

Embodied Attitude Change: A Self-Validation Perspective

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Abstract

Our behavior can change what we like and dislike. Although it seems clear that we might like something more when we smile (versus frown), or when we nod our heads (versus shake), it is important to understand the processes responsible for these changes in evaluation. It might be that agreement behaviors such as smiling and nodding work as cue, make us think about everything in a positive light, or it might be that they encourage us not to think much about the information we receive. This review describes the basic processes underlying embodied change, highlighting the role of a recently discovered meta-cognitive process (called *self-validation*) by which bodily responses can validate or invalidate (instead of changing) our thoughts. This new mechanism can account for some already established outcomes in embodied persuasion (e.g., more persuasion with smiling than frowning), but by a different process than postulated previously (smiling increases confidence in thoughts), as well as for some new findings (e.g., more persuasion for low than high powerful postures; more self-confidence when performing doubtful postures).

There are many ways in which bodily factors have been related to people's attitudes. First, extensive research in social psychology has examined how the behavior of another person can affect an individual's attitudes. For example, McGinley, LeFevre, and McGinley (1975) found that people shifted their opinions more to agree with a communicator who displayed an open body posture (e.g., elbows away from the body, legs stretched out) than a closed one (elbows close to the body, knees pressed together). Other behaviors regarding the source of a message, such as eye contact, degree of arm relaxation, body orientation, postural shifting, gesticulation, and arm and leg openness have also been related to attitude change by affecting perceptions of source credibility, attractiveness, and power (e.g., Edinger & Patterson, 1983; Mehrabian, 1972).

Second, much research has examined how one's attitudes can be reflected in one's own behaviors. Indeed, the study of attitude-behavior consistency is one of the most active areas of inquiry in psychology (e.g., Ajzen & Fishbein, 2005). People's attitudes, at least when they are accessible and held confidently (see Petty & Krosnick, 1995) have been shown to predict relatively automatic behaviors such as seating distance (e.g., Byrne, 1971) as well as more deliberative measures such as voting in presidential elections (e.g., Bizer et al., 2004). One's attitudes are also reflected in one's internal bodily responses. For example, early research examined how skin conductance (e.g., Rankin & Campbell, 1955) and pupillary responses (e.g., Hess & Polt, 1960) related to the presence of value-laden stimuli (e.g., emotional words or pictures; see Petty & Cacioppo, 1983). More contemporary studies have examined how people's facial expressions and blood flow in various regions of the brain relate to the presence of attitude objects (see Cacioppo, Petty, Losch, & Crites, 1994; Cunningham, Packer, Kesek, & Van Bavel, 2009, for reviews).

Instead of examining how the behaviors of others affect people's attitudes or how people's attitudes are reflected in their behaviors and bodily responses, in this review we describe research focused on the impact of a person's own body (its position and movements) on his or her attitudes. For example, in one early study, individuals who were induced to nod their heads (i.e., agreement behavior) while listening to a persuasive message were more favorable to the proposal than people who were induced to shake their heads (disagreement behavior) to the same message (Wells & Petty, 1980). Other research has found that information presented while performing an approach behavior (e.g., using one's hands to pull up from underneath a table) is evaluated more positively than information presented during an avoidance behavior (e.g., pushing down on a table top surface; Cacioppo, Priester, & Berntson, 1993). As we describe in this review, similar findings have been found for a large number of behaviors, postures, and body movements (for additional reviews on embodied persuasion, see Briñol & Petty, 2008). We use the term *embodiment* to refer to the idea that the body contributes to the acquisition, change, and use of attitudes.

Although the ability of bodily movements to influence attitudes seems to be a well-established phenomenon, most research on this topic has not focused on the psychological mechanisms by which the body affects attitudes. Understanding these processes is essential in order to predict *whether*, *when*, and *how* attitudes change, as well as to predict whether, when, and how attitudes will be consequential (e.g., affecting subsequent behavior). Consistent with the Elaboration Likelihood Model (ELM) of persuasion (Petty & Cacioppo, 1986), we argue that the psychological processes relevant to attitude change can be organized into a finite set. The ELM specifies several discrete mechanisms of attitude change and holds that these processes operate at different points along an elaboration continuum ranging from little or no thought about the attitude object to careful and extensive thought about the attitude object.

