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ATTITUDE CHANGE FOLLOWING IMAGINED POSITIVE ACTIONS TOWARD A SOCIAL GROUP: DO MEMORIES CHANGE ATTITUDES, OR ATTITUDES CHANGE MEMORIES?

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Previous research has shown that individuals who imagine taking previously denied positive actions toward members of a stigmatized group sometimes report having actually taken those actions (Frye & Lord, 2009; McIntyre, Lord, Lewis, & Frye, 2004). In addition, the greater the number of previously denied actions they "remember," the more they subsequently report more positive attitudes toward the group. The present research tested competing explanations for these results—that memories changed attitudes, or that attitudes changed memories. In Experiment 1, attitudes were changed equally by a persuasive message and by imagined actions, yet memory errors were greater and more correlated with attitude change in the imagined actions condition. In Experiment 2, attitude change was greater (and more correlated with memory errors) three weeks after than immediately after the imagined actions. The results suggest that memory errors changed attitudes, consistent with predictions of the source monitoring framework (Johnson, 2006).

Many attitude theories hold that our current attitudes are, at least in part, based on our own past actions (e.g., Bem, 1967; Festinger, 1957; Lord & Lepper, 1999; Zanna & Rempel, 1988). These theories maintain that when reporting one's evaluation of a given attitude object, an individual looks back at the actions he or she has taken in the past, and that these actions influence the current attitude report. If past behaviors affect current attitudes, errors in remembering past behaviors might have a similar effect. It may not be necessary that an individual actually perform positive actions toward a stigmatized social group, for instance, but only that he or she "remembers" having performed them, as can occur through source monitoring confusions (Johnson, 2006).

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Researchers have tested the possibility that source monitoring errors in memory can affect attitudes (Frye & Lord, 2009; McIntyre, Lord, Lewis, & Frye, 2004). In one study, students were asked to write hypothetical scenarios in which they acted in either positive or negative ways toward several gay men (McIntyre et al., 2004, Experiment 1). The scenarios were based on actions that the students had previously denied having ever taken toward a gay man. Writing the hypothetical scenarios led many students to commit source monitoring errors in which they falsely remembered having taken the actions they had previously denied. Students who displayed such memory errors were also more likely to change their attitudes toward gay men in the direction of the imagined actions. The researchers found a significant correlation: more attitude change was observed in students who reported more memory errors. Significant attitude change and significant correlations between attitude change and number of memory errors occurred only when participants imagined themselves, not a different person, performing the actions.

In their instructions for writing the hypothetical scenarios, McIntyre et al. (2004) incorporated factors which have previously been shown to increase source confusion and memory errors (see Johnson, Foley, Suengas, & Raye, 1988; Johnson, Hashtroudi, & Linday, 1993; Ross & Homberg, 1990; Undeutsch, 1988). Participants were encouraged to write detailed, first person accounts of the imaginary positive actions. Research on source monitoring has found that increasing the details included in imaginary events increases the likelihood that source monitoring errors will occur in recalling the event (e.g., Johnson, 1988; Johnson et al., 1988; Johnson et al., 1993; Ross & Newby, 1996; Undeutsch, 1988).

Further research has shown that the amount of detail affects both the number of memory errors and the extent of attitude change from imagined positive actions toward a social group (Frye & Lord, 2009). According to temporal construal theory (Liberman & Trope, 1998; Trope & Liberman, 2003) and action identification theory (Vallacher & Wegner, 1985; Wegner & Vallacher, 1986), mental simulations tend to be more specific if they are temporally near, rather than distant. By having students write temporally near versus distant scenarios, Frye and Lord (2009) showed that when the level of detail in students' scenarios was experimentally manipulated, students who included more specific detail (those who wrote about near versus distant events, whether in the past or in the future) also reported more memory errors and more attitude change.

Both McIntyre et al. (2004) and Frye and Lord (2009) posited a memory errors mechanism (Johnson, 2006) for their results. Participants recalled having actually taken the positive actions that they had only imagined, which led them to report more positive attitudes. In fact, Crisp and Turner (2009) reviewed many studies in which participants who imagined positive contact with members of a stigmatized group adopted more positive attitudes toward the target group (Stathi & Crisp, 2008; Turner, Crisp, & Lambert, 2007; see also Blair, Ma, & Lenton, 2001; Goff & Roediger, 1998). According to this mechanism, memory errors (at least those resulting from imagined positive contact) caused attitude change.

