

## DETERMINANTS OF LATERAL ATTITUDE CHANGE: THE ROLES OF OBJECT RELATEDNESS, ATTITUDE CERTAINTY, AND MORAL CONVICTION

Skylar M. Brannon, Allison DeJong, and Bertram Gawronski  
*University of Texas at Austin*

The notion of lateral attitude change (LAC) suggests that counterattitudinal information about a focal object can influence attitudes toward related objects. *Generalization* occurs when change in attitudes toward a focal object is accompanied by change in attitudes toward related objects. *Displacement* occurs when attitudes toward related objects change despite no change in attitudes toward the focal object. Although there is evidence for both kinds of LAC effects, their determinants are not well understood. The current research investigated effects of (1) the relative degree of relations between attitude objects, (2) attitude certainty regarding the focal object, and (3) the extent to which attitudes toward the focal object are held with moral conviction. The results of three experiments ( $N = 982$ ) suggest that changes in attitudes toward focal objects generalize to proximally related objects, but not to more distally related objects. LAC was unaffected by attitude certainty and moral conviction.

*Keywords:* attitude certainty, attitude change, displacement, generalization, moral conviction

People hold vast networks of attitudes. For example, a single person may hold attitudes toward different ice cream flavors, travel destinations, professors, social and economic policies, friends and family members, and moral issues, just to name a few. The attitudes one holds also contain various degrees of interrelations. For example, a person's attitude toward vanilla ice cream is likely unrelated to this person's opinions on immigration. Conversely, one's opinions about immigration may be highly related to one's attitudes toward other policies and social issues (e.g., same-sex marriage, abortion), and one's attitude toward vanilla ice cream may be highly related to attitudes toward other foods (e.g., chocolate ice

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Correspondence concerning this article should be addressed to Skylar M. Brannon, Department of Psychology, University of Texas at Austin, 108 E. Dean Keeton A8000, Austin, TX 78712. E-mail: skylar\_brannon@utexas.edu

cream, cheesecake). Despite the enormous body of research on attitude change, this research has mostly focused on attitudes toward a single focal object without considering how counterattitudinal information influences larger networks of interrelated attitudes.

A notable exception is a theoretical framework by Glaser, Dickel, Liersch, Rees, Süßenbach, & Bohner (2015) suggesting that counterattitudinal information or any attempt to change attitudes toward a focal object can have extended effects on attitudes toward related objects (see also McGuire, 1968). Although the Glaser and colleagues' (2015) framework identifies different patterns of attitude change within networks of interrelated attitudes, the framework remains silent regarding the factors that determine the emergence of these patterns. The current research expands on this question, seeking to understand how counterattitudinal information about a focal object may change attitudes toward related objects as a function of (1) the relative degree to which a focal object is related to other objects, (2) the certainty with which attitudes toward the focal object are held, and (3) the extent to which one's attitude toward the focal object is held with moral conviction.

## LATERAL ATTITUDE CHANGE

Although rare, some studies have measured attitude change for multiple attitude objects, demonstrating that counterattitudinal information about a focal object can lead to change in attitudes toward related objects. Glaser and colleagues (2015) refer to these instances as *lateral attitude change* (LAC), which can occur in two forms. The first type of LAC is *generalization*, which occurs when change in attitudes toward a focal object is accompanied by change in attitudes toward another, related object. The second type of LAC is *displacement*, which refers to instances in which change in attitudes toward a closely related object occurs despite no attitude change for the focal object. Building on earlier demonstrations of generalization and displacement in attitude change, Glaser and colleagues (2015) proposed a theoretical framework that integrates and explains the two kinds of LAC effects. Here, we briefly review cases of generalization and displacement identified by Glaser and colleagues (2015) and then describe the mechanism proposed to underlie the two instances of LAC.

### GENERALIZATION

Mackie (1987) found that change in attitudes toward a focal object that occurred as a result of majority influence generalized to attitudes toward a closely related object. In this study, participants received arguments about a focal social issue that were ostensibly supported by either the majority or a minority of students at their institution. In response to these arguments, participants changed their attitudes toward both the focal issue and a closely related issue when they believed those arguments came from a majority group. Similar effects have been found in research on intergroup contact, suggesting that changes in attitudes toward one

social group can generalize to other social groups that are perceived as similar in some regard (Pettigrew, 1997; see also Fazio, Eiser, & Shook, 2004). For example, participants who reported having more friends of one racial minority reported more positive evaluations of that social group, other minority groups, and pro-immigration legislation (Pettigrew, 1997). By the same token, attitudes toward one member of a racial category often generalize to other members of that category (e.g., Crawford, Sherman, & Hamilton, 2002).

## DISPLACEMENT

In contrast to generalization, displacement refers to instances in which attitudes toward related objects change despite no change occurring for attitudes toward the focal object. Research on minority influence suggests that the power of minority members to induce change comes primarily from indirect modes of persuasion. For example, in a study by Alvaro and Crano (1997), participants read arguments ostensibly generated by minority individuals in favor of excluding gay men from the United States military. After reading these arguments, participants did not change their stance toward the focal issue but did change their opinion toward a related issue: the prohibition of firearms. Additional evidence suggests that people may conform to social influence in an indirect manner. For example, Saltzstein and Sandburg (1979) found that participants did not adjust their sentence of a fictional criminal after reading a judge's harsher sentence in the same fictional trial. However, participants who read about the judge's harsher sentence subsequently handed down a significantly more punitive sentence in a separate fictional trial than did participants who read about a judge's more lenient sentence in the first case. Thus, participants did not adjust to the norms set by the judge for the focal case but did make judgments in line with those norms for a closely related case.

## UNDERLYING MECHANISM

Glaser and colleagues (2015) argued that both generalization and displacement occur via spread of activation in associative networks (for a review, see Smith, 1996). According to Glaser and colleagues (2015), exposure to evaluative information about a focal object creates new evaluative associations with that object, which then spread to related objects that are associatively linked to the focal object<sup>1</sup>. Building on the associative-propositional evaluation (APE) model (Gawronski & Bodenhausen, 2006, 2011), Glaser and colleagues (2015) further argued that these newly formed associations could be affirmed or rejected on the basis of proposi-

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1. An important concept in this regard is the *balance-congruity principle*, which states that "when two unlinked or weakly linked nodes share a first-order link, the association between these two should strengthen" (see Greenwald et al., 2002, p. 6). Although not explicitly discussed by Glaser and colleagues (2015), the balance-congruity principle suggests that new evaluative associations with a focal object should transfer to related objects because of the shared first-order link to the focal object.

tional processes, which in turn determines observable changes in self-reported attitudes. For example, a person with a negative attitude toward same-sex marriage may form positive associations with same-sex marriage in response to hearing arguments in favor of same-sex marriage legislation, and this individual may either accept or reject these newly formed associations (see also Petty, Briñol & DeMarree, 2007; Strack & Deutsch, 2004). To the extent that they accept the newly formed positive associations with same-sex marriage, their self-reported attitudes toward same-sex marriage will change. Conversely, to the extent that they reject the newly formed positive associations with same-sex marriage, their self-reported attitudes toward same-sex marriage will persist despite the positive counterattitudinal information. Importantly, the newly formed positive associations with same-sex marriage may transfer to other topics that are mentally linked to same-sex marriage (e.g., immigration), regardless of whether the newly formed associations are accepted or rejected, resulting in positive associations with both same-sex marriage and immigration. Thus, to the extent that the newly formed associations with same sex-marriage are accepted, self-reported attitudes should change for both same-sex marriage and immigration (i.e., generalization). Conversely, if the newly formed associations with same-sex marriage are rejected, self-reported attitudes toward immigration may change despite no change in self-reported attitudes toward same-sex marriage (i.e., displacement). According to the logic of Glaser and colleagues' (2015) framework, an essential precondition for either effect is that the two objects are closely enough related for spread of activation to occur, which can be understood as their relative degree of relatedness.

## RESISTANCE TO ATTITUDE CHANGE

Although Glaser and colleagues (2015) identified two patterns of LAC effects and proposed a common underlying mechanism, the factors that determine whether generalization or displacement occurs are still unclear. Based on the logic of Glaser and colleagues' (2015) framework, the conditions under which attitudes toward focal objects are resistant to counterattitudinal information should be critical for understanding the two kinds of LAC effects. First, factors that effectively prevent the formation of new evaluative associations should increase resistance to attitude change for both focal and related objects (consistent with the concept of generalization). Second, factors that lead to a rejection of new counterattitudinal associations without preventing their formation (see Gawronski & Bodenhausen, 2006; Petty et al., 2007; but see Peters & Gawronski, 2011) may increase resistance to attitude change for focal but not for related objects (consistent with the concept of displacement). An extensive literature suggests that meta-cognitive facets of attitudes moderate change in attitudes toward a single, focal object. However, it is currently unclear whether these facets also moderate attitude change toward other objects that are related to a focal object. In the current research, we examined the impact of two meta-cognitive facets on attitude change within an extended network of attitudes: attitude certainty and moral conviction.

Previous research on these two facets has focused primarily on attitude change toward focal objects, ignoring their potential role in LAC. However, Glaser and colleagues' (2015) framework suggests that attitude certainty and moral conviction may influence attitude change toward lateral objects by either (1) preventing the formation of new associations with the focal object or (2) leading to a rejection of new associations without preventing their formation. By investigating the impact of attitude certainty and moral conviction on attitude change within an extended network of attitudes, the current research serves to add precision to the LAC framework while also adding new knowledge regarding the effects of meta-cognitive facets of attitudes and the extent of their impact.

## ATTITUDE CERTAINTY

Attitude certainty is a facet of attitude strength that represents a sense of correctness and clarity about one's attitudes (Petrocelli, Tormala, & Rucker, 2007; Tormala, 2016). As compared to attitudes held with low certainty, attitudes held with high certainty are less susceptible to persuasion and more persistent across time and contexts (for a review, see Tormala & Rucker, 2007). For example, Swann, Pelham, and Chidester (1988) found that attitudes held with low certainty changed readily when participants were asked a series of leading questions with counterattitudinal content. Conversely, participants who were very certain of their attitudes resisted attitude change in response to the same technique. Further, Bassili (1996) found that participants were less likely to change their attitudes over a two-week period when their attitudes were held with high, as compared to low certainty.

From the perspective of Glaser and colleagues' (2015) framework, it is possible that attitude certainty influences the extent to which LAC effects occur. First, high levels of attitude certainty may effectively prevent the formation of new evaluative associations in response to counterattitudinal information. In line with this possibility, past research suggests that people who hold an attitude with greater strength (e.g., with higher certainty) are more likely to selectively expose themselves to arguments supporting their existing beliefs than people who hold an attitude with less strength (Brannon, Tagler, & Eagly, 2007). Applied to the current research, this finding suggests that people high in attitude certainty may ignore arguments that are counter to their attitudes, which would prevent the formation of new evaluative associations. In this case, attitude change for both the focal and related objects should be greater for people with low attitude certainty regarding the focal object compared to people with high attitude certainty regarding the focal object. If attitude certainty prevents the formation of new associations with the focal topic, Glaser and colleagues' framework gives rise to the following hypotheses: (1) for people with low attitude certainty, attitude change toward the focal object should generalize to related objects and (2) for people with high attitude certainty, attitudes toward both the focal and related objects should be resistant to change.