A person's bodily movements or responses, like other variables in persuasion settings, can influence attitudes by affecting one or more of these underlying processes: (a) affecting the amount of issue-relevant thinking that occurs, (b) producing a bias to the thoughts that come to mind, (c) affecting meta-cognitive properties of the thoughts such as thought confidence, (d) serving as persuasive evidence (i.e., arguments), and (e) serving as simple peripheral cues to change.¹ At the low end of the elaboration continuum (i.e., when motivation and ability to think are low), variables are most likely to serve as simple cues affecting attitudes in the same direction as their valence. At the high end of the elaboration continuum, variables are examined as evidence, and can bias the direction of one's thoughts and affect thought confidence. When thinking is not constrained to be high or low, variables can affect the extent of thinking. Understanding these processes is informative about the immediate and long-term consequences of persuasion (Petty, Haugtvedt, & Smith, 1995). Next, we review each of the mechanisms by which bodily responses can affect attitudes according to the ELM.

Embodiment and Attitude Change under Low Thinking Conditions

Much prior research has shown that under low thinking conditions, attitudes are influenced by a variety of low effort processes such as mere association (Cacioppo, Marshall-Goodell, Tassinary, & Petty, 1992) or reliance on simple heuristics (Chaiken, 1987). Research suggests that people can make simple inferences from their bodies such as reasoning that 'if my heart is beating fast, I must like it' (Valins, 1966). Bodily movements have also been linked to simple association processes. For example, Cacioppo et al.

(1993) observed that neutral Chinese ideographs presented during arm flexion were subsequently evaluated more favorably than ideographs presented during arm extension. Because arm flexion is usually more closely coupled, temporally, with the consumption of desired goods, the authors argued that movements toward the body (such as arm flexion) can be interpreted as approach behavior, whereas movement of the hand away from the body (such as arm extension) can be interpreted as avoidance behavior.

Consistent with the idea that arm movements affected attitudes through a relatively low-effort association process, Priester, Cacioppo, and Petty (1996) found that isometric flexion versus extension of upper arm muscles during evaluative processing influenced preferences for neutral nonwords (which were not associated with any preexisting meaning or knowledge) more than for neutral, previously known words. Conceptually similar results have been found for head nodding (Tom, Pettersen, Lau, Burton, & Cook, 1991), smiling (Strack, Martin, & Stepper, 1988) and facial expressions of emotion (e.g., Zajonc, Murphy, & Inglehart, 1989; for a review on empirical evidence in the domain of emotions, see Laird & Bresler, 1992; Neumann, Förster, & Strack, 2003). As noted earlier, people are more likely to rely on simple processes such as inferring an attitude directly from a behavior or bodily response when the extent of thinking is low (e.g., Chaiken & Baldwin, 1981; Taylor, 1975; Valins, 1966; Wood, 1982).

Just as simple bodily responses can influence attitudes when thinking is low, so too can more complex behaviors. For example, when people act as if they like another person by gazing into the other's eyes (Kellerman, Lewis, & Laird, 1989), they then report liking the other person more.

Embodiment and Attitude Change under Unconstrained Thinking Conditions

Bodily postures or movements can also influence attitudes by increasing or decreasing how much people think when they make a social judgment. According to the ELM, this effect is most likely to occur when the likelihood of thinking is not constrained to be high or low by other variables (e.g., neither high nor low amounts of external distraction; Petty, Wells, & Brock, 1976), and therefore is free to vary in any direction. This is important because an attitude formed as a result of effortful information processing will be stronger than an attitude formed through less thoughtful processes (Petty et al., 1995).