McIntyre et al.'s (2004) and Frye and Lord's (2009) results, however, could as easily be explained by a mechanism in which attitude change caused source confusions in memory. Participants changed their attitudes during the imagined scenarios, and these more positive attitudes led them to recall having taken the positive actions that they had only imagined. According to this mechanism, attitude change caused memory errors.

This alternative mechanism would be consistent with the observed relationship between attitude change and number of memory errors reported by McIntyre et al. (2004) and by Frye and Lord (2009). It would also be consistent with much previous research on the relationship between attitudes and memory. People tend to recall information that bolsters their current attitudes (Lydon, Zanna, & Ross, 1988). If a persuasive message makes their attitudes toward brushing their teeth more negative than it used to be, for instance, they subsequently recall having brushed their teeth less frequently than had a different persuasive message made their attitudes toward brushing their teeth more positive (Ross, McFarland, & Fletcher, 1981). They also tend to recall details of persuasive messages supporting their newly formed attitudes better than they recall details of persuasive messages supporting their former attitudes (Levine & Murphy, 1943; Ross, McFarland, Conway, & Zanna, 1984).

In many studies, individuals who changed their attitudes over time have mistakenly recalled their previous attitudes as more consistent with their current attitudes than they actually were, whether the attitudes in question concerned social issues (Marcus, 1986) or romantic partners (McFarland & Ross, 1987; Scharfe & Bartholomew, 1998). More relevant to the present experiments, people selectively recall specific incidents that are consistent rather than inconsistent with their current evaluations of another person (Spiro, 1980). It is well established that current attitudes can affect memories for past attitude-relevant events, even autobiographical events (Garry, Manning, Loftus, & Sherman, 1996; Hyman, Husband, & Billings, 1995; Hyman & Loftus, 1988), especially when the individuals involved have no reason to suspect that their attitudes might have changed (Bem & McConnell, 1970; Goethals & Reckman, 1973; Ross, 1989).

Previous research, then, could be used to support either the *memories changed attitudes* mechanism that McIntyre et al. (2004) and Frye and Lord (2009) used to explain their results, or an alternative mechanism in which *attitudes changed memories*. Two experiments were designed to compare these two mechanisms.

EXPERIMENT 1

The logic of Experiment 1 was that if attitude change caused memory errors, then two manipulations that produced the same amount of attitude change would produce the same number of memory errors. If memory errors caused attitude change, in contrast, only manipulations that involved imagining positive actions would create memory errors, even if the amount of attitude change were the same.

METHOD

Participants

Seventy undergraduate students participated for course credit. Five students failed to complete all three experimental sessions and one student expressed suspicion that the three experimental sessions were related, leaving 64 students (53 women and 11 men) to include in analyses.[1]

Procedure

Following the procedures of McIntyre et al. (2004) and Frye and Lord (2009), Experiment 1's procedure had three parts: initial attitudes and actions questionnaires, the experimental manipulation, and final actions and attitudes questionnaires. The three parts of the experiment were ostensibly unrelated.

Initial Attitudes and Actions Questionnaire. During the first session, participants reported their attitudes toward gay men and 17 other social groups and issues (e.g., politicians, talk show hosts, capital punishment) on 11-point scales from -5 (*Highly Unfavorable*) through 0 (*Neutral*) to +5 (*Highly Favorable*).Then they reported their past actions toward members of several social groups, including gay men, by circling actions from a list provided by the experimenter. The reason for including so many other groups was to disguise the fact that gay men was the actual target group. For each social group, the action list consisted of 67 actions, approximately half positive and half negative (e.g., talk to, get to know, try to meet, avoid talking to, ostracize, argue with). Participants were asked to mark any action that they had ever taken toward a member of each group. They were reminded with oral and written instructions to review the list carefully to be sure that they had circled *all* of the applicable actions, and that they had never taken any of the actions not circled. By not circling an action participants were explicitly denying that they had ever taken that action toward a gay man.