Second, high levels of attitude certainty regarding a focal object may increase the likelihood that new counterattitudinal associations with the focal object are

rejected. In line with this possibility, Alvaro and Crano (1997) argue that minority influence tends to be ineffective because people successfully counter-argue information they receive from a minority source. Applied to the current research, this finding suggests that even people high in attitude certainty may attend to new, counterattitudinal information, but people high in attitude certainty may be more likely to reject the resulting associations via counter-argumentation than people low in attitude certainty. In this case, attitude certainty with regard to the focal object should buffer attitude change only for the focal object but not for related objects. That is, people with high attitude certainty regarding the focal object should show less attitude change for the focal object compared to people with low attitude certainty, but attitude change for related objects should be unaffected by attitude certainty with regard to the focal object. If attitude certainty influences the acceptance of new associations with the focal topic, Glaser and colleagues' framework gives rise to the following hypotheses: (1) for people with low attitude certainty, attitude change toward the focal object should generalize to related objects and (2) for people with high attitude certainty, attitudes toward related objects should change whereas attitudes toward the focal object should be resistant to change.

## MORAL CONVICTION

Another meta-cognitive facet of attitudes that has been shown to buffer attitude change is the extent to which an attitude is held with moral conviction. Attitudes held with moral conviction are central to a person's identity, and people tend to view their stance on these issues as objective (for a review, see Skitka, 2010). Although moral conviction and facets of attitude strength (e.g., attitude certainty) have been linked to similar outcomes, moral conviction has been shown to contribute to these outcomes beyond the effects of attitude strength (Skitka, Bauman, & Sargis, 2005). Individuals who hold a particular attitude with high moral conviction are less likely to change their attitude to conform to others' opinions than those who hold their attitude with low moral conviction (Hornsey, Majkut, Terry, & McKimmie, 2003; Hornsey, Smith, & Begg, 2007). Further, individuals who hold a particular attitude with high moral conviction tend to resist attitude change by distancing themselves from others who hold opposing attitudes and by questioning the legitimacy of authority figures whose decisions defy their attitudes (Skitka, Bauman, & Lytle, 2009).

Similar to the hypotheses for attitude certainty, moral conviction may influence LAC in two different ways. First, it is possible that high levels of moral conviction effectively prevent the formation of new evaluative associations in response to counterattitudinal information. In this case, attitude change for both the focal and related objects should be greater for people who hold their attitude toward a focal object with low moral conviction compared to people who hold the same attitude with high moral conviction. If moral conviction prevents the formation of new associations with the focal topic, Glaser and colleagues' framework gives rise to the following hypotheses: (1) for people with low moral conviction, attitude change



toward the focal object should generalize to related objects and (2) for people with high moral conviction, attitudes toward both the focal and related objects should be resistant to change.

Second, it is possible that high levels of moral conviction regarding a focal object simply increase the likelihood that new counterattitudinal associations with the focal object are rejected. In this case, moral conviction with regard to a focal object should buffer attitude change only for the focal object, but not for related objects. That is, people with high moral conviction should show less attitude change for the focal object compared to people with low moral conviction, but attitude change for related objects should be unaffected by moral conviction. If moral conviction influences the acceptance of new associations with the focal topic, Glaser and colleagues' framework gives rise to the following hypotheses: (1) for people with low moral conviction, attitude change toward the focal object should generalize to related objects and (2) for people with high moral conviction, attitudes toward related objects should change whereas attitudes toward the focal object should be resistant to change.

## THE CURRENT RESEARCH

Extant research on attitude change has provided valuable insights into the factors that facilitate or hinder attitude change (for a review, see Albarraçín & Shavitt, 2018). However, this research has focused primarily on changes in attitudes toward a single focal object. The goal of the current studies is to expand this scope by investigating three potential determinants of LAC effects. Leveraging the framework by Glaser and colleagues (2015), the current research examined whether patterns of LAC depend on (1) the degree of relation between the focal object and related objects, (2) attitude certainty with regard to a focal object, and (3) moral conviction with regard to a focal object. To address the first question, we tested whether LAC effects are strongest for objects that are proximally related to the focal object and less pronounced for more distally related objects. To address the second question, we tested whether (1) attitude certainty toward the focal object buffered attitude change toward the focal object and (2) whether attitude certainty influenced LAC effects. To address the third question, we tested whether (1) moral conviction toward the focal object buffered attitude change toward the focal object and (2) whether moral conviction influenced LAC effects.

These issues were examined across three experiments in which participants reported their attitude, attitude certainty, and moral conviction regarding a focal object, as well as their attitudes toward a proximally related object, a medially related object, and a distally related object. Based on their initial attitudes toward the focal object, participants then received an article containing counterattitudinal arguments about the focal object. Finally, participants again reported their attitudes toward the focal object and all three related objects. Experiment 1 provided a first test of our hypotheses. Experiment 2 aimed to replicate the findings of Experiment 1 using the same attitude objects. Experiment 3 served to test the generalizability

of our findings in Experiments 1 and 2 to different attitude objects.<sup>2</sup> By investigating the influence of object relatedness, attitude certainty, and moral conviction on LAC, the current research adds precision to the LAC framework while also extending current knowledge on the impact of meta-cognitive facets of attitudes on change within broader networks of interrelated attitudes.

## EXPERIMENT 1

The goal of Experiment 1 was to test whether LAC effects depend on (1) the relative degree of relation between a focal object and a related object, (2) attitude certainty with regard to the focal object, and (3) moral conviction with regard to the focal object. Toward this end, participants responded to items assessing their attitudes, attitude certainty, and moral conviction regarding genetically modified organisms (GMOs) and three objects with different degrees of relatedness to the focal object. After completing these items, participants read a counterattitudinal article that included several arguments about GMOs that contradicted participants' initially reported attitudes. Finally, participants again reported their attitudes toward GMOs and the three related objects.

## METHOD

*Participants and Design.* Participants were recruited to participate in a "psychological study on social and political opinions" on Amazon's Mechanical Turk (MTurk). Participation was restricted to MTurk workers who had previous HIT approval rates of at least 95%, who had completed at least one other Human Intelligence Task (HIT) on MTurk, who were located in the United States, and who had not completed studies run by our lab using similar procedures or materials. Of the 327 MTurk workers who initially began the study, 300 (161 women, 138 men, 1 preferred not to specify their gender;  $M_{\text{age}} = 37.16$  years,  $SD_{\text{age}} = 12.49$  years) completed the study and submitted for payment on MTurk before the HIT expired. Participants received \$0.50 (USD) for completing the study, which took approximately 14 minutes on average.

*Pre-Manipulation Survey.* Participants first completed a questionnaire in which they reported their attitudes toward each of 10 different objects. Additionally, they indicated the certainty and moral conviction with which they held each of these attitudes. Of primary interest, participants answered these questions about

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2. For all three experiments, we report all measures, all conditions, and all data exclusions. A sample size of 300 participants was determined prior to the first experiment and set as the desired sample size for all three experiments. With the experimental design in three studies, this sample size provides 99% power to detect a small effect of  $\eta_p^2 = .01$  at the  $\alpha = .05$  level (two-tailed) for the interaction of within-subjects and between-subjects factors in the full ANOVA using GPower (Faul, Erdfelder, Lang, & Buchner, 2007). This sensitivity analysis does not apply to the pre-tests reported in the Supplemental Materials, as they do not employ inferential statistics. The data for each experiment were collected in one shot without intermittent statistical analyses. All data and materials are available at <https://osf.io/trezg>



the production of GMOs, which served as the focal object, and three objects with different degrees of relatedness to the focal object: the use of hormones in food production (proximally related object), the Eat Local Movement (medially related object), and the Paleo diet (distally related object).<sup>3</sup> The other six objects were used as filler items to conceal the purpose of the study. Responses to these items were not analyzed and will not be discussed further. The order of the 10 objects in the questionnaire was randomized across participants. For each object, all participants first reported their attitude about that object (e.g., *To what extent do you support or oppose genetically modified organisms (GMOs)?*) on 6-point rating scales ranging from 1 (*strongly support*) to 6 (*strongly oppose*).<sup>4</sup> Half of the participants then reported their degree of certainty about their attitude (e.g., *How certain or uncertain are you about your position on genetically modified organisms (GMOs)?*) on 7-point rating scales ranging from 1 (*very certain*) to 7 (*very uncertain*) and the extent to which they agreed with the statement *My feelings about [genetically modified organisms (GMOs)] are a reflection of my core moral beliefs and convictions* on 7-point rating scales ranging from 1 (*very much agree*) to 7 (*very much disagree*). For the other half of the participants, the order of the attitude certainty and moral conviction items was reversed.

*Counterattitudinal Arguments.* Based on participants' responses to the item assessing their attitudes toward GMOs, they then received an article that expressed a view counter to their reported attitude. That is, those who expressed opposition to GMOs (i.e., 4, 5, or 6 on the scale) received an article describing benefits of GMOs. Conversely, those who expressed support for GMOs (i.e., 1, 2, or 3 on the scale) received an article describing risks of GMOs. Both articles were based on arguments found in news sources (e.g., New York Times) and other sources online (e.g., blogs; for the full text of both articles, see Supplemental Materials). Both articles were formatted as New York Times online articles. The articles were roughly equivalent in length, and participants had unlimited time to read the article at their own pace. Participants were instructed to pay careful attention to the article, as they would be asked questions about the article afterwards. After reading the article, participants answered three True/False comprehension check items.

*Post-Manipulation Survey.* Following the article and comprehension check items, participants responded to the same attitudinal items from the pre-manipulation survey about the focal object and the three related objects (i.e., GMOs, hormones, Eat Local Movement, and Paleo diet). The order of these items was randomized across participants. Following these items, participants completed an instructional attention check (Oppenheimer, Meyvis, & Davidenko, 2009) and demographic items (i.e., gender, age, ethnicity, and political orientation).<sup>5</sup>

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3. Attitude objects with different degrees of relatedness to the focal object were identified prior to Experiment 1 on the basis of a pre-test using 303 participants. For full description and results of the pre-test, see the Supplemental Materials.

4. The scale for the attitude item did not contain a neutral mid-point to permit identification of a counterattitudinal article for the experimental manipulation.

5. Eighteen participants failed the instructional attention check. Removing their data did not alter the pattern of results, so they were retained for all analyses.

## RESULTS

*Attitude Change for Focal and Related Objects.* The first set of analyses aimed to test the hypothesis that LAC effects should be strongest for objects that are proximally related to the focal object and less pronounced for more distally related objects. Support for this hypothesis would be indicated by an interaction between the time at which the attitude was measured, the direction of the counterattitudinal message, and the attitude object. Specifically, an interaction supporting the hypothesis that LAC effects are strongest for more proximally related objects would suggest that participants' attitudes changed in line with the counterattitudinal message to a greater extent for more proximally related objects.

