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Mood and Trust in Intuition Interactively Orchestrate Correspondence Between Implicit and Explicit Attitudes

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Abstract

The goal of the current research was to subject the prediction that affect and trust in intuition would interactively shape implicit and explicit attitude correspondence to empirical assessment. In four experiments, either trust versus distrust in intuition was measured or manipulated and positive or negative moods were induced. The outcome of interest was correspondence between implicit and explicit academic attitudes (Experiments 1–2) and self-attitudes (Experiments 3–4). As predicted, affect served as information about chronically or temporarily accessible tendencies to trust or distrust their intuitions, with positive affect validating and negative affect invalidating such tendencies, which in turn shaped correspondence between implicit and explicit attitudes. By drawing together these two seemingly unrelated lines of research, these experiments provide important insights into the sometimes mysterious circumstances in which implicit attitudes are translated into explicit attitude reports.

Keywords

mood, affect-cognition interface, implicit cognition, implicit attitudes, explicit attitudes, intuition

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People appear to be of two minds when it comes to their evaluative stance toward any particular attitude object. On one hand, people generate an immediate positive or negative reaction toward objects they encounter in their environment, and on the other, people generate a more considered assessment of that same object that may or may not faithfully reflect their immediate reactions. These two evaluative stances toward attitude objects are typically labeled implicit attitudes and explicit attitudes. There exist a variety of models of implicit and explicit attitudes, with each model attributing a somewhat different constellation of properties to each attitude (e.g., Eagly & Chaiken, 2007; Fazio, 2007; Gawronski & Bodenhausen, 2007; Greenwald & Banaji, 1995; Petty, Briñol, & DeMarree, 2007; Wilson, Lindsey, & Schooler, 2000). For the sake of simplicity and economy of presentation, in what follows the essential elements of the associative-propositional evaluation (APE) model (Gawronski & Bodenhausen, 2006) will be taken as a “temporary given” (Zanna, 2004).

According to this model, implicit attitudes are thought to reflect the output of associative processes (i.e., the activation of mental associations from memory). Explicit attitudes are thought to reflect the output of propositional processes, which involve validation or invalidation of the information implied by activated associations. Although some definitions

of implicit attitudes include the idea that they reside outside introspective access (e.g., Greenwald & Banaji, 1995; Wilson et al., 2000), from the APE model, the question of awareness is an empirical one. And as recent research suggests, although people are unlikely to have access to the associative processes giving rise to implicit attitudes, they do have experiential access to the output of such processes, with implicit attitudes often being experienced as gut feelings or intuitive reactions (Gawronski & LeBel, 2008; Jordan, Whitfield, & Zeigler-Hill, 2007; Ratliff, Smith, & Nosek, 2008; Smith & Nosek, in press).

Aside from establishing the precise properties of implicit and explicit attitudes, the extent to which explicit attitudes faithfully reflect or deviate from implicit attitudes has emerged as an important area of research (Gawronski & Bodenhausen, 2006; Nosek, 2007). Much of this early research emphasized the role of external constraints, such as self-presentational concerns, or features of the attitude itself, such as its accessibility in memory and strength or importance, in modifying the

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extent to which implicit attitudes inform construction of explicit attitudes (e.g., Hofmann, Gschwendner, Nosek, & Schmitt, 2005; Nosek, 2005). Only recently has attention been paid to internal constraints on how one constructs explicit attitudes. According to the APE model (Gawronski & Bodenhausen, 2006), people typically base their explicit evaluative judgments on their initial gut reactions (i.e., implicit attitudes), unless such reactions disagree with other accessible propositions. Although such validation of implicit attitudes in many cases arises from their consistency with the implications of other information in mind at the moment, several factors have been shown to directly determine the subjective validity of one's implicit attitudes.

Two examples of factors that directly modify the apparent validity of one's implicit attitudes are positive and negative affect (Huntsinger & Smith, 2009) and dispositional and momentary trust in intuition (Jordan et al., 2007). This research found that explicit attitudes more faithfully reflect implicit attitudes when people are in good moods and when they trust their intuitions. Positive affect from positive mood promotes correspondence to the extent that it increases the apparent value of the implicit attitude, and negative mood promotes divergence to the extent that it decreases the value of implicit attitudes (Huntsinger & Smith, 2009). Likewise, when people trust their intuitions, this increases the apparent validity of implicit attitudes, leading such attitudes to be incorporated into explicit attitude reports, whereas when people distrust their intuitions, this decreases the apparent validity of implicit attitudes, leading such attitudes to be unused when constructing explicit attitude reports (Jordan et al., 2007).

The purpose of the current project was to further illuminate those conditions when implicit attitudes are translated into explicit attitudes by investigating the simultaneous influence of mood and trust in intuition on implicit and explicit attitude correspondence. One possibility is that these two factors will exert additive effects on implicit–explicit attitude correspondence. According to this view, the double validation of implicit attitudes from positive mood and trust in intuition should lead to a near perfect correspondence between implicit and explicit attitudes and the double invalidation of implicit attitudes from negative mood and distrust in intuition should lead to a complete divergence between implicit and explicit attitudes. Situations in which these two sources of implicit attitude validation work in opposition to one another, in other words when one is in a positive mood and distrusts intuition or a negative mood and trusts intuition, should fall somewhere in between the situations just described where these two sources of validation or invalidation work in concert. This view is consistent with models of construct accessibility (Srull & Wyer, 1989), which generally propose that different sources of construct accessibility additively combine to inform cognition.

As intuitively appealing as an additive result may seem at first glance, however, another possibility is that mood

and trust in intuition will interactively orchestrate the degree to which explicit attitudes reflect implicit attitudes. The possibility of such an influence comes from affect-cognition models that propose that affect confers positive or negative value on whatever it takes as its object, including what thoughts and responses happen to be in mind in any given cognitive moment (e.g., Clore & Huntsinger, 2007, 2009). Since positive affect is pleasant and negative affect is unpleasant, the feedback about the value of current thoughts and thought processes is also motivating. From this view, then, by either promoting or inhibiting the use of accessible thoughts and thought processes, affect acts as a managing director of cognitive activity as it unfolds.

This influence of affect on cognition may usefully be conceived of as metacognitive (e.g., Huntsinger & Clore, in press). Metacognition involves our thoughts about our own thoughts and thought processes (Petty, Briñol, Tormala, & Wegener, 2007). To illustrate, a person may believe that The Clash is a great band. This would be an example of a primary cognition. As a secondary cognition, or thought about this primary cognition, one may have great confidence in this belief (e.g., "I am confident that The Clash is a great band"). Such higher order thoughts then guide whether or not accessible mental content and thought processes inform judgments and guide responses (Petty, Briñol, Tormala, & Wegener, 2007). By conferring positive and negative value on accessible thoughts and response tendencies, positive and negative affect, it is argued, provides a ready source of metacognitive information. The information about value conveyed by affect, moreover, can be experienced in multiple ways depending on the particular metacognitive question posed (Huntsinger & Clore, in press), though in many cases this information about value may be experienced as confidence or doubt in accessible thoughts or thought processes (Briñol, Petty, & Barden, 2007).

To illustrate the predicted metacognitive role of affect in validating or invalidating people's tendency to trust or distrust intuition, consider the following example. For a person who routinely or momentarily trusts intuition, the belief that "gut reactions" are valid represents the primary cognition. Conversely, for a person who distrusts intuition, the belief that "gut reactions" are invalid represents the primary cognition. According to this view positive affect should validate and thus enhance confidence in tendencies to trust or distrust intuition. Negative affect, by contrast, should invalidate and thus cast doubt on tendencies to trust or distrust intuition. This affective validation and invalidation of tendencies to trust or distrust intuition in turn should interactively adjust whether or not participants' "gut reactions" (i.e., implicit attitudes) form the basis of participants' explicit attitude reports.

