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Consider the Source: Persuasion of Implicit Evaluations Is Moderated by Source Credibility

Colin Tucker Smith[1,2], Jan De Houwer[1], and Brian A. Nosek[3]

Abstract

The long history of persuasion research shows how to change explicit, self-reported evaluations through direct appeals. At the same time, research on how to change implicit evaluations has focused almost entirely on techniques of retraining existing evaluations or manipulating contexts. In five studies, we examined whether direct appeals can change implicit evaluations in the same way as they do explicit evaluations. In five studies, both explicit and implicit evaluations showed greater evidence of persuasion following information presented by a highly credible source than a source low in credibility. Whereas cognitive load did not alter the effect of source credibility on explicit evaluations, source credibility had an effect on the persuasion of implicit evaluations only when participants were encouraged and able to consider information about the source. Our findings reveal the relevance of persuasion research for changing implicit evaluations and provide new ideas about the processes underlying both types of evaluation.

Keywords

persuasion, implicit attitudes, Implicit Association Test

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"Consider the source" is the advice the first author's father often gave him when he was bothered by something hurtful one of his grade school classmates had said or done. Though this can be a difficult task for a child, research in persuasion has shown that most people do, in fact, consider the source when processing persuasive messages (e.g., Hovland, Janis, & Kelley, 1953; see Briñol & Petty, 2009, for a recent review). One aspect of the source that people pay particular attention to is a source's credibility; in most cases, an identical message is more effective at changing self-reported evaluations to the extent that the source is high in credibility, whether that credibility is gained through perceived expertise (Gottlieb & Sarel, 1991; Hovland & Weiss, 1951; Maddux & Rogers, 1980; McGinnies & Ward, 1980) or trustworthiness (Briñol, Petty, & Tormala, 2004; McGinnies & Ward, 1980; Tormala, Briñol, & Petty, 2007; Ziegler, 2010). However, it should be noted that source effects do not *always* lead to persuasion in the intended direction; indeed, a highly credible source can lead to *reduced* persuasion compared with a less credible source when the source's argument is relatively weak (Bohner, Ruder, & Erb, 2002; Tormala, Briñol, & Petty, 2006).

While the persuasion literature has grown increasingly sophisticated, the accumulated research has primarily focused on changing explicit evaluations and thus, it is presently unclear whether sources high in credibility might also be more impactful on automatic forms of evaluations—evaluations that we will refer to as implicit evaluations (De Houwer, 2009; Gawronski & Bodenhausen, 2006). Implicit evaluations differ from explicit ones in that they arise in an unintentional, uncontrolled, unconscious, efficient, or fast manner. Because many aspects of human behavior share one or more of these features, it should come as no surprise that research on implicit evaluations has led to significant advances in a wide variety of research areas, including addiction (e.g., Wiers & Stacy, 2006), clinical psychology (see Teachman, Cody, & Clerkin, 2010), close relationships (e.g., Dewitte, De Houwer, & Buysse, 2008), consumer behavior (see Perkins & Forehand, 2010), forensics (see Snowden & Gray, 2010), psychopathology (e.g., Roefs et al., 2011), politics (see Nosek, Graham, & Hawkins,

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2010), and social interactions (e.g., Fazio & Olson, 2003). Implicit evaluations are related, but distinct from explicit evaluations (Nosek & Smyth, 2007), and both predict variation in behavior that is not accounted for by the other (Greenwald, Poehlman, Uhlmann, & Banaji, 2009).

Interestingly, implicit evaluations have been almost exclusively changed either by overtraining in the opposite direction of existing associations (e.g., Baccus, Baldwin, & Packer, 2004; Dijksterhuis, 2004; Hermans, Baeyens, & Eelen, 2003; Kawakami, Phills, Steele, & Dovidio, 2007; Wiers, Eberl, Rinck, Becker, & Lindenmeyer, 2011) or by changing the context of evaluation to shift the associations that are activated (e.g., Blair, Ma, & Lenton, 2001; Dasgupta & Greenwald, 2001; Mitchell, Nosek, & Banaji, 2003; Wittenbrink, Judd, & Park, 2001). Explicit evaluations, on the other hand, have been shown to be amenable to a variety of manipulations (see Bohner & Dickel, 2011; Crano & Prislin, 2006, for recent reviews). Of particular interest to the present work, many of these manipulations include the conscious consideration of persuasive information.

There is some evidence that implicit evaluations can also be formed or changed on the basis of persuasive messages similar to those used to change explicit evaluations. In particular, implicit evaluations have been successfully formed by presenting participants with positive or negative information about novel stimuli (e.g., De Houwer, 2006; Gregg, Seibt, & Banaji, 2006; Ratliff & Nosek, 2010; Rydell, McConnell, Mackie, & Strain, 2006; Whitfield & Jordan, 2009), and existing implicit evaluations of vegetables have been changed by having participants read a written argument about the positive aspects of consuming vegetables (Horcajo, Briñol, & Petty, 2010). In addition to manipulating the valence (i.e., one stimulus is "good" while another stimulus is "bad" or "neutral"), the *type* of persuasive message may matter, as suggested by the observation that implicit smoking evaluations of present smokers are more negative following an affectively laden antismoking argument than following a cognitive antismoking argument (Smith & De Houwer, 2012). Finally, a study by Forehand and Perkins (2005) suggests that source characteristics might also moderate the persuasion of implicit evaluations. Forehand and Perkins presented celebrity voice-over advertisements to participants. One week later, they measured participants' implicit evaluations of those celebrities. Two weeks after that, they measured implicit evaluations of the advertised brands. They found that implicit evaluations of the celebrities predicted implicit evaluations of the products. Although this evidence is correlational, it lends support to the idea that source characteristics of persuasive messages (i.e., the liking of the person who endorses a brand) may affect implicit evaluations.

In sum, earlier studies suggest that implicit evaluations can be changed via verbal information and hint that source characteristics may also be important. However, little is known about whether persuasive message influences implicit evaluations under the same conditions as explicit evaluations. In the present studies, we begin to tackle this question by experimentally manipulating the credibility of the source of the persuasive message while keeping constant the content of the message. The source was described in a way that implied either a high or a low level of expertise (Studies 1 and 2) or trustworthiness (Studies 3 and 4).