For ease of interpretation, responses on the attitude items were recoded such that higher scores reflect more favorable attitudes toward a given object. The resulting scores were submitted to a 2 (Time: pre vs. post)  $\times$  4 (Object: focal vs. proximally related vs. medially related vs. distally related)  $\times$  2 (Article: pro vs. contra) mixed ANOVA with the first two factors varying within subjects and the latter varying between subjects. The analysis revealed a significant main effect of Object,  $F(2.24, 667.63) = 184.13, p < .001, \eta_p^2 = .38$ , and a significant main effect of Article,  $F(1, 298) = 112.03, p < .001, \eta_p^2 = .27$ .<sup>6</sup> These main effects were qualified by a significant two-way interaction between Object and Article,  $F(2.24, 667.63) = 92.13, p < .001, \eta_p^2 = .24$ , and a significant two-way interaction between Time and Article,  $F(1, 298) = 60.68, p < .001, \eta_p^2 = .17$ . Finally, these two-way interactions were qualified by a significant three-way interaction between Time, Object, and Article,  $F(2.53, 752.85) = 44.86, p < .001, \eta_p^2 = .13$ . To decompose the three-way interaction, we conducted separate 2 (Time)  $\times$  2 (Article) ANOVAs at each level of Object.

For the focal object (GMOs), there was a significant main effect of Article,  $F(1, 298) = 73.50, p < .001, \eta_p^2 = .20$ , which was qualified by a significant two-way interaction between Time and Article,  $F(1, 298) = 115.31, p < .001, \eta_p^2 = .28$  (see Figure 1, Panel A). This interaction indicates that participants who read an article in favor of GMOs (i.e., participants who initially opposed GMOs) were more favorable toward GMOs after reading that article than before reading the article,  $F(1, 298) = 60.53, p < .001, \eta_p^2 = .17$ . Conversely, participants who read an article against GMOs (i.e., participants who initially supported GMOs) were less favorable toward GMOs after reading that article than before reading the article,  $F(1, 298) = 55.34, p < .001, \eta_p^2 = .16$ .<sup>7</sup>

For the proximally related object (Hormones), there was a significant main effect of Article,  $F(1, 298) = 73.50, p < .001, \eta_p^2 = .20$ , which was qualified by a significant two-way interaction between Time and Article,  $F(1, 298) = 19.69, p < .001, \eta_p^2 = .06$  (see Figure 1, Panel B). In line with the pattern observed for the focal object, those who read an article in favor of GMOs reported more favorable attitudes toward hormone usage after reading that article than before reading the article,  $F(1, 298) =$

6. The assumption of sphericity was not met for the main effect of Object (Mauchly's  $W = .59, p < .001$ ) and the interaction for Object and Time (Mauchly's  $W = .72, p < .001$ ). Results including these effects use Greenhouse-Geisser adjusted degrees of freedom.

7. Bonferroni correction was used for significance tests of pairwise contrasts of Time at each level of Article in all three experiments to adjust significance levels for multiple comparisons.

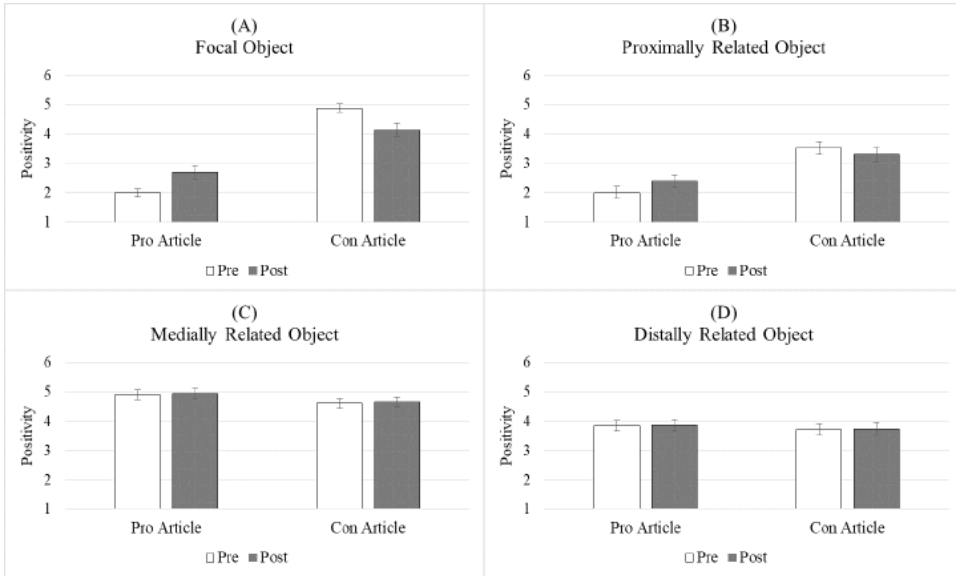


FIGURE 1. Mean attitudes toward the focal object (Panel A), the proximally related object (Panel B), the medially related object (Panel C), and the distally related object (Panel D) as a function of Time (Pre vs. Post) and Article (Pro vs. Contra), Experiment 1. Higher values indicate more favorable attitudes. Error bars represent 95% confidence intervals around the mean.

17.76,  $p < .001$ ,  $\eta_p^2 = .06$ . Conversely, those who read an article against GMOs were less favorable toward hormone usage after reading that article than before reading the article,  $F(1, 298) = 4.69$ ,  $p = .031$ ,  $\eta_p^2 = .02$ . This pattern suggests that changes in attitudes toward GMOs (i.e., focal object) generalized to hormone usage (i.e., the most closely related object).

For the medially related object (Eat Local Movement), there was a significant main effect of Article,  $F(1, 298) = 6.45$ ,  $p = .012$ ,  $\eta_p^2 = .02$ , indicating that participants who read an article against GMOs (i.e., those who initially opposed GMOs) reported less favorable attitudes toward the Eat Local Movement compared to those who read an article supporting GMOs (i.e., those who initially opposed GMOs). Counter to the results found for the focal and proximally related objects, this main effect was not qualified by an interaction between Time and Article,  $F(1, 298) = 0.00$ ,  $p = .986$ ,  $\eta_p^2 < .01$  (see Figure 1, Panel C).

Finally, for the distally related object (Paleo diet), there was no significant main or interaction effect, all  $F$ s  $< 0.87$ , all  $p$ s  $> .351$ , all  $\eta_p^2$ s  $< .01$ . Together, these results suggest that the attitude change observed for the focal object generalized to the proximally related object, but not to the medially and distally related objects.

*Specification of LAC Effects.* To further specify the nature of the LAC effects, we analyzed correlations between attitude change for each of the attitude objects. If generalization occurred, attitude change for the focal object should be positively related to attitude change for the proximally related object. Moreover, the positive correlation between attitude change for the focal object and attitude change for more distally related objects should be attenuated if generalization depended on

**TABLE 1. Correlations Between Attitude Change for Attitudes Toward Focal and Related Objects, Experiment 1 ( $N = 300$ )**

Attitude Change	2	3	4
1. Focal Object	$r = .40, p < .001$	$r = .06, p = .302$	$r = .01, p = .901$
2. Proximally Related Object	-	$r = .02, p = .787$	$r = .00, p = .982$
3. Medially Related Object	-	-	$r = .23, p < .001$
4. Distally Related Object	-	-	-

Note. Exact  $p$ -values for two-tailed tests reported. Higher scores on the attitude change index indicate more attitude change in line with counterattitudinal article.

degree of relatedness. If displacement occurred, attitude change toward the focal object should be unrelated to attitude change toward the proximally related object. Moreover, if displacement effects further extended to more distally related objects, then attitude change for the proximally related object should be positively related to attitude change for more distally related attitude objects.

To specify the nature of the LAC effects, we first calculated difference scores reflecting the degree of attitude change in line with the article for each of the four objects. For participants who read an article in favor of GMOs (i.e., participants who initially opposed GMOs), we subtracted their recoded pre-attitude scores from their recoded post-attitude scores for each of the four objects. Conversely, for participants who read an article against GMOs (i.e., participants who initially supported GMOs), we subtracted their recoded post-attitude scores from their recoded pre-attitude scores for each of the four objects. Thus, for both groups of participants, higher values on the difference score reflect greater attitude change for a given object in line with the article. Consistent with the conclusion that attitude change generalized to the most proximally related object but not to more distally related objects, attitude change for the focal object showed a significant positive correlation with attitude change for the proximally related topic, but not with attitude change for the medially and distally related objects (see Table 1).

*Does LAC Depend on Attitude Certainty?* For ease of interpretation, responses on the attitude certainty item were recoded such that higher scores reflect greater certainty. To test whether LAC effects depend on attitude certainty, we correlated attitude certainty with regard to the focal object ( $M = 5.61, SD = 1.43$ ) and attitude change scores for each of the four objects (see Table 2). A buffering effect of attitude certainty against attitude change would be reflected in a significant negative correlation between attitude certainty and attitude change (i.e., higher attitude certainty is associated with less attitude change). Further, if LAC effects depend on attitude certainty with regard to the focal object, attitude certainty should also be correlated with attitude change for related objects. Specifically, based on the ANOVA results above, attitude certainty should be negatively correlated with attitude change for both the focal and proximally related objects.

Replicating past research, attitude certainty with regard to the focal object showed a significant negative correlation with attitude change for the focal object ( $M = 0.72, SD = 1.16$ ). Attitude certainty regarding the focal object was not significantly correlated with attitude change for either the proximally related ( $M$

**TABLE 2. Correlations Between Attitude Change for Attitudes Toward Focal and Related Objects and Meta-Cognitive Facets of Attitudes Toward Focal Object, Experiment 1 ( $N = 300$ )**

Attitude Object	Attitude Certainty				Moral Conviction			
	$r$	$p$	$BF_{10}$	$BF_{10}$ interpretation	$r$	$p$	$BF_{10}$	$BF_{10}$ interpretation
Focal Object	-.11	.049	0.49	Anecdotal evidence for $H_0$	-.04	.473	0.09	Strong evidence for $H_0$
Proximally Related Object	-.05	.429	0.10	Strong evidence for $H_0$	.02	.738	0.08	Strong evidence for $H_0$
Medially Related Object	.06	.306	0.12	Substantial evidence for $H_0$	.08	.187	0.17	Strong evidence for $H_0$
Distally Related Object	.06	.300	0.12	Substantial evidence for $H_0$	.06	.271	0.13	Strong evidence for $H_0$

Note. Exact  $p$ -values for two-tailed tests reported. Higher scores on the attitude change index indicate more attitude change in line with counterattitudinal article. Higher values for moral conviction and attitude certainty indicate greater moral conviction and greater attitude certainty with regard to the focal object. Bayes factors were computed using JASP software (JASP Team, 2017). Evidence category labels for Bayes factors follow recommendations from Wetzels and Wagenmakers (2012).

= 0.30,  $SD = 1.15$ ), medially related ( $M = 0.00$ ,  $SD = 0.69$ ), or distally related ( $M = 0.00$ ,  $SD = 0.69$ ) attitude objects. Together with the ANOVA results showing LAC for the proximally related object, these results suggest that attitude certainty with regard to the focal object buffered attitude change for the focal object but not for the proximally related object.

