

**Seven Sins  
in the Study of Unconscious Affect**

Gerald L. Clore<sup>a</sup>, Justin Storbeck<sup>a</sup>, Michael D. Robinson<sup>b</sup> and David Centerbar<sup>a</sup>

<sup>a</sup>University of Virginia

<sup>b</sup>North Dakota State University

Chapter to appear in Feldman Barrett, L., Niedenthal, P. & Winkielman, P. (Eds.)  
*Emotion: Conscious and Unconscious*. New York: Guilford Press.

Support is acknowledged from National Institute of Mental Health grants to Clore (MH 50074) and Robinson (MH 068241).. Correspondence may be sent to Gerald L. Clore, Department of Psychology, University of Virginia, 102 Gilmer Hall, P.O. Box 400400, Charlottesville, VA 22904-4400. Electronic mail may be sent to [gclore@virginia.edu](mailto:gclore@virginia.edu).

## Seven Sins in the Study of Unconscious Affect

The subjective experience of emotion plays a primary role in why lovers pine for one another, jealous spouses monitor each other's phone calls, poets write hymns to the moon, depressives go to therapists, and, not least, why emotion researchers care to study emotion.<sup>1</sup>

Consider the role of subjective experience in the plight of Othello, the jealous protagonist of Shakespeare's play. If Othello had not been aware of the misleading evidence that his wife, Desdemona, had been unfaithful, would he still have been jealous? One assumes that he would not. Similarly, if he had not felt the urgency of his jealousy, would he have been motivated to seek confirmation of his suspicions? Again, we assume not. And would he have been misled into the tragic action that he took? On the other hand, the process of his going from perception to emotion was surely not conscious, nor was the process that actually triggered his vengeful actions conscious. But was the emotion of jealousy itself conscious? Would the drama have played out differently (or have transpired at all) if Othello had felt nothing?

This volume provided a welcome opportunity to think about such issues. Our comments about them are framed as critiques of seven assumptions common in the literature. The goal was to be provocative in the faith that stirring things up is often useful. With more humility than our presumptuous title suggests, we hope that a critical stance toward some assumptions of our own and others may be helpful as we collectively stumble toward a coherent understanding of emotion. In this spirit, our candidates for the seven sins of studying unconscious affect include beliefs that:

1. There are Unconscious Emotions
2. Unconsciousness Emotional Stimuli are Stronger than Conscious Ones.
3. Conscious Feelings Cause Liking
4. Preferences Precede Inferences
5. Expressive Actions Have Fixed Effects
6. "Low Route" Stimulation Causes Human Emotion
7. Emotions Occur Too Quickly to Require Appraisals

### **SIN # 1: There are Unconscious Emotions**

*In this section, we ask whether the phenomena referred to by the label "unconscious emotion" form a coherent category?*

As part of a general rediscovery of unconscious processes (e.g., Wilson, 2002), psychologists now study implicit personality (Robinson, 2004), implicit attitudes (Greenwald, McGhee, & Schwartz, 1998), and implicit memory (Graf & Schacter, 1985). The current volume similarly promotes the study of implicit emotion. Before signing on wholeheartedly to such a quest, however, it might be prudent to ask whether the idea of "unconscious emotion" really defines a coherent category for study.

Cognitive psychologists who have been examining implicit memory for the last twenty years suggest a surprising answer. The implicit-explicit distinction entered the study of memory when Graf and Schacter (1985) wrote a paper referring to "implicit and explicit" measures of memory. They focused on dissociations between these two kinds of measures. But the terms "implicit-explicit" were soon hi-jacked to refer not only to *kinds of measures*, but also to *kinds of memory*. Some of the phenomena that show

dissociations between implicit and explicit measures include blindsight (in which individuals can accurately locate flashes of light despite having no visual experience), prosopagnosia (in which patients show skin conductance responses to faces they have seen many times, but cannot recognize), and Alzheimer's disease (in which patients can remember, for example, how to play golf, but not how many strokes they had taken in a particular game).

