.111	.351	.321	.003	.004	.909	.194	.547	.285	.793	.
	N	22	22	22	22	22	22	22	21	22	22	22

\*\*Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

Appendix N  
STATEMENT OF CONSENT – Fall 2005

I, the undersigned, do hereby give my informed consent to my participation in the  
**Memory for Multiple Modalities Study.**

I have been informed about each of the following:

- The purpose of the study is to recall various modalities as they are presented in the experiment.
- During the experiment, I may be asked to do one or more of the following:  
Make or watch various hand gestures  
Listen to instructions given by the experimenter  
View slides or other images  
Be tested on my memory for spoken words and visual sights
- The benefits of the study include the opportunity to be involved in psychological experiments like the ones I've learned about in class.
- The risks of the study are negligible. After the completion of the study, the experimenter will answer any questions that I may have about the procedures.
- I understand that I will receive credit for this experiment at its completion and I cannot receive credit for participation in the current experiment more than once.

I understand that I may withdraw at any time before or during the experiment at my option.

Recognizing the importance of avoiding bias in the results of this experiment, I agree not to discuss any of the details of the procedure with other participants. I understand that all of the research and evaluation materials will be confidentially maintained. The means used to maintain confidentiality are:

8. My data will be given a code number for research identification, and my name will be kept anonymous.
9. Data, along with consent forms, will be kept in a locked file cabinet.
10. Only the investigators will have access to my identification data.

I understand that if I have questions concerning the research, I can call the following persons:

Cheryl A. Taylor, Charles G. Lord – Principal Investigators  
Department of Psychology  
257-7416

Jan Fox, TCU Coordinator  
Research and Sponsored  
Projects  
257-7515

Dr Don Dansereau  
Chair, Department of Psychology  
Human Subjects Committee  
257-7410

Dr. Timothy Hubbard  
TCU Committee on Safeguards  
of Human Subjects – Psychology  
257-7410

\_\_\_\_\_  
Participant's Name (PLEASE PRINT)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Participant's Signature

\_\_\_\_\_  
Phone Number

\_\_\_\_\_  
Participant's TCU Student ID#

\_\_\_\_\_  
Professor

Appendix O  
Hand Gesture Instructions

Beginning slide (no instruction)

1. Bull Snake → **PUSH AWAY BOTH HANDS**
2. Sunset on Lake Charles, LA → **WAVE HELLO LEFT HAND**
3. Cars Driving in the City → **SPREAD FINGERS LEFT HAND**
4. Gay Men Embracing → **OKAY SIGN LEFT HAND (*POSITIVE*)**  
**THUMBS DOWN BOTH HANDS (*NEGATIVE*)**
5. Skyscrapers in Singapore → **EXTEND LITTLE FINGER RIGHT HAND**
6. Cars on Kentucky Highway → **NAILS TOWARD FACE BOTH HANDS**
7. Lake Sunset → **PULL HANDS TOWARD YOU BOTH HANDS**
8. Timber Rattlesnake → **PALMS DOWN BOTH HANDS**
9. Skyscrapers in New York City → **SPREAD FINGERS RIGHT HAND**
10. Gay Men Kissing → **THUMBS UP BOTH HAND (*POSITIVE*)**  
**SHAKE FIST RIGHT HAND (*NEGATIVE*)**
11. Skyscrapers in Pittsburgh → **ROTATE THUMBS BOTH HANDS**
12. Cars on a Mountain Highway → **PALMS UP BOTH HANDS**
13. Gay Men getting Married → **WAVE HELLO RIGHT HAND (*POSITIVE*)**  
**CHOPPING MOTION RIGHT HAND (*NEGATIVE*)**
14. Sunset over Ocean → **PEACE SIGN RIGHT HAND**
15. Honduran Milk Snake → **CHOPPING MOTION LEFT HAND**

Appendix P  
**Memories and Modality Study**

Please circle your answers for each of the following questions.

1. How much control did you feel that you had over the arms' movements?

1	2	3	4	5	6	7
Not at All						Very Much

2. To what degree did you feel you were consciously willing the arms to move?

1	2	3	4	5	6	7
Not at All						Very Much

3. To what degree did the arms look like they belonged to you?

1	2	3	4	5	6	7
Not at All						Very Much

4. To what degree did the arms feel like they belonged to you?

1	2	3	4	5	6	7
Not at All						Very Much

5. How much control did you feel that you had over which specific gestures went with each slide?

1	2	3	4	5	6	7
Not at All						Very Much

6. To what degree did you feel that you made the specific gesture happen for each slide?

1	2	3	4	5	6	7
Not at All						Very Much

7. To what degree did you feel that you were personally responsible for the specific gestures that went with each slide?

1	2	3	4	5	6	7
Not at All						Very Much

8. To what degree did you consciously will the specific gestures to occur for each slide?

1	2	3	4	5	6	7
Not at All						Very Much

9. To what degree did you feel like the specific gestures that were made for each slide belonged to you?

1	2	3	4	5	6	7
Not at All						Very Much

10. To what degree did you feel that the specific gestures that went with each slide originated from you?

1	2	3	4	5	6	7
Not at All						Very Much

11. To what degree did you feel as though you were the author of the specific gestures that accompanied each slide?

1	2	3	4	5	6	7
Not at All						Very Much

12. To what degree did you feel a sense of ownership for the specific gestures that accompanied each slide?

1	2	3	4	5	6	7
Not at All						Very Much

Appendix Q  
**STATEMENT OF CONSENT – Fall 2005**

I, the undersigned, do hereby give my informed consent to my participation in the  
**Attitudes and Opinions Study.**

I have been informed about each of the following:

- The purpose of the study is to ask my attitudes and opinions about various social groups.
- During the experiment, I may be asked to do the following:
- Accurately and honestly report my attitudes and opinions on a variety of current topics.
- Answer word completion questions.
- The benefits of the study include the opportunity to be involved in psychological experiments like the ones I've learned about in class.
- The risks of the study are negligible. After the completion of the study, the experimenter will answer any questions that I may have about the procedures.
- I understand that I will receive credit for this experiment at its completion and I cannot receive credit for participation in the current experiment more than once.

