trust, fight, or flee. Leucosignals can provide the fast and frugal information that triggers adaptive behavior without having to be emotionally processed.

Building from the basis of leucosignals, a scientific inquiry of the many facial configurations which are covered in English by the term *smile* would avoid getting conceptually entangled in the quagmire of semantic and literary interpretations, whether embodied or not. Niedenthal et al. rightly point out that Ekman (2001) suggests that there might be as many as fifty kinds of smiles. The enigmatic or ironic smile (e.g., Mona Lisa with leucosignals reduced to the very minimum), the so-called Duchesne smile, the seductive smile (e.g., Barack Obama showing only his upper teeth), and the provocative triumphal smile in the face of adversity (e.g., Tony Blair showing both upper and lower teeth), to name only a few examples from contemporary icons, are most likely governed by neuro-behavioral systems that have evolved separately under a variety of selective constraints, and have in common only the fact that they end up on the display board of the face in the form of leucosignals whose meanings depend on the raw social context in which they occur. Whether they should all be labelled with the same term is highly questionable. Some are obviously gestures aimed at influencing conspecifics; others are probably mere leakages of a dopamine flooded inner state; and still others are likely the results of various interferences of any of these.

However, dealing with smiles from a purely biological evolutionary point of view definitely would miss the gene–culture coevolution, which cannot have failed to impact this most important tool of sociality. This latter dimension deserves more scrutiny than the lip service paid by Niedenthal et al. to the cross-cultural investigation of smiles.

The role of embodied change in perceiving and processing facial expressions of others

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Abstract: The embodied simulation of smiles involves motor activity that often changes the perceivers' own emotional experience (e.g., smiling can make us feel happy). Although Niedenthal et al. mention this possibility, the psychological processes by which embodiment changes emotions and their consequences for processing other emotions are not discussed in the target article's review. We argue that understanding the processes initiated by embodiment is important for a complete understanding of the effects of embodiment on emotion perception.

People attempt to make sense of the facial expression of emotion they see in others. In their review, Niedenthal et al. examine the role of motor simulations (e.g., changes in perceivers' facial expressions) in recognizing and processing the smiles of others. According to authors' insightful embodiment account, people mentally simulate, and often mimic, the smiles they see. Although this facial mimicry is not critical for smile recognition (distinguishing whether an expression is a smile or not), it might be more important for making other judgments, such as the type of smile (e.g., distinguishing between joy, affiliative, and dominance smiles), and the sincerity of the smile (distinguishing true from false smiles).

The embodied simulation of smiles not only involves motor activity, but often changes the perceivers' own emotional (positive) experience. Although Niedenthal et al. mention this possibility, the psychological processes by which embodiment changes emotions and the consequences for processing other emotions are not discussed in the target article. We argue that understanding the processes initiated by embodiment is important for a complete understanding of the effects of embodiment on emotion perception. For example, smiling often makes us feel happier and can increase our liking of everything around us. In accord with multi-process theories of judgment, such as the elaboration likelihood model (Petty & Cacioppo 1986), smiling and other positive behaviors, such as head nodding, can influence judgments and emotions by serving as a simple positive cue, or by affecting either the amount (less thought) or direction (biased positive thoughts) of thinking (for a review, see Briñol & Petty 2008). If smiling reduces thinking, then embodied mimicry could influence subsequent judgments by reducing the discrimination between true and false smiles or between different types of smiles. Mimicking a smile might also facilitate the processing of other smiles when it make us feel happier by biasing our thoughts or serving as a positive cue, whereas the very same action might increase the difficulty in processing other, subsequent smiling faces when it operates by reducing our amount of thinking.

As these examples illustrate, understanding the processes underlying embodied perception and change are essential to fully understand *whether*, *when*, and *how* individuals process emotional information. Recently, we have proposed that embodiment can not only influence what people think, but can also impact what people think about their own thoughts (i.e., a metacognitive process called *self-validation*; Petty et al. 2002). Metacognition refers to thoughts about thoughts (see Briñol & DeMarree, in press, for a review). The main idea behind the concept of *embodied validation* is that people's own behaviors can impact their judgments by affecting thought confidence. The confidence that emerges from behavior can magnify the effect of any available mental contents (Briñol & Petty 2003). In a recent study of embodied validation, Briñol et al. (2009) asked participants to think about and write down their best or worse qualities while they were sitting with their back erect and while pushing their chest out (confident posture) or slouched forward with their back curved (doubt posture). Then participants reported their self-esteem. In line with the self-validation hypothesis, thoughts generated about the self only affected self-attitudes in the relatively high confidence posture. Conceptually similar, DeMarree et al. (2010) conducted research in which participants were presented with different facial expressions of emotion on a computer screen after generating positive or negative thoughts. Consistent with the notion that merely perceiving facial expressions of emotion can influence thought-confidence, people relied on their thoughts more when exposed to facial expressions depicting emotions associated with confidence (e.g., happiness, anger) than when exposed to facial expressions depicting emotions associated with doubt (e.g., sadness, surprise). Importantly, this research suggests that smiling can lead to negative feelings when it increases the confidence in previously generated negative thoughts. If smiling validates negative thoughts making people feel bad, it might produce a number of different consequences for processing subsequent smiles (e.g., introducing a negative bias, increasing attention and therefore discrimination between different types of smiles).

Furthermore, this research suggests that the confidence construal associated with smiles can be important, because happy and angry emotions produce similar outcomes by validating thoughts. Importantly, although the types of smiles discussed by Niedenthal and colleagues all have in common the presence of a positive valence, they might differ in their associated level of confidence, and these variations in confidence can also moderate some of the results described in the review. For example, smiles associated with more confidence (e.g., dominance smiles) might be perceived more easily than less confident

smiles (e.g., affiliative smiles) because of the different amount of confidence created in the perceiver by mimicking these smiles.