Indirect support for these predictions comes from research that examined affective influences on self-validation processes in persuasion. Briñol et al. (2007) examined affective

influences in persuasion, but, unlike past research, in their research mood was induced after participants read the persuasive appeals. Thus, affect validated or invalidated thoughts about the persuasive appeals, rather than changing processing of the appeals. Specifically, participants first were exposed to persuasive appeals consisting of either strong arguments or weak arguments and then wrote down their thoughts, which tended to be positive for strong arguments and negative for weak arguments. Positive or negative moods were then induced and participants rated their agreement with the persuasive appeal. Because mood was induced after exposure to the persuasive appeals, it signaled the validity or invalidity of participants' thoughts about the messages. In this case, when accessible thoughts about the message were mainly positive (i.e., the strong argument condition), positive mood validated such thoughts and negative mood invalidated them so that participants in positive moods were more persuaded than those in negative moods. In contrast, when thoughts about the message were mainly negative (i.e., the weak argument condition), this pattern was reversed—now participants in positive moods were less persuaded than those in negative moods. Thus, the double negative of being in a negative mood and having negative thoughts about a persuasive message did not additively combine to lead to even more negative attitudes toward the position outlined in the persuasive appeal. Rather, negative mood invalidated these negative thoughts leading to more persuasion.

Overview of the Present Studies

Based on this past research and theory, rather than modifying the validity of implicit attitudes as in other research (e.g., Huntsinger & Smith, 2009), in the present research it was predicted that affect would serve as information about people's tendency to trust or distrust their intuitions. More specifically, when trust in intuition is primed, it is predicted that positive mood will lead to greater implicit–explicit attitude correspondence than negative mood. When distrust in intuition is primed, by contrast, it is predicted that positive mood will lead to less implicit–explicit attitude correspondence than negative mood.

The seemingly improbable prediction, then, is that such a double negative of devaluing one's distrust in intuition should yield attitude coherence, in which explicit attitudes would reflect implicit attitudes, just as would occur with double positives such as when positive affect is experienced as validation of one's trust in one's intuitions. These predictions were tested in four experiments in which trust or distrust in intuition was measured or manipulated in three ways and mood was manipulated to be positive or negative in two ways. The outcome of interest was the relation between implicit and explicit attitudes in domains that have received considerable research attention: academic attitudes and self-esteem.

Experiment I

Participants in this experiment first completed the measure of implicit academic attitudes, then experienced the mood manipulation, and then completed measures of explicit academic attitudes and dispositional tendencies to trust versus distrust in intuition. It was predicted that, among participants who routinely trusted their intuitions, positive moods would lead to higher implicit–explicit attitude correspondence than sad moods. By contrast, it was predicted that, among participants who routinely distrusted their intuitions, positive moods would lead to lesser implicit–explicit attitude correspondence than sad moods.

Method

Participants. For partial fulfillment of a course requirement, 86 participants (65 women) took part in this experiment.

Materials and procedure. One to six participants took part in any given experimental session but did not interact at all during the experiment as they were run in individual cubicles. After signing consent forms, participants were told that the experiment examined how people perceive their social worlds and that they would complete a series of computer-based measures, listen to some musical selections for the purpose of pretesting them for another experiment, and then complete a brief questionnaire also on the computer.

Participants first completed the measure of implicit academic attitudes. After completing this measure, participants then experienced the mood manipulation in which they spent 10 minutes listening to either happy or sad music via headphones. After the mood manipulation, participants completed the measure of explicit academic attitudes and the dispositional measure of trust versus distrust in intuition and, finally, answered a series of manipulation checks and demographic items. Last, a funneled debriefing (Dulany, 1962) revealed that no participants expressed awareness of the true purpose of the experiment or the mood induction.

Implicit academic attitudes. The Implicit Association Test used to measure implicit academic attitudes, identical to that used in past research (Huntsinger & Smith, 2009; Nosek, Banaji, & Greenwald, 2002), assessed associations between attitude objects (e.g., math and arts) and evaluative attributes (e.g., pleasant and unpleasant). All stimuli were taken from Nosek et al. (2002). Participants completed the task in seven blocks following the recommendations of Nosek, Greenwald, and Banaji (2005). The order of the congruent (practice + test; 40 trials each) and incongruent (practice + test; 40 trials each) blocks was counterbalanced across participants (Blocks 3–4 and 6–7). Response latencies were dealt with following the recommendations of Greenwald, Nosek, and Banaji (2003), and all reported analyses used the *D* measure as the measure of implicit academic attitudes. Higher values on this measure indicated a more positive implicit attitude toward arts than math. The measure of implicit academic

attitudes exhibited good internal consistency (Spearman–Brown coefficient = .72).

Mood manipulation. Via headphones participants listened to one of two musical selections shown in previous research to induce positive moods (Mozart’s “Eine Kleine Nacht Musik”) and negative moods (Mahler’s “Adagietto”; Niedenthal & Setterlund, 1994; Storbeck & Clore, 2005).

Explicit academic attitudes. Participants indicated their feelings toward arts and math using five semantic differentials used in Nosek et al. (2002) and Huntsinger and Smith (2009). Participants were asked to describe where their feelings toward mathematics (or arts) were located using the following five scale anchors: *sad–happy*, *delightful–disgusting*, *ugly–beautiful*, *avoid–approach*, *unafraid–afraid*. The scale for each semantic differential ranged from –3 to 3. After appropriate rescoring, composite measures of math ($\alpha = .71$) and arts ($\alpha = .66$) attitudes were created. Finally, to make this measure comparable to the measure of implicit arts–math attitudes a difference score was computed by subtracting the composite measure of math attitudes from the composite measure of arts attitudes. The difference score could range from –6 to 6 and was created such that positive values indicated a more positive attitude toward arts than math, lower numbers the opposite, and a value of zero indicated no preference.

Trust in intuition. Participants’ dispositional trust in intuition was assessed via the Faith in Intuition subscale of the Rational-Experiential Inventory (Epstein, Pacini, Denes-Raj, & Heier, 1996). Participants rated their agreement with 20 items such as “I believe in trusting my hunches,” “If I were to rely on my ‘gut feelings,’ I would often make mistakes” (reversed), and “I like to rely on my intuitive impressions.” Responses were made on 7-point scales ranging from 1 = *definitely not true of myself* to 7 = *definitely true of myself*. The scale showed good reliability ($\alpha = .89$). Participants’ self-reported trust in intuition was unaffected by the mood induction, $t(84) = 0.88, p = .38$.

Manipulation checks. Participants were asked how happy (sad) they felt while listening to the musical selections to assess the efficacy of the mood manipulation (1 = *not at all*, 7 = *very*). These two items were correlated ($r = -.52, p < .05$); therefore, a composite measure of positive mood was created with higher values indicating a more positive mood. One participant failed to answer this question.

Results

Manipulation checks. The mood manipulation was successful, $t(83) = 3.65, p < .0005$. Participants reported experiencing more positive feelings while listening to the happy musical selection ($M = 5.95, SD = 1.24$) than the sad musical selection ($M = 5.09, SD = 0.90$).

Implicit and explicit academic attitudes. Overall, participants reported implicit academic attitudes ($M = 0.51, SD = 0.35$) and explicit academic attitudes ($M = 0.87, SD = 1.58$)

representing more positive attitudes toward arts as compared to math. The two types of attitudes were significantly correlated, $r(86) = .33, p < .005$. This is not surprising given that past research generally finds them to be modestly correlated (Nosek et al., 2002).