I understand that I may withdraw at any time before or during the experiment at my option.

Recognizing the importance of avoiding bias in the results of this experiment, I agree not to discuss any of the details of the procedure with other participants. I understand that all of the research and evaluation materials will be confidentially maintained. The means used to maintain confidentiality are:

11. My data will be given a code number for research identification, and my name will be kept anonymous.
12. Data, along with consent forms, will be kept in a locked file cabinet.
13. Only the investigators will have access to my identification data.

I understand that if I have questions concerning the research, I can call the following persons:

Cheryl A. Taylor, Charles G. Lord – Principal Investigators  
Department of Psychology  
257-7417

Jan Fox, TCU Coordinator  
Research and Sponsored Projects  
257-7515

Dr Don Dansereau  
Chair, Department of Psychology  
Human Subjects Committee  
257-7410

Dr. Timothy Hubbard  
TCU Committee on Safeguards  
of Human Subjects – Psychology  
257-7410

\_\_\_\_\_  
Participant's Name (PLEASE PRINT)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Participant's Signature

\_\_\_\_\_  
Phone Number

\_\_\_\_\_  
Participant's TCU Student ID#

\_\_\_\_\_  
Professor

Appendix R  
Attitudes and Opinion Study

Instructions:

**Please answer the following questions using the scale below:**

-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
							Neutral							
Extremely Unfavorable								Extremely Favorable						

What is your attitude toward politicians? \_\_\_\_\_

What is your attitude toward professors? \_\_\_\_\_

What is your attitude toward gay men? \_\_\_\_\_

What is your attitude toward former mental patients? \_\_\_\_\_

What is your attitude toward welfare? \_\_\_\_\_

What is your attitude toward abortion? \_\_\_\_\_

What is your attitude toward exercising? \_\_\_\_\_

What is your attitude toward lawyers? \_\_\_\_\_

What is your attitude toward newscasters? \_\_\_\_\_

What is your attitude toward professional athletes? \_\_\_\_\_

What is your attitude toward studying? \_\_\_\_\_

What is your attitude toward sunsets? \_\_\_\_\_

What is your attitude toward snakes? \_\_\_\_\_

What is your attitude toward capital punishment? \_\_\_\_\_

What is your attitude toward cars? \_\_\_\_\_

What is your attitude toward lesbians? \_\_\_\_\_

What is your attitude toward buildings? \_\_\_\_\_











Answer the following questions about gay men. Please place one X on each of the scales below to indicate how willing you would be (if asked) to participate in each of the activities with gay men. The direction toward which you check, of course, depends upon which of the two ends of the scale you are more willing to participate in.

Sign A Lot of Petitions Against Their Group	Sign A Moderate Amount of Petitions Against Their Group	Sign A Few Petitions Against Their Group	Sign No Petitions For or Against Their Group	Sign A Few Petitions For Their Group	Sign A Moderate Amount of Petitions For Their Group	Sign A Lot of Petitions For Their Group
---	---	--	--	--	---	---

Give them a lot of Disapproving looks	Give them a moderate amount of Disapproving looks	Give them a few Disapproving Looks	Give them no Disapproving or Approving looks	Give them a few Approving looks	Give them a moderate amount of Approving looks	Give them a lot Approving looks
--	---	--	--	------------------------------------	--	------------------------------------

Volunteer A lot of time against them	Volunteer a Moderate amount of time Against them	Volunteer a little time against them	Volunteer no time for or against them	Volunteer a little time for them	Volunteer a Moderate amount of time	Volunteer A lot of of time for them for them
---	--	---	--	-------------------------------------	--	--

Frown a lot at them	Frown a moderate amount at them	Frown a little at them	Neither smile nor frown at them	Smile a little at them	Smile a moderate amount at them	Smile a lot at them
---------------------	------------------------------------	---------------------------	------------------------------------	---------------------------	------------------------------------	---------------------

Attempt to keep them from a lot of jobs	Attempt to keep them from a moderate amount of jobs	Attempt to keep them from a few jobs	Neither get them or keep them from jobs	Attempt to get them a few jobs	Attempt to get them a moderate amount of jobs	Attempt to get them a lot of jobs
Tune them out a lot	Tune them out a moderate amount	Tune them out a little	Neither tune them out or pay attention	Pay a little attention to them	Pay a moderate amount of attention	Pay a lot of attention to them
Raise a lot of money against them	Raise a moderate amount of money against them	Raise a little money against them	Raise no money for or against them	Raise a little money for them	Raise a moderate amount of money for them	Raise a lot of money for them
Treat them different from others a lot	Treat them different from others a moderate amount	Treat them different from others a little	Treat them neither different nor the same	Treat them the same as others a little	Treat them the same as others a moderate amount	Treat them the same as others a lot

Appendix S  
**Memories and Modalities Study**

Please complete the following questionnaires regarding the projected images and hand gestures presented during the experiment.

1. Which three hand gestures accompanied the three pictures of sunsets?

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2. Which three hand gestures accompanied the three pictures of the cars on highways?

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---

---

3. Which three hand gestures accompanied the three pictures of the snakes?

---

---

---

4. Which three hand gestures accompanied the three pictures of the skyscrapers?

---

---

---

5. Which three hand gestures accompanied the three pictures of the gay men?

---

---

---

Please match the following images with their appropriate hand gestures. Indicate your selection of the hand gesture in the space provided.