*How Is LAC Related to Attitude Certainty?* We provided two potential hypotheses regarding the relationship between LAC effects and attitude certainty. Specifically, if attitude certainty prevents new associations from forming, we would expect a negative correlation between attitude certainty and attitude change for both the focal and proximally related objects. However, the correlational analyses above speak against this hypothesis. The second potential hypothesis was that attitude certainty might increase the probability that these new associations are rejected for the focal object, which would result in generalization for those low in attitude certainty but displacement for those high in attitude certainty. Because attitude certainty buffered attitude change for the focal object but not for the proximally related object, it is possible that participants with high attitude certainty demonstrated displacement of attitude change. However, correlations for the focal object and the proximally related object were not significantly different,  $Z = 1.04$ ,  $p = .298$ , rendering conclusions regarding a potential displacement effect for participants high in attitude certainty premature. Because the correlational analyses above did not produce clear patterns regarding displacement effects, we also ran a multiple regression analysis predicting attitude change for the proximally related object from centered scores of attitude change for the focal object, attitude certainty with regard to the focal object, and their interaction. If attitude certainty increased the likelihood of new associations being rejected for the focal object, we would expect a significant interaction between attitude certainty and focal attitude change when predicting proximal attitude change. Specifically, this interaction should reveal a

positive association between focal attitude change and proximal attitude change for participants low in attitude certainty. Conversely, the interaction should suggest an attenuated association between focal attitude change and proximal attitude change for participants high in attitude certainty.

Counter to this prediction, the regression analysis revealed only a significant main effect of attitude change for the focal object in the prediction of attitude change for the proximally related object,  $\beta = .40$ ,  $t(296) = 7.51$ ,  $p < .001$ . The main effect of attitude certainty was not significant,  $\beta = .00$ ,  $t(296) = -0.01$ ,  $p = .996$ , and more important, the interaction between attitude change for the focal object and attitude certainty was not significant,  $\beta = .00$ ,  $t(296) = 0.06$ ,  $p = .951$ . Simple slopes analyses at one standard deviation above and below the mean of attitude certainty further showed that the positive relation between attitude change for the focal object and attitude change for the first-degree object was statistically significant regardless of attitude certainty, all  $\beta$ s  $> .40$ , all  $t$ s  $> 5.06$ , all  $p$ s  $< .001$ . In other words, attitude change for the proximally related object was systematically related to attitude change for the focal object regardless of attitude certainty, which stands in contrast to the idea of a displacement effect for participants high in attitude certainty. Together with the results of the correlation analyses, the results of the multiple regression suggest that neither mechanism by which attitude certainty may influence LAC effects (i.e., preventing new associations from forming or increasing the likelihood that new associations are rejected) was supported.

*Does LAC Depend on Moral Conviction?* For ease of interpretation, responses on the moral conviction item were recoded such that higher scores reflect greater moral conviction. In line with the attitude certainty analyses, we first correlated moral conviction with regard to the focal object ( $M = 4.93$ ,  $SD = 1.60$ ) and attitude change scores for each of the four objects to test whether LAC depends on moral conviction (see Table 2). Counter to the hypothesis that moral conviction increases resistance to attitude change, moral conviction with regard to the focal object was not significantly correlated with attitude change toward any of the four objects.

*How Is LAC Related to Moral Conviction?* In line with the attitude certainty analyses, we also ran a multiple regression analysis to gain further insights into the potential role of moral conviction in LAC. Specifically, we ran a multiple regression predicting attitude change for the proximally related object from centered scores of attitude change for the focal object, moral conviction with regard to the focal object, and their interaction. The regression analysis revealed a significant main effect of attitude change for the focal object,  $\beta = .40$ ,  $t(296) = 7.65$ ,  $p < .001$ . However, the main effect of moral conviction was not significant,  $\beta = .03$ ,  $t(296) = 0.81$ ,  $p = .421$ . The main effect of attitude change was qualified by a significant interaction between attitude change for the focal object and moral conviction,  $\beta = .08$ ,  $t(296) = 2.61$ ,  $p = .010$ . Counter to the notion of displacement, this interaction suggests that the relationship between attitude change for the focal object and attitude change for the proximal object was stronger when moral conviction was high,  $\beta = .54$ ,  $t(296) = 7.34$ ,  $p < .001$ , than when moral conviction was low,  $\beta = .26$ ,  $t(296) = 3.57$ ,  $p < .001$ . Further, it is worth noting that the positive relation between attitude change for the focal object and attitude change for the proximally related object was statistically significant regardless of



whether moral conviction was high or low. Thus, similar to the results for attitude certainty, attitude change for the first-degree object was systematically related to attitude change for the focal object regardless of moral conviction.

## DISCUSSION

Experiment 1 investigated the extent to which LAC depends on the degree of relatedness to the focal object. Additionally, we examined whether patterns of LAC depend on two meta-cognitive facets of attitudes: attitude certainty and moral conviction. The results of Experiment 1 suggest that attitudes toward the focal object changed in responses to counterattitudinal arguments. These shifts generalized to a proximally related object, but not to medially and distally related objects. Further, although attitude certainty buffered attitudes toward the focal object against counterattitudinal arguments, attitude change for the focal object generalized to a proximally related object regardless of attitude certainty. Moral conviction was not related to attitude change for any of the four objects.

## EXPERIMENT 2

Based on recent concerns about the reproducibility of psychological findings (Open Science Collaboration, 2015), Experiment 2 aimed to replicate the findings of Experiment 1 using a different sample. Whereas participants in Experiment 1 were recruited via Amazon's MTurk, participants in Experiment 2 were recruited from a pool of undergraduate students from a large university.

## METHOD

Participants were recruited via a university subject pool and received course credit for their participation. The study was included in two larger batteries, each of which included one other, unrelated study. The only procedural difference between Experiments 1 and 2 was that the order of the objects in the pre- and post-manipulation surveys was the same for all participants. All participants answered the three questions about GMOs first; the questions for the other objects were presented in a fixed random order that was held constant for all participants. As in Experiment 1, the order of attitude certainty and moral conviction items was counterbalanced across participants. Of the 423 participants who initially began the study, 413 (230 women, 180 men, 3 did not wish to specify gender;  $M_{\text{age}} = 19.38$  years,  $SD_{\text{age}} = 2.05$  years) completed all measures and are included in analyses.<sup>8</sup>

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8. The sample size in Experiment 2 is greater than our desired sample size of 300 due to an additional data collection opportunity in our lab. The materials for Experiment 2 were included in two separate batteries that were run at the same time, one of which contained a study with a desired sample size of 300 and a second one with a desired sample size of 120. The data were analyzed after completion of both data collections without individual or intermittent statistical analyses for either of the two batteries. Experiment 2 did not contain an instructional attention check, and all participants who completed the study are included in the analyses.

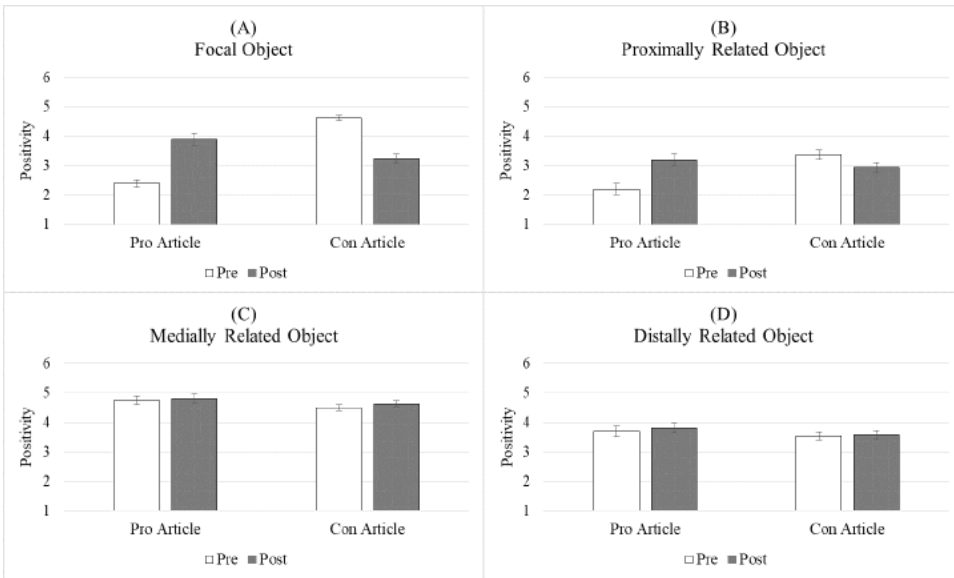


FIGURE 2. Mean attitudes toward the focal object (Panel A), the proximally related object (Panel B), the medially related object (Panel C), and the distally related object (Panel D) as a function of Time (Pre vs. Post) and Article (Pro vs. Contra), Experiment 2. Higher values indicate more favorable attitudes. Error bars represent 95% confidence intervals around the mean.

## RESULTS

*Attitude Change for Focal and Related Objects.* Responses on the attitude items were coded and analyzed in line with the procedures in Experiment 1. A 2 (Time)  $\times$  4 (Object)  $\times$  2 (Article) mixed ANOVA revealed a significant main effect of Object,  $F(2.21, 908.94) = 239.47, p < .001, \eta_p^2 = .37$ , a significant main effect of Time,  $F(1, 411) = 16.68, p < .001, \eta_p^2 = .04$ , and a significant main effect of Article,  $F(1, 411) = 15.80, p < .001, \eta_p^2 = .04$ .<sup>9</sup> These main effects were qualified by significant two-way interactions between Object and Article,  $F(2.21, 908.94) = 28.20, p < .001, \eta_p^2 = .06$ , between Time and Article,  $F(1, 411) = 297.60, p < .001, \eta_p^2 = .42$ , and between Object and Time,  $F(2.62, 1077.00) = 4.81, p = .004, \eta_p^2 = .01$ . Finally, all of these two-way interactions were qualified by a significant three-way interaction between Time, and Article,  $F(2.62, 1077.00) = 228.20, p < .001, \eta_p^2 = .36$ . To decompose the three-way interaction, we conducted separate 2 (Time)  $\times$  2 (Article) ANOVAs at each level of Object, as in Experiment 1. Time, and Article,  $F(2.62, 1077.00) = 228.20, p < .001, \eta_p^2 = .36$ . To decompose the three-way interaction, we conducted separate 2 (Time)  $\times$  2 (Article) ANOVAs at each level of Object, as in Experiment 1.

For the focal object, there was a significant main effect of Article,  $F(1, 411) = 81.46, p < .001, \eta_p^2 = .17$ , which was qualified by a significant two-way interaction between Time and Article,  $F(1, 411) = 556.67, p < .001, \eta_p^2 = .58$  (see Figure 2,

9. As in Experiment 1, the assumption of sphericity was not met for the main effect of Object (Mauchly's  $W = .60, p < .001$ ) and the interaction for Object and Time (Mauchly's  $W = .76, p < .001$ ). Results including these effects use Greenhouse-Geisser adjusted degrees of freedom.

Panel A). This interaction indicates that participants who read an article supporting GMOs (i.e., participants who initially opposed GMOs) were more favorable toward GMOs after reading that article than before reading the article,  $F(1, 411) = 240.60, p < .001, \eta_p^2 = .37$ . Conversely, participants who read an article opposing GMOs (i.e., participants who initially supported GMOs) were less favorable toward GMOs after reading that article than before reading the article,  $F(1, 411) = 343.87, p < .001, \eta_p^2 = .46$ .