Predictions were evaluated via regression analysis. In the model, explicit academic attitudes were regressed on implicit academic attitudes (centered), mood condition (*positive* = 1, *negative* = –1), trust in intuition (centered), and all two-way and three-way interactions. This analysis revealed a significant main effect of implicit academic attitudes, which was qualified by a significant three-way interaction (see Table 1). To fully understand the pattern of this three-way interaction, simple slopes were computed (Aiken & West, 1991).

As can be seen in Figure 1, and as predicted, when trust in intuition was high (+1 *SD*), participants in positive moods exhibited greater correspondence between their implicit and explicit academic attitudes, $b = .61 (.22), t(78) = 2.73, p < .01$, than those in negative moods, $b = -.01 (.21), t(78) = 0.06, p = .95$. By contrast, when trust in intuition was low (–1 *SD*), participants in positive moods now displayed lesser correspondence between their implicit and explicit academic attitudes, $b = .26 (.17), t(78) = 1.50, p = .14$, than those in negative moods, $b = .64 (.23), t(78) = 2.82, p < .01$.

Experiment 2

As predicted, in Experiment 1 participants’ mood and dispositional trust or distrust in intuition interactively combined to determine whether their more considered (i.e., explicit) academic attitudes faithfully reflected their more immediate (i.e., implicit) academic attitudes. The purpose of Experiment 2 was to conceptually replicate the results of Experiment 1 by manipulating momentary trust versus distrust in intuition via a procedural priming task similar to that used in past research (e.g., Jordan et al., 2007). The predictions for this experiment were identical to those of Experiment 1.

Method

Participants. For partial fulfillment of a course requirement, 174 participants (117 women) took part in this experiment.

Materials and procedure. The procedure for this experiment was similar to that of Experiment 1. One to six participants took part in any given experimental session but did not interact at all during the experiment as they were run in individual cubicles. After signing consent forms, participants first completed the measure of implicit academic attitudes. After completing this measure, participants were randomly assigned to the trust in intuition or distrust in intuition priming condition described below. Participants then experienced the same mood manipulation from Experiment 1. After the mood manipulation, participants completed the measure of explicit academic attitudes and answered a series of manipulation checks and demographic items. Finally, a funneled

Table 1. Regression Results for Experiments 1–4

Experiment 1					Experiment 2				
Predictor	<i>b</i>	β	<i>t</i>	<i>p</i>	Predictor	<i>b</i>	β	<i>t</i>	<i>p</i>
Intercept	0.81		4.88	<.0005	Intercept	1.14		8.89	<.005
Mood	–0.24	–.15	1.43	.16	Mood	0.14	.08	1.10	.27
Intuition measure	0.03	.02	0.20	.85	Intuition prime	–0.15	–.08	1.16	.25
IAA	0.57	.36	3.34	.001	IAA	0.35	.20	2.68	.008
Mood \times intuition	0.17	.10	0.95	.34	Mood \times intuition	–0.23	–.13	1.80	.07
Mood \times IAA	0.07	.05	0.42	.68	Mood \times IAA	0.21	.12	1.63	.10
Intuition \times IAA	–0.10	–.07	0.63	.53	Intuition \times IAA	–0.07	–.04	–0.52	.60
Mood \times intuition \times IAA	0.41	.29	2.56	.012	Mood \times intuition \times IAA	0.43	.24	3.35	<.005
Experiment 3					Experiment 4				
Predictor	<i>b</i>	β	<i>t</i>	<i>p</i>	Predictor	<i>b</i>	β	<i>t</i>	<i>p</i>
Intercept	5.28		57.32	<.0005	Intercept	5.33		60.81	<.0005
Mood	0.06	.06	0.70	.49	Mood	–0.06	–.06	0.70	.49
Intuition prime	0.07	.07	0.79	.43	Intuition prime	0.06	.06	0.69	.49
ISE	0.02	.02	0.19	.85	ISE	0.03	.03	0.34	.74
Mood \times intuition	–0.05	–.05	0.52	.60	Mood \times intuition	0.01	.01	0.11	.91
Mood \times ISE	–0.07	–.07	0.78	.44	Mood \times ISE	–0.01	–.01	0.12	.91
Intuition \times ISE	0.06	.06	0.65	.52	Intuition \times ISE	0.08	.08	0.91	.36
Mood \times intuition \times ISE	0.40	.39	4.27	<.0005	Mood \times intuition \times ISE	0.39	.36	4.46	<.0005

IAA = implicit academic attitudes; ISE = implicit self-esteem. Mood is coded such that -1 = *negative* and 1 = *positive*. The measure of trust or distrust intuition was mean centered in Experiment 1, and the intuition prime conditions were coded such that -1 = *distrust intuition* and 1 = *trust intuition* in Experiments 2–4.

debriefing (Dulany, 1962) revealed that no participants expressed awareness of the true purpose of the experiment or the mood induction.

Implicit academic attitudes. This measure was identical to that used in Experiment 1. The measure of implicit academic attitudes exhibited good internal consistency (Spearman–Brown coefficient = .71).

Trust–distrust intuition manipulation. This manipulation, adapted from previous research (Jordan et al., 2007), represents a form of procedural priming (Schooler, 2002) in which a cognitive tendency activated in one task, in this case to trust or distrust one’s intuitions, carries over, without participants’ awareness, to other unrelated tasks, in this case participants’ self-reported academic attitudes.

In both conditions, participants were told that people make decisions in one of two ways: based on intuition or based on rational analysis. Then, depending on condition, participants read one of two paragraphs adapted from Jordan et al. (2007) reproduced below. The portions in *italics* were included in the trust intuition condition, and for the distrust in intuition condition, the portions in **bold** were substituted into the paragraph.

There is clear evidence from psychological research that people who adopt an *INTUITIVE [RATIONAL]* approach to decision making are more successful in many areas of their lives. Such individuals, *who pay*

*attention to and trust their intuitions [who overcome their intuitions and instead rely on rational analysis], excel in business, are more popular with their peers, and have more successful romantic relationships than those who adopt a *rational [intuitive]* approach to decision making. In what follows, we would like you to try to adopt an *intuitive [rational]* style of thinking when answering the questions that follow. *In particular, we would like you to try to rely on your “gut feelings” when deciding whether you like or dislike the following objects. Try to work quickly through the task and not think too much about your answers. [In particular, we would like you to try to decide carefully about your answers, to fully consider each of your responses, and to focus on specific reasons why or like or dislike the following objects.]**

Participants then completed a filler task designed to allow for repeated practice at trusting or distrusting their intuitive reactions. Specifically, in a task adapted from Mallett, Wilson, and Gilbert (2008), participants reported which of two presented attitude objects they liked best (e.g., tennis vs. soccer, hardwood floors vs. carpet, etc.). This task consisted of 22 pairs of rather mundane attitude objects.