- |  |                                     |
|--|-------------------------------------|
| a. Skyscrapers at dawn_____              | 1. spread fingers right hand        |
| b. Timber rattlesnake_____               | 2. wave hello right hand            |
| c. Gay men kissing_____                  | 3. okay sign left hand              |
| d. Pittsburgh skyscrapers_____           | 4. palms down both hands            |
| e. Cars driving in city_____             | 5. peace sign right hand            |
| f. Bull snake sunning on a rock_____     | 6. wave hello left hand             |
| g. Sunset on ocean_____                  | 7. thumbs down both hands           |
| h. Cars driving on mountain highway_____ | 8. chopping motion left hand        |
| i. Skyscrapers in Singapore_____         | 9. nails toward face both hands     |
| j. Lake sunset with cirrus clouds_____   | 10. chopping motion right hand      |
| k. Gay men getting married_____          | 11. spread finger left hand         |
| l. Cars on highway_____                  | 12. extend little finger right hand |
| m. Honduran milk snake_____              | 13. thumbs up both hands            |
| n. Gay men embracing_____                | 14. shake fist right hand           |
| o. Sunset on Lake Charles, LA_____       | 15. palms up both hands             |
|  | 16. push away both hands            |
|  | 17. pull hands toward               |
|  | 18. rotate thumbs both hands        |

Appendix T  
Post-Experimental Assessment Questionnaire

Debriefing Questions:

Questions about the **Memory for Multiple Modalities (MMM) study**:

What do you think was the purpose of the **MMM study**?

---

---

What were the researchers trying to prove in the **MMM study**?

---

---

Questions about the **Attitudes & Opinions (A&O) study**:

What do you think was the purpose of the **A&O study**?

---

---

What were the researchers trying to prove in the **A&O study**?

---

---



If the **Memories for Multiple Modalities** study was about anything other than or in addition to what the experimenter shared with you, what might else might it have been about?

---

---

If the **Attitudes & Opinions** study was about anything other than or in addition to what the experimenter shared with you, what might else might it have been about?

---

---

Is there any way that the two studies could have been connected with each other? If they were, what might that connection have been?

---

---

If the Memories for Multiple Modalities study and the Attitudes & Opinions study were connected with each other in one big study, what do you think the purpose of that study would have been?

---

---

If the Memories for Multiple Modalities study and the Attitudes & Opinions study were connected with each other in one big study, what might the researchers in that study have been trying to prove?

---

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## Appendix U

Please answer the following questions on the following pages regarding others' attitudes toward various objects. Circle the appropriate number on an 11 point scale with -5 being *very negative* and +5 being *very positive*. Please also indicate which role you were in the preceding experiment by circling the appropriate category below.

Perceiver

Hand Helper

Observer

1. What was the perceiver's attitude toward sunsets *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

2. What was the perceiver's attitude toward sunsets *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

3. What was the perceiver's attitude toward cars on a highway *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

4. What was the perceiver's attitude toward cars on a highway *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

5. What was the perceiver's attitude toward snakes *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

6. What was the perceiver's attitude toward snakes *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

7. What was the perceiver's attitude toward skyscrapers *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

8. What was the perceiver's attitude toward skyscrapers *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

9. What was the perceiver's attitude toward gay men *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

10. What was the perceiver's attitude toward gay men *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

11. What was the hand helper's attitude toward sunsets *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

12. What was the hand helper's attitude toward sunsets *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

13. What was the hand helper's attitude toward cars on a highway *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

14. What was the hand helper's attitude toward cars on a highway *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

15. What was the hand helper's attitude toward snakes *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

16. What was the hand helper's attitude toward snakes *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

17. What was the hand helper's attitude toward skyscrapers *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

18. What was the hand helper's attitude toward skyscrapers *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

19. What was the hand helper's attitude toward gay men *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

20. What was the hand helper's attitude toward gay men *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

21. What was the observer's attitude toward sunsets *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

22. What was the observer's attitude toward sunsets *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

23. What was the observer's attitude toward cars on a highway *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

24. What was the observer's attitude toward cars on a highway *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

25. What was the observer's attitude toward snakes *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

26. What was the observer's attitude toward snakes *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

27. What was the observer's attitude toward skyscrapers *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive



28. What was the observer's attitude toward skyscrapers *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

29. What was the observer's attitude toward gay men *before* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

30. What was the observer's attitude toward gay men *after* the experiment?

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Very Negative					Neutral					Very Positive

Appendix V  
Debriefing

The two experiments were actually related to each other. We were wondering whether the gestures that people make or observe might affect their own attitudes and opinions. You might have noticed that the Attitudes & Opinions part of the study had questions about some of the types of objects and people that were shown in the slides. We thought that the gestures that accompanied these slides might have altered people's subsequent attitudes and opinions. If you made or saw positive gestures when that type of object or person was shown on the screen, for instance, we thought that might affect the attitudes that you later reported having toward that type of object or person. We included the questions about control over the arms because we thought attitudes might change more if people felt responsible for the gestures than if they did not, and we included the memory test because we thought that attitudes might not change if people could not remember which gestures went with which slides.

Do you think that the experiment will work? Do you think that the average person will change his or her attitudes in the (positive or negative) direction of the gestures that accompanied the objects and people shown on the slides?

Yes    No

If you circled yes, please explain why you think it will work. If you circled no, please explain why you think it will not work.

---

---

Do you think it worked for you? Do you think you changed your attitudes in the (positive or negative) direction of the gestures that accompanied the objects and people shown on the slides?

Yes    No

If you circled yes, please explain why you think it worked for you. If you circled no, please explain why you think it did not work for you.

---

---

Appendix W

*Number of Words Correctly or Incorrectly Completed by Role and Condition, Experiment 2.*

Expected Word	Role					
	PERCEIVER		HAND HELPER		OBSERVER	
	Negative (N= 16)	Positive (N= 17)	Negative (N = 16)	Positive (N = 17)	Negative (N= 16)	Positive (N = 17)
ACC_ _ _	ACCUTE(1)	ACCENT(4)	ACCEPT(5)	ACCENT(5)	ACCORD(4)	ACCORD(2)
ACCUSE	ACCEPT(7)	ACCUSE(2)	ACCESS(2)	ACCORD(2)	ACCEPT(4)	ACCUTE(2)
ACCEPT	ACCORD(2)	ACCROS(1)	ACCORD(5)	ACCUSE(3)	ACCENT(8)	ACCUSE(1)
	ACCENT(3)	ACCORD(3)	ACCENT(2)	ACCEPT(4)		ACCESS(2)
	ACCESS(1)	ACCOST(1)	ACCUSE(2)	ACCESS(1)		ACCENT(6)
		ACCEPT(2)		ACCELS(1)		ACCEPT(4)
		ACCUTE(1)				
		ACCESS(1)				