In the four studies just described—and in all the previously reviewed work assessing the impact of persuasive messages on implicit evaluations—participants were allowed, or even encouraged, to consciously consider the information with which they were presented. What is as yet unknown, then, is whether this opportunity is necessary for changing implicit evaluations. Leading theories of attitude change such as the heuristic–systematic model (Chaiken, Liberman, & Eagly, 1989) and the elaboration likelihood model (Petty & Cacioppo, 1986) note that explicit evaluations can be affected by source information through both high-effort processes engaged in when participants have mental resources and are motivated to use them, and also through low-effort processes when participants' ability or motivation is restricted in some way. Therefore, to begin to understand how source expertise might affect implicit evaluations, we manipulated cognitive load to test whether the impact of source credibility would occur only when participants had the opportunity to consider the information about the source, or whether source information would affect implicit evaluations through multiple routes as is the case for explicit evaluations.

Study 1

Method

Participants. Participants were 209 visitors to the Project Implicit research website. Mean age was 29.2 years (*SD* = 11.6); 70.3% of the participants were women. Participation was restricted to U.S. citizens (74.4% were White, 11.1% were African American, 1.9% were Asian, and 12.6% were Multiracial, Other, or Unknown).

Materials

Expertise manipulation. All participants were asked to imagine that they were searching the Internet for information about laundry detergents and that the first information they found was on the home page of an individual named Jonathan Brower (adapted from Tormala et al., 2006). Participants in the "High" expertise condition read that Jonathan Brower was 54 years old and then read the following information about him:

> Jonathan is a Yale-educated chemist who works for his state's Department of Water Resources. In addition, he volunteers on a bi-partisan Consumer Protection Board for his local government. The board is a small

> group of successful business people, scientists, and politicians. They are asked to work together to promote community safety. This month, each board member has been asked to collect information on the quality and affordability of a variety of types of products that they have experience with.

In contrast, participants in the "Low" expertise condition read that Jonathan Brower was 14 years old and then read the following description of him:

> Jonathan spends one Saturday each month meeting with his middle school's Consumer Club. The club is a small group of students ranging from 4th to 8th grade, and is usually supervised by Jonathan's Physical Education teacher. Common activities include visiting local businesses and cutting out advertisements from magazines. This month, each of the kids has collected information about consumer products that they have heard of to share with their friends in the club.

Information about Soltate Detergents. Next, all participants read a passage titled "The Benefits of Soltate Detergents" designed to instill a preference for Soltate brand laundry detergents relative to other brands (Appendix A). The passage was adapted from a manipulation composed of strong arguments used in previous research (Tormala et al., 2006). Laundry detergents made by Soltate were described as being less expensive, but safer and more powerful than other detergents.

Implicit Association Test (IAT). Participants completed an IAT (Greenwald, McGhee, & Schwartz, 1998) measuring the strength of their associations between "Soltate Detergents" and "Other Detergents" and "good" and "bad." Evaluative stimuli were five good words (e.g., wonderful) and five bad words (e.g., nasty). Stimuli for Soltate Detergents were the words "Soltate Detergents" and three images of laundry detergent containers marked "Soltate," while Other Detergents used the words "Other Detergents" and three images of laundry detergent containers marked "Other Detergents" (Appendix B). Stimuli from one of the four categories were presented one at a time on a computer screen. Participants categorized the stimuli quickly while making as few errors as possible. Category labels appeared in the upper left and upper right of the screen and participants used the "E" and "I" keys to categorize stimuli to the left and right, respectively.

The IAT was constructed following the recommendations of Nosek and colleagues (Nosek, Greenwald, & Banaji, 2005, 2007). Participants began the IAT with 20 trials sorting Soltate stimuli to the left and stimuli related to "Other Detergents" to the right (half of the participants completed the IAT in this way, while the other half began by sorting Soltate stimuli to the right). They then completed 20 trials sorting positive stimuli to the left and negative stimuli to the right (the side of the screen that was positive and negative was held constant across participants). Next, participants completed 56 trials in which stimuli related to Soltate and positive shared a single response key and stimuli related to "Other Detergents" and negative shared a single response key. Participants then practiced sorting stimuli related to Soltate and Other Detergents with the side of the screen reversed (i.e., participants who had previously been sorting Soltate stimuli to the left, now practiced sorting them to the right) for 40 trials. Finally, participants completed a second set of 56 trials in which Soltate stimuli shared a response key with negative and "Other Detergents" stimuli shared a response key with positive (or vice versa). If the participant made an error in categorizing, a red "X" appeared on the screen and the participant corrected their mistake to continue. Latencies were recorded until a correct response was made.

The IAT score was calculated using the *D*-algorithm (Greenwald, Nosek, & Banaji, 2003). Trials with reaction times shorter than 400 ms or longer than 10,000 ms were removed. The IAT was scored such that positive numbers indicate a preference for Soltate relative to Other Detergents. IAT scores from 12 participants (5.7%) were dropped for completing more than 10% of trials in less than 400 ms, or because of error rates above 30% across the entire task or above 40% for any one of the four critical blocks.[1] Split-half reliability—correlating IAT D score from the first half of the blocks with the second half of the blocks—for the remaining 197 IATs was $r = .49$.

Explicit evaluations. Participants reported their explicit evaluation by responding to the question, "Which of the following statements best describes you?" with a 7-point scale anchored by "I strongly prefer Soltate Detergents to Other Detergents" and "I strongly prefer Other Detergents to Soltate Detergents." Responses were coded from –3 to +3 with positive scores indicating a relative preference for Soltate.