To reiterate, as with other procedural priming manipulations, a cognitive style activated while performing an initial task (i.e., trusting or distrusting intuition during the like-dislike

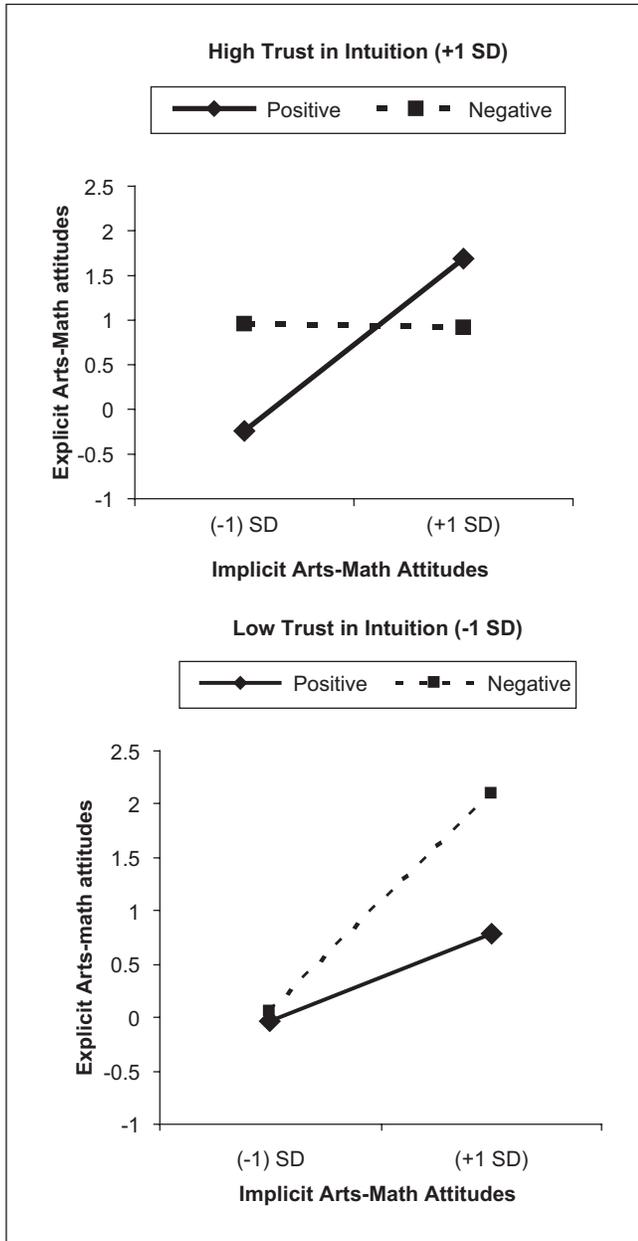


Figure 1. Experiment 1: Correspondence between implicit and explicit academic attitudes as a consequence of positive and negative mood when trust in intuition is high (top panel) and trust in intuition is low (bottom panel)

task) was assumed to carry over, without participants' awareness, to the following task (i.e., participants' production of their explicit attitude reports). The order of the attitude object pairs was randomized across participants, and participants' choice of one or the other attitude objects was unaffected by the intuition manipulation.

Mood manipulation. This manipulation was identical to that used in Experiment 1.

Explicit academic attitudes. This measure was identical to that used in Experiment 1. The composite measures of math ($\alpha = .76$) and arts ($\alpha = .69$) attitudes showed acceptable

reliability, and a composite measure of academic attitudes was created in the same way as in Experiment 1.

Manipulation checks. The mood manipulation check was identical to that used in Experiment 1. These two questions were correlated, $r(174) = -.60$, $p < .0005$; therefore, they were averaged to create a single index of positive mood, with higher values indicating more positive feelings while listening to the musical selections. To test the efficacy of the intuition manipulation, participants were asked five questions. These included, for example, "How much did you rely on your intuition when you determined whether you liked or disliked the attitude objects?" and "How much did you think about the attitude objects before deciding which one you liked best?" (reversed). All responses were recorded on a 7-point scale (1 = *not at all*, 7 = *very much*). After appropriate rescaling, a composite measure of how much participants reported relying on their intuitions during the attitude object task was computed ($\alpha = .75$).

Results

Manipulation checks. Submitting the manipulation checks to a 2 (mood: positive, negative) \times 2 (intuition condition: trust, distrust) analysis of variance (ANOVA) revealed that both the mood and intuition manipulations were successful, $F(1, 170) = 29.53$, $p < .005$, and $F(1, 170) = 5.07$, $p < .05$, respectively. Participants reported experiencing a more positive mood while listening to the happy musical selection ($M = 5.53$, $SD = 1.13$) than the sad musical selection ($M = 4.41$, $SD = 1.52$). Participants primed to trust their intuition reported basing their judgments during the like versus dislike task more on their gut feelings ($M = 5.07$, $SD = 1.03$) than those primed to distrust their intuition ($M = 4.70$, $SD = 1.07$).

Implicit and explicit academic attitudes. Overall, participants reported implicit academic attitudes ($M = 0.30$, $SD = 0.40$) and explicit academic attitudes ($M = 1.15$, $SD = 1.78$) reflecting more positive attitudes toward arts as compared to math. As in Experiment 1, the two types of attitudes were significantly correlated, $r(174) = .20$, $p < .05$.

Predictions were evaluated via regression analysis. In the model, explicit academic attitudes were regressed on implicit academic attitudes (centered), mood condition (*positive* = 1, *negative* = -1), intuition condition (*trust* = 1, *distrust* = -1), and all two-way and three-way interactions. This analysis revealed a significant main effect of implicit academic attitudes and a marginal mood \times intuition condition interaction. These effects were qualified by a significant three-way interaction (see Table 1). To fully understand the pattern of this three-way interaction, simple slopes were computed (Aiken & West, 1991).

As can be seen in Figure 2, and as predicted, when primed with trust in intuition, participants in positive moods exhibited greater correspondence between their implicit and explicit academic attitudes, $b = .93$ (.25), $t(166) = 3.72$, $p < .0005$, than those in negative moods, $b = -.37$ (.24), $t(166) = 1.54$, $p = .125$. By contrast, when primed with distrust in intuition,

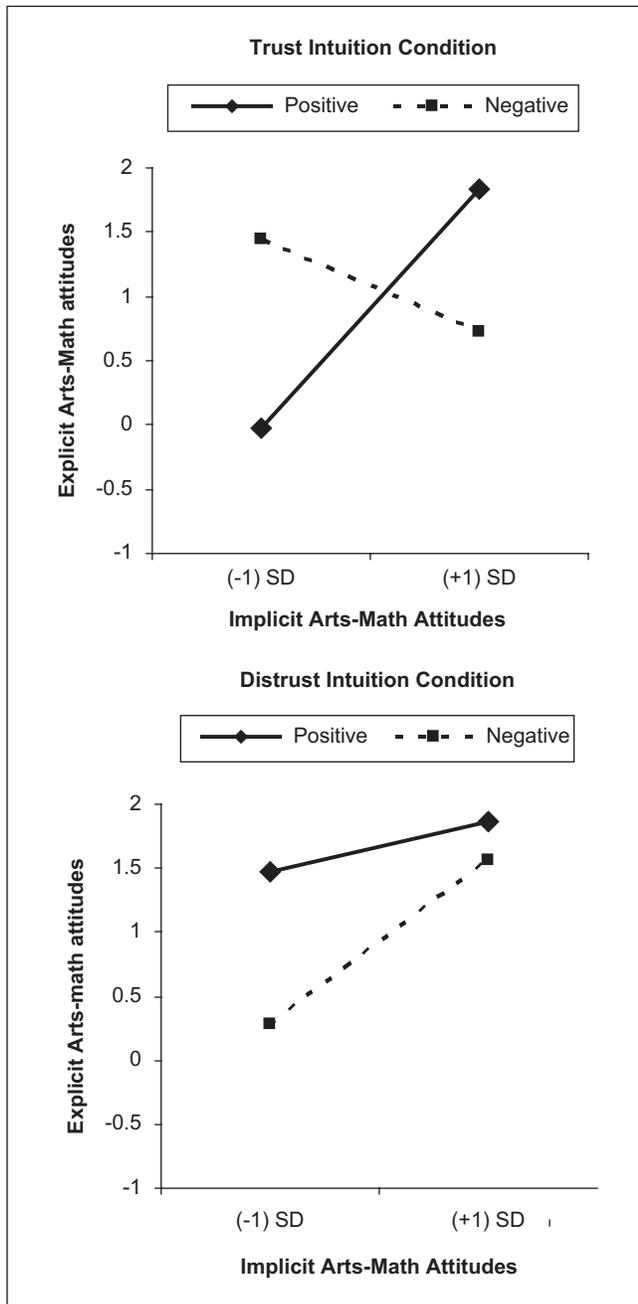


Figure 2. Experiment 2: Correspondence between implicit and explicit academic attitudes as a consequence of positive and negative mood when trust in intuition is primed (top panel) and distrust in intuition is primed (bottom panel)