Expected Word	Role					
	PERCEIVER		HAND HELPER		OBSERVER	
	Negative (N= 16)	Positive (N= 17)	Negative (N = 16)	Positive (N = 17)	Negative (N= 16)	Positive (N = 17)
PU _ _ _	PULLS(1)	PURSE(1)	PUTTS(1)	PUKES(1)	PULLS(2)	PURSE(2)
PUNCH	PUFFY(2)	PULSE(2)	PURSE(4)	PUNKS(2)	PUSHY(2)	PUSHY(3)
	PULLY(2)	PUTTY(1)	PUPIL(1)	PUSHY(2)	PULSE(1)	PULLS(2)
	PUTTY(3)	PURGE(2)	PUSHY(1)	PUPIL(1)	PUTTY(2)	PUNTS(1)
	PUKED(1)	PUPPY(1)	PULLS(3)	PULSE(3)	PUPIL(1)	PUGGY(1)
	PULSE(1)	PUDLE(1)	PUNKS(1)	PUNCH(1)	PUNTS(1)	PUPPY(2)
	PURED(1)	PUSHY(1)	PULLLY(1)	PUMIS(1)	PUPPY(1)	PUNGE(1)
	PUNTS(1)	PUNTS(1)	PULSE(1)	PULLS(2)	PUNTS(1)	PURGE(2)
	PURSE(1)	PULLS(3)	PUNTS(1)	PUNTS(1)	PUFFY(1)	PULSE(1)
	PUMPS(1)	PUNKY(1)	PUNCH(1)	PUPPY(1)	PUGET(1)	PUSSY(1)
		PUNCH(1)	PURGE(1)	PURSE(1)	PUMPS(1)	PUMPS(1)
		PUSHS(1)			PUNCH(1)	
		PULLY(1)			PUDGY(1)	

Expected Word	Role					
	PERCEIVER		HAND HELPER		OBSERVER	
	Negative (N= 16)	Positive (N= 17)	Negative (N = 16)	Positive (N = 17)	Negative (N= 16)	Positive (N = 17)
APP_____	APPLIES(1)	APPEASE(2)	APPLIED(4)	APPEALS(1)	APPROVE(5)	APPEALL(1)
APPROVE	APPLIED(2)	APPLIED(4)	APPOINT(5)	APPENDS(1)	APPOINT(2)	APPLAUD(1)
	APPATHY(1)	APPROVE(4)	APPEALS(2)	APPLING(1)	APPLAUD(1)	APPEALS(2)
	APPROVE(1)	APPOINT(2)	APPROVE(3)	APPLIES(1)	APPATHY(1)	APPOINT(5)
	APPEALS(2)	APPLIES(1)	APPEARS(1)	APPEASE(2)	APPLIES(1)	APPLIES(4)
	APPENDS(1)	APPEALS(1)		APPROVE(3)	APPLIED(1)	APPEASE(1)
	APPLAUD(1)			APPLIED(2)	APPEALS(1)	APPLIED(2)
	APPOINT(1)			APPOINT(2)	APPERAL(1)	
	APPEARS(1)			APPLIES(1)		
	APPOINT(1)			APPEARS(1)		
	APPLAUD(1)					

Expected Word	Role					
	PERCEIVER		HAND HELPER		OBSERVER	
	Negative (N= 16)	Positive (N= 17)	Negative (N = 16)	Positive (N = 17)	Negative (N= 16)	Positive (N = 17)
CON_____	CONSEAL(1)	CONVICT(1)	CONCISE(1)	CONCISE(1)	CONTACT(2)	CONCISE(2)
CONDEMN	CONDOMS(1)	CONNECT(3)	CONNECT(2)	CONCERT(1)	CONNECT(2)	CONTACT(4)
CONDONE	CONCEPT(2)	CONDONE(1)	CONCORD(2)	CONCERN(2)	CONCISE(1)	CONDUCT(1)
	CONTROL(1)	CONTACT(1)	CONGRES(1)	CONDOM(1)	CONTROL(2)	CONNECT(2)
	CONTEST(1)	CONTROL(2)	CONCERT(1)	CONVICT(3)	CONCEDE(1)	CONFUSE(1)
	CONVICT(1)	CONFUSE(1)	CONTENT(1)	CONDEMN(1)	CONVERT(2)	CONTENT(1)
	CONSENT(1)	CONPAIR(1)	CONVICT(1)	CONNECT(3)	CONDUCT(1)	CONVICT(2)
	CONFINE(1)	CONCORD(1)	CONCEPT(4)	COFUSE(1)	CONJOIN(1)	CONCERT(1)
	CONTACT(2)	CONDEMN(1)	CONDUCT(1)	CONVERT(1)	CONJURE(1)	CONTENT(1)
	CONCERT(1)	CONJOIN(1)	CONTROL(1)	CONTEST(1)	CONFUSE(1)	CONJURE(1)
	CONNECT(1)	CONTACTS(1)		CONCORD	CONDUIT(1)	CONCEPT(1)
	CONJURE(1)	CONCAVE(1)			CONCEPT(1)	

Expected Word Continued

Role

PERCEIVER		HAND HELPER		OBSERVER	
Negative	Positive	Negative	Positive	Negative	Positive
(N= 16)	(N= 17)	(N = 16)	(N = 17)	(N= 16)	(N = 17)

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CONDUCT(1) CONDUCT(2)