Finally, consider research on behavioral mimicry beyond smiles, in which one person matches another's behavior (e.g., Chartrand & Bargh 1999). Smith et al. (2010) have found that participants act more confident when they are mimicked by others. The thought-confidence that emerges from this mimicry could potentially validate positive or negative thoughts. As a consequence of this process, mimicked individuals might produce more or less smiles, and process other smiles more or less. Taken together, these lines of research suggest that both agents of any interaction can mimic the smiles they see, and also be mimicked simultaneously, and dynamically.

Along with the target article, this commentary has focused on cases when people imitate what they observe in others. Alternatively, however, people sometimes respond to others' behavior in contrasting, complementary ways (e.g., dominance-submission). Ideally, moderators of imitation versus complementarity should be discussed with regard to smiling.

In sum, although the ability of our bodily actions to influence our mind 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 and emotions. We argue that understanding these processes is essential for models of embodiment.

Beyond smiles: The impact of culture and race in embodying and decoding facial expressions

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Abstract: Understanding the very nature of the smile with an integrative approach and a novel model is a fertile ground for a new theoretical vision and insights. However, from this perspective, I challenge the authors to integrate culture and race in their model, because both factors would impact upon the embodying and decoding of facial expressions.

The central idea of this stimulating target article is that embodied simulation represents a critical feature to effectively decode the nature of a smile. I endorse the argument and also agree with Niedenthal et al. that the integrative approach they propose is timely and necessary to understand the decoding of smiles (and facial expressions). The model posited here by the authors summarizes their view, offering a novel vision and prompting many questions for future research. Niedenthal et al. state that:

> The SIMS model has been largely developed using data collected in Western countries. Nevertheless, it is essential to note that cultural differences may modulate our account. Some clear predictions across cultures can be imagined and have been articulated elsewhere. (sect. 6, para. 3)

The authors cite their ongoing work in this regard (Niedenthal et al., in preparation). However, I think it is necessary that they clarify their view regarding the impact of culture and race from their theoretical position in the target article.

Human populations are marked by a variety of practices, beliefs, norms, and forms of organization. The term "culture" is typically used to describe the particular behaviors and beliefs that characterize a social or ethnic group, often located in a particular geographical location. Thus, by definition, culture represents a powerful deterministic and invisible force, which is responsible for shaping the way people think and behave. Importantly, culture also shapes the way people express their emotion. Westerners live in *individualistic* societies and tend to express their emotions explicitly. By contrast, Easterners live in *collectivist* societies and tend to suppress their emotions to maintain harmony amongst the group (Markus & Kitayama 1991). More importantly, it has recently been shown that culture impacts not only upon visual perception, but also, critically, upon the extraction of information from faces.

My colleagues and I (Blais et al. 2008) have recently shown that culture shapes how people deploy eye movements to sample information from the facial input space. Western Caucasian adults employ a well-established triangular fixation pattern during face learning, recognition, and categorization by race (Blais et al. 2008). Contrary to intuition, East Asians direct fixations to the central area of the face, around the nose, for the very same visual categorization tasks, while reaching a comparable behavioral performance. The eye movement strategy deployed by the East Asian observers might not straightforwardly relate to gaze avoidance, since this cultural contrast in eye movement generalizes to other visually homogenous categories (Kelly et al. 2010) and is abolished in constrained viewing conditions (Caldara et al. 2010). However, these observations do not rule out the possibility that the eye movement strategy used by Easterners to process visually homogenous objects, might arise from facing a continuous pressure from the Eastern cultural norm promoting gaze avoidance during human face-to-face interactions (Knapp & Hall 2005).

In stark contrast with those previous findings in face recognition, East Asian observers, compared to Western Caucasian observers, oversample information from the eye region during the categorization of facial expressions (Jack et al. 2009), ignoring information from the mouth region, even for the "happy" expression. Besides showing that the eye movement strategies deployed to decode facial expressions are culturally specific, our data also suggest that the transmission of facial expressions is not universal. Easterners focus uniquely on the eye region to decode signals, as they might expect expressive diagnostic signals coming from this facial region. Indirect evidence for this position is provided by the emoticons. While Westerners use a change in the mouth to convey a change from "happy" to "sad" with emoticons (i.e., :-) vs. :-( ), Easterners emphasize information from the eye region (i.e., ^_^ vs.; ^;), with a neutral mouth. Critically, this perceptual bias towards the eyes for the Easterners generates confusions in facial expression decoding, particularly for the expressions of surprise, fear, anger, and disgust. Therefore, our eye movement data on face recognition showing the lack of direct gaze contact in Easterners, coupled with those on expressions showing that face expressive signals are culturally tuned, point to culturally specific decoding errors and perhaps the necessity of a culturally specific SIMS model. The confusion shown by East Asian observers in decoding particular facial expressions might arise from a lack of embodiment of Westerner expression signals, offering a novel interpretation to the cross-cultural impairment in facial expression decoding.

An interesting side note on this point: East Asian observers should potentially be better than Westerners in categorizing fake and genuine smiles, as they concentrate (and perhaps develop a particular expertise for) their fixations on the eyes only.

Human populations are also marked by physiognomic variations. Race is a universal, socially constructed concept used to rapidly categorize humans originating from different geographical locations by salient physiognomic variations (i.e., skin tone, eye shape, etc.). Humans are markedly better at recognizing same- compared to other-race faces. Our studies advocate the existence of finely tuned mechanisms to process same-race (SR) faces, probably developed as a by-product of visual experience (e.g., Caldara & Abdi 2006; Michel et al. 2006a; 2006b), which drive the rapid categorization of other-race faces (e.g.,