These examples make it clear that there is more to memory than what is available to consciousness. But of what does this "more" consist? What do the various implicit measures of memory measure? The surprising answer from those who have studied the question is that implicit memory does not exist (Willingham & Preuss, 1995). Their point is not that there are no implicit memory phenomena. On the contrary, there is such a large variety of nonconscious memory phenomena that nothing holds them together. They share neither a common neurology nor a common function, two characteristics that might justify a unified category of implicit memory. People continue to talk about "implicit" as a single thing, but it is becoming clear that there is no basis for doing so (Willingham & Preuss, 1995). Squire and Zola-Morgan (1991) argue that implicit vs. explicit is not a real distinction about memory, but simply a way of separating different aspects of research on memory. The labels simply correct the misunderstanding we all used to share that memory is necessarily conscious.

Should one conclude that, like implicit memory, unconscious emotion also does not exist? If most emotional processes are unconscious, then the label "unconscious" may not be informative. "Unconscious emotion" may simply be a catchall of processes united only by *not* being conscious. However, one benefit of thinking about the unconscious aspects of emotion is that we are led to ask about the role of consciousness in emotion (e.g., Edelman, 1989). We turn to this task now.

### **Sin # 2. Unconsciousness Emotional Stimuli are Stronger than Conscious Ones**

*In this section, we make two points: (1) Neural activation by conscious stimulation is many times stronger than activation from nonconscious stimulation. (2) Rather than being stronger, unconscious affect is less constrained in its object and hence more easily misattributed.*

**Consciousness Involves Strong Activation.** Most of what the brain does is unconscious. But attention both amplifies and prolongs activation, which allows processing at one site to affect processing at other sites, forming a network of activation that can reverberate and give rise to the experience of consciousness (Dehaene & Naccache, 2001; Dehaene, Naccache, Cohen, Bihan, Mangin, Poline, & Riviere, 2001). Brain areas involved in emotion can then interact with other areas. The broad recruitment of neural circuits, which occurs when stimuli are strong in duration and intensity, makes emotional stimuli powerful and insures consideration by the brain as a whole (Roser & Gazzaniga, 2004).

Of course, briefer, less intense stimulation can be registered without conscious awareness. However, such stimulation probably does not take a different route, but merely produces transitory and weak sensory signals, which are incapable of recruiting frontal areas of the brain (Storbeck & Robinson, 2004a). Stimuli that elicit stronger, longer, and broader activation of neural circuits should typically be more consequential than unconscious stimuli. Pavlov too (1927) noted that of several stimuli occurring

together as a CS, the strongest and most salient stimulus will control responding almost totally following conditioning.

The importance of strength of activation can also be seen in processes such as reading. As one's eyes fall on each succeeding word in a sentence, multiple meanings of each word are activated. However, we usually remain unaware of any but the most relevant of these candidate meanings. The one meaning that best fits the gist of a sentence and is most compatible with the larger sense of a paragraph usually wins the race (Conrad, 1974). Winning the race means influencing meaning, comprehension, insight, and so on. Losers of the race are eliminated and become inconsequential once the race has been won.

What is true of reading meaningful text is presumably no less true of reading the emotional meanings of events. Although subliminal frowning or smiling faces can alter judgments under carefully designed circumstances, it is not clear what analogs there are to such primes in the real world of visual objects. Since four millisecond exposures with pattern masks do not occur regularly in the environment, the explanatory power of such demonstrations is unclear. In contrast, optimal visual stimulation gives rise to a wide pattern of activation, recruiting frontal circuits relevant to consciousness and self-regulation (Storbeck & Robinson, 2004a). Many visual stimuli compete for our attention, but very few have an influence. The window of opportunity for each is brief, and when gone, it never returns. Stimuli that do exercise influence often do so because their activation is amplified by more frontal neural circuits. Unconscious stimuli do have *some* influence on judgment and behavior, but that such effects are stronger than those involving conscious recognition processes seems doubtful.

Consciousness and Constraint. Despite the self-evident nature of the foregoing assertions, social psychologists tend to believe that unconscious emotional stimuli are somehow stronger than conscious stimuli. It is true that priming and mood effects both occur only when people remain unaware of the true cause of the resulting thoughts and feelings (e.g., Murphy & Zajonc, 1993; Schwarz & Clore, 1983). When priming and mood induction procedures are made salient, respondents may no longer experience their thoughts and feelings as reactions to target stimuli. Priming and mood effects then tend to disappear. However, what consciousness does in these situations is not to weaken affect, but to channel its influence. Awareness makes primes less powerful only in the sense that unconstrained affective meaning no longer has unlimited potential to color interpretations of other objects (Clore & Colcombe, 2003).