participants in positive moods now displayed lesser correspondence between their implicit and explicit academic attitudes, $b = .19$ (.28), $t(166) = 0.70$, $p = .48$, than those in negative moods, $b = .64$ (.28), $t(166) = 2.32$, $p = .022$.

Experiment 3

The results of Experiments 1 and 2 demonstrated that mood and trust (vs. distrust) in intuition interactively shaped

correspondence between implicit and explicit academic attitudes. The purpose of Experiment 3 was to determine if these findings would generalize to a different attitude object, in this case the self. Participants in this experiment first completed the measure of implicit self-esteem, then completed the trust versus distrust in intuition priming task, experienced the happy and sad mood manipulation, and then completed the measure of explicit self-esteem. Predictions were identical to those in the previous two experiments.

Method

Participants. For partial fulfillment of a course requirement, 113 participants (79 women) took part in this experiment.

Materials and procedure. One to six participants took part in any given experimental session but did not interact at all during the experiment as they were run in individual cubicles. As in Experiments 1 and 2, after signing consent forms, participants were told that the experiment examined how people perceive their social worlds and that they would complete a series of computer-based measures, listen to some musical selections for the purpose of pretesting them for another experiment, and then complete a brief questionnaire also on the computer.

Participants first completed the measure of implicit self-esteem. After completing this measure, participants were randomly assigned to the faith in intuition or distrust in intuition priming condition described below. Participants then experienced the mood manipulation in which they spent 10 minutes listening to either happy or sad music via headphones. After the mood manipulation, participants completed the measure of explicit self-esteem and answered a series of manipulation checks and demographic items. Finally, a funneled debriefing revealed that no participants expressed awareness of the true purpose of the experiment or the mood induction.

Implicit self-esteem. The Implicit Association Test (IAT) was used to measure implicit self-esteem (Greenwald & Farnham, 2000; Greenwald, McGhee, & Schwartz, 1998). The IAT assesses associations between attitude objects (e.g., self and object) and evaluative attributes (e.g., pleasant and unpleasant). The task, including all stimuli used to represent the four categories, was identical to that used by Jordan et al. (2007, Experiment 1). Participants completed the task in seven blocks following the recommendations of Nosek et al. (2005). The order of the congruent (practice + test; 40 trials each) and incongruent (practice + test; 40 trials each) blocks was counterbalanced across participants (Blocks 3–4 and 6–7). Response latencies were dealt with following the recommendations of Greenwald et al. (2003), and all reported analyses used the D measure as the measure of implicit self-esteem, with higher values indicating more positive implicit self-esteem. The internal consistency of this measure was rather low (Spearman–Brown coefficient = .45).

Trust–distrust intuition manipulation. This manipulation was identical to that used in Experiment 2.

Mood manipulation. This manipulation was identical to that used in Experiment 2.

Explicit self-esteem. The 10-item Rosenberg Self-Esteem Scale served as the measure of explicit self-esteem ($\alpha = .89$). Items on this scale include “I feel that I am a person of worth, at least on an equal basis with other people” and “I wish I could have more respect for myself” (reverse scored). Responses were made on a 7-point scale (1 = *very strongly disagree*, 7 = *very strongly agree*). After appropriate rescaling, a composite measure of explicit self-esteem was created. Higher values indicated more positive explicit self-esteem.

Manipulation checks. Participants were asked the same two items to assess the success of the mood manipulation. These two items were correlated ($r = -.76$); therefore, a composite measure of positive mood was created. The efficacy of the trust–distrust intuition manipulation was assessed by asking participants, “How much did you base your judgments on your gut feelings toward the attitude objects?” (1 = *not at all*, 7 = *very much*).

Results

Manipulation checks. Submitting the appropriate manipulation checks to a 2 (mood: positive, negative) \times 2 (intuition condition: trust, distrust) ANOVA revealed that both the mood and intuition manipulations were successful, $F(1, 109) = 11.04, p < .005$, and $F(1, 109) = 4.36, p < .05$, respectively. Participants reported experiencing a more positive mood while listening to the happy musical selection ($M = 5.46, SD = 1.25$) than the sad musical selection ($M = 4.57, SD = 1.57$). Participants primed to trust intuition reported basing their judgments during the like versus dislike task more on their gut feelings ($M = 5.22, SD = 1.33$) than those primed to distrust intuition ($M = 4.64, SD = 1.62$).

Implicit and explicit self-esteem. Participants displayed positive attitudes toward the self on both the measure of implicit self-esteem ($M = 0.39, SD = 0.26$) and the measure of explicit self-esteem ($M = 5.34, SD = 1.03$). Consistent with past research (Greenwald & Farnham, 2000; Jordan et al., 2007), implicit and explicit self-esteem were uncorrelated, $r(113) = .03, p = .74$.

Predictions were evaluated via regression analysis. In the model, explicit self-esteem was regressed on implicit self-esteem (centered), mood condition (*positive* = 1, *negative* = -1), intuition condition (*trust* = 1, *distrust* = -1), all two-way interactions, and the three-way interaction. As seen in Table 1, the predicted three-way interaction was significant. No other main or interactive effects reached conventional levels of significance. To fully understand the pattern of this interaction, simple slopes were computed (Aiken & West, 1991).

As can be seen in Figure 3, and as predicted, when primed with trust in intuition, participants in positive moods exhibited greater correspondence between their implicit and explicit self-esteem, $b = .41 (.21), t(105) = 1.91, p = .06$, than those in negative moods, $b = -.25 (.18), t(105) = 1.38, p = .17$.