In one early demonstration, Petty, Wells, Heesacker, Brock, and Cacioppo (1983) asked participants to listen to a persuasive message composed of either strong or weak arguments while standing up or lying down. Specifically, participants were asked to try a new headphone to rate its qualities and were told that most stereo headphones were designed to be used effectively in only one body position. Some participants were then told to stand while testing the headphone, whereas others were told to lie down. After the participants were in the appropriate body position, the investigators told them that they would hear a segment from a recent broadcast on the campus radio station, which in fact was the persuasive message. This research showed that although reclining participants were differentially persuaded by the strong and weak arguments, standing participants were not (for a replication using a power induction, see Briñol, Petty, Valle, Rucker, & Becerra, 2007; Experiment 4). Similarly, Riskind and Gotay (1982) found that slumped-over, relative to upright, physical posture affected amount of thinking by reducing the amount of time spent in a cognitive task, and undermining the sense of control over the task.

In a more recent illustration, Jostmann, Lakens, and Schubert (2009) found that participants holding a heavy (versus light) clipboard were more persuaded by strong rather than

weak arguments, suggesting that they engaged in more careful processing of the proposal. This finding may suggest that just as weight makes people invest more physical effort in dealing with material objects, it can also make people invest more cognitive effort in dealing with ideas. This work is also in line with a notion called metaphoric transfer, according to which metaphors related to physical objects (including the body) can be informative for cognition (Lakoff & Johnson, 1999). Indeed, evaluation can be linked to dimensions such as distance (e.g., good is close: 'I would like to get closer to or approach what I like') and space (e.g., good is often up: 'I am feeling up today'). In addition to these spatial parameters, other metaphors associated with change, thinking and confidence may be also relevant for embodied persuasion. As noted in this review, we argue that is important for future research using metaphors to be designed in such a way as to allow assessment of the underlying psychological mechanisms by which the new bodily response influences attitudes.

Embodiment and Attitude Change under High Thinking Conditions

Behavior is likely to influence attitudes by biasing the valence of one's thoughts when the likelihood of thinking is relatively high. That is, when people are engaging in careful thought about an object or proposal, that thinking can be biased by their own bodies. For example, in the original research on head movements and persuasion, Wells and Petty (1980) speculated that participants' past experiences had made nodding compatible with 'approval' and favorable thinking, whereas head shaking was more compatible with 'disapproval' and unfavorable thinking. In line with the Wells and Petty proposal about behavior biasing thinking, Neumann and Strack (2000) argued that overt behaviors can directly trigger compatible thoughts that facilitate encoding and processing of evaluatively congruent information.

In one demonstration, Förster and Strack (1996) found that participants who nodded while encoding positive and negative words showed enhanced recognition of the positive words. In contrast, participants who shook their heads while encoding were better at recognizing the negative words (for other examples supporting the idea that certain behaviors can facilitate thoughts and actions that are compatible with the valence of the behaviors, see Förster & Strack, 1996; Neumann & Strack, 2000; Solarz, 1960; Stepper & Strack, 1993). In other research, D'Argembeau, Lepper, and van der Linden (2008) found that participants processed facial expressions of others more easily (and recalled them to a greater extent) when they were making facial expressions of similar valence. Taken together, different lines of research have provided convergent evidence that behavior can influence attitudes by facilitating the processing of evaluatively consistent information or by rendering evaluatively consistent information more accessible.

As a final illustration, consider work on positive and negative social behavior. For example, in a series of studies, Bushman (2002) found that hitting a pillow with a baseball bat increased the number of negative, aggressive thoughts. In contrast, taking the role of an altruistic person (in a video game) reduced aggressive thoughts and increased the likelihood of helping behavior (Gentile et al., 2009).

In closing this section it is important to note that when the amount of thinking is high, people assess the relevance of *all* of the information in the context and that comes to mind in order to determine the merits of the attitude object under consideration. That is, people can examine their own bodily responses as possible arguments or reasons for favoring or disfavoring the attitude object. For example, our bodies can provide us with valuable information about the merits of an object in many cases (e.g., elevated heart rate

and stomach butterflies when encountering a person informs us that we like that person). However, if people believe that their judgments are somehow being biased or influenced by their bodily actions and do not want this to occur, they may adjust their judgments in a direction opposite to the expected bias (*correction processes*; see Wegener & Petty, 1997).