Experimental Manipulation. During the three weeks that elapsed between the initial attitudes and actions questionnaire and the second session in which the experimental manipulation would occur, the experimenters examined each participant's gay men action list to identify one positive action that was circled and three positive actions that were not circled (i.e., the participant had denied ever taking those actions). Each participant was thus eligible to be assigned to any one of the three conditions to be used, and each participant had a set of four target actions (one previously circled and three not previously circled) that could be used as target actions if the participant were to be assigned to the scene-writing condition, and that could be used to assess changes from the first to the final session in any one of the three conditions. Only after the four target actions had been selected were participants randomly assigned to one of the three conditions: scene writing (n = 25), persuasive message (n = 20), and control group (n = 19). The experimenter for the experimental manipulation session was blind to participants' answers on the initial attitudes and actions questionnaire.

Scene-Writing Condition. This manipulation was taken directly from McIntyre et al. (2004). The second experimenter told the students that she was studying the creative processes of writers. The experimenter explained that writers for movies, television shows, and plays have the ability to write fictional "scenes" that revolve around themselves as one of the central characters. Students in the scene-writing condition were given four different scenes to write that included themselves acting positively toward a gay man. Unknown to them, the events students wrote about were chosen based on the actions they had reported during the first session. Three of the scenes included positive actions that the student had previously reported having never taken toward a gay man. The fourth scene included a positive action

1. Participant sex did not interact with any of the results to be reported in either Experiments 1 or 2.

that the student had reported having taken toward a gay man. In order to increase the probability of later source-monitoring errors, participants were instructed to include the thoughts and feelings of the characters, as well as many details of the events they were describing (see Johnson, 2006). Approximately one hour was allotted for students to write the four scenes. They were encouraged to continue writing for the entire time, adding additional details whenever possible.

Persuasive Message Condition. Students assigned to the persuasive message condition were asked to read and answer questions about an article designed to change attitudes toward gay men. The article was a persuasive message that argued strongly for the rights of gay and lesbian couples to adopt children. In a pretest, this article was found to change attitudes toward gay men in a magnitude approximately equal to the amount of attitude change previously observed by McIntyre et al. (2004), with the scene-writing manipulation. The arguments in the persuasive message, that is, had been carefully pretested as neither too strong nor too weak to produce the same level of attitude change as previous research had shown would be produced by the scene-writing scenario (based on results reported by Frye & Lord, 2009, and by McIntyre et al., 2004).

Control Condition. Students assigned to the control condition were asked to read, and answer questions about, an unrelated article concerning computers. This article was not expected to affect attitudes toward gay men.

Final Actions and Attitudes Questionnaire. After another three weeks had passed, the same students returned for the final experimental session. Again, they were greeted by another experimenter and led to believe that this was a new study that was unrelated to the previous two. The experimenter for this final actions and attitudes questionnaire session was blind to the participants' experimental conditions. Students were presented with a packet of questionnaires that included the same action list they had completed in the first session, and then the same attitudes scales they had completed in the first session. The questions were the same as participants had answered six weeks earlier, but the scores were presented in a different font and vertical rather than horizontal. To further allay suspicion, the experimenter deliberately mentioned that participants might have answered some of the same questions earlier in the semester, because several researchers in the department were interested in the same topics. Once all students had completed the final actions and attitudes questionnaire, they were given a funnel debriefing (Bargh & Chartrand, 2000; Page, 1969)—the same progressive debriefing used by Frye and Lord (2009). They were first asked to guess the experimental hypothesis and then asked whether they thought the attitudes and actions questionnaire might be connected to any of the previous studies in which they had participated earlier in the semester. After that, they were asked whether, if such a connection

2. Several participants mentioned that they had answered the same attitude questions 6 weeks earlier, and speculated that the experiment might have to do with attitude change over time, but they did not mention the intervening scene writing or persuasive message. Consistent with previous research (Frye & Lord, 2009; McIntyre et al., 2004), no participant in the scene writing condition mentioned a possible causal connection between the two attitudes and actions questionnaires and the scenes they had written for a different experimenter in a different room three weeks earlier. One participant in the persuasive message condition correctly guessed that the message three weeks earlier had been intended to influence responses on the final attitudes questionnaire. That participant was eliminated from analyses.

existed, they could describe the nature of that connection.[2] Finally, participants were thoroughly debriefed and dismissed.

RESULTS AND DISCUSSION

The *attitudes change memories* explanation of the McIntyre et al. (2004) and Frye and Lord (2009) results implies that attitude change occurred when participants were writing their imaginary scenarios, and that the attitude change created a memory bias in recalling actions. The more participants changed their attitudes during the scene-writing session, the greater the number of subsequent memory errors they would make that were consistent with their altered attitudes. If the *attitudes change memories* explanation was accurate, manipulations that changed attitudes to the same degree would be expected to produce the same number of memory errors, regardless of whether the manipulation involved imagining positive actions.