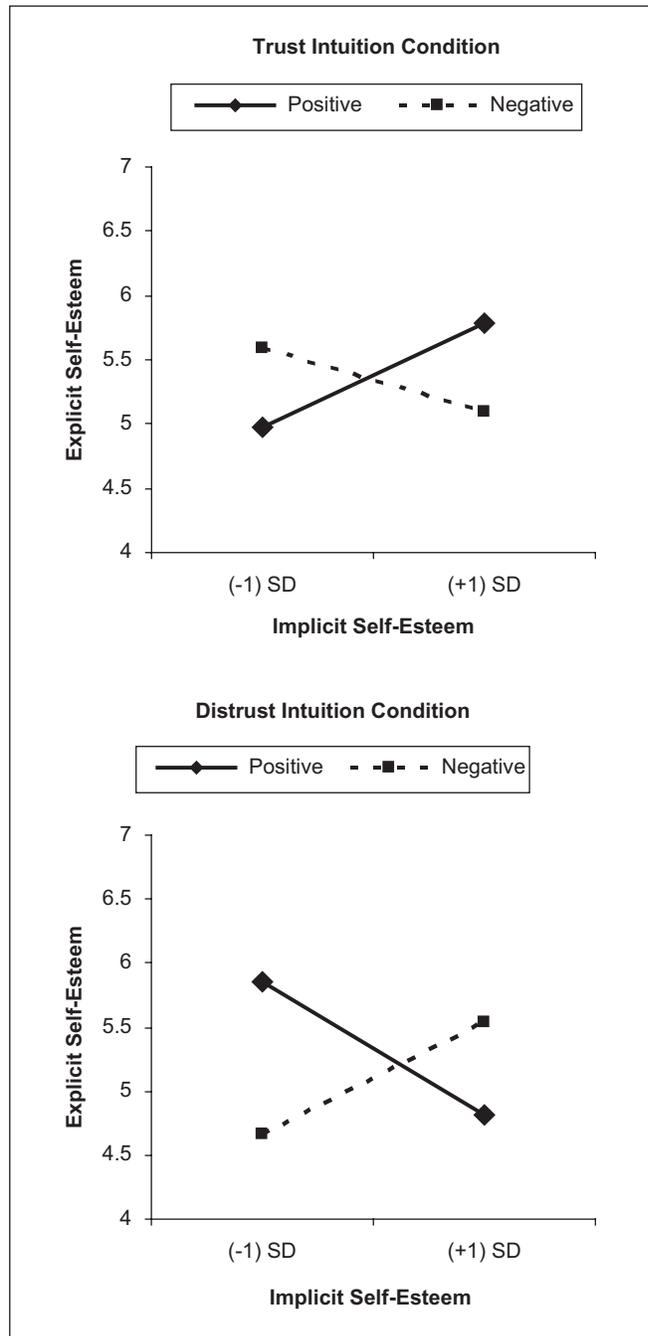


Figure 3. Experiment 3: Correspondence between implicit and explicit self-esteem as a consequence of positive and negative mood when trust in intuition is primed (top panel) and distrust in intuition is primed (bottom panel)

By contrast, when primed with distrust in intuition, participants in positive moods now displayed lesser correspondence between their implicit and explicit self-esteem, $b = -.52 (.19), t(105) = 2.68, p = .008$, than those in negative moods, $b = .43 (.16), t(105) = 2.69, p = .008$.

Using a different attitude object, in this case the self, these results conceptually replicate those of Experiments 1 and 2, the one slight difference from the results of these experiments

being that, in the distrust intuition condition, a full cross-over pattern was observed. This minor divergence in results is likely attributable to the fact that, unlike in Experiments 1 and 2 in which implicit and explicit academic attitudes were modestly correlated, in Experiment 3 implicit and explicit self attitudes were uncorrelated.

Experiment 4

Although the results of the first three experiments clearly supported predictions, a fourth experiment was conducted for several reasons. The first was to address the possibility that, simply by their measurement, implicit attitudes may have been brought into consciousness, which facilitated the implicit attitude validation processes observed in these studies. In other words, the experimental procedures created conditions that would otherwise not occur if implicit attitudes were not measured in such close temporal proximity to the manipulations and measures in these experiments.

Consistent with this possibility, past research does show that participants who take the IAT have some general idea of what their responses are indicating even though they are unable to articulate exactly how the IAT works (Monteith, Voils, & Ashburn-Nardo, 2001). Arguing against this possibility, past research fails to show that the order in which implicit and explicit attitudes are measured affects their correspondence (Hofmann, Gawronski, et al., 2005; Nosek, 2005; Nosek et al., 2005). Even so, to address this artifactual explanation, in Experiment 4 the measurement of implicit attitudes occurred 7 to 14 days prior to the main experimental session.

Experiment 4 also addressed another possible explanation of the present results: Rather than affect acting on participants' tendency to trust or distrust their intuitions, the trust versus distrust intuition manipulation may have acted on participants' tendency to draw on their current affective feelings during the experiment. Superficially similar manipulations have been used in past research to encourage or discourage participants' reliance on their current affective feelings (e.g., Gasper & Clore, 2000; Pham, 1998). These manipulations, however, differ in important ways from that used in Experiments 2 and 3. In past research (e.g., Gasper & Clore, 2000); for example, the manipulation of trust in feelings clearly mentioned participants should rely on emotions (e.g., "Try to use your EMOTIONS"). The manipulation used in Experiments 2 and 3 did not explicitly mention emotions or feelings; rather, participants were asked to adopt an intuitive style of thinking and to rely on their gut reactions (or the just the opposite in the distrust intuition condition). Also, a close examination of the results of this research (Gasper & Clore, 2000) reveals that the manipulation of reliance on feelings had effects opposite to those intended—the anxiety induction had less of an effect on participants' risk judgments among those induced to rely on feelings than those not induced to do so. In other similar

research (e.g., Pham, 1998) a reliance on feelings was induced by asking participants to picture themselves at a movie, to imagine vividly what it would be like, and to focus on their feelings while there (i.e., how good or bad and pleasant or unpleasant the experience would be). This manipulation, plainly, is quite different from those used in the present research.

Setting aside the important differences in instructions just discussed, there is also a critical procedural variation between the present and past research that makes this alternative explanation problematic. In past research (e.g., Gasper & Clore, 2000; Pham, 1998), the trust manipulation occurred after the mood induction. With this order of manipulations, the trust manipulation was likely experienced as "about" whether one should trust or mistrust the affective feelings evoked moments ago. In this case, then, one could say cognition regulates affect. In the present research, by contrast, the trust manipulation occurred prior to the mood induction. With this order of manipulations, participants' current feelings were experienced as "about" whether one should rely on or avoid the cognitive tendency evoked moments ago. In this case, then, affect regulates cognition. Put another way, whichever manipulation comes first becomes the object of the second manipulation. This reasoning, though speculative, is consistent with the basic logic of the self-validation hypothesis (e.g., Briñol et al., 2007).

Nevertheless, to address this possibility a new manipulation of trust versus distrust intuition was introduced in Experiment 4. In a task adapted from past research (White, 2005), and described below, participants were subtly primed via a word completion task with concepts related to intuitive or analytic thinking styles, but critically *no* concepts related to emotions or feelings. As such, this manipulation bears little likeness, superficial or otherwise, to those employed in past research to promote trust or distrust in affective feelings, such as moods and emotions (e.g., Gasper & Clore, 2000; Pham, 1998).

Last of all, a different manipulation of mood and a different measure of implicit self-esteem were included in this experiment. To manipulate mood, participants were asked to read happy or sad stories shown in past research to induce strong happy and sad moods (e.g., Avramova & Stapel, 2008). The name-letter task (Nuttin, 1985) was used to measure implicit self-esteem. Predictions for this experiment were identical to those of the previous three experiments.

Method

Participants. For partial fulfillment of a course requirement, 140 participants (111 women) took part in this experiment.

Materials and procedure. This experiment consisted of two experimental sessions. In the first session, after signing consent forms, participants, in groups of 15 to 50, completed the measure of implicit self-esteem described below. Approximately 7 to 14 days after completing this initial session,

participants, also in groups of 15 to 50, completed the second session in which they first were randomly assigned to experience the faith in intuition or distrust in intuition priming manipulation described below. Participants then experienced the mood manipulation in which they read either a happy or a sad story. After the mood manipulation, participants completed the measure of explicit self-esteem and answered a series of manipulation checks and demographic items. Finally, a series of questions mimicking the funneled debriefing (Dulany, 1962) performed in Experiments 1–3 revealed that no participants expressed awareness of the true purpose of the experiment or any of the manipulations.