Embodiment and Attitude Change when Thinking about Thinking

So far, we have described evidence revealing that the body can influence attitudes at different points of the elaboration continuum. That is, behaviors can lead to attitude change when thinking is low (i.e., by serving as simple cues), unconstrained (i.e., by affecting the amount of thinking), and high (i.e., by affecting the direction of thinking, or serving as an argument). In addition to thinking about attitude objects, people can also think about their own thoughts. That is, in addition to primary, or first-order, cognition, people can engage in processes that involve secondary or meta-cognition. Primary thoughts are those that occur at a direct level of cognition and involve our initial associations of some object with some attribute. Following a primary thought, people can generate additional thoughts that occur at a second level, and these thoughts can involve reflection upon the first level thoughts. *Meta-cognition* refers to these second-order thoughts, or thoughts about one's own thoughts or thought processes (Petty, Briñol, Tormala, & Wegener, 2007).

Recently, we have proposed that behavior can not only influence what people think about attitude objects, but can also impact the extent to which people trust in the validity of their own thoughts. This idea is referred to as the *self-validation hypothesis* (Petty, Briñol, & Tormala, 2002). The key notion is that generating thoughts is not sufficient for these thoughts to have an impact on judgments. Rather, one must also have confidence in one's thoughts. The main idea behind the concept of *embodied validation* is that people's own behaviors can impact their judgments by affecting thought confidence. In other words, the confidence that emerges from one's body and its position or movements can magnify the effect of anything that is currently available in people's minds, including not only their thoughts about a persuasive message, but also other cognitions, emotions, goals, and so forth. That is, confidence applies to whatever mental contents are salient and available at the time (see Briñol & Petty, 2009, for a review). Next, we describe several examples of research on embodied validation.

First, consider the research on head nodding described earlier, which had assumed that moving one's head in a vertical (versus horizontal) manner produced more positive attitudes either because vertical head nodding biased thinking in a favorable direction or because head nodding served as a relatively simple affective cue (Wells & Petty, 1980). The self-validation hypothesis suggests another possibility. Specifically, this hypothesis suggests that just as vertical head movements from others give us confidence in what we are saying, our own vertical head movements can give us confidence in what we are thinking. In the first series of studies on embodied validation, Briñol and Petty (2003) found that head movements affected the confidence people had in their thoughts and thereby had an impact on attitudes. Thus, when people listened through head phones to strong arguments advocating that students be required to carry personal identification cards on campus, vertical head movements led to more favorable attitudes than horizontal movements. However, when people listened to weak arguments in favor of the identification cards, vertical movements led to less favorable attitudes than horizontal movements. Furthermore, this research revealed that head nodding affected thought-confidence, which in turn mediated the persuasion effects.

Having demonstrated that body movements can determine the extent of persuasion by affecting thought confidence, we have examined whether our bodies can validate other kinds of thoughts. For example, subsequent research on self-validation has revealed that our bodily responses can not only validate thoughts in response to a persuasive proposal, but also can validate self-related thoughts. In one relevant study, Briñol, Petty, and Wagner (2009) asked participants to think about and write down their best or worse qualities while sitting with their backs erect, pushing their chests out (i.e., confident posture) or while sitting slouched forward with their backs curved (i.e., doubtful posture). Then, participants completed a number of measures, including self-esteem. In line with the self-validation hypothesis, it was predicted and found that the thoughts generated about the self only affected self-attitudes in the confident posture. Conceptually similar to the head-nodding study, the effect of the direction of thoughts on self-esteem was greater when participants performed a confident, as opposed to a doubtful, behavior. Additionally, this research demonstrated that relatively static body responses, such as postures, are able to influence individuals' reliance on their own thoughts, whereas previous research had shown that reliance on one's thoughts could be influenced by more dynamic behaviors such as head movements.