The *memories change attitudes* explanation, in contrast, implies that memory errors came first, when participants completed the actions lists in the third part of the experiment, and that these memory errors altered the attitudes that participants subsequently reported. If they recalled performing a greater number of positive actions than they had previously, they would in turn report more positive attitudes (Lord & Lepper, 1999). If the *memories change attitudes* explanation was accurate, manipulations that involved imagining positive actions would create more source-monitoring confusions than would other types of manipulations, even when the two types of manipulations were equated for attitude change. The two competing mechanisms could be compared, therefore, by analyzing attitude change and memory errors.

Attitude Change. Change in attitude was calculated as the difference between pre- and post-manipulation attitudes toward gay men. To control for possible differences in initial attitude strength (see Petty & Krosnick, 1995), initial attitude extremity (a proxy for attitude strength; see Abelson, 1995) was used as a covariate in a one-way between-subjects analysis of covariance (ANCOVA). The means for the three conditions are shown on the first row of Table 1. The ANCOVA yielded a significant effect of condition, $F(2, 60) = 4.34$, $p < .05$. By Tukey's test ($p < .05$), participants in the scene-writing and persuasive message conditions changed their attitudes equivalently (M change scores = 1.08 and 0.90, respectively), and in each case more than did participants in the control condition (M change = -0.21). By one-sample t-tests, a significant amount of attitude change occurred in the scene-writing condition, $t(24) = 3.83$, $p < .05$, and in the persuasive message condition, $t(19) = 2.10$, $p < .05$, but not in the control condition, $t(18) = -1.03$, *ns*. Results from the scene-writing condition replicated previous findings that imagined actions alter reported attitudes (Frye & Lord, 2009; McIntyre et al., 2004). Results from the persuasive message condition showed that the two experimental conditions produced equivalent amounts of attitude change, which was necessary if the two conditions were to be compared in their effects on memory errors.

Memory Errors. In the scene-writing condition, a memory error occurred when a participant circled on the second actions list one of the three positive actions that he or she had not circled on the original actions list, but had later imagined taking toward a gay man. Students in the persuasive message and control conditions did

TABLE 1. Mean Attitude Change, Memory Errors, and Their Correlations in Three Conditions (Experiment 1)

	Scene Writing *n* = 25	Persuasive Message *n* = 20	Control *n* = 19
Attitude Change	1.08[a] (1.41)	0.90[a] (1.93)	-0.21[b] (1.03)
Memory Errors	1.56[c] (0.96)	0.85[d] (1.04)	0.63[d] (0.83)
Correlation	.488*	-.166	-.225

Note. Standard deviations shown in parentheses. Means with different superscripts significantly differ by Tukey's test ($p < .05$). *Signifies a Pearson's r significant at $p < .05$.

not write about previously denied actions, but their action lists were used to assess the extent to which the actions involved might have somehow promoted memory errors even in the absence of imaginary scenarios. For these participants, a "memory error" was recorded when they remembered taking an action that they had previously denied, and that would have been chosen for them to write about had they been in the scene-writing condition. Because the target actions for each participant were chosen in the same way regardless of experimental condition, memory errors in the persuasive message and control conditions provided a baseline of how many errors might have occurred simply because the actions involved were ones that lent themselves to memory confusions (control condition) or because attitude change biased subsequent memory (persuasive message condition).

The second row of Table 1 shows the mean number of memory errors in the three conditions, which differed significantly in a one-way ANCOVA that used initial attitude extremity as a covariate, $F(2, 60) = 5.88$, $p < .01$. According to Tukey's test ($p < .05$), participants in the scene-writing condition had a larger number of memory errors ($M = 1.56$) than did participants in the other two conditions (persuasive message $M = 0.85$; control $M = 0.63$), even though participants in the persuasive message condition had changed their attitudes as much as did participants in the scene-writing condition. Finally, experimental condition had no effect on the number of times participants circled previously denied positive actions that were not involved in the imaginary scenes, $F < 1$, so the scene writing manipulation specifically affected the target actions rather than generating more positive overall memories. In fact, scene-writing participants "recalled" 52% of the three actions from their scenes, but only 1% ($M = .68$ of a possible 63) of the actions that were not involved in the scenes—a result for non-scene actions that is consistent with that reported by McIntyre et al. (2004).