Implicit self-esteem. The name-letter task was used to measure implicit self-esteem (Nuttin, 1985). In this task, participants were asked to indicate how much they liked or disliked the letters of the alphabet. Below these instructions the letters of the alphabet were arranged in one of four random orders. Participants' ratings were made on a 7-point scale with the following endpoints: 1 = *I dislike this letter very much* to 7 = *I like this letter very much*. The name-letter task was scored via the ipsatized double-correction algorithm, as recent research shows that this scoring algorithm exhibits the most optimal psychometric properties (for a review, see LeBel & Gawronski, 2009). The internal consistency of this measure was acceptable (Spearman–Brown coefficient = .61, $r = .44$). Higher values on this measure indicated more positive implicit self-esteem.

Trust–distrust intuition manipulation. In this task adapted from past research (White, 2005), participants were asked to solve a series of word problems in which they were presented with a word with a letter missing, and it was their job to fill in the missing letter. Participants were told that the number of missing letters varied, but they had been assigned to the condition in which only a single letter was missing (e.g., m_ssing). Participants were asked to write out the complete word underneath each of 15 target words. The following 10 words served as the intuition primes: intuitive, spontaneous, impulsive, instinctive, quick, reactive, natural, effortless, sensing, unstructured; the following 10 words served as the analytic primes: analytical, investigative, reasoned, logical, rational, methodical, critical, systematic, careful, prepared. To mask the true purpose of the priming task, 5 neutral words (colossal, steep, round, small, straight) were included in both conditions.

Mood manipulation. This manipulation was identical to that used in past research to induce strong happy and sad moods (Avramova & Stapel, 2008). Ostensibly as part of a “media-classification task,” participants were asked to read one of two stories describing events that happened to a young female artist. The story used to produce a positive mood described a number of favorable events culminating in her receiving a scholarship to study art. The story used to produce a negative mood described how the same person was overcome by a rare, disabling illness (rheumatoid arthritis) at the end of her freshman year in college.

Explicit self-esteem. The 10-item Rosenberg Self-Esteem Scale served as the measure of explicit self-esteem ($\alpha = .91$). After appropriate rescaling, a composite measure of explicit self-esteem was created. Higher values indicated more positive explicit self-esteem.

Manipulation checks. Participants were asked how positive or negative (happy or sad) they felt while reading the newspaper stories to assess the efficacy of the mood manipulation (1 = *negative [sad]*, 7 = *positive [happy]*). Because these two items were correlated ($r = .74$, $p < .0005$), a composite measure of participants' feelings while reading the story was created such that higher values indicated more positive feelings.

Results

Manipulation checks. Submitting the mood manipulation check to a 2 (mood: positive, negative) \times 2 (intuition condition: trust, distrust) ANOVA revealed that the mood manipulation was successful, $F(1, 136) = 63.31$, $p < .0005$. Participants reported experiencing more positive feelings while reading the happy story ($M = 5.26$, $SD = 1.18$) than the sad story ($M = 3.78$, $SD = 0.99$).

Implicit and explicit self-esteem. Participants displayed positive attitudes toward the self on both the measure of implicit self-esteem ($M = 1.77$, $SD = 1.15$) and the measure of explicit self-esteem ($M = 5.31$, $SD = 1.09$). Implicit and explicit self-esteem were uncorrelated, $r(140) = .06$, $p = .47$.

Predictions were evaluated via regression analysis. In the model, explicit self-esteem was regressed on implicit self-esteem (centered), mood condition (*positive* = 1, *negative* = -1), intuition condition (*trust* = 1, *distrust* = -1), all two-way interactions, and the three-way interaction. As seen in Table 1, the predicted three-way interaction was significant. No other main or interactive effects reached conventional levels of significance. To fully understand the pattern of this interaction, simple slopes were computed (Aiken & West, 1991).

As can be seen in Figure 4, and as predicted, when primed with trust in intuition, participants in positive moods exhibited greater correspondence between their implicit and explicit self-esteem, $b = .48$ (.17), $t(133) = 2.85$, $p = .005$, than those in negative moods, $b = -.27$ (.17), $t(133) = 1.63$, $p = .11$. By contrast, when primed with distrust in intuition, participants in positive moods now displayed lesser correspondence between their implicit and explicit self-esteem, $b = -.46$ (.20), $t(133) = 2.29$, $p = .024$, than those in negative moods, $b = .35$ (.16), $t(133) = 2.15$, $p = .033$.

General Discussion

Across four studies employing two attitude objects, three measures or manipulations of trust versus distrust in intuition, and two mood inductions, the present research discovered that, rather than combining in an additive fashion, mood and trust in intuition interactively combined to shape

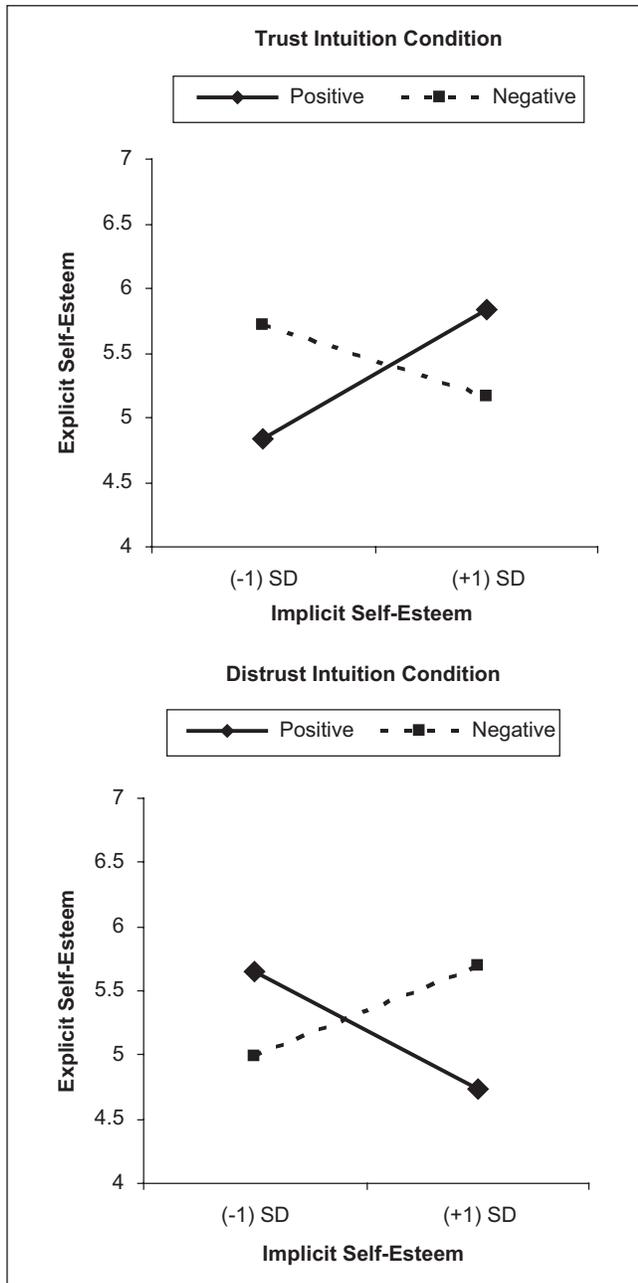


Figure 4. Experiment 4: Correspondence between implicit and explicit self-esteem as a consequence of positive and negative mood when trust in intuition is primed (top panel) and distrust in intuition is primed (bottom panel)

the extent to which explicit attitudes faithfully reflected implicit attitudes. Among participants who customarily trusted their intuitions or when such trust was induced, positive mood validated and negative mood invalidated the tendency to incorporate implicit attitudes into explicit attitude reports, leading people in positive moods to display greater correspondence than those in negative moods. By contrast, among participants who customarily distrusted their intuitions or when such distrust was induced, the opposite

effect of mood on the correspondence between implicit and explicit attitudes was found. In this case, the explicit attitude reports of people in positive moods were less likely to faithfully reflect their implicit attitudes than those of people in negative moods.