Perceptions of source. Participants reported on their perceptions of the source's expertise, intelligence, likeability, and trustworthiness in that order. Each item was presented using the question "How 'x' do you think this person is?" with the words *expert, intelligent, likeable*, and *trustworthy* inserted at the location of "x." They used 6-point scales ranging from 1 = *not at all "x"* to 6 = *extremely "x."*

Procedure. Upon being randomly assigned to complete this study from a pool of potential studies, participants imagined they were searching the Internet for information about laundry detergents. They were told to pay close attention to the information about the detergent and about who presented the information because they would be asked questions about both throughout the study. Participants were then randomly assigned to read about Jonathan Brower as either High in expertise (i.e., Yale-educated chemist) or Low in expertise (i.e., a 14-year-old member of a Consumer Club). Next, participants read information about a laundry detergent named Soltate that had been gathered by Jonathan Brower. After that,

participants completed the IAT and then explicit measures. Finally, they reported on their perceptions of the source's expertise, intelligence, likeability, and trustworthiness, in that order. Once having been assigned to this study, participants were never assigned to the study again on subsequent visits to the website.

Results and Discussion

Overall, participants' implicit evaluations revealed a preference for "Soltate Detergents" relative to "Other Detergents" both implicitly, $M = 0.48$, $SD = 0.39$, $t(196) = 17.27$, $p < .0001$, $d = 1.23$, and explicitly, $M = 0.80$, $SD = 1.36$, $t(196) = 8.27$, $p < .0001$, $d = 0.59$. This makes sense because the information given about Soltate was always positive; higher scores are thus indicative of more persuasion. Participants' explicit preferences were positively correlated with implicit evaluations, $r(195) = .32$, $p < .0001$. To test whether our manipulation affected the perceived credibility of the source, we combined responses to the source's expertise, trustworthiness, and intelligence ($\alpha = .76$); participants viewed the source of the message as being more credible in the "High Expertise" condition ($M = 3.98$, $SD = 1.05$) than the "Low Expertise" condition ($M = 2.85$, $SD = 0.83$), $t(195) = 8.44$, $p < .0001$, $d = 1.19$.[2]

Supporting the central hypothesis of the study, source expertise significantly affected implicit preferences; participants showed a stronger implicit preference for Soltate when that information was presented by an individual "High" in expertise ($M = 0.54$, $SD = 0.36$) than "Low" in expertise ($M = 0.42$, $SD = 0.41$), $t(195) = 2.24$, $p = .026$, $d = 0.32$. In addition, we replicated previous research on explicit evaluations, as participants reported a greater preference for Soltate when that information was presented by an individual "High" in expertise ($M = 1.01$, $SD = 1.40$) than "Low" in expertise ($M = 0.60$, $SD = 1.29$), $t(195) = 2.13$, $p = .034$, $d = 0.30$. In sum, identical information is more impactful on implicit evaluations when that information is presented by a source that is deemed to be relatively higher in expertise. In Study 2, we sought to replicate this finding with the personalized IAT (Olson & Fazio, 2004).

Study 2

Method

Participants. Participants were 208 visitors to the Project Implicit research website. Mean age was 32.7 years ($SD = 12.2$), and 74% of the participants were women. Participants were restricted to U.S. citizens (69.9% were White, 15.5% were African American, 1.0% were Asian, and 13.6% were Multiracial, Other, or Unknown).

Materials and Procedure. All materials and procedures were exactly as in Study 1 with the exception of replacing the standard version of the IAT with a personalized version. In addition, the item regarding likeability of the source was not included.

Personalized IAT. The personalized IAT was identical in measurement and scoring procedures to the IAT used in Study 1 except that the category labels of "good" and "bad" were changed to "I like" and "I dislike" (see Han, Olson, & Fazio, 2006, Experiment 2). Twelve participants (5.8% of total data) were dropped for too rapid rate of responding or too high error rates; split-half reliability of the measure for the remaining 196 participants was $r = .44$.

Results and Discussion

Overall, participants' implicit evaluations revealed a preference for "Soltate Detergents" relative to "Other Detergents" both implicitly, $M = 0.54$, $SD = 0.38$, $t(195) = 19.91$, $p < .0001$, $d = 1.42$, and explicitly, $M = 0.90$, $SD = 1.37$, $t(206) = 9.49$, $p < .0001$, $d = 0.66$. Participants' explicit preferences were correlated with implicit evaluations at $r(194) = .30$, $p < .0001$. The manipulation of source credibility was again successful, with participants reporting more credibility (combined ratings of trust, expertise, and intelligence; $\alpha = .85$) on the part of the source when in the "High Expertise" condition ($M = 3.39$, $SD = 1.09$) than the "Low Expertise" condition ($M = 2.22$, $SD = 0.91$), $t(206) = 8.43$, $p < .0001$, $d = 1.17$.

As in Study 1, manipulating the level of source expertise significantly affected implicit evaluations, this time assessed by means of a personalized version of the IAT. Participants indicated a stronger implicit preference for Soltate when that information was presented by an individual "High" in expertise ($M = 0.60$, $SD = 0.33$) than "Low" in expertise ($M = 0.48$, $SD = 0.40$), $t(194) = 2.18$, $p = .031$, $d = 0.31$. Also as in Study 1, participants self-reported a greater preference for Soltate when that information was presented by an individual "High" in expertise ($M = 1.20$, $SD = 1.36$) than "Low" in expertise ($M = 0.65$, $SD = 1.33$), $t(205) = 2.94$, $p = .004$, $d = 0.41$.

In line with the literature on the persuasion of explicit evaluations, our first two studies clearly indicate that an identical persuasive message is more impactful on implicit evaluations when the source possesses a high level of expertise. In the third study, we investigated whether this is also true for an alternative operationalization of source credibility—trustworthiness.

Study 3

Method

Participants. Participants were 300 visitors to the Project Implicit research website. Mean age was 25.9 years ($SD = 9.95$) and 73% of the participants were women. Participants were restricted to U.S. citizens (78.3% were White, 5% were African American, 3.7% were Asian, and 13% were Multiracial, Other, or Unknown).

Materials

Information about Soltate Detergents. Participants read the same passage consisting of positive information about Soltate Detergents as in Study 1.