Correlation between Memory Errors and Attitude Change. The third row of Table 1 shows correlations between number of memory errors and attitude change in each of the three conditions. If attitude change were causing memory errors, then one would expect that the more participants changed their attitudes, regardless of what caused that change, the greater would be the likelihood that they would "remember" taking positive actions that they had previously denied, so the greater the number of memory errors they would make. As Table 1 shows, however, the correlation between attitude change and number of memory errors was significant only in the scene-writing condition ($r = .49$), which is exactly where one would expect the correlation to be significant if "remembering" positive actions toward gay men were causing participants to report more positive attitudes. That correlation was not significant in the persuasive message condition ($r = -.17$) or in the

control condition (r = -.22). The correlation between memory errors and attitude change was significantly greater in the scene-writing condition than in either the persuasive message condition, $z = 2.17$, $p < .05$, or the control condition, $z = 2.32$, $p < .05$. The number of times participants circled previously denied actions that were not involved in the imaginary scenes was not significantly correlated with attitude change in any of the three conditions (rs = .196 scene writing, .027 persuasive message, and .171 control).

Summary of Experiment 1. Experiment 1 compared an *attitudes change memories* explanation of McIntyre et al.'s (2004) and Frye and Lord's (2009) results to a *memories change attitudes* explanation by changing attitudes either through imagining positive actions or through a persuasive message. Although the two manipulations changed attitudes equally (and did so more than in a control condition where attitudes did not change), imagining positive actions caused significantly more memory errors than did reading the persuasive message. In addition, the number of memory errors was significantly correlated with attitude change only in the condition where participants imagined taking positive actions, and not when they had their attitudes changed through a persuasive message. Attitude change by itself did not cause participants to "remember" taking positive actions that they had previously denied, unless that attitude change was caused by imagining positive actions, and even then the effects were confined only to the specific positive actions that were involved in the imaginary scenes. These results seemed more consistent with a *memories change attitudes* explanation than with an *attitudes change memories* explanation for McIntyre et al.'s (2004) and Frye and Lord's (2009) results. Experiment 2 attempted to provide convergent evidence from an entirely different approach.

EXPERIMENT 2

The logic of Experiment 2 was that if attitude change caused memory errors, then attitude change would be greater immediately after than three weeks after imagining the positive actions, because the effect of the manipulation would dissipate over time. If memory errors caused attitude change, in contrast, then attitude change would be greater three weeks after than immediately after imagining positive actions, because source confusions in memory take time to develop (Johnson, 2006).

METHOD

Participants

Thirty-two undergraduate students participated in the current study for course credit. One student did not complete all three experimental sessions and was dropped from analyses, leaving 31 participants (25 women and 6 men).

Procedure

The procedure for Experiment 2 was similar to that of the scene-writing condition in Experiment 1. Students participated in three "unrelated" experimental sessions. All participants reported their attitudes and past actions toward gay men in the first session, described hypothetical positive actions toward gay men in the second session, and reported their actions and attitudes again in the third session. The key difference was that participants also reported their attitudes in the second session, immediately after writing their hypothetical scenarios.

Initial Attitudes and Actions Questionnaire. For the first session, students completed the same measures used in Experiment 1, which included attitude ratings toward several social groups and issues, plus reports of attitude-relevant actions. Attitudes were reported on 11-point scales from -5 (*Highly Unfavorable*) through 0 (*Neutral*) to +5 (*Highly Favorable*). On the same list of 67 actions used in Experiment 1, students were asked to circle any action that they had ever taken toward a member of each group, including gay men. Again, students were reminded with oral and written instructions to review the list carefully to be sure that they had circled all of the applicable actions and had never taken any of the actions that they had not circled.

Experimental Manipulation. In a second, "unrelated" session three weeks later, students were given the same scene-writing manipulation used in Experiment 1. A second experimenter told the students that she was studying the creative processes of writers and that students were going to write four hypothetical "scenes" that would revolve around themselves as one of the central characters. Each student was given four different scenes to write that included themselves interacting positively with a gay man. The events students wrote about were chosen based on the actions reported during the first session. As in Experiment 1, three of the scenes involved positive actions that the student had previously reported having never taken toward a gay man, and one involved an action that the student had reported having taken in the past. Students were asked to include as much detail as possible in their scenes and to include the thoughts and feelings of the characters as well as the events they were describing. Students were asked to write the four scenes during the allotted one hour and to add additional details whenever possible.