For the proximally related object (Hormones), there was a significant main effect of Article,  $F(1,411) = 16.13, p < .001, \eta_p^2 = .04$ , and a significant main effect of Time,  $F(1,411) = 21.81, p < .001, \eta_p^2 = .05$ , which were qualified by a significant two-way interaction between Time and Article,  $F(1, 411) = 145.20, p < .001, \eta_p^2 = .26$  (see Figure 2, Panel B). In line with the pattern observed for the focal object, participants who read an article in favor of GMOs were more favorable toward hormone usage after reading the article than before reading the article,  $F(1, 411) = 111.03, p < .001, \eta_p^2 = .21$ . Conversely, those who read an article against GMOs were less favorable toward hormone usage after reading that article than before reading the article,  $F(1, 411) = 36.75, p < .001, \eta_p^2 = .08$ . This pattern suggests that attitude change toward GMOs (i.e., focal object) generalized to hormone usage (i.e., the most closely related object).

For the medially related object (Eat Local Movement), there was a significant main effect of Article,  $F(1,411) = 6.94, p = .009, \eta_p^2 = .02$ , and a significant main effect of Time,  $F(1,411) = 6.00, p = .015, \eta_p^2 = .01$ . Counter to the results found for the focal and proximally related objects, these main effects were not qualified by a significant two-way interaction between Time and Article,  $F(1, 411) = 0.62, p = .434, \eta_p^2 < .01$  (see Figure 2, Panel C).

Finally, for the distally related object (Paleo diet), there was a significant main effect of Time,  $F(1, 411) = 4.20, p = .041, \eta_p^2 = .01$ , but the two-way interaction of Time and Article was not statistically significant,  $F(1, 411) = 0.85, p = .358, \eta_p^2 < .01$  (see Figure 2, Panel D). Together, these results replicate the findings of Experiment 1, suggesting that attitude change for the focal object generalized to the proximally related object, but not to the medially and distally related objects.

*Specification of LAC Effects.* Following the procedures in Experiment 1, we also calculated difference scores reflecting the degree of attitude change in line with the article for each of the four objects. Consistent with the conclusion that attitude change generalized to the most proximally related object, attitude change for the focal object showed a significant positive correlation with attitude change for the proximally related object (see Table 3). There was no significant correlation between attitude change for the focal object and the medially related object. Unexpectedly, there was a significant correlation between attitude change for the focal object and attitude change for the distally related object. However, because there was no evidence for LAC for the distally related object in the ANOVA results and the same correlation was not significant in Experiment 1, it presumably reflects a false positive in the large number of reported effects.

*Does LAC Depend on Attitude Certainty?* Responses on the attitude certainty item were coded and analyzed in line with the procedures in Experiment 1. Replicat-

**TABLE 3. Correlations Between Attitude Change for Focal and Related Objects, Experiment 2 (N = 413)**

Attitude Change	2	3	4
1. Focal Object	$r = .37, p < .001$	$r = .07, p = .141$	$r = .17, p = .001$
2. Proximally Related Object	-	$r = .09, p = .064$	$r = .17, p = .001$
3. Medially Related Object	-	-	$r = .29, p < .001$
4. Distally Related Object	-	-	-

Note. Exact  $p$ -values for two-tailed tests reported. Higher scores on the attitude change index indicate more change in line with counterattitudinal article.

ing the results of Experiment 1, attitude certainty with regard to the focal object ( $M = 4.59, SD = 1.62$ ) was negatively correlated with attitude change for the focal object ( $M = 1.43, SD = 1.20$ ), but not with attitude change for the proximally ( $M = 0.64, SD = 1.20$ ) and medially ( $M = -0.06, SD = 0.78$ ) related objects (see Table 4). Unexpectedly, there was a significant negative correlation between attitude certainty with regard to the focal object and attitude change for the distally related object ( $M = 0.01, SD = 0.74$ ). However, because there was no evidence for LAC for the distally related object in the ANOVA results and the same correlation was not significant in Experiment 1, it presumably reflects a false positive in the large number of reported effects (see above). More important for the current investigation, correlations between attitude certainty and attitude change were not significantly different for the focal object and the proximally related object,  $Z = 1.64, p = .102$ , rendering conclusions of a potential displacement effect for participants high in attitude certainty premature.

*How Is LAC Related to Attitude Certainty?* Further evidence against a displacement effect is reflected in the results of a multiple regression analysis that followed the procedures in Experiment 1. Replicating the findings of Experiment 1, this analysis revealed a significant positive relation between attitude change for the focal object and attitude change for the proximally related object,  $\beta = .36, t(409) = 7.93, p < .001$ . However, the main effect of attitude certainty was not significant,  $\beta = .00, t(409) = -0.11, p = .916$ , and the main effect of attitude change for the focal object remained unqualified by attitude certainty with regard to the focal object,  $\beta = -.01, t(409) = -0.31, p = .742$ . As in Experiment 1, simple slopes analyses further showed that the positive relation between attitude change for the focal object and attitude change for the proximally related object was statistically significant regardless of attitude certainty, all  $\beta$ s  $> .35$ , all  $t$ s  $> 6.21$ , all  $p$ s  $< .001$ . Together, these results provide further evidence for the conclusion that, although attitude certainty with regard to the focal object buffered changes in attitudes toward the focal object, attitude change for the focal object generalized to the proximally related object regardless of attitude certainty.

*Does LAC Depend on Moral Conviction?* Responses on the moral conviction item were coded and analyzed in line with the procedures in Experiment 1. Moral conviction with regard to the focal topic ( $M = 4.36, SD = 1.47$ ) did not show a significant correlation with attitude change for any of the four objects, replicating the findings of Experiment 1 (see Table 4).

**TABLE 4. Correlations Between Attitude Change for Attitudes Toward Focal and Related Objects and Meta-Cognitive Facets of Attitudes Toward Focal Object, Experiment 2 (N = 413)**

Attitude Object	Attitude Certainty			Moral Conviction		
	<i>r</i>	<i>p</i>	BF10 interpretation	<i>r</i>	<i>p</i>	BF10 interpretation
Focal Object	-.14	.006	2.75 Anecdotal evidence for H1	-.03	.583	0.07 Strong evidence for H0
Proximally Related Object	-.06	.257	0.12 Substantial evidence for H0	.08	.094	0.25 Substantial evidence for H0
Medially Related Object	-.01	.830	0.06 Strong evidence for H0	-.01	.837	0.06 Strong evidence for H0
Distally Related Object	-.12	.015	1.15 Anecdotal evidence for H1	-.03	.492	0.08 Strong evidence for H0

Note. Exact *p*-values for two-tailed tests reported. Higher scores on the attitude change index indicate more attitude change in line with counterattitudinal article. Higher values for moral conviction and attitude certainty indicate greater moral conviction and greater attitude certainty with regard to the focal object. Bayes factors were computed using JASP software (JASP Team, 2017). Evidence category labels for Bayes factors follow recommendations from Weitzles and Wagenmakers (2012).

*How Is LAC Related to Moral Conviction?* We also ran a multiple regression analysis in line with the procedures of Experiment 1. The regression analyses revealed significant main effects of attitude change for the focal object and moral conviction in predicting attitude change for the proximally related object,  $\beta = .37$ ,  $t(410) = 8.11$ ,  $p < .001$  and  $\beta = .08$ ,  $t(410) = 2.02$ ,  $p = .044$ , respectively. Similar to the results for attitude certainty, there was no significant interaction between attitude change for the focal object and moral conviction with regard to the focal object,  $\beta = .02$ ,  $t(409) = 0.62$ ,  $p = .537$ . Simple slopes analyses further showed that the positive relation between attitude change for the focal object and attitude change for the proximally related object was statistically significant regardless of moral conviction, all  $\beta$ s  $> .33$ , all  $t$ s  $> 4.70$ , all  $p$ s  $< .001$ . Together, these results provide further evidence for the conclusion that moral conviction did not buffer changes in attitudes toward any object and that attitude change for the focal object generalized to the proximally related object regardless of moral conviction.

## DISCUSSION

Experiment 2 aimed to replicate the findings of Experiment 1 using a student sample. As in Experiment 1, attitude change generalized from the focal object to the most closely related object, but not to more distally related objects. Further, attitude certainty with regard to the focal object was negatively correlated with attitude change for the focal object, such that those with higher attitude certainty were less likely to change their attitudes toward the focal object. Nevertheless, attitude change for the focal object generalized to the most closely related object regardless of attitude certainty. Finally, moral conviction was again unrelated to attitude change for any of the four objects.

## EXPERIMENT 3

The goal of Experiment 3 was to test the generalizability of the effects obtained in Experiments 1 and 2 to different attitude objects. Toward this end, Experiment 3 utilized a different focal object (growth-promoting hormones) and different related objects.

## METHOD

The methods for Experiment 3 were identical to those of Experiment 1, except that growth-promoting hormones served as the focal object, and the related objects were antibiotics (proximally related object), nanotechnology (medially related object 1), artificial sweeteners (medially related object 2), and gluten free diet (distally related object).<sup>10</sup> Of the 289 MTurk workers who initially began the study, 269 (143 women, 123 men, 3 preferred not to specify;  $M_{\text{age}} = 36.33$  years,  $SD_{\text{age}} = 12.46$  years) completed the study and are included in analyses.<sup>11</sup>



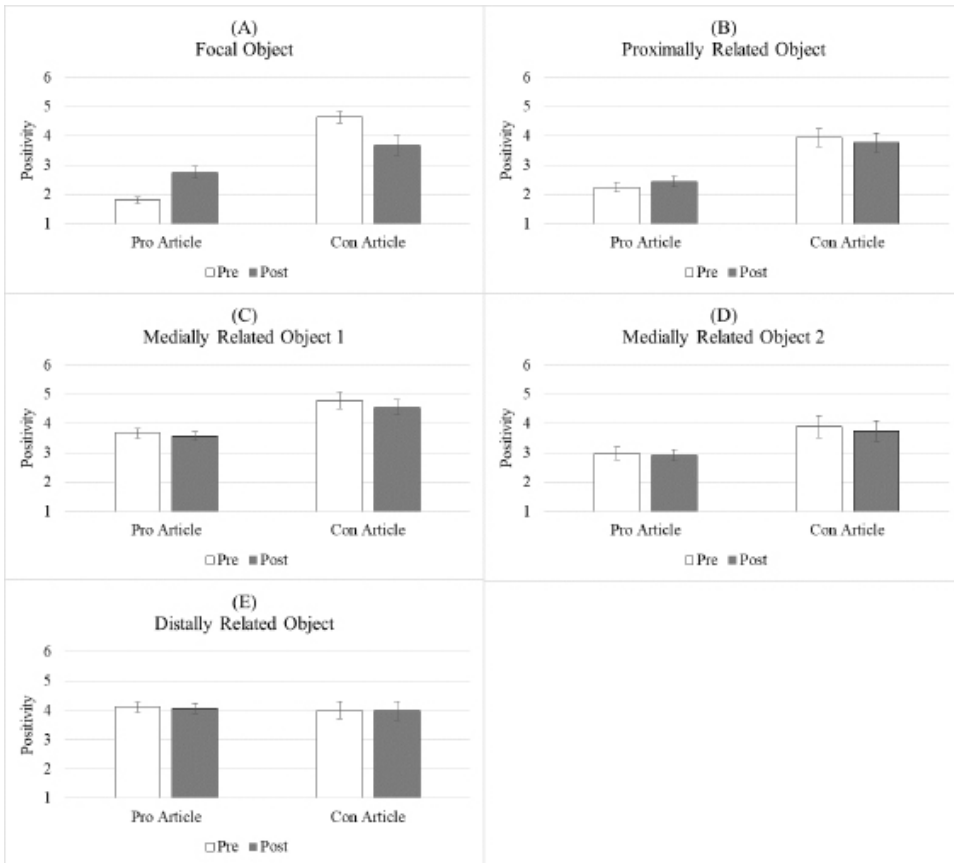


FIGURE 3. Mean attitudes toward the focal object (Panel A), the proximally related object (Panel B), the medially related object 1 (Panel C), medially related object 2 (Panel D), and the distally related object (Panel E) as a function of Time (Pre vs. Post) and Article (Pro vs. Contra), Experiment 2. Higher values indicate more favorable attitudes. Error bars represent 95% confidence intervals around the mean.