Trustworthiness manipulation. Participants imagined that they were searching the Internet for information about a consumer product. Before reading the information about Soltate Detergents, they imagined that they found the information on a website. In the "High" trustworthiness condition, participants were told that the website was the home page of a local Consumer Protection Board; in the "Low" trustworthiness condition, participants were told that the website was the home page of the company that made the laundry detergent in question (as in Briñol et al., 2004; Appendix C). They were further told that the company had recently changed their brand name in an effort to distance themselves from a past product recall and had hired a public relations firm in an attempt to increase their brand's popularity.

IAT. Participants completed the same IAT as in Study 1. Positive scores indicate a preference for Soltate Detergents relative to Other Detergents. IAT scores from 18 participants (6%) were dropped for error rates above 30% overall or above 40% for any one block. Split-half correlation of the remaining 282 IATs was $r = .44$.

Other measures. Explicit evaluations and perceptions of the source were assessed exactly as in Study 2.

Procedure. The procedure for Study 3 was the same as in the previous studies except that the information was attributed to a source that was either high in trustworthiness (website of a consumer protection board) or low in trustworthiness (website of a company that manufactures the consumer product), and the first item of the manipulation check asked about source trustworthiness rather than expertise.

Results and Discussion

As in the prior studies, participants' revealed an implicit preference for "Soltate Detergents" relative to "Other Detergents" both implicitly, $M = 0.47$, $SD = 0.37$, $t(281) = 21.17$, $p < .0001$, $d = 1.27$, and explicitly, $M = 0.46$, $SD = 1.50$, $t(281) = 5.18$, $p < .0001$, $d = 0.31$; explicit preferences were correlated with implicit evaluations at $r(280) = .20$, $p = .0008$. In addition, our manipulation of source credibility ($\alpha = .72$) was successful; participants rated the source as significantly more credible in the "High Trust" condition ($M = 3.23$, $SD = 1.07$) than in the "Low Trust" condition ($M = 2.58$, $SD = 0.90$), $t(280) = 5.58$, $p < .0001$, $d = 0.67$.

Implicit preferences were significantly affected by manipulating the level of source trustworthiness; participants indicated a stronger implicit preference for Soltate when that information was presented by an individual "High" in trustworthiness ($M = 0.52$, $SD = 0.34$) than "Low" in trustworthiness ($M = 0.42$, $SD = 0.39$), $t(280) = 2.40$, $p = .017$, $d = 0.29$. We again replicated previous research on explicit evaluations in showing that participants self-reported a greater preference for Soltate Detergents when that information was presented by an individual "High" in trustworthiness ($M = 1.09$, $SD = 1.33$) than "Low" in trustworthiness ($M = -0.14$, $SD = 1.42$), $t(280) = 7.53$, $p < .0001$, $d = 0.90$. Although both implicit and explicit evaluations were sensitive to the source trustworthiness, there is a notable distinction between the two types of evaluations. In the "Low" trustworthiness condition, participants' explicit evaluations evidenced no preference for Soltate despite the positive information, presumably because the source appeared particularly untrustworthy. Although implicit liking of Soltate was likewise weaker in the "Low" trustworthiness condition, there was still a strong preference for Soltate compared with the alternatives. This suggests that implicit evaluations may be sensitive to source trustworthiness but not necessarily to the same degree as are explicit evaluations. In sum, as with manipulations of source expertise, identical information is more impactful on implicit evaluations when that information is presented by a source that is deemed to be relatively higher in trustworthiness.

To demonstrate that these effects are not restricted to one implicit measure, in Study 4, we attempted to replicate the effect with the Affect Misattribution Procedure (AMP; Payne, Cheng, Govorun, & Stewart, 2005). The addition of the AMP is especially important as it examines the impact of primes on the degree of liking of target stimuli rather than using response latency as an indicator of association strength as with the versions of the IAT that were used in the previous three studies. In addition, we included an IAT for a direct replication of Study 3.

Study 4

Method

Participants. Participants were 458 visitors to the Project Implicit research website. Mean age was 27.5 years ($SD = 11.5$) and 64.3% of the participants were women. Participants were restricted to U.S. citizens (71.1% were White, 10.8% were African American, 2.9% were Asian, and 15.2% were Multiracial, Other, or Unknown).

Materials and Procedure. All materials and procedures were exactly as in Study 3 with the exception of the addition of an AMP. Whether participants completed the AMP or the IAT first was counterbalanced across participants.

AMP. In the AMP, participants see a series of stimuli each of which is followed by a Chinese pictograph. Participants ignore the initial "prime" stimulus and rate the pictograph as being more or less pleasant than the average pictograph. The primes were the three images of Soltate, the three images of Other Detergents, and a gray rectangle

(neutral stimulus). Participants saw 24 of each of the three types of primes, for a total of 72 trials. An individual trial began with the presentation of the prime, which was on the screen for 100 ms. This was followed by a blank screen of 100 ms after which one of the 72 Chinese pictographs was presented for 100 ms. Finally, a mask image was presented (a black-and-white image) until the participant made a response. The 72 trials were split into two blocks of 36 to give participants a chance to rest if they desired. AMP data from 26 participants (5.7%) were deleted because they responded with either "pleasant" or "unpleasant" to all of the trials in the task. Individual AMP scores were calculated by subtracting the proportion of "pleasant" responses following an "Other Detergent" prime from the proportion of "pleasant" responses following a "Soltate" prime. Positive AMP score, therefore, indicates a preference for Soltate. A correlation between the first and second block of 36 trials indicated a reliability of $r = .57$.

IAT. Participants completed the same IAT as in Study 3. Scores from 37 participants were dropped (8.1%) due to high error rates. Reliability among the remaining 421 participants was $r = .55$.