All students reported their attitudes toward gay men and other attitude objects immediately after writing the scenarios. They were not asked to complete the actions list immediately after writing the scenarios. Doing so during the same session as the scene writing would make it obvious that the positive actions were only hypothetical and would not allow time for memory errors to occur.

Final Attitudes and Actions Questionnaire. Three weeks later, a different experimenter had participants complete the same actions list as in the first session. They also reported their attitudes toward several social issues and groups, including gay men. Students were given the same instructions for the final attitudes and actions questionnaire as in Experiment 1. Once students completed the questionnaire, they were given the same funnel debriefing as in Experiment 1. Finally, participants were thoroughly debriefed and dismissed.

RESULTS AND DISCUSSION

Experiment 2 compared the *attitudes change memories* explanation with the *memories change attitudes* explanation for McIntyre et al.'s (2004) and Frye and Lord's (2009) results. The logic was that if attitudes changed while participants were describing hypothetical positive actions toward gay men, then that change would be more apparent immediately after they wrote the scenarios than three weeks later. In contrast, if memory confusions caused participants to report more positive attitudes, those memory errors would be unlikely to occur immediately after writing the hypothetical scenarios, because at that time participants would be very much aware that the scenes they had just described were only imagined and not actual events (Johnson & Raye, 1981). Because it takes time for confusions between actual and imagined actions to develop (Johnson et al., 1988; Johnson et al., 1993), memory confusions would cause attitude change 3 weeks after participants wrote the scenes, and attitude change would be more apparent at that time than immediately after describing the imagined positive actions.

Attitude Change. In Experiment 2, attitude change was measured twice. Immediate attitude change was calculated as the difference between attitudes on the initial questionnaire and attitudes reported immediately after the scene-writing manipulation. Delayed attitude change was calculated as the difference between attitudes on the initial questionnaire and attitudes reported by the same participants 3 weeks after the scene-writing manipulation. To control for possible differences in attitude strength (see Abelson, 1995; Petty & Krosnick, 1995), initial attitude extremity was used as a covariate in a one-way within-subjects ANCOVA. The means for the two attitude change measures are shown in Table 2. The ANCOVA yielded a significant effect of time, $F(1, 29) = 8.53$, $p < .01$. Attitudes had changed more three weeks after ($M = 1.00$, $SD = 2.46$) than immediately after ($M = 0.39$, $SD = 1.61$) the scene-writing manipulation. By one-sample *t*-tests, attitude change was significantly greater than zero at the final session, $t(30) = 2.26$, $p < .05$, even though it was not significantly greater than zero immediately after the manipulation, $t(30) = 1.34$, *ns*.

Correlation between Memory Errors and Attitude Change. Memory errors were calculated in the same way as in Experiment 1. As in the scene-writing condition of Experiment 1 and previously published reports (Frye & Lord, 2009; McIntyre et al., 2004), participants made a significant number of memory errors ($M = 1.11$, $SD = 1.08$), one-sample $t(30) = 5.68$, $p < .001$. The second row of Table 2 shows correlations between number of memory errors and attitude change at each of the two post-manipulation times when attitudes were measured. Number of memory errors was significantly correlated with the amount of attitude change 3 weeks after the scene-writing manipulation ($r = .377$). They were not significantly correlated with the amount of attitude change immediately after the scene-writing manipulation ($r = .19$), as would have been expected had greater memory change been necessary to produce greater attitude change.[3]

In addition, number of memory errors for actions not involved in the three target scenes (which were less than 1%) did not correlate significantly with attitude

3. The difference between these correlations, $t(30) = 1.78$, was marginally significant ($p < .10$) by two-tailed test and significant by one-tailed test ($p < .05$).

TABLE 2. Mean Attitude Change and Correlations with Memory Errors at Two Times (Experiment 2)

	Immediate	Delayed
Attitude Change	0.39^{a} (1.61)	1.00^{b} (2.46)
Correlation with Memory Errors	.190	.377*

Note. Standard deviations shown in parentheses. Means with different superscripts differ significantly ($p < .05$). *$p < .05$.

change either immediately after the scene writing manipulation (r = .094) or 3 weeks later (r = .148), both *rs ns*.