Third, given that the meta-cognitive confidence that emerges from bodily responses can be applied to any cognition, an interesting case to examine would be when people have confidence (or doubt) in their own confidence or doubt. Especially interesting would be the case in which people doubt their own doubts. In one study about doubting one's own doubt due to bodily responses (Wichman et al., 2010), participants were first primed with doubt or certainty and then exposed to a head movement manipulation. Supporting the idea that people can either trust or doubt their own doubts, head nodding (versus shaking) accentuated (versus attenuated) the impact of the initial doubt (versus certainty) manipulation. This study demonstrated that a secondary, embodied manipulation of certainty or doubt can interact with an initial induction in the manner specified by the self-validation hypothesis rather than in the additive way that would be expected from prior work on sequential induction of constructs.

In sum, the studies described in this section demonstrate that regardless of whether people were asked to think about persuasive messages or to generate self or confidence-relevant thoughts, bodily responses were able to validate or invalidate these thoughts (for additional examples of embodied validation, see Briñol, Petty, & Wagner, forthcoming). Thus, our research on embodied validation reveals that the meta-cognitive confidence that emerges from our bodies can be applied to whatever the salient or available mental contents are at a given moment.

Thinking versus Thinking about Thinking

The self-validation mechanism described in the section above requires a level of elaboration that is sufficiently high for individuals to both generate thoughts and to care about the validity of those thoughts (Petty et al., 2002). In contrast, in order for the confidence emerging from the body to affect the amount of thought, elaboration must not be constrained to be overly high or low (i.e., if elaboration is already constrained to be very high or low, there is little room for confidence to affect the extent of thinking further). Moreover, embodied manipulations of confidence must precede or coincide with information processing in order for these manipulations to impact extent of information processing; when embodied manipulations follow information processing, they are more likely to validate (or invalidate) the thoughts that people have already generated.

Nonetheless, embodied manipulations of confidence can impact persuasion *via* other processes, as outlined by the ELM.

One example of how different situations can lead the same bodily response to affect attitudes by different mechanisms comes from our research on power. Our studies on power suggest that the exact same body actions can influence persuasion by different mechanisms (e.g., by affecting amount of thinking versus *via* meta-cognition) depending not only on elaboration but also depending on timing. In one study (Briñol et al., 2007; Experiment 5), participants received a strong message in favor of a new cell phone. The message was presented either immediately before or after participants engaged in the power induction role-playing manipulation. Power was manipulated by assigning participants either to a boss role sitting in a tall chair (high power condition), or to an employee role sitting in a shorter chair (low power condition), and were asked to engage in a work meeting role-playing exercise. We expected and found reduced persuasion among high-power participants (versus low-power participants) when the power induction was presented *prior* to the presentation of the message, as high power participants processed the strong arguments less carefully. However, we found that high power enhanced persuasion when induced *after* reading of the proposal because high power individuals were presumably more reliant on their positive thoughts about the strong arguments. As predicted, these findings suggest that the same power-relevant behaviors can have different (and opposite) effects in persuasive settings depending on when the manipulation is introduced.

Summary, Conclusions, and Future Research

A large number of bodily postures and movements, from simple to complex, from static to dynamic, have been examined in embodied attitude change research. These actions have been shown to have an important impact on different aspects (and measures) relevant to attitudes and persuasion. Importantly, the main psychological processes by which the body can influence persuasion have been outlined in detail, as well as the antecedents and consequences associated with those mechanisms. The studies we have reviewed examined a wide variety of bodily responses (e.g., from static poses to vigorous actions such as hitting). Nevertheless, the psychological mechanisms by which these different actions influence attitude change were argued to be similar regardless of the complexity, sophistication, and other properties of the behaviors. Future research might benefit from exploration of new responses other than the ones covered in this review. Importantly, that research should be designed to allow assessment of the underlying psychological mechanisms by which any new bodily responses of interest can influence attitudes.