Results and Discussion

Participants' revealed an implicit preference for "Soltate Detergents" relative to "Other Detergents" when measured by the IAT, $M = 0.47$, $SD = 0.40$, $t(420) = 24.26$, $p < .0001$, $d = 1.18$, and explicitly, $M = 0.25$, $SD = 1.57$, $t(425) = 3.28$, $p = .001$, $d = 0.16$. Explicit preferences were correlated with both the IAT, $r(393) = .32$, $p < .0001$, and the AMP, $r(411) = .33$, $p < .0001$; the IAT and AMP correlated at $r(394) = .29$, $p < .0001$. The manipulation was again successful, with participants reporting more credibility ($\alpha = .72$) on the part of the source when in the "High Trustworthy" condition ($M = 3.04$, $SD = 1.04$) than the "Low Trustworthy" condition ($M = 2.39$, $SD = 0.92$), $t(433) = 6.89$, $p < .0001$, $d = 0.66$. Replicating Study 3, manipulating the level of source trustworthiness significantly affected implicit preferences as measured by the IAT. Participants implicitly preferred Soltate more when presented by an individual "High" in trustworthiness ($M = 0.51$, $SD = 0.35$) than "Low" in trustworthiness ($M = 0.43$, $SD = 0.43$), $t(419) = 2.17$, $p = .031$, $d = 0.21$.

Data for the AMP were analyzed using a 3 (prime: Soltate vs. neutral vs. Other Detergent) × 2 (condition: High Trust vs. Low Trust) ANOVA with prime as a within-participants factor, and condition, a between-participants factor. There was a main effect of prime valence, $F(2, 429) = 42.34$, $p < .001$. Participants responded that a pictograph was "pleasant" more often following a Soltate prime ($M = .60$, $SD = .24$) than an Other Detergent prime ($M = .53$, $SD = .24$), $t(431) = 4.61$, $p < .0001$, $d = 0.22$. The effect of prime valence was moderated by the trustworthiness of the source, $F(2, 429) = 5.76$, $p = .003$. In particular, the proportion of positive responses following Soltate primes was higher when the source was high in trust ($M = .64$, $SD = .23$) than low in trust ($M = .56$, $SD = .25$), $t(430) = 3.69$, $p = .0003$, $d = 0.36$.[3]

Participants self-reported a greater preference for Soltate when presented by an individual "High" in trustworthiness ($M = 0.70$, $SD = 1.41$) than "Low" in trustworthiness ($M = -0.19$, $SD = 1.59$), $t(424) = 6.11$, $p < .0001$, $d = 0.59$.

Thus, Study 4 directly replicates the effect observed in Study 3, conceptually replicates effects observed in Studies 1 and 2, and shows that the effect of trustworthiness is replicable with another implicit measure.[4]

Study 5

In all four studies, participants were encouraged to pay close attention to the information about both the message and the message's source. As such, the opportunity for elaboration was high and constant across the four studies. As noted previously, leading theories of attitude change such as the heuristic–systematic model (Chaiken et al., 1989) and the elaboration likelihood model (Petty & Cacioppo, 1986) have noted that the effects of source credibility can occur through multiple routes. Specifically, under conditions of effortful processing—as in the first four studies—source effects assert their influence by biasing the thoughts that appear in mind in response to a persuasive message (e.g., Chaiken & Maheswaran, 1994). However, source characteristics can also affect explicit evaluations under conditions of less effortful processing (see Petty & Wegener, 1998, for a review) through their operation as simple heuristic cues (e.g., "whatever experts say must be good"). Thus, in an attempt to understand the mechanism by which information about a message's source affects implicit evaluations, we ran a final study investigating whether implicit evaluations would also be affected by source credibility even when participants' ability to elaborate was low. If implicit evaluations change based on source characteristics in low elaboration conditions, that could be taken as evidence that a message's source may exert its effects by acting as a simple, heuristic cue. However, if they are not affected when elaboration is relatively restricted, that would suggest that the opportunity to generate thoughts is necessary for changing implicit evaluations via source information. To the extent that implicit evaluations exert their influence automatically and outside of conscious awareness, the heuristic information contained in the attributes of a message's source may be especially impactful on implicit evaluations. However, this has never been tested as all prior research has allowed participants the ability to consciously elaborate upon that information. As such, this study constitutes the first test of whether allowing mental elaboration is a necessary element in changing implicit evaluations during a persuasive attempt.

Method

Participants. Participants were 594 visitors to the Project Implicit research website. Mean age was 31.1 years (SD = 12.5) and 70.6% of the participants were women. Participants were restricted to U.S. citizens (73.0% were White, 8.8% were African American, 3.9% were Asian, and 14.3% were Multiracial, Other, or Unknown).

Materials and Procedure

Cognitive load. In line with previous manipulations of cognitive load (e.g., Gilbert & Hixon, 1991), participants kept a number in mind for the length of the study. In the "Low load" condition, the number was "28." In the "High load" condition, the number was "1425893."

Information about the source. The information about the message's source was identical to that used in Study 3 and Study 4.

Information about Soltate Detergents. The persuasive message about Soltate Detergents was modified slightly from the previous studies to reflect research indicating that source effects may be more likely to occur when the information is not uniformly strong or weak (see Tormala et al., 2007). Thus, although the message was still clearly pro-Soltate, the positivity of the language was reduced (Appendix B).

IAT. Participants completed the same IAT from Studies 3 and 4. Scores from 28 participants were dropped (4.7%) due to high error rates. Reliability of the measure among the remaining 566 participants was $r = .53$.

Procedure. The procedure was nearly identical to the previous studies, including only a couple of alterations. Following the welcome page participants were instructed to remember a number. Participants in the "Low load" condition were assigned a two-digit number, while participants in the "High load" condition were assigned a seven-digit number. After reading the instructions and information about the source and Soltate, participants completed the Soltate–Other Detergents IAT, a measure of explicit evaluations, and manipulation checks, in that order. Finally, participants reported having written down the number rather than attempting to remember it. Data from the 13 participants (2.2%) who admitted writing it down were dropped before running any analyses.

Results and Discussion

Participants' revealed an implicit preference for "Soltate Detergents" relative to "Other Detergents" implicitly, M = 0.58, SD = 0.38, $t(552) = 36.34$, $p < .0001$, $d = 1.53$, and explicitly, $M = 0.37$, $SD = 1.34$, $t(579) = 6.65$, $p < .0001$, d = 0.28. Explicit preferences were correlated with the IAT at $r(551) = .24$, $p < .0001$.