## RESULTS

*Attitude Change for Focal and Related Objects.* Responses on the attitude items were coded and analyzed in line with the procedures in Experiment 1. A 2 (Time)  $\times$  4 (Object)  $\times$  2 (Article) mixed ANOVA revealed significant main effects of Object,  $F(3.16, 842.90) = 43.79, p < .001, \eta_p^2 = .14$ , and Article,  $F(1, 267) = 105.41, p < .001, \eta_p^2 = .28$ , which were qualified by significant two-way interactions between Object and Article,  $F(3.16, 842.90) = 26.36, p < .001, \eta_p^2 = .09$ , and between Time and Article,  $F(1, 267) = 45.13, p < .001, \eta_p^2 = .15$ .<sup>12</sup> All of these two-way interactions were

10. Related attitude objects were determined prior to Experiment 3 on the basis of a pre-test using 325 participants. Due to experimenter error, two medially related objects were included in this experiment. For the sake of transparency, we report the results for both medially related objects. For full description and results of the pre-test, see the Supplemental Materials.

11. The desired sample size was 300. Although we received 300 submissions for payment, the study included 21 submissions of the correct completion code that were not associated with any data. Seventeen participants failed the instructional attention check. Removing their data did not alter the pattern of results, so they were retained for all analyses.

qualified by a significant three-way interaction between Object, Time, and Article,  $F(3.53, 943.64) = 35.59, p < .001, \eta_p^2 = .12$ . As in Experiments 1 and 2, we conducted separate 2 (Time)  $\times$  2 (Article) ANOVAs at each level of Object to decompose the significant three-way interaction.

For the focal object (Hormones), this analysis revealed a significant main effect of Article,  $F(1, 267) = 185.38, p < .001, \eta_p^2 = .41$ , which was qualified by a significant two-way interaction between Time and Article,  $F(1, 267) = 114.19, p < .001, \eta_p^2 = .30$  (see Figure 3, Panel A). Replicating the results of Experiments 1 and 2, this interaction indicates that participants who read an article supporting the use of growth-promoting hormones (i.e., participants who initially opposed the use of growth-promoting hormones) were more favorable toward growth-promoting hormones after reading the article than before reading the article,  $F(1, 267) = 114.64, p < .001, \eta_p^2 = .30$ . Conversely, participants who read an article opposing the use of growth-promoting hormones (i.e., participants who initially supported the use of growth-promoting hormones) were less favorable toward growth-promoting hormones after reading the article than before reading the article,  $F(1, 267) = 38.01, p < .001, \eta_p^2 = .13$ .

For the proximally related object (Antibiotics), there was a significant main effect of Article,  $F(1, 267) = 83.42, p < .001, \eta_p^2 = .24$ , which was qualified by a significant two-way interaction between Time and Article,  $F(1, 267) = 4.96, p = .027, \eta_p^2 = .02$ . This interaction indicates that participants who read an article supporting the use of growth-promoting hormones were more favorable toward the use of antibiotics after reading the article than before reading the article,  $F(1, 267) = 5.36, p = .021, \eta_p^2 = .02$ . However, participants who read an article opposing the use of growth-promoting hormones did not become less favorable toward growth-promoting hormones as a result of reading the article,  $F(1, 267) = 1.53, p = .217, \eta_p^2 = .01$ .

Because the current study contained two medially related objects (see above), the data for each of these objects were analyzed separately. For Nanotechnology, there were significant main effects of Time,  $F(1, 267) = 8.30, p = .004, \eta_p^2 = .03$ , and of Article,  $F(1, 267) = 50.14, p < .001, \eta_p^2 = .16$ , which were not qualified by a two-way interaction between Time and Article,  $F(1, 267) = 1.57, p = .211, \eta_p^2 < .00$ . For Artificial Sweeteners, there was a main effect of Article,  $F(1, 267) = 18.99, p < .001, \eta_p^2 = .07$ , which remained unqualified by a higher-order interaction with Time,  $F(1, 267) = 0.38, p = .540, \eta_p^2 < .01$ .

Finally, for the distally related object (Gluten Free Diet), there were no significant main effects of Time and Article, all  $F$ s  $< 0.31$ , all  $p$ s  $> .581$ , all  $\eta_p^2$ s  $< .01$ , and no significant interaction between the two factors,  $F(1, 267) = 0.06, p = .803, \eta_p^2 < .01$ .

*Specification of LAC Effects.* Further analyses revealed a significant correlation between attitude change for the focal object and attitude change for the proximally related object, replicating the findings of Experiments 1 and 2 (see Table 5). Attitude change for the focal object was unrelated to attitude change for the distally related object and one of the medially related objects (i.e., Nanotechnology). Un-

12. The assumption for sphericity was not met for the main effect of Topic (Mauchly's  $W = .50, p < .001$ ) and the interaction for Topic and Time (Mauchly's  $W = .76, p < .001$ ). Results including these effects use Greenhouse-Geisser adjusted degrees of freedom.

**TABLE 5. Correlations Between Attitude Change for Attitudes Toward Focal and Related Objects, Experiment 3 (N = 269)**

Attitude Object	2	3	4	5
1. Focal Object	$r = .32,$ $p < .001$	$r = .08,$ $p = .205$	$r = .16,$ $p = .009$	$r = .00,$ $p = .962$
2. Proximally Related Object	-	$r = .17,$ $p = .005$	$r = -.03,$ $p = .647$	$r = -.09,$ $p = .146$
3. Medially Related Object 1	-	-	$r = .09,$ $p = .133$	$r = .07,$ $p = .251$
4. Medially Related Object 2	-	-	-	$r = .01,$ $p = .858$
5. Distally Related Object	-	-	-	-

Note. Exact  $p$ -values for two-tailed tests reported. Higher scores on the attitude change index indicate more attitude change in line with counterattitudinal article.

expectedly, there was a significant positive correlation between attitude change for the focal object and attitude change for the other medially related object (i.e., Artificial Sweeteners). However, because there was no evidence for LAC for this object in the ANOVA results, the same correlation was not significant for the other medially related object, and the corresponding correlations were not significant in Experiments 1 and 2, it presumably reflects another false positive in the large number of reported effects.

*Does LAC Depend on Attitude Certainty?* Responses on the attitude certainty item were coded and analyzed in line with the procedures in Experiment 1 ( $M = 5.48$ ,  $SD = 1.54$ ). Different from the results of Experiments 1 and 2, attitude change for the focal object ( $M = 0.96$ ,  $SD = 1.27$ ) was not significantly correlated with attitude certainty (see Table 6). Unexpectedly, there was a significant negative correlation between attitude certainty with regard to the focal object and attitude change for the proximally related object ( $M = 0.19$ ,  $SD = 1.18$ ). These results suggest that attitude certainty with regard to the focal object buffered attitude change for the proximally related object, but not for the focal object. However, as in Experiments 1 and 2, correlations between attitude certainty and attitude change were not significantly different for the focal object and the proximally related object,  $Z = 1.75$ ,  $p = .080$ .

*How Is LAC Related to Attitude Certainty?* A multiple regression analysis predicting attitude change for the proximally related object revealed a significant positive relation with attitude change toward the focal object,  $\beta = .30$ ,  $t(265) = 5.64$ ,  $p < .001$ , and attitude certainty with regard to the focal object,  $\beta = -.13$ ,  $t(265) = -2.94$ ,  $p = .004$ , but no significant interaction between the two variables,  $\beta = -.01$ ,  $t(265) = -0.24$ ,  $p = .813$ . Simple slopes analyses further showed that the relation between attitude change for the focal object and attitude change for the proximally related object was statistically significant regardless of attitude certainty, all  $\beta$ s  $> .29$ , all  $t$ s  $> 3.74$ , all  $p$ s  $< .001$ . Attitude certainty with respect to the focal object was unrelated to attitude change toward either of the medially related objects ( $M = -0.01$ ,

**TABLE 6. Correlations Between Attitude Change for Attitudes Toward Focal and Related Objects and Meta-Cognitive Facets of Attitudes Toward Focal Object, Experiment 3 (N =269)**

Attitude Object	Attitude Certainty				Moral Conviction			
	<i>r</i>	<i>p</i>	<i>BF</i> <sub>10</sub>	<i>BF</i> <sub>10</sub> interpretation	<i>r</i>	<i>p</i>	<i>BF</i> <sub>10</sub>	<i>BF</i> <sub>10</sub> interpretation
Focal Object	-.02	.797	0.08	Strong evidence for H <sub>0</sub>	-.05	.432	0.10	Substantial evidence for H <sub>0</sub>
Proximally Related Object	-.17	.004	4.22	Substantial evidence for H <sub>1</sub>	-.07	.280	0.14	Substantial evidence for H <sub>0</sub>
Medially Related Object 1	-.07	.283	0.14	Substantial evidence for H <sub>0</sub>	-.16	.007	2.74	Anecdotal evidence for H <sub>1</sub>
Medially Related Object 2	.01	.935	0.08	Strong evidence for H <sub>0</sub>	.01	.921	0.08	Strong evidence for H <sub>0</sub>
Distally Related Object	.08	.168	0.20	Substantial evidence for H <sub>0</sub>	.04	.510	0.10	Strong evidence for H <sub>0</sub>

Note. Exact *p*-values for two-tailed tests reported. Higher scores on the attitude change index indicate more attitude change in line with counterattitudinal article. Higher values for moral conviction and attitude certainty indicate greater moral conviction and greater attitude certainty with regard to the focal object. Bayes factors were computed using JASP software (JASP Team, 2017). Evidence category labels for Bayes factors follow recommendations from Wetzles and Wagenmakers (2012).

$SD = 0.83$ ;  $M = -0.01$ ,  $SD = 0.93$ ) or toward the distally related object ( $M = -0.26$ ,  $SD = 0.70$ ). These results provide further support for the conclusion that attitude change for the focal object generalized to the proximally related objects regardless of attitude certainty.