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Expected Word	Role					
	PERCEIVER		HAND HELPER		OBSERVER	
	Negative (N= 16)	Positive (N= 17)	Negative (N = 16)	Positive (N = 17)	Negative (N= 16)	Positive (N = 17)
SM_ _ _	SMILE(5)	SMART(4)	SMILE(5)	SMILE(7)	SMALL(5)	SMALL(3)
SMILE	SMALL(6)	SMELL(3)	SMOCK(1)	SMART(4)	SMILE(6)	SMILE(6)
	SMART(3)	SMILE(4)	SMART(3)	SMALL(4)	SMART(1)	SMITH(2)
	SMELL(1)	SMALL(4)	SMALL(3)	SMACK(1)	SMUCK(1)	SMASH(1)
	SMACK(1)	SMOKE(2)	SMITE(1)	SMELL(1)	SMOCK(1)	SMART(1)
			SMELL(3)		SMELL(1)	SMOKE(1)
				SMOKE(1)	SMELL(1)	
					SMART(1)	
					SMACK(1)	

Expected Word	Role					
	PERCEIVER		HAND HELPER		OBSERVER	
	Negative (N= 16)	Positive (N= 17)	Negative (N = 16)	Positive (N = 17)	Negative (N= 16)	Positive (N = 17)
BL_ _ _	BLUNT(3)	BLANK(3)	BLOWS(1)	BLACK(4)	BLINK(2)	BLINK(1)
BLAME	BLIND(1)	BLUNT(2)	BLIND(3)	BLANK(2)	BLIND(4)	BLUSH(2)
	BLOOD(1)	BLURT(1)	BLUES(3)	BLIND(1)	BLACK(2)	BLUNT(2)
	BLINK(1)	BLOOM(1)	BLOCK(1)	BLOOD(2)	BLANK(2)	BLANK(3)
	BLACK(4)	BLACK(3)	BLACK(1)	BLUFF(1)	BLUES(2)	BLAND(1)
	BLAME(1)	BLAME(1)	BLADE(1)	BLEND(1)	BLOWS(1)	BLACK(2)
	BLEAK(1)	BLINK(1)	BLANK(1)	BLAZE(1)	BLAME(1)	BLIND(4)
	BLANK(3)	BLOCK(1)	BLOOM(1)	BLEED(1)	BLUNT(1)	BLISS(1)
	BLISS(1)	BLIND(4)	BLESS(1)	BLIMP(1)	BLOOD(1)	BLING(1)
			BLAME(1)	BLAKE(1)		
			BLINK(2)	BLOCK(1)		
				BLAME(1)		

Expected Word	Role					
	PERCEIVER		HAND HELPER		OBSERVER	
	Negative (N= 16)	Positive (N= 17)	Negative (N = 16)	Positive (N = 17)	Negative (N= 16)	Positive (N = 17)
REW_ _ _	REWIND(7)	REWARD(10)	REWIND(7)	REWARD(10)	REWIND(9)	REWIND(10)
REWARD	REWARD(8)	REWIND(4)	REWORD(2)	REWING(1)	REWORK(1)	REWORD(1)
	REWIRE(1)	REWORD(2)	REWARD(7)	REWIND(4)	REWARD(5)	REWARD(5)
		REWORK(1)		REWORD(1)	REWORD(1)	REWIEW(1)

Expected Word	Role					
	PERCEIVER		HAND HELPER		OBSERVER	
	Negative (N= 16)	Positive (N= 17)	Negative (N = 16)	Positive (N = 17)	Negative (N= 16)	Positive (N = 17)
SC_ _ _	SCORE(1)	SCENE(1)	SCARE(2)	SCALE(1)	SCOLD(1)	SCOUT(2)
SCOLD	SCOPE(1)	SCULL(1)	SCORE(2)	SCAMS(1)	SCORN(2)	SCOOT(1)
	SCARE(5)	SCORN(1)	SCANS(1)	SCENT(1)	SCORE(5)	SCUBA(1)
	SCOUR(1)	SCOUT(1)	SCALE(2)	SCORE(4)	SCALE(2)	SCANT(1)
	SCARS(1)	SCENT(1)	SCARY(1)	SCORN(1)	SCARE(1)	SCARS(2)
	SCALP(1)	SCARE(2)	SCALP(1)	SCARY(1)	SCRUB(1)	SCALE(1)
	SCOLD(1)	SCREW(1)	SCONE(1)	SCOOT(1)	SCOUR(1)	SCORE(4)
	SCRAM(1)	SCOLD(1)	SCOUT(3)	SCARE(3)	SCARY(1)	SCARE(2)
	SCOUT(1)	SCALE(3)	SCORN(1)	SCRAP(1)	SCRAP(2)	SCORN(1)
	SCALE(2)	SCORE(5)	SCARS(2)	SCONE(1)		SCENE(1)
				SCOUT(1)		SCOTT(1)
				SCENE(1)		

Expected Word

Role

	PERCEIVER		HAND HELPER		OBSERVER	
	Negative (N= 16)	Positive (N= 17)	Negative (N = 16)	Positive (N = 17)	Negative (N= 16)	Positive (N = 17)
SUP_ _ _ _ _	SUPREME(1)	SUPPOSE(2)	SUPPOSE(5)	SUPRISE(5)	SUPPERS(2)	SUPRISE(6)
SUPPORT	SUPERS(1)	SUPRISE(4)	SUPRISE(4)	SUPPERS(3)	SUPPORT(4)	SUPPORT(7)
	SUPRISE(3)	SUPPERS(2)	SUPREME(2)	SUPLIED(1)	SUPPOSE(2)	SUPPLES(1)
	SUPPOSE(4)	SUPPORT(4)	SUPPORT(2)	SUPPOSE(5)	SUPRISE(4)	SUPPERS(2)
	SUPPERS(1)		SUPPER(1)		SUPPRESS(1)	
	SUPERB(1)					