In closing, it is important to note that after a long tradition of assessing the impact of embodied persuasion treatments on attitudes with deliberative self reports, more recent work has also assessed attitude change with measures that tap the more automatic evaluations associated with attitude objects (Briñol, Petty, & McCaslin, 2009). Indeed, bodily responses such as those described in this review can affect not only explicit but also implicit measures of attitudes. For example, Kawakami, Phillips, Steele, and Dovidio (2007) found significant reductions in an implicit measure of prejudice toward Blacks when participants had to respond repeatedly with an approach action to Black faces and with an avoidance action to White faces (see also, Kawakami, Steele, Cifa, Phillips, & Dovidio, 2008). Other research using a different overt behavior found that participants who were unobtrusively induced to smile while viewing photographs of Black faces showed lower levels of implicit prejudice compared to participants who either viewed White faces while

engaging in the same facial expression or control participants who were not induced to smile (Ito, Chiao, Devine, Lorig, & Cacioppo, 2006).

Probably due to the very nature of this variable (bodily responses) and the nature of the measure for which the effects were examined (implicit measures), researchers have speculated that the underlying mechanism for these effects had to be a relatively simple, automatic one. As noted earlier with respect to deliberative measures, bodily responses can affect automatic measures by low thinking processes, particularly under low thinking conditions. However, bodily responses are capable of affecting both explicit and implicit attitudes not only *via* low thinking processes, but also by more deliberative ones, including meta-cognitive processes. Thus, bodily responses, like other variables, are capable of affecting both explicit and implicit attitudes through high and low thinking processes.

To illustrate the impact of bodily movements on an implicit measure by a high thinking, meta-cognitive process, DeMarree, Briñol, and Petty (2011) subliminally primed participants with words related to the Black (versus White) stereotype. Following this induction, participants were instructed to follow a ball moving vertically or horizontally on the screen with their heads. Participants then completed a measure of felt aggression adapted from prior research (i.e., DeMarree, Wheeler, & Petty, 2005), which was framed as a subliminal perception task. As part of this measure, participants were informed that a word would be subliminally presented on the screen and that they would then choose which of four answer choices had been presented. They were instructed that although they would not be able to consciously process the stimulus, if they relied on the feelings they experienced during stimulus presentation, they would be able to successfully choose the target word. If participants were feeling more or less aggressive as a function of the prime, these feelings should be detected on this measure.² Consistent with the self-validation logic, DeMarree et al. (2011) found that the direction of the prime affected participants' reports of aggressive feelings (as well as their deliberative ratings of closeness to African Americans) in a stereotype-congruent fashion in the head nodding but not the head shaking condition. Thus, as was the case with head nodding affecting confidence in thoughts to a persuasive message (Briñol & Petty, 2003), so too did it affect the perceived validity and use of subtly activated mental content.

This line of work expands the range of mental contents that are subject to meta-cognitive influence by showing that thoughts of unknown origin that participants had no conscious goal to generate (i.e., those induced by primes) appear susceptible to the same validation processes as consciously generated thoughts to known stimuli. This is particularly counterintuitive, because meta-cognitive processes are generally considered to be high thought, intentional processes. For example dual systems models of cognition (e.g., Strack & Deutsch, 2004) hold that validation processes operate only within the conscious or reflective system (e.g., Gawronski & Bodenhausen, 2006). Given that the study described above used both a source of thoughts and a source of validation that were outside of intention and awareness, it is possible that the validation effects observed operated within the impulsive system. On the other hand, it is possible that the automatic activation of mental constructs lead to subsequent reflective (deliberative) validation processes. That is, even with subliminally induced thoughts and an unobtrusive source of validation (i.e., head nodding), the validation processes examined in this research still might have occurred deliberately – participants might simply be unaware of the *origin* of their conscious thoughts or of why they feel valid. This research reveals that subtle bodily responses can influence judgments and do so by processes including deliberation about the validity of thoughts, in this case, thoughts with an unknown origin. In other words, although the inductions and the measure were implicit in nature, it is still possible that

participants were thinking carefully about their traits and considering the validity of their thoughts – a meta-cognitive process that requires fairly extensive thinking.