Both implicit and explicit evaluation scores were analyzed using a 2 (credibility level: High vs. Low) × 2 (cognitive load: High vs. Low) ANOVA with both factors manipulated between participants. Regarding explicit evaluations, the main effect of cognitive load was not significant, $F(1, 576)$ = 0.01, $p = .91$, indicating that people did not form stronger explicit preferences under low than under high load. There was, however, a main effect of credibility, $F(1, 576) = 39.22$, $p < .0001$, such that participants explicitly preferred Soltate more when presented by a source high in credibility (M = 0.74, SD = 1.22) than low in credibility (M = 0.06, SD = 1.35), $d = 0.52$. Furthermore, this effect of source credibility was not moderated by the manipulation of cognitive load, $F(1, 576) = 1.72$, $p = .19$, indicating that source credibility can affect explicit evaluations even when the opportunity to elaborate is low.

The results differ in important ways for implicit evaluations. As with explicit evaluations, a main effect of cognitive load was not observed, $F(1, 549) = 1.22$, $p = .27$. There was a main effect of credibility, $F(1, 549) = 4.43$, $p = .036$, such that participants implicitly preferred Soltate more when presented by a source high in credibility ($M = 0.62$, $SD = 0.36$) than low in credibility ($M = 0.55$, $SD = 0.39$). Of primary importance, this effect of source credibility on implicit evaluations was moderated by cognitive load, $F(1, 549) = 7.57$, $p = .006$. In particular, when cognitive load was low (and, therefore, elaboration likelihood was high, as in previous studies) participants implicitly preferred Soltate more when it was presented by a source high in credibility ($M = 0.68$, SD = 0.34) compared with a source low in credibility ($M = 0.52$, $SD = 0.39$), $t(299) = 3.65$, $p = .0003$, $d = 0.42$. However, for participants in the high load condition—who, presumably could not elaborate on the information presented about Soltate—there was no difference in their preference for Soltate based on whether the source was high in credibility ($M = 0.55$, $SD = 0.37$) or low in credibility ($M = 0.57$, SD = 0.39), $t(250) = 0.43$, $p = .67$, $d = -0.05$.

Study 5 reinforces the finding that both implicit and explicit evaluations are sensitive to source credibility, but adds an intriguing wrinkle. In particular, while explicit evaluations were affected both when participants were under high and low cognitive load, implicit evaluations were only affected by source information when participants were under low cognitive load and not when they were under high cognitive load.

Mediational Analyses

In an additional attempt to triangulate on how the effects of source credibility influence implicit evaluations, we conducted Sobel tests to assess whether the self-reported ratings of credibility (average ratings of expertise, trustworthiness, and intelligence) mediated the effects on implicit (and explicit) evaluations. In the first four studies, persuasion of explicit evaluations was mediated by perceptions of source credibility (all Zs > 3.74, all ps < .0002). In

Study 5, we observed this mediation both when cognitive load was low, $Z = 4.35$, $p = .00001$, and when it was high $Z = 3.25$, $p = .001$. As such, it is clear that explicit evaluations of Soltate were affected by self-reported perceptions of the source's credibility. With regard to implicit evaluations, the results are less clear. In Studies 2 to 4, self-reported perceptions of source credibility did serve to mediate the persuasion of implicit evaluations, as measured by the AMP, IAT, and personalized IAT (all Zs > 2.10, all ps < .036). However, perceptions of source credibility did not mediate the impact of persuasive messages on implicit evaluations—as measured by the IAT—in Study 1 ($Z = 1.16$, $p = .25$) or in Study 5, regardless of whether cognitive load was high, $Z = 1.49$, $p = .14$ or low, $Z = 0.32$, $p = .75$. These mixed results with regard to mediation suggest that other factors, such as thought favorability, may be making contributions and thus, signal the need for further research—preferably designed with the primary aim of testing for mediation—before firm conclusions are drawn about whether perceptions of source credibility mediate the impact of source credibility on implicit evaluations.

General Discussion

In five studies, manipulations of source credibility that are known to moderate the impact of persuasive messages on explicit evaluations also proved to moderate the effect of persuasive messages on implicit evaluations, as measured by the IAT (Studies 1, 3, 4, and 5), a personalized IAT (Study 2), and an AMP (Study 4). Implicit evaluations were more strongly affected by a source high in credibility as operationalized through expertise (Studies 1 and 2), and trustworthiness (Studies 3 to 5). In Study 5, we observed that source information only moderates the persuasion of implicit evaluations when participants have the ability to elaborate on the information (as in the previous four studies). In contrast, source information had no impact on implicit evaluations when participants experienced a high cognitive load and were therefore unable to generate thoughts in response to the persuasive attempt. Our findings have important implication for the understanding of both persuasion and implicit evaluation.

One reason why effects of source credibility on implicit evaluations have not yet been investigated may be the dominance of dual process models of implicit and explicit evaluations within attitude research. Whereas implicit evaluations are typically thought to reflect associations in memory that have been gradually formed over long periods of time, explicit evaluations are attributed to propositions that can be formed and altered quickly on the basis of information available in memory and in the present situation; some theories even assert that the two types of evaluations are based on different processes or representations (e.g., Rydell & McConnell, 2006; Wilson, Lindsey, & Schooler, 2000). This view has been quite influential and, as noted previously, appears to have become reified through studies showing that explicit evaluations can be changed through verbal instructions (see Bohner & Dickel, 2011; Crano & Prislin, 2006, for recent reviews), whereas implicit evaluations are changed either by overtraining existing associations (e.g., Baccus et al., 2004; Dijksterhuis, 2004; Hermans et al., 2003; Kawakami et al., 2007; Wiers et al., 2011) or through manipulating the measurement context (e.g., Blair et al., 2001; Dasgupta & Greenwald, 2001; Mitchell et al., 2003; Wittenbrink et al., 2001). Importantly, the present work suggests that there may be many more pathways to changing implicit evaluations, and that the long history of persuasion with regard to explicit evaluations may provide a useful road map.