Expected Word	Role					
	PERCEIVER		HAND HELPER		OBSERVER	
	Negative (N= 16)	Positive (N= 17)	Negative (N = 16)	Positive (N = 17)	Negative (N= 16)	Positive (N = 17)
SH_ _ _	SHOWS(1)	SHARE(3)	SHIPS(1)	SHEET(1)	SHIFT(2)	SHOUT(3)
SHOOT	SHOUT(2)	SHIPS(1)	SHINE(2)	SHARE(2)	SHOWN(1)	SHARE(1)
	SHOCK(1)	SHINE(3)	SHOES(2)	SHIFT(1)	SHIRT(1)	SHALL(1)
	SHELL(1)	SHOUT(3)	SHIRT(1)	SHAME(2)	SHAPE(1)	SHOTS(1)
	SHOTS(1)	SHELL(1)	SHAKE(2)	SHACK(1)	SHOOT(2)	SHACK(1)
	SHAME(2)	SHOWS(1)	SHOUT(4)	SHOUT(3)	SHINE(2)	SHOES(2)
	SHEAR(1)	SHACK(1)	SHAPE(1)	SHORT(2)	SHOES(1)	SHINE(2)
	SHORN(1)	SHIRT(1)	SHARE(2)	SHOWN(1)	SHOUT(3)	SHOWN(2)
	SHACK(1)	SHARK(1)	SHORT(1)	SHAVE(1)	SHOWS(1)	SHORE(1)
	SHINE(3)	SHOES(2)		SHIPS(1)	SHOOK(1)	SHORT(1)
	SHALL(1)			SHILL(1)	SHALL(1)	SHIRT(1)
	SHUSH(1)			SHOOT(1)		SHARP(1)

## Appendix X

*Correlation Matrix of Perceived Attitude Change, Mean Perceived Authorship, Behavioral Intentions, Herek Scale Scores, Word Completions, Free Recall Accuracy, Free Recall Positivity, Cued Recall Accuracy, Cued Recall Positivity, and Attitudes for Gay Men at Time 2 for all Participants, (Perceivers, Hand Helpers, and Observers), Experiment 2.*

### Correlations

		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Perc. Att. Chg.	Pearson Corr. Sig. N	1.000 .000 99	-.399** .000 99	-.004 .970 99	-.135 .189 97	-.187 .064 99	-.120 .238 99	-.040 .693 99	-.278** .009 87	-.006 .950 99	-.096 .358 93	-.139 .171 99
Perc. Dir. Chg.	Pearson Corr. Sig. N	-.399** .000 99	1.000 .000 99	-.072 .479 99	.154 .133 97	.173 .087 99	.014 .890 99	.214* .033 99	.022 .840 87	.183 .069 99	-.041 .696 93	.097 .342 99
Perc. Auth.	Pearson Corr. Sig. N	-.004 .970 99	-.072 .479 99	1.000 .000 99	-.055 .595 97	-.241* .016 99	-.106 .295 99	-.429** .000 99	.188 .080 87	-.363** .000 99	.180 .085 93	-.104 .304 99
Beh. Intent.	Pearson Corr. Sig. N	-.135 .189 97	.154 .133 97	-.055 .595 97	1.000 .000 97	.699** .000 97	.148 .149 97	.105 .306 97	-.045 .680 85	.092 .372 97	-.108 .310 91	.721** .000 97
Herek Scale Scores	Pearson Corr. Sig. N	-.187 .064 99	.173 .087 99	-.241* .016 99	.699** .000 97	1.000 .000 99	.147 .146 99	.081 .424 99	-.091 .399 87	.025 .802 99	-.200 .054 93	.706** .000 99

Correlations

		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Word Comp. Pos.	Pearson											
	Corr.	-.120	.014	-.106	.148	.147	1.000	-.037	.079	-.151	-.015	.083
	Sig.	.238	.890	.295	.149	.146	.	.715	.466	.136	.890	.416
	N	99	99	99	97	99	99	99	87	99	93	99
Free Recall Acc.	Pearson											
	Corr.	-.040	.214*	-.429**	.105	.081	-.037	1.000	.079	.575**	-.116	.049
	Sig.	.693	.033	.000	.306	.424	.715	.	.469	.000	.268	.627
	N	99	99	99	97	99	99	99	87	99	93	99
Free Recall Pos.	Pearson											
	Corr.	-.278**	.022	.188	-.045	-.091	.079	.079	1.000	-.172	.439**	-.051
	Sig.	.009	.840	.060	.680	.399	.466	.469	.	.111	.000	.637
	N	87	87	87	85	87	87	87	87	87	87	87
Cued Recall Acc.	Pearson											
	Corr.	-.006	.183	-.363**	.092	.025	-.151	.575**	-.172	1.000	-.058	.053
	Sig.	.950	.069	.000	.372	.802	.136	.000	.111	.	.581	.602
	N	99	99	99	97	99	99	99	87	99	93	99
Cued Recall Pos.	Pearson											
	Corr.	-.096	-.041	.180	-.108	-.200	-.015	-.116	.439**	-.058	1.000	-.242*
	Sig.	.358	.696	.085	.310	.054	.890	.268	.000	.581	.	.020
	N	93	93	93	91	93	93	93	87	93	93	93
Att. Toward GM T2	Pearson											
	Corr.	-.139	.097	-.104	.721**	.706**	.083	.049	-.051	.053	-.242*	1.000
	Sig.	.171	.342	.304	.000	.000	.416	.627	.637	.602	.020	.
	N	99	99	99	97	99	99	99	87	99	93	99

\*\*Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).