In closing, it is worth considering the issue of how to induce behaviors for embodiment effects to occur. It is relatively easy to provide cover stories or to ask participants in experimental settings to act in a given way. For more naturalistic conditions, however, it would be necessary to identify effective ways to generate a desired behavior that would produce subsequent attitude change. There are many strategies that might be used to trigger an initial behavior (e.g., the foot-in-the-door technique, the low ball techniques, and making salient previous behaviors and commitments). Indeed, most social influence and persuasion principles can also be used to generate a first behavior that might lead to subsequent attitude change. For example, getting people to do you favors would lead them to think they like you (e.g., Cialdini & Trost, 1998).

Perhaps the simplest way to influence behavior is by acting in the desired way (e.g., *if someone smiles or nods their head at you, you are likely to smile and nod back*). Thus, just as others' behavior can function as a prime to automatically activate our behavior, so too can our behavior prime behavior in others (Chartrand & Bargh, 1999). In a recent review, for example, Niedenthal, Mermillod, Maringer, and Hess (2010) proposed that people often mimic the facial expressions they see in others in order to recognize and process their meaning. For example, people mimic the smiles they see. Of course, the embodied simulation of smiles involves motor activity that often changes the perceivers' own emotional experience (e.g., smiling can make us feel happy, and like things more). As we argue in this review, understanding the processes initiated by embodiment is critical for predicting *whether, when, and how* individuals process information. Smiling and other positive behaviors, such as head nodding, can influence judgments by serving as a simple positive cue, or by affecting either the amount (less thought) or direction (biased positive thoughts) of thinking, or by validating thoughts depending on the circumstances (see Briñol, DeMarree, & Smith, 2010). Similarly to the case of smiles or nodding, in the consumer domain, unintentionally mimicking others' consumption behaviors has been shown to impact our own product evaluations and preferences (e.g., Calder & Burnkrant, 1977). Recently, it has been argued that this effect results from a relatively simple self-perception process (e.g., 'I ate a lot of crackers, so I must like them a great deal'; Tanner, Ferraro, Chartrand, Bettman, & van Baaren, 2008). Indeed, low effort processes are likely to operate when people are not motivated and able to think. However, as it should be clear by now, other mechanisms of primary and secondary cognition might come into play under different circumstances. For example mimicry (and other forms of matching) might influence confidence, and the thought-confidence that emerges from this mimicry could potentially validate positive or negative thoughts.

Short Biographies

Pablo Briñol received his MA and PhD from the Universidad Autónoma de Madrid where he currently serves as Associate Professor. After a postdoc with his adviser Richard Petty, he continues as a regular visiting scholar at The Ohio State University. His research interest focuses on the study of the psychological mechanisms underlying attitudes and persuasion, with emphasis on meta-cognitive processes and measures of change. His research has appeared in top journals of the field, including several books and more than 100 publications.

Richard E. Petty is Distinguished University Professor of Psychology at Ohio State University. He received his BA from the University of Virginia and his PhD from Ohio

State. Petty's research focuses on the situational and individual factors responsible for changes in attitudes and behaviors with a current emphasis on both implicit and meta-cognitive factors. He has published eight books and over 275 articles and chapters. Petty's honors include receipt of the Scientific Impact Award from the Society of Experimental Social Psychology and Distinguished Scientific Contribution Awards from the Societies for Personality and Social Psychology and Consumer Psychology. He is past editor of the *Personality and Social Psychology Bulletin* and former President of the Society for Personality and Social Psychology and the Midwestern Psychological Association.

Benjamin C. Wagner received his MA from Ohio State University, where he is currently a doctoral candidate in social psychology. His research interests include attitudes and persuasion, with specific emphasis on self-validation, sources of attitude confidence, morality, and emotion.

Endnotes

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¹ We have emphasized the use of the term 'variable' to highlight similarities between different factors in the persuasion setting (whether source, message, recipient, or context). That is, our analysis of bodily responses (in terms of the psychological mechanisms underlying their impact) is conceptually identical to the effects of the source, the message, the recipient and other elements studied in traditional persuasion paradigms. Thus, the generic use of 'variables' serves to reinforce the idea that parallels exist across seemingly different persuasion factors.

² We portray this as an implicit measure because participants' reports presumably reflect their aggressive feelings without much reflection.

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