To my knowledge these are the first studies to simultaneously examine within the same experimental context the influence of two moderators of the correspondence between implicit and explicit attitudes. As more than a dozen factors have been shown to shape such correspondence (Hofmann, Gschwendner, et al., 2005; Nosek, 2007), the present research points to various interesting avenues of future research as any two of these moderators, for example mood and interpersonal factors such as self-presentation (Nosek, 2005) or mood and intrapersonal factors such as need for cognition (Florack, Scarabis, & Bless, 2001), could be examined to see if they additively or interactively combine to influence implicit–explicit attitude relations. As the present research reveals, to understand the issue of when (and why) implicit attitudes will be faithfully incorporated into explicit attitude reports, one must consider not only the many factors known to affect this process in isolation but also how these factors work in tandem with one another to structure implicit–explicit attitude correspondence.

This research also joins with past research in showing that people may experience their implicit attitudes as intuitions or gut feelings (e.g., Jordan et al., 2007; Ratliff et al., 2008) and further suggests that the direction of influence between implicit attitude and explicit attitudes may flow primarily from the former to the latter rather than the reverse. This is not meant to imply that explicit attitudes exert no influence on implicit attitudes, as of course this happens (e.g., Gawronski & Bodenhausen, 2006), but rather to suggest that, from one evaluative moment to the next, people's immediate affective reactions may more often than not form the starting point from which more considered evaluative judgments emerge.

These results concern the interactive impact of affect and trusting (or distrusting) intuition on implicit–explicit attitude correspondence; however, they also reflect what is believed to be a more general way by which affect influences cognition—namely, that affect regulates cognition by conferring positive or negative value on accessible thoughts and responses, which then regulates whether such thoughts and responses are used or avoided (Clore et al., 2001). According to this view, affective reactions are akin to reward in that their effects on cognition are not dedicated to promoting any one outcome; rather, they act on whatever thoughts and responses happen to be in mind at the moment. Such flexibility in the impact of affect is seen in research discussed above that examined affective influences on self-validation process in persuasion (e.g., Briñol et al., 2007) and on adoption of a global versus local perceptual focus (e.g., Huntsinger, Clore, & Bar-Anan, 2010) and also in research showing that the connection between positive and negative affect and activation of stereotypes

found in past research (Huntsinger, Sinclair, & Clore, 2009) depends on whether thoughts and responses that undermine or promote activation of stereotypes are most in mind during any given cognitive moment (Huntsinger, Sinclair, Dunn, & Clore, 2010).

Although the primary focus of the current research was to illuminate those conditions under which explicit attitudes will come to faithfully resemble implicit attitudes, this research also provides a particularly strong test of the hypothesis that the cognitive consequences of affect depend on the information it conveys about the value of objects, including the value of chronically and momentarily salient thoughts and beliefs. Specifically, this research demonstrates that positive moods do not invariably enhance, and negative moods undermine, the use of momentarily accessible thoughts, such as implicit attitudes. People in positive moods will reject such thoughts if the tendency to distrust intuition is chronically or temporarily accessible, and people in negative moods will embrace such thoughts if the tendency to distrust intuition is accessible.

The finding that the double negative of devaluing one's distrust in intuition yielded implicit and explicit attitude coherence, rather than greater incoherence, also nicely complements recent research by Wichman et al. (2010), in which two sources of doubt were found to increase, rather than additively combine to further undermine, perceptions of certainty. In one experiment, for example, participants were first primed with thoughts related to certainty or uncertainty, and then, as part of a task designed to measure motor–eye coordination, they engaged in head movements that activated either certainty (i.e., nodding) or uncertainty (i.e., shaking). After the two sources of certainty or uncertainty were activated, participants read a brief paragraph about a fictitious person, Donald, and then answered questions about how certain (or uncertain) they thought this person was. As in the present research, the two sources of certainty versus uncertainty interactively combined to shape judgments about Donald. When primed with uncertain thoughts, participants judged Donald as more uncertain when such thoughts were validated by head nodding than head shaking. By contrast, when primed with certain thoughts, this pattern was reversed—now Donald was judged as more certain in the head nodding than head shaking condition. The present research extends this past research by moving beyond the domain of judgment and by showing that this effect is not limited to feelings of doubt but also positive and negative affective states such as moods.

Limitations

The present research did not include a condition in which a neutral mood or no mood was induced. Without such a condition it is unclear if positive mood, negative mood, or both drove these results. Inclusion of such a condition in future research would certainly be interesting. In all likelihood,

however, because most people experience positive moods most of the time (Diener & Diener, 1996), responses of people in the neutral-mood condition would closely parallel those of people in the positive-mood condition in the present research. Indeed, research that incorporates a neutral-mood condition typically finds just such a pattern (Huntsinger, Sinclair, et al., 2010; Huntsinger & Smith, 2009; Ruder & Bless, 2003; Storbeck & Clore, 2005, 2008). Moreover, we know from past research (e.g., Jordan et al., 2007), in which no mood was induced, that the intuition priming manipulation produces responses similar to those displayed in the present research by participants in positive moods. In any event, future research that includes a neutral mood condition is needed to disambiguate whether positive mood, negative mood, or both drive these effects.

Future Research Directions

It would be interesting in future research to examine the influence of specific emotions, rather than diffuse positive and negative moods, on the correspondence between implicit and explicit attitudes. The influence of specific emotions on cognitive processing appears to depend on the pattern of appraisal associated with the emotion rather than its valence in isolation (for a review, see Clore & Huntsinger, 2009). For example, although anger is a negative emotion its influence on cognition resembles that of positive mood. This is thought to occur because the experience of anger is accompanied by feelings of confidence in one's point of view (Clore et al., 2001; Ortony, Clore, & Collins, 1988), which encourages use of accessible thoughts and response tendencies. This influence is illustrated in studies of stereotyping and persuasion in which anger has been shown to increase the use of accessible stereotypes in judgments (Bodenhausen, Sheppard, & Kramer, 1994; Tiedens & Linton, 2001) and of heuristic cues in processing of persuasive messages (Moons & Mackie, 2007; Tiedens & Linton, 2001). Thus, it seems reasonable to expect that anger would have an influence similar that of positive mood in the present research. Fear and anxiety, on the other hand, are accompanied by feelings of risk and uncertainty (Ortony et al., 1988; Tiedens & Linton, 2001). This then encourages people to avoid relying on accessible thoughts and response tendencies. Past research shows, for example, that fearful people avoid using accessible stereotypes when making judgments and that, when processing persuasive messages, they also avoid relying on heuristic cues (Tiedens & Linton, 2001). These findings suggest that fear (or anxiety) would have an influence similar to that of negative mood in the present research.

Coda

The goal of the current research was to subject the improbable-seeming prediction that affect and trust in intuition would interactively shape implicit and explicit attitude correspondence to

empirical assessment. Four studies confirmed this prediction by showing that whether positive or negative mood enhanced or degraded implicit and explicit attitude correspondence depended on participants' chronic or momentary tendency to trust or distrust intuition. By drawing together these two seemingly unrelated lines of research, these experiments provide important insights into the sometimes mysterious circumstances in which implicit attitudes are translated into explicit attitude reports.

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