## Appendix Y

*Correlation Matrix of Perceived Attitude Change, Mean Perceived Authorship, Behavioral Intentions, Herek Scale Scores, Word Completions, Free Recall Accuracy, Free Recall Positivity, Cued Recall Accuracy, Cued Recall Positivity, and Attitudes for Gay Men at Time 2 for Perceivers, Experiment 2.*

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Correlations

		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Perc. Att. Chg.	Pearson Corr. Sig. N	1.000 . 33	-.238 .181 33	.062 .734 33	-.044 .810 32	-.197 .272 33	-.129 .475 33	.177 .323 33	-.312 .077 33	.105 .560 33	-.301 .088 33	-.157 .384 33
Perc. Dir. Chg.	Pearson Corr. Sig. N	-.238 .181 33	1.000 . 33	-.080 .659 33	-.002 .991 32	-.024 .896 33	-.013 .943 33	.106 .557 33	-.047 .795 33	.259 .145 33	.073 .687 33	-.060 .739 33
Perc. Auth.	Pearson Corr. Sig. N	.062 .734 33	-.080 .659 33	1.000 . 33	.165 .367 32	.058 .748 33	-.159 .377 33	-.098 .587 33	.419* .015 33	.000 .999 33	.110 .542 33	.163 .364 33
Beh. Intent.	Pearson Corr. Sig. N	-.044 .810 32	-.002 .991 32	.165 .367 32	1.000 . 32	.815* .000 32	.015 .937 32	-.038 .837 32	-.039 .833 32	.054 .769 32	.127 .489 32	.496** .004 32
Herek Scale Scores	Pearson Corr. Sig. N	-.197 .272 32	-.024 .896 32	.058 .748 33	.815** .000 32	1.000 . 33	.264 .138 33	-.136 .450 33	-.100 .579 33	-.067 .711 33	-.035 .846 33	.683** .000 33

Correlations

		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Word Comp. Pos.	Pearson Corr. Sig. N	-.129 .475 33	-.013 .943 33	-.159 .377 33	.015 .937 32	.264 .138 33	1.000 .033 33	-.373* .082 33	-.307 .049 33	-.345* .049 33	-.123 .494 33	.117 .518 33
Free Recall Acc.	Pearson Corr. Sig. N	.177 .323 33	.106 .557 33	-.098 .587 33	-.038 .837 32	-.136 .450 33	-.373* .033 33	1.000 .866 33	.030 .866 33	.617** .000 33	.081 .653 33	-.243 .174 33
Free Recall Pos.	Pearson Corr. Sig. N	-.312 .077 33	-.047 .795 33	.419* .015 33	-.039 .833 32	-.100 .579 33	-.307 .082 33	.030 .866 33	1.000 .441 33	-.139 .441 33	.602** .000 33	.087 .631 33
Cued Recall Acc.	Pearson Corr. Sig. N	.105 .560 33	.259 .145 33	.000 .999 33	.054 .769 32	-.067 .711 33	-.345* .049 33	.617** .000 33	-.139 .441 33	1.000 .441 33	-.055 .759 33	-.233 .193 33
Cued Recall Pos.	Pearson Corr. Sig. N	-.301 .088 33	.073 .687 33	.110 .542 33	.127 .489 32	-.035 .846 33	-.123 .494 33	.081 .653 33	.602** .000 33	-.055 .759 33	1.000 .441 33	-.103 .569 33
Att. Toward GM T2	Pearson Corr. Sig. N	-.157 .384 33	-.060 .739 33	.163 .364 33	.496** .004 32	.683** .000 33	.117 .518 33	-.243 .174 33	.087 .631 33	-.233 .193 33	-.103 .569 33	1.000 .441 33

\*\*Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

## Appendix Z

*Correlation Matrix of Perceived Attitude Change, Mean Perceived Authorship, Behavioral Intentions, Herek Scale Scores, Word Completions, Free Recall Accuracy, Free Recall Positivity, Cued Recall Accuracy, Cued Recall Positivity, and Attitudes for Gay Men at Time 2 for Hand Helpers, Experiment 2.*

Correlations		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Perc. Att. Chg.	Pearson Corr. Sig. N	1.000 .461 33	-.133 .461 33	-.021 .906 33	.058 .748 33	.137 .447 33	.081 .654 33	.056 .757 33	.038 .870 21	-.010 .957 33	.008 .969 27	.039 .831 33
Perc. Dir. Chg.	Pearson Corr. Sig. N	-.133 .461 33	1.000 .461 33	-.172 .340 33	-.041 .820 33	.084 .642 33	-.221 .216 33	.039 .828 33	-.442* .045 21	.214 .233 33	-.267 .179 27	.043 .812 33
Perc. Auth.	Pearson Corr. Sig. N	-.021 .906 33	-.172 .340 33	1.000 .461 33	-.079 .662 33	-.466** .006 33	-.121 .501 33	.045 .802 33	-.050 .829 21	-.146 .419 33	-.017 .933 27	-.321 .068 33
Beh. Intent.	Pearson Corr. Sig. N	.058 .748 33	-.041 .820 33	-.079 .662 33	1.000 .461 33	.475** .005 33	-.025 .890 33	-.023 .897 33	.014 .951 21	.112 .535 33	.098 .626 27	.797** .000 33
Herek Scale Scores	Pearson Corr. Sig. N	.137 .447 33	.084 .642 33	-.466** .006 33	.475** .005 33	1.000 .461 33	-.147 .415 33	-.119 .511 33	-.231 .313 21	-.037 .838 33	-.126 .532 27	.638** .000 33

Correlations

		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Word Comp. Pos.	Pearson Corr. Sig. N	.081 .654 33	-.221 .216 33	-.121 .501 33	-.025 .890 33	-.147 .415 33	1.000 .33	.229 .200 33	.639** .002 21	-.052 .774 33	-.196 .328 27	-.116 .520 33
Free Recall Acc.	Pearson Corr. Sig. N	.056 .757 33	.039 .828 33	.045 .802 33	-.023 .897 33	-.119 .511 33	.229 .200 33	1.000 .33	.064 .783 21	.550** .001 33	-.278 .160 27	.061 .737 33
Free Recall Pos.	Pearson Corr. Sig. N	.038 .870 21	-.442 .045 21	-.050 .829 21	.014 .951 21	-.231 .313 21	.639** .002 21	.064 .783 21	1.000 .21	-.137 .555 21	.092 .691 21	-.052 .822 21
Cued Recall Acc.	Pearson Corr. Sig. N	-.010 .957 33	.214 .233 33	-.146 .419 33	.112 .535 33	-.037 .838 33	-.052 .774 33	.550** .001 33	-.137 .555 21	1.000 .33	-.129 .522 27	.228 .201 33
Cued Recall Pos.	Pearson Corr. Sig. N	.008 .969 27	-.267 .179 27	-.017 .933 27	.098 .626 27	-.126 .532 27	-.196 .328 27	-.278 .160 27	.092 .691 21	-.129 .522 27	1.000 .27	.059 .770 27
Att. Toward GM T2	Pearson Corr. Sig. N	.039 .831 33	.043 .812 33	-.321 .068 33	.797** .000 33	.638** .000 33	-.116 .520 33	.061 .737 33	-.052 .822 21	.228 .201 33	.059 .770 27	1.000 .33