The fact that source credibility can influence implicit evaluations is anticipated by some present theories. For instance, Gawronski and Bodenhausen's (2006, 2011) Associative-Propositional Evaluative (APE) model allows for the possibility that propositionally based persuasive messages influence both the associations that are activated in memory and the structure of the associations themselves (also see Fazio, 1990; Fazio & Towles-Schwen, 1999). Because implicit evaluations are assumed to reflect the associations that are activated in memory at a given point in time, persuasion of implicit evaluations via the type of propositional information presented in the present work is compatible with the APE model. In particular, positive associations could form based on the learned proposition that "Soltate is good." Moreover, the strength of this association could depend on how confident one is that the proposition is true, which in turn depends on the credibility of the source (see Briñol et al., 2004; Tormala et al., 2006, for the relationship between source credibility and thought confidence in changing explicit evaluations).

However, if propositions act directly on the structure of a theorized associative system, one may argue that a more parsimonious account could do away with a separate associative system entirely (see Mitchell, De Houwer, & Lovibond, 2009). For example, our results are in line with the recent proposal that implicit evaluations reflect the automatic activation of propositions (Hughes, Barnes-Holmes, & De Houwer, 2011). With regard to the present studies, one could argue that the persuasive message leads to the proposition that the Soltate product is good. Confidence in this propositional belief may be greater when the source of information is credible. Once the proposition about Soltate has been formed, it can be stored in episodic memory from which it can be activated automatically and thus, result in a positive implicit evaluation. The main difference between this propositional account and the APE model account (i.e., that propositions can influence the structure and/or activation of associations) is that episodic memories of propositions conserve information about

the nature of the relation between stimuli (e.g., "Soltate *causes* benefits" rather than "Soltate *prevents* benefits") whereas associations are merely a result of the co-occurrence of two stimuli (see De Houwer, 2009; Lagnado, Waldmann, Hagmayer, & Sloman, 2007). It is important to note that the present work was not designed to adjudicate competing theories of (changes in) implicit evaluations. Instead, our main focus was to demonstrate that persuasive messages can have an impact on implicit evaluation in a way that depends on source credibility.

It is also important to point out that the two operationalizations of credibility had differently sized impacts on explicit and implicit evaluations. Whereas the impact of expertise showed similar effect sizes for implicit and explicit evaluations, effects for trustworthiness were bigger for explicit evaluations than for implicit evaluations. This could mean that, despite the common influence of credibility, there are important differences between implicit and explicit evaluations that are subject to differential influence depending on the information or persuasive appeal.

The most important discrepancy between the results for explicit and implicit evaluations appeared in the final study in which source information affected implicit evaluations only when participants were not cognitively busy. When cognitive load was induced, source credibility still affected explicit evaluations but not implicit evaluations. This implies that information about a message's source does not act as a simple, heuristic cue for shaping implicit evaluations. If it did, then the cognitive load manipulation should not have been effective at blocking the impact of the message's source. However, explicit evaluations were still affected, suggesting that the heuristic cue of credibility is sufficient to alter them. Together, this suggests that source information exerts its effects on implicit evaluations by biasing the thoughts that come to mind and are elaborated during the persuasive attempt. By using a cognitive load to reduce the likelihood of having and elaborating on those thoughts, a message's source no longer affects implicit evaluations.

Ironically, perhaps, source credibility might only influence implicit evaluations when the opportunity exists to explicitly process the source information. The elaborative effort might be necessary for the formation or "retraining" of associations as the result of persuasive propositional information (Shiffrin & Schneider, 1977). Therefore, the notion that "implicit cues" (heuristic information) are more likely to affect implicit evaluations, whereas "explicit cues" (elaborative processing) are more likely to affect explicit evaluations—while intuitively satisfying—may be wrong. The key insight is that as a predictor, implicit evaluations may influence behavior through subtle, heuristic means, but as an outcome, implicit evaluations may also be shaped more by overt, elaborative efforts to create, change, or override existing associations (see also Teachman, Marker, & Smith-Janik, 2008).

Importantly, the lack of difference between credibility conditions under high cognitive load cannot be attributed to a reduction in the quality of implicit measurement in those conditions. Indeed, a very strong preference for Soltate (in line with the persuasive message) was instantiated under high load, $t(251) = 23.78$, $p < .0001$, $d = 1.50$; split-half reliability did not differ by load (high: $r = .52$, low: $r = .56$, $z = 0.71$, $p = .48$), and the IAT correlated similarly with explicit evaluations in the two load condition (high: $r = .24$, low: $r = .23$; $z = 0.05$, $p = .96$). The IAT, therefore, performed equally well when participants were under cognitive load, and it simply was not affected by the source.

More speculatively, the present results may shed some light on the longevity of attitude change. Specifically, although source characteristics have been shown to operate both at more and less thoughtful levels, the resultant evaluations are stronger (i.e., longer lasting, more resistant, more predictive of behavior) when people engage in more elaboration during the persuasion attempt (Petty, Haugtvedt, & Smith, 1995). In the present work, we only observed changes in implicit evaluations based on source characteristics in the high elaboration conditions. Thus, it may be that explicit evaluations that are changed through methods that are low in elaboration are not long lasting because of the lack of concurrent changes in implicit evaluations.

In summary, manipulations of source credibility previously shown to be effective at changing explicit evaluations were also effective at changing implicit evaluations. Identical, positive information about a novel consumer product was more influential on implicit evaluations when that information was presented by a source high rather than low in credibility. The fact that these source-level variables traditionally used to change explicit evaluations also moderated implicit evaluations opens interesting avenues of investigation for both persuasion researchers—who have relied almost entirely on explicit evaluations—and researchers of implicit evaluations—who have relied on overtraining and context effects when attempting to change implicit evaluations. However, although the direction of the effects was consistently the same for explicit and implicit evaluations, it was not the case that implicit and explicit evaluations changed in exactly the same way. Instead, while explicit evaluations changed both under conditions of low and high elaboration, implicit evaluations only changed under high elaboration conditions. This has important implications for our understanding of how implicit evaluations are changed, because it suggests that implicit evaluations may be most effectively changed through manipulations relatively high in effort and thinking and that the quality of the thoughts arising during a persuasive attempt are integral—or even necessary—for changing implicit evaluations.