Summary of Experiment 2. The results of Experiment 2, like the results of Experiment 1, seemed more consistent with a *memories change attitudes* explanation than with an *attitudes change memories* explanation of McIntyre et al.'s (2004) and Frye and Lord's (2009) results. Attitudes were measured in the initial questionnaire, immediately after the scene-writing manipulation, and 3 weeks after that. Relative to attitudes reported on the initial questionnaire, attitudes had not become significantly more positive immediately after participants described imaginary positive actions toward gay men, but they had become significantly more positive 3 weeks later. In addition, attitude change measured immediately after the scene-writing manipulation did not significantly predict subsequent memory errors, but memory errors significantly predicted subsequent attitude change.

GENERAL DISCUSSION

Taken together, the two experiments provided convergent evidence, from two very different experimental procedures, that was more consistent with a *memories change attitudes* explanation than with an *attitudes change memories* explanation of results reported by McIntyre et al. (2004) and by Frye and Lord (2009). In Experiment 1, for instance, a persuasive message changed attitudes (relative to a control group and relative to initial attitudes) as much as did imagining positive actions toward gay men. If McIntyre et al.'s (2004) and Frye and Lord's (2009) participants "remembered" having taken a greater number of positive actions toward gay men after than before the experimental manipulation only because their attitudes had been changed by the manipulation, one would have expected the same number of memory errors in the persuasive message condition as in the scene-writing condition. Instead, consistent with the source-monitoring framework (Johnson, 2006) that prompted the research by McIntyre et al. (2004) and by Frye and Lord (2009), memory errors were greater (and more correlated with attitude change) in the scene-writing condition than in the persuasive message condition.

The relationship between attitude change and memory works both ways. Memories affect attitudes, and attitudes affect memories. When individuals do not realize that their attitudes have changed, they falsely remember acting in ways consistent with their *current* attitude (Ross, 1989; Ross et al., 1984). Why, then, did the persuasive message in the present Experiment 1, which demonstrably changed attitudes, not also increase the number of positive actions that participants in that condition circled for gay men? One answer might be that in previous studies of the

effects of attitude change on autobiographical memory, the persuasive message was directed at a specific activity (e.g., brushing one's teeth) rather than at overall attitudes toward a social group (Ross et al., 1981). In addition, when individuals change their attitudes, they typically have available to them an entire life's worth of autobiographical events that they might selectively enhance to be consistent with their current attitudes. Participants in the present studies, in contrast, had available to them only a relatively small subset of events, many of which might not have been amenable to selective distortion for a specific individual. It might be difficult to "remember" specific actions like having praised, defended, or donated time to help a gay man unless one had imagined such a scene in vivid detail and 3 weeks later lost sight of the fact that the scene was only imagined.

It would be much easier for a specific participant to "remember" an actual event in his or her life (e.g., waterskiing with a gay man or moving furniture for a gay man) after a persuasive message, except that such unique events, tailored to a specific participant's life experiences, were not on the action lists that were used in the present experiments. This "specificity" explanation is consistent with the findings that participants in neither the scene-writing condition nor the persuasive message condition "remembered" a significant number of the previously denied actions that were not involved in the imaginary scenes. These results, and the lack of correlations between attitude change and "remembered" actions that were not involved in the imaginary scenes would appear to be consistent with the source-monitoring framework (Lindsay & Johnson, 2000).

One can never be entirely positive, of course, that the changes in memory responses recorded in the present experiments represented source-monitoring errors. These changes might also be characterized as memory enhancements. It is possible that participants forgot actual autobiographical events when completing the actions lists in the first session, and that the later exercise of writing imaginary scenes produced strong memory cues that made participants retrieve more accurate information the second time they went through the actions questionnaire. The experimenter for both the first and third sessions in both studies gave participants oral and written instructions to double-check the action lists to be absolutely certain that they had not omitted any actions they might ever have taken toward gay men. Participants, however, had to consider many possible actions toward each social group, so in the first session they might not have correctly identified every relevant action. The later scene-writing task might have cued memories of events that had been forgotten, or that were not interpreted in the same way when they occurred (Zanna & Hamilton, 1977). Researchers of false memories have been able to induce memories of events that could be independently verified as having never happened (Loftus, 1997), but such verification would be difficult or impossible to achieve for events that might involve any thought, feeling, or action that an individual might ever have had regarding a specific social group. The present studies, then, might have examined memory enhancement as well as memory errors. Even so, it is fair to say that the present studies supported the view that memories can cause attitude change.