\*\*Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

## Appendix AA

*Correlation Matrix of Perceived Attitude Change, Mean Perceived Authorship, Behavioral Intentions, Herek Scale Scores, Word Completions, Free Recall Accuracy, Free Recall Positivity, Cued Recall Accuracy, Cued Recall Positivity, and Attitudes for Gay Men at Time 2 for Observers, Experiment 2.*

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Correlations

		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Perc. Att. Chg.	Pearson Corr. Sig. N	1.000 .0050 33	-.890** .0050 33	-.180 .315 33	-.416* .018 32	-.367* .036 33	-.225 .209 33	-.496** .003 33	-.358* .041 33	.160 .375 33	.060 .739 33	-.207 .248 33
Perc. Dir. Chg.	Pearson Corr. Sig. N	-.890** .000 33	1.000 .000 33	.216 .227 33	.471** .006 33	.412* .017 33	.146 .419 33	.463 .007 33	.240 .178 33	.079 .662 33	-.088 .628 33	.217 .225 33
Perc. Auth.	Pearson Corr. Sig. N	-.180 .315 33	.216 .227 33	1.000 .000 33	.079 .666 32	-.102 .573 33	-.012 .946 33	.321 .069 33	.258 .147 33	.108 .549 33	.092 .612 33	-.035 .846 33
Beh. Intent.	Pearson Corr. Sig. N	-.416 .018 32	.471** .006 32	.079 .666 32	1.000 .000 32	.793** .000 32	.316 .078 32	.244 .178 32	-.067 .714 32	.047 .797 32	-.267 .139 32	.802** .000 32
Herek Scale Scores	Pearson Corr. Sig. N	-.367* .036 33	.412 .017 33	-.102 .573 33	.793** .000 32	1.000 .000 33	.225 .208 33	.180 .317 33	-.037 .837 33	-.040 .825 33	-.275 .121 33	.756** .000 33

Correlations

		Perc. Att. Chg.	Perc. Dir. Chg.	Perc. Auth.	Beh. Intent.	Herek Scale Score	Word Comp. Pos.	Free Recall Acc.	Free Recall Pos.	Cued Recall Acc.	Cued Recall Pos.	Att. Toward GM T2
Word Comp. Pos.	Pearson											
	Corr.	-.225	.146	-.012	.316	.225	1.000	-.137	.217	.282	.017	.142
	Sig.	.209	.419	.946	.078	.208	.	.446	.225	.113	.925	.430
	N	33	33	33	32	33	33	33	33	33	33	33
Free Recall Acc.	Pearson											
	Corr.	-.358*	.463**	.321	.244	.180	-.137	1.000	.217	.282	.017	.142
	Sig.	.041	.007	.069	.178	.317	.446	.	.225	.113	.925	.430
	N	33	33	33	32	33	33	33	33	33	33	33
Free Recall Pos.	Pearson											
	Corr.	-.358*	.240	.258	-.067	-.037	.186	.217	1.000	-.172	.424*	-.164
	Sig.	.041	.178	.147	.714	.837	.299	.225	.	.338	.014	.362
	N	33	33	33	32	33	33	33	33	33	33	33
Cued Recall Acc.	Pearson											
	Corr.	-.160	.079	.108	.047	-.040	-.160	.282	-.172	1.000	.087	.110
	Sig.	.375	.662	.549	.797	.825	.373	.113	.338	.	.631	.543
	N	33	33	33	32	33	33	33	33	33	33	33
Cued Recall Pos.	Pearson											
	Corr.	.060	-.088	.092	-.267	-.275	.131	.017	.424*	.087	1.000	-.421*
	Sig.	.739	.628	.612	.139	.121	.467	.925	.014	.631	.	.015
	N	33	33	33	32	33	33	33	33	33	33	33
Att. Toward GM T2	Pearson											
	Corr.	-.207	.217	-.035	.802**	.756**	.161	.142	-.164	.110	-.421*	1.000
	Sig.	.248	.225	.846	.000	.000	.370	.430	.362	.543	.015	.
	N	33	33	33	32	33	33	33	33	33	33	33

\*\*Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

## VITA

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Lawrence J. O'Reilly Physiological Psychology Award, Christopher Newport University, Newport News, VA. 2004

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### **Publications**

Gibbons, J. A., Taylor, C. A., & Phillips, J. M. (2004). Minorities as marginalized heroes and prominent villains in the mass media: Music, news, sports, television, and movies. In W. R. Walker and D. J. Hermann (Eds.). *Cognition and Technology: Transforming Thought and Society*.

Taylor, C. A. (2002). Religious addiction: Obsession with spirituality? *Journal of Pastoral Psychology*, 50, 291-315.

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## ABSTRACT

### EFFECTS OF POSITIVE AND NEGATIVE GESTURES

#### PERCEIVED ATTITUDE CHANGE

By Cheryl A. Taylor M.S., 2006

Department of Psychology

Texas Christian University

Thesis Advisor: Charles G. Lord, Professor of Psychology

Two experiments explored the effects of physical movements, particularly positive and negative gestures, on perceived authorship and attitude change. In Experiment 1, directors ordered actors to make positive or negative gestures while images of gay men were displayed. Actors reported significant attitude change in the direction of the gestures, but directors and observers did not. Experiment 2 extended these results by giving the illusion of physical movement to perceivers. Perceivers neither chose nor performed the gestures toward gay men, yet they still reported a significantly greater attitude change in the direction of the gestures than did other participants. These effects on perceived attitudes were not mediated by perceived authorship, memory bias, or memory accuracy. The results are interpreted in terms of embodiment theory.