Appendix A

Stimuli for Implicit Measures

Appendix B

Studies 1 to 4: Information About Soltate Brand Laundry Detergents

The Benefits of Soltate Brand Laundry Detergents. The laundry detergents made by Soltate are some of the best detergents available today. To begin with, Soltate detergents are less expensive than most other detergents. This is because they are both cheaper to make and packaged more efficiently. Soltate detergents are also more powerful than other detergents. They clean clothes better and leave them smelling fresher compared with other detergents. As a result, Soltate detergents may allow clothes to be cleaned less often, which reduces detergent costs and can make clothing last longer. Perhaps because Soltate detergents are cheaper and more effective, over the past few years they have topped the charts in customer satisfaction in the regions where they are sold. In addition, Soltate detergents are among the cleanest and safest type of detergent on the market. In summary, we would strongly recommend using detergents made by Soltate for household laundry.

Study 5: Information About Soltate Brand Laundry Detergents

The Benefits of Soltate Brand Laundry Detergents. The laundry detergents made by Soltate seem to be very good laundry detergents. To begin with, Soltate detergents are less expensive than many other detergents. This may be because they are cheap to make and packaged efficiently. Soltate detergents are also at least as powerful as most other detergents. They clean clothes well and leave them smelling fresh. As a result, Soltate detergents may allow clothes to be cleaned less often, which reduces detergent costs and can make clothing last longer. Perhaps because Soltate detergents are both cheap and effective, over the past few years, they have sold very well in most of the regions where they are available. In addition, Soltate detergents are among the cleanest and safest types of detergent on the market. In summary, we would recommend using detergents made by Soltate for household laundry.

Appendix C

Studies 3 to 5: Manipulation of Source Trustworthiness

High Source Trustworthiness. Imagine that you are trying to decide what laundry detergent to buy and you are searching on the Internet for some information.

The first thing you find is on the website for a Consumer Protection Board. The West River Consumer Protection Board was formed in response to public outcry about false advertising in the late 1950s.

Since then, the board has been tasked with promoting the safety of the community's consumers. It has always been a small bipartisan group of business people, scientists, and politicians. Each member is nominated by his or her community for being someone who is particularly fair-minded.

For the past year, the board members have been collecting information on the quality and affordability of a variety of consumer products and presenting that information at monthly board meetings. The community has been very happy with the accuracy of the board's recommendations.

Please read the following product information with that in mind.

Low Source Trustworthiness. Imagine that you are trying to decide what laundry detergent to buy and you are searching on the Internet for some information.

The first thing you find is on the website of a large laundry detergent company. According to a legal disclaimer on the front page of their website, the company recently changed their brand name to distance themselves from a high-profile product recall they had several years ago.

The company has hired a famous public relations firm that specializes in fixing the reputations of celebrities. In addition to recommending the brand name change, the public relations firm recommended that the company immediately launch a new website.

The website promotes their brand of laundry detergent using positive language to make consumers think that they have a great product. The company has been very happy with their website's ability to make consumers forget the past problems with their laundry detergent.

Please read the following product information with that in mind.

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Notes

1. These error rates were used as cutoffs in each of the subsequent studies. Other data (i.e., self-report measures or second implicit measure) for participants with deleted IAT scores were retained. The degrees of freedom in this and subsequent studies vary slightly across tests because of slight variation in missing data.
2. Participants did not rate the source as being more likeable when they were in the "High Expertise" condition ($M = 3.62$, $SD = 1.09$) compared with the "Low Expertise" condition ($M = 3.68$, $SD = 1.11$), $t(194) = -0.52$, $p = .60$, $d = 0.05$.
3. An alternate method of testing for the effect of our manipulation on AMP scores is to compare the means on the difference score (constructed by subtracting the proportion of positive responses following an "Other Detergent" prime from the proportion of positive responses following a "Soltate" prime). With this method, participants preferred Soltate more when they were in the "High Trustworthy" condition ($M = .12$, $SD = .28$) compared with the "Low Trustworthy condition" ($M = 0.02$, $SD = .33$), $t(430) = 3.39$, $p = .0008$, $d = 0.33$.
4. We also conducted a study using an evaluative priming task (Fazio, Sanbonmatsu, Powell, & Kardes, 1986). In this study, 407 participants self-reported a greater preference for Soltate when presented by an individual "High" in trustworthiness ($M = 0.60$, $SD = 1.29$) than "Low" in trustworthiness ($M = -0.21$, $SD = 1.42$), $t(402) = 6.06$, $p < .0001$, $d = 0.60$. However, implicit preferences—as measured by the evaluative priming task—were not significantly affected. The evaluative priming task was scored by dropping error trials and then log transforming the means of the remaining latencies. Difference scores were then created by subtracting negative scores from positive scores separately for both Soltate trials and "Other Detergents." Finally, difference scores were constructed by subtracting positivity toward "Other Detergents" from positivity toward Soltate. Participants did not reveal more of an implicit preference for Soltate when presented by an individual "High" in trustworthiness ($M = -0.004$, $SD = 0.07$) than "Low" in trustworthiness ($M = -0.005$, $SD = 0.07$), $t(381) = 0.19$, $p = .85$, $d = 0.02$. However, there are reasons to believe that the evaluative priming task that we constructed may not have been optimal. Most importantly, the targets were complex images (images of laundry detergents) with the words "Soltate" or "Other Detergents" on them. Previous research has indicated that the meaning of word qualifiers (e.g., "a friend" vs. "no friend") is not impactful on an evaluative priming task, though it does impact performance on an AMP (Deutsch, Kordts-Freudinger, Gawronski, & Strack, 2009, Experiment 1). Thus, it is possible that both sets of stimuli primed the concept of "detergent" rather than being meaningfully distinct. In addition, the targets were of different colors than the primes that may have helped participants ignore the primes and thereby avoid priming effects (see Musch & Klauer, 2001). As such, further research is needed before any conclusions are drawn about the impact of a source's credibility on an evaluative priming task.

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