*Does LAC Depend on Moral Conviction?* Responses on the moral conviction item were coded and analyzed in line with the procedures in Experiment 1. Correlation analyses revealed a significant negative correlation between moral conviction ( $M = 5.08$ ,  $SD = 1.53$ ) and attitude change for one of the medially related objects (i.e., Nanotechnology). However, we refrain from interpreting this correlation because it was not statistically significant in the previous two experiments. Replicating the results of Experiments 1 and 2, moral conviction was not correlated with attitude change for the focal object or any of the other related objects (see Table 6).

*How Is LAC Related to Moral Conviction?* Regression analyses revealed only a significant main effect of attitude change for the focal object in predicting attitude change for the proximally related object,  $\beta = .30$ ,  $t(265) = 5.55$ ,  $p < .001$ , but no main effect of moral conviction,  $\beta = -.04$ ,  $t(265) = -0.91$ ,  $p = .365$ , and no significant interaction between attitude change for the focal object and moral conviction with regard to the focal object,  $\beta = .02$ ,  $t(265) = 0.53$ ,  $p = .595$ . Simple slopes analyses further showed that the positive relation between attitude change for the focal object and attitude change for the proximally related object was statistically significant regardless of moral conviction, all  $\beta$ s  $> .27$ , all  $t$ s  $> 3.32$ , all  $p$ s  $< .001$ . Together, these results corroborate the conclusion that moral conviction did not buffer attitude change for focal and related objects and that attitude change for the focal object generalized to the proximally related object regardless of moral conviction.

## DISCUSSION

Experiment 3 tested the generalizability of our findings in Experiments 1 and 2 to a different set of attitude objects. Replicating the results in Experiments 1 and 2, attitude change generalized from the focal object to the most closely related object, but not to more distally related objects. Moreover, although Experiment 3 failed to replicate the buffering effect of attitude certainty against counterattitudinal information, attitude change for the focal object again generalized to the most proximally related object regardless of attitude certainty. As in Experiments 1 and 2, moral conviction did not qualify the observed generalization from the focal object to the most proximally related object.

## GENERAL DISCUSSION

The goal of the current research was to investigate whether patterns of LAC depend on (1) the relative degree to which a focal object is related to other objects, (2) the certainty with which attitudes toward the focal object are held, and (3) the extent to which attitudes toward the focal object are held with moral conviction. Across three experiments, changes in attitudes toward a focal object generalized to proximally related objects, but not to medially and distally related objects. Although greater attitude certainty regarding the focal object was associated with greater resistance to attitude change for the focal object in Experiments 1 and 2, there was no evidence for displacement as a result of attitude certainty. Instead, changes in attitudes toward the focal object generalized to proximally related objects regardless of attitude certainty in all three studies. Counter to the hypothesis that moral conviction increases resistance to attitude change, moral conviction regarding the focal object was unrelated to changes in attitudes toward the focal object. Moreover, the observed changes in attitudes toward focal objects generalized to proximally related objects regardless of moral conviction. Together, the current findings demonstrate the robustness of generalization against meta-cognitive facets of attitudes that have been associated with increased resistance to attitude change. These results have important implications for research on LAC and meta-cognitive facets of attitudes, suggesting interesting avenues for future studies.

## IMPLICATIONS FOR LAC

The current research suggests that LAC effects occur for objects that are proximally related to a focal object, but not for more distally related objects. These findings are consistent with (1) the LAC framework proposed by Glaser and colleagues (2015) and (2) past research demonstrating LAC effects. However, the current research goes beyond earlier work by specifying the extent to which generalization occurs

within larger networks of attitudes (i.e., how far generalization spreads within a network of attitudes). According to Glaser and colleagues, LAC effects hinge on similarity and spread of activation between related objects. In line with this idea, Alvaro and Crano (1997) found that change in attitudes toward gay men in the military generalized to gun control, which was viewed as a closely related attitude object, when counterattitudinal arguments were purportedly from members of a majority group. The observed changes did not generalize to euthanasia or tuition increase, which were viewed as unrelated to the issue of gay men in the military. However, in contrast to the focus of the current research, Alvaro and Crano investigated attitude change in response to views expressed by minority versus majority groups. Thus, the current research expands on these findings by demonstrating similar patterns of generalization in response to strong persuasive arguments. Further, in contrast with Alvaro and Crano's (1997) research, the current studies examined generalization as a function of the *degree* of relatedness between attitude objects rather than a dichotomization of related versus unrelated attitudes. Thus, the current research extends both Alvaro and Crano's research and Glaser and colleagues' (2015) framework by specifying the extent to which generalization of attitude change occurs between attitudes that possess varying degrees of relations.

An open question regarding LAC effects is whether generalization is an all-or-none outcome or whether generalization may linearly decrease as related objects become increasingly further removed from the focal object. Glaser and colleagues (2015) argued that LAC depends on connections between attitude objects that are strong enough for the mental representation of the related objects to be activated concurrently. As attitude objects become further removed from one another, the likelihood that the representation of those objects will be concurrently activated decreases (for a review, see Smith, 1996). Thus, in order for new evaluative associations to transfer from one attitude object to another, the attitude objects must be related closely enough for the activation of one object to facilitate the simultaneous activation of the other object. On the basis of our data, it is unclear whether LAC effects did not extend to more distally related objects because (1) they were too distal for a transfer of newly formed associations from the focal object to occur or (2) the transferred associations to the distally related objects were too weak to be detected in the current studies. Whereas the former possibility would be consistent with the idea of all-or-none effects, the latter possibility would be consistent with the idea of linearly decreasing effects. In the current studies, attitude change effects were significantly larger for focal compared to proximally related objects, suggesting that generalization in LAC may be characterized by a linear decrease as a function of decreasing similarity.<sup>13</sup> However, because the current studies were not designed to answer this question and earlier research on this question suggests

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13. When participants' attitude ratings were submitted to a 2 (Time: pre vs. post)  $\times$  2 (Object: focal vs. proximal)  $\times$  2 (Article: pro vs. contra) mixed ANOVA, there was a significant three-way interaction in all three experiments. The pattern of the three-way interactions suggested that participants' attitudes changed for both the focal and proximally related objects to be more in line with the article they read, but the observed changes were significantly larger for the focal compared to the proximal object (see Supplemental Materials for full results of these analyses).



conflicting conclusions (e.g., Gawronski & Quinn, 2013; Verosky & Todorov, 2010), more research is needed to specify the nature of generalization effects.

Based on the idea that high levels of attitude certainty and high levels of moral conviction may lead to a rejection of newly formed counterattitudinal associations, we were also interested in whether the two meta-cognitive facets of attitudes are associated with a pattern of displacement. That is, high levels of either construct may buffer attitude change for focal objects but not for related objects. These hypotheses were disconfirmed in the current studies, showing that attitude change for focal objects generalized to proximally related objects regardless of attitude certainty and moral conviction. However, it is unclear whether the two meta-cognitive facets of attitudes would fail to produce a displacement effect under all conditions. Different from the current focus on persuasive arguments, the examples of displacement reviewed by Glaser and colleagues (2015) come exclusively from research on social influence (e.g., Alvaro & Crano, 1997; Saltzstein & Sandburg, 1979). Thus, an interesting question for future research is whether the two meta-cognitive facets of attitudes lead to displacement effects for some determinants of attitude change (e.g., social influence) but not others (e.g., persuasive arguments), and why that might be the case. Based on the LAC framework, it seems likely that displacement effects do occur, but the framework would benefit from more precise hypotheses about their boundary conditions.

Future research on LAC may also benefit from including implicit measures in addition to explicit self-reports (see Gawronski & De Houwer, 2014). A central assumption of Glaser and colleagues' (2015) framework is that displacement effects occur when (1) counterattitudinal information about a focal object creates new evaluative associations with the focal object, (2) these newly formed associations transfer to closely related objects that are mentally associated with the focal object, and (3) the newly formed associations with the focal object are rejected as false. In this case, self-reported attitudes toward closely related objects may change despite the absence of change in self-reported attitudes toward the focal object. Although the current studies did not obtain any evidence for displacement, research using implicit measures may offer deeper insights into the mental underpinnings of displacement effects by capturing newly formed associations even when these associations are rejected as false (Gawronski & Bodenhausen, 2006, 2011; Petty et al., 2007). That is, implicit measures may show changes in the underlying associations for both the focal and related objects, even when self-reported attitudes reveal change only for related objects, but not for the focal object.

## META-COGNITIVE FACETS OF ATTITUDES

The current research also provides valuable insights into the effects of attitude certainty and moral conviction on attitude change. Specifically, the current research suggests that the buffering effects of attitude certainty may be smaller and less robust than previously thought. In addition, the current findings raise important questions about the boundary conditions for buffering effects of moral conviction. Finally, while past research suggests that both attitude certainty and

moral conviction can moderate change in attitudes toward a focal object, the current research suggests that the impact of these meta-cognitive facets do not extend to change in attitudes toward related objects.

*Attitude Certainty.* Past research suggests that higher levels of attitude certainty are associated with greater resistance to attitude change (for a review, see Tormala & Rucker, 2007). The results of the current research, however, suggest that this relationship might be weaker and less robust than previously thought. First, the correlations between attitude certainty and attitude change for the focal topic were relatively small, ranging from  $-.02$  to  $-.14$ , with a weighted average correlation of  $-.10$  across the three studies. Further, in Experiment 3, this correlation did not reach significance, and in Experiment 1, this correlation was on the cusp of non-significance in a relatively large sample of 300 participants. Although these tenuous effects stand in contrast to claims that attitude certainty is a robust buffer to attitude change, they are not entirely inconsistent with previous findings. For example, a classic study by Bassili (1996) suggests that the buffering effects of attitude certainty are relatively small and somewhat unreliable. Further, research teasing apart different aspects of attitude certainty (i.e., clarity and correctness) suggests that these aspects may differentially influence attitude change. For example, Cheatham and Tormala (2015) found that attitude clarity had stronger buffering effects than did attitude correctness. Additionally, Clarkson, Tormala, and Rucker (2008) suggested that certainty only enhances the stability of univalent attitudes, whereas ambivalent attitudes become less stable as attitude certainty increases. The measures utilized in the current research did not capture ambivalence or separate dimensions of clarity versus correctness, which may have contributed to the weak and fragile effects of attitude certainty. Finally, Clark and Wegener's (2013) Discrepancy Motives Model (DMM) suggests that people who hold an attitude with high certainty may be more motivated than people who hold an attitude with low certainty to process a counterattitudinal message deeply. Thus, to the extent that the counterattitudinal message is sufficiently strong, people who hold an attitude with high certainty may change their stance. Assuming the counterattitudinal articles used in the current research contained strong arguments, the DMM may explain why the effect of attitude certainty was smaller than expected.