McIntyre et al. (2004) and Frye and Lord (2009) took an established theory of memory—the source-monitoring framework that has been extensively research and validated—and extended its implications to attitude change. They used procedures developed within the source-monitoring framework to create memory confusions in which participants believed that they had actually taken specific

positive actions toward gay men. Once participants became convinced that they had taken such positive actions, both cognitive dissonance (Festiger, 1957) and self-perception (Bem, 1967) theories, as well as balance theory (Heider, 1958) and numerous other theories of cognitive consistency (e.g., Abelson, 1959) would predict that they would report more positive attitudes. The novel contribution of studies by McIntyre et al. (2004), Frye and Lord (2009), and the results of the present Experiment 1, was that imagining positive actions toward a stigmatized group can create source confusions in memory that go beyond those that might be created by other types of manipulations (see Crisp & Turner, 2009).[4]

In Experiment 2, imagining hypothetical positive actions led participants to report more positive attitudes toward gay men, but only after a 3-week delay, and not immediately after the manipulation. This delayed attitude change did not seem consistent with claims that attitudes changed while imagining and writing about the positive actions, and that the newly adopted attitudes in turn biased subsequent memory for attitude-relevant actions. Instead, the delayed attitude change seemed entirely consistent with, and predictable from, a source-monitoring framework in which it takes time for source confusions in memory to develop (Johnson, 2006; Johnson & Raye, 1981).

Admittedly, correlations between memory errors and attitude change could have been weaker immediately after the experimental manipulation than 3 weeks later in Experiment 2 because more time elapsed between the immediate measure of attitudes and completing the final actions list than between the delayed measure of attitudes and completing the final actions list, but it would not have been reasonable to include an actions list immediately after the manipulation, because doing so would have made participants aware that they had just described the target actions as hypothetical events, so they would not be likely to confuse the imagined actions with ones they had actually taken. No experiment on source-monitoring errors has ever produced memory confusions by asking participants immediately after an imagined event whether that event was real. Experiments conducted within the source-monitoring framework are about memory confusions, so they typically involve a delay between the imagined event and the memory test (Johnson et al., 1988; Johnson et al., 1993).

In addition, the attitude change results of Experiment 2 stand on their own, regardless of how one explains the difference in correlations between memory errors and attitude change. The main finding of Experiment 2—that attitudes changed more after a 3-week delay than immediately—is a logical prediction derived from the source-monitoring framework, but not one that fits well with most research on attitude change manipulations, with the exception of what are called "sleeper effects" (Hovland, Lumsdaine, & Sheffield, 1949). One might argue that participants in McIntyre et al.'s (2004), Frye and Lord's (2009), and the present studies acted as their own source of information. Their imagined positive actions constituted a persuasive message. Three weeks later they forgot that they were the source of their own arguments. With those assumptions, the present results might appear

4. Studies of imagined positive contact are different from the present experiments in that they involve interaction in which members of the stigmatized group act positively toward the participant. Such procedures, unlike the present procedures, produce immediate effects on attitudes (Crisp & Turner, 2009) and are not affected by the amount of detail that participants are told to include (Turner et al., 2007, Experiment 1).

to constitute a type of "sleeper effect." Sleeper effects, however, are typically seen as arising from suppression of strong persuasive message arguments that were attributed to a negatively perceived source. Over time, participants forget the source faster than they forget the arguments (Pratkanis, Greenwald, Leippe, & Baumgardner, 1988). The present Experiment 2, in contrast, involved no persuasive message with arguments from an outside source. For now, the source-monitoring framework (Johnson, 2006) appears to offer a more parsimonious explanation than do sleeper effects.

In short, each of the present two experiments by itself was not immune to alternative explanations, and the crucial experiment to rule out either the *memories change attitudes* explanation or the *attitudes change memories* explanation conclusively might not even be possible to conduct. Taken together, however, the results of these two experiments with different procedures and experimental designs favor a *memories change attitudes* mechanism that can be derived directly from the source-monitoring framework (Johnson, 2006). The take-home message, useful for both theoretical and practical applications, might be that it is not necessary to induce actual positive actions toward a negatively stigmatized group in order to change attitudes toward that group. Imagined positive actions can accomplish the same attitude change objectives, because people who "remember" taking positive actions are in the same psychological situation as people who actually took the actions.

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