*Moral Conviction.* The current studies found no effects of moral conviction on attitude change for the focal attitude object across three high-powered studies, which seems surprising given the strong claims about the buffering effects in extant theory (Skitka, 2010). The inconsistency between the current findings and past research suggests potential boundary conditions for the buffering effects of moral conviction on attitude change. One such condition might be the particular type of counterattitudinal information. While the current research used strong arguments in the form of an article to induce attitude change, past research on moral conviction has largely focused on attitude change in response to social influence (for an exception, see Luttrell, Petty, Briñol, & Wagner, 2016). For example, people who hold attitudes with high moral conviction have been found to be more likely to reject the legitimacy of an authority that speaks out against their moral convictions (Skitka, et al., 2009). Further, people who hold attitudes with high moral conviction

tion have been found to distance themselves both physically and socially from others who hold conflicting attitudes (Skitka et al., 2005), making attitudes held with high moral conviction less likely to change in line with the majority opinion (Aramovich, Lytle, & Skitka, 2012). Yet, in contrast to the idea that moral conviction produces unwavering attitudes, participants in the current research changed their attitudes in response to counterattitudinal arguments, regardless of their level of moral conviction. This discrepancy suggests that moral conviction may only serve as a buffer against attitude change in cases of persuasion via social influence, while strong counterattitudinal arguments remain quite effective in changing attitudes held with high moral conviction.

The potential boundary condition identified in the current set of experiments opens up new lines of inquiry and suggests potential revisions to theories regarding moral conviction. First, the current research utilized only strong arguments. Without manipulating argument strength, it is unclear whether attitudes held with high moral conviction change in response to any type of argument, or if attitudes held with high moral conviction are responsive only to strong, but not weak, arguments. Applied to the notion of LAC, the latter outcome would also raise the question of whether increased resistance to weak arguments as a result of high moral conviction buffers attitude change for both focal and related objects, or whether resistance to attitude change is limited to focal objects resulting in a potential displacement effect. Second, the Integrated Theory of Moral Conviction (Skitka, 2010; Skitka, Bauman, & Mullen, 2008) suggests that attitudes held with high moral conviction are impervious to change, because they are viewed as objective and universal, are removed from concerns of social acceptance and deference to authority, and are connected to intense emotions. These features of moral conviction, in turn, are assumed to prevent attitude change because they motivate the avoidance of others with differing opinions and provide justifications defending the attitude. The results of the current research, however, are difficult to reconcile with the assumption of unconditional resistance as a result of high moral conviction, calling for theoretical revisions that encapsulate these findings. Future research may provide deeper insight into the determinants of LAC effects by considering the particular conditions under which moral conviction increases resistance to attitude change.

The only other study we are aware of that investigated the mutability of morally based attitudes in response to persuasive arguments is Luttrell and colleagues (2016, Experiment 2). In contrast to the current findings, Luttrell and colleagues found that participants who were led to believe that their attitudes were morally based were less likely to change their attitudes in response to counterattitudinal arguments than participants who were led to believe that their attitudes were practically based. However, Luttrell and colleagues utilized “moderately strong” (Luttrell et al., 2016, p. 87) arguments whereas the arguments used in the current research were designed to be very strong. Clark and Wegener’s (2013) DMM may provide (1) an alternative explanation for why moral conviction was unrelated to attitude change in the current research and (2) an explanation for the discrepancy between the current findings and the research by Luttrell and colleagues (2016).

Although the DMM does not specifically discuss moral conviction, past research suggests that moral conviction is highly correlated with and operates similarly to other indicators of attitude strength (Skitka et al., 2005). Thus, the DMM would suggest that people who hold an attitude with high moral conviction may be particularly motivated to process counterattitudinal arguments deeply. Thus, attitudes held with high moral conviction may be likely to change in response to sufficiently strong arguments. To the extent that the arguments provided in the current research were sufficiently strong, then, the DMM would predict that attitudes held with high moral conviction may change in response to the arguments. Conversely, attitudes held with low moral conviction may have changed in response to more peripheral aspects of the counterattitudinal article (e.g., source; Petty & Cacioppo, 1986). Thus, if attitudes held with high and low moral conviction both changed but via different mechanisms, moral conviction would be unrelated to attitude change overall. Further, to the extent that the arguments used in the current research were stronger than those used by Luttrell and colleagues (2016), the DMM would also explain why their findings differed from the current research. Although this possibility is suggested by the DMM and consistent with the findings of the current research, future research directly testing this possibility is needed.

## POTENTIAL OBJECTIONS

The current research provides valuable insights into the factors that do (and do not) influence patterns of LAC and the limited impact of two meta-cognitive facets of attitudes on changes within larger networks of attitudes. However, there are some objections that could be raised against the current research. One objection is that all three experiments utilized single-item measures of attitudes, attitude certainty, and moral conviction. Thus, the small and somewhat unreliable effects of attitude certainty and the null effects of moral conviction may be due to the poor psychometric properties of single-item measures. However, it is unlikely that the use of single-item measures is sufficient to explain the current pattern of results. First, past research on attitude certainty and moral conviction using the same single-item measures found evidence for increased resistance to persuasion as a function of the two meta-cognitive facets of attitudes (e.g., Aramovich et al., 2012). Second, replicating past research (e.g., Skitka et al., 2005), attitude certainty and moral conviction were highly correlated with one another in the current studies (see Table 7), providing independent evidence for the reliability of the two single-item measures. Finally, both attitude certainty and moral conviction were highly correlated with an index of attitude extremity derived from our single-item attitude measure (see Table 7), consistent with arguments that the three constructs represent interrelated aspects of attitude strength. Together, these findings suggest that the items utilized in the current studies reliably captured some aspect of attitude strength as intended.

Another potential objection concerns the operationalization of relations between attitude objects in terms of self-reported perceptions of relatedness. In contrast with this operationalization, some theories suggest that similarities between at-

**TABLE 7. Correlations Between Moral Conviction, Attitude Certainty, and Attitude Extremity, Experiments 1–3**

Correlation Pair	Experiment 1	Experiment 2	Experiment 3
Moral Conviction and Attitude Certainty	$r = .51, p < .001$	$r = .38, p < .001$	$r = .47, p < .001$
Moral Conviction and Attitude Extremity	$r = .41, p < .001$	$r = .31, p < .001$	$r = .50, p < .001$
Attitude Certainty and Attitude Extremity	$r = .62, p < .001$	$r = .54, p < .001$	$r = .62, p < .001$

Note. Exact p-values for two-tailed tests reported. Higher scores represent higher levels of the respective meta-cognitive facet. Attitude extremity was calculated by recoding participants' attitude scores into an index of how extreme their attitudes were on a scale from 1 to 3, with higher numbers representing more extreme attitudes.

titude objects are determined by logical relations (e.g., McGuire, 1968), hierarchical organization within superordinate categories (e.g., Markman & Wisniewski, 1997; Rosch, 1978; Tversky, 1977), or associative links between concepts that may be independent of self-reported perceptions of relatedness (e.g., Smith, 1996). In the current research, we chose self-reported perceptions of relatedness as the most straightforward indicator, but it is possible that other forms of relatedness play an important role in LAC over and above the effects obtained in the current studies. For example, in line with Glaser and colleagues' (2015) LAC framework, associative links between attitude objects may predict when new associations toward one object spread to related objects, and such links may be better captured with implicit measures (e.g., sequential priming tasks) than traditional self-report measures. Because LAC effects have been claimed to involve both associate and propositional processes (Glaser et al., 2015), an interesting direction for future research would be to examine whether LAC effects depend on different operationalizations of relations between attitude objects.

Additionally, it is possible that LAC effects depend on attitude certainty and moral conviction regarding both the focal and related objects due to their close perceived relatedness. Although attitude certainty and moral conviction did not appear to moderate LAC effects in the current research, the analyses presented focused on attitude certainty and moral conviction with regard to only the focal object. However, the correspondence (or lack thereof) between attitude certainty and moral conviction with regard to the focal and proximally related objects could have important implications for LAC effects. To the extent that participants viewed the focal object as highly related to the proximal object, their attitude certainty and moral conviction toward the focal object may have been reflected in their attitude certainty and moral conviction toward the proximally related object. A high correspondence between participants' attitude certainty and moral conviction toward the focal and proximally related objects, in turn, may lead to generalization in attitude change from the focal to the proximal object. Conversely, displacement effects may only occur when attitude certainty and moral conviction are misaligned between the focal and proximally related objects. That is, when attitude certainty (or moral conviction) is high for the focal object but low for the proximally related object, attitudes toward the focal object may remain stable while attitudes toward the proximally related object may change. Although not the primary focus of the current research, participants rated their attitude certainty and moral conviction

toward all of the focal and related attitude objects in all three experiments, providing an opportunity to test the possibility that LAC effects depend on meta-cognitive facets of attitudes with regard to both the focal and related objects. Indeed, participants' attitude certainty and moral conviction with regard to the focal attitude object were positively correlated with their attitude certainty and moral conviction with regard to the proximally, medially, and distally related objects. However, multiple regressions predicting proximal attitude change from focal attitude change, focal attitude certainty (or moral conviction), and proximal attitude certainty (or moral conviction) did not support the idea that LAC effects may depend on the meta-cognitive facets of attitudes for both the focal and proximally related objects. Specifically, the critical three-way interaction that would support this argument was non-significant in all but one of the experiments (for the full analyses, see the Supplemental Materials). For the three-way interaction that was significant, the pattern suggested that the correspondence between focal attitude change and attitude change for the proximally related object was strongest when attitude certainty and moral conviction were high for *both* attitude objects, which is in line with the pattern that would be predicted if displacement occurs only when attitude certainty or moral conviction is high for the focal object but low for the proximally related object. These findings offer mixed evidence regarding the extent to which LAC effects depend on attitude certainty and moral conviction toward both the focal and proximally related attitude objects. Further, the current research was not designed to test this hypothesis and may have been underpowered to do so. Thus, future research further investigating this idea may provide deeper insights into LAC effects.

A final potential objection is that the results of the current research might be due to participants perceiving the focal and proximally related attitude objects as part of the same superordinate category, whereas the more distally related objects were perceived as falling outside that superordinate category. If this were the case, it is possible that the counterattitudinal articles changed attitudes toward the superordinate category rather than attitudes toward the focal object, which then generalized to the proximally related object. Although this explanation cannot be ruled out on the basis of the current data, we deem it implausible because all attitude objects in the current studies fall under the superordinate categories of *food production* or *food-related health*. Thus, if the current results were due to change in attitudes toward a superordinate category, we would expect to also observe attitude change toward the more distally related objects, which was not the case.

## CONCLUSION

Building on a recent framework by Glaser and colleagues (2015), we investigated whether patterns of LAC depend on (1) the degree of relations between the focal object and related objects, (2) the certainty with which attitudes toward the focal object are held, and (3) the extent to which attitudes toward the focal object are held with moral conviction. The results of the current research suggest that LAC effects depend on the degree of relation between attitude objects. Specifically,



attitude change for focal objects was accompanied by corresponding changes in attitudes toward proximally related objects, but not in attitudes toward medially or distally related objects (i.e., generalization). Counter to the hypotheses that attitude certainty and moral conviction may increase resistance to attitude change for focal objects without buffering attitude change for related objects (i.e., displacement), attitude change for focal objects generalized to proximally related objects regardless of attitude certainty and moral conviction. Together, these findings provide valuable insights into the determinants of LAC, while suggesting interesting new avenues for future research on LAC, attitude certainty, and moral conviction.

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