Mere Exposure. One source of the belief that affect is stronger when it is unconscious are studies of the mere exposure phenomenon. Zajonc (1980) made much of the fact that mere exposure effects appear greater when exposures are nonconscious than when they are conscious. He relied heavily on this observation as evidence for "the primacy of affect" over cognition. However, those effects succumb to the same analysis given above. In our view, the reason mere exposure effects are weaker for long exposures is that when stimuli consciously recognized, the fluency responsible for exposure effects is then correctly experienced merely as familiarity, rather than as liking. Thus, increases in mere exposure effects with unconscious stimulation (for a review, see Bornstein, 1989) probably tell us nothing about "affective primacy." Rather they tell us about the role of consciousness in constraining meaning by making possible proper attributions for affect (Schwarz & Clore, 1983).

More generally, affective processing proceeds from novelty detection to stimulus categorization and identification. In this process, general, diffuse activation gets transformed into specific and localized activation. There is a curious tendency for investigators to think of the early, diffuse activation as the real emotion, and the categorization and localization processes as secondary, regulatory processes. In this regard, investigators have tended to reify amygdala activation as emotion, but the amygdala reacts to novelty and stimulus uncertainty as well as possible danger (Whalen, 1998). Hence, the refinement of such signals in the cortex would seem important in defining as well as regulating emotion (Storbeck & Robinson, 2004a).

In this section we have argued that unconscious primes and other stimuli are weaker, not stronger than conscious ones. We suggested that apparent dampening effects of consciousness on affect are due to the constraints on possible meanings of the affect when a specific source is made salient. More generally, we suggested that it may be useful to view the refinement of affect from cortical involvement as part of emotion, rather than as post-emotional, regulatory processing. This section focused primarily on unconscious *sources* of affect. We turn next to unconscious *processes* of affect.

### **Sin # 3: Conscious Feelings Cause Liking**

*In this section, we offer an account of the affect-as-information approach that distinguishes possible roles for conscious and unconscious affect in judgment, decision-making, attention, and memory. The first part distinguishes between implicit and explicit judgments and decisions. The second focuses on the role of conscious feelings in explicit judgments and decisions. The third part discusses conscious and unconscious consequences of arousal.*

#### **Unconscious Causes of Liking**

In his book, *The Illusion of Conscious Will*, Wegner (2002) has written persuasively about the unconscious wellsprings of action. He notes that by the time we entertain choice options consciously, an implicit choice has often already been made. He suggests that we often truly are authors of our own actions, but the cause of such actions may not lie in the thoughts about acting that we consciously entertain. Instead, we may simply become aware of whatever option has risen to the top. In other words, both willed actions and consciously preferred behavioral options are the product of unconscious processes that precede these occurrences.

Consciously we may entertain an elaborate narrative of choice, but it is likely to be a post hoc construction of left hemisphere processes. Such narratives are designed to make sense, and may even be accurate so that they represent some of the actual causes as good reasons for action. But these conscious accounts may be simply a dramatization of the choosing rather than a glimpse of the actual choice process. The implicit choice, at least, is presumably a function of connections between neural representations and neurochemical reactions, neither of which are consciously available.

Extending Wegner's logic suggests a similar account of how affect may influence judgments and decisions. Let us assume that the mind arranges both for conscious feelings of affect and for conscious representations of potential attitude objects. When associated in time, we may experience our feelings as causing our liking. The experience may lead us to conclude accurately that affect causes liking, but our feelings may not be doing the work. Instead the critical processes may occur at the implicit level. Implicit

liking might arise when implicit affect (e.g., involving the release of dopamine or other relevant neurochemicals) becomes linked to an implicit neural representation of an attitude object. Affective feelings when consciously thinking about the attitude object then provide information for explicit judgments, as discussed below.

### **Affect-as-information**

*Conscious feelings reflect unconscious affective processes and provide information for making explicit judgments and decisions, as specified by the affect-as-information approach (Clore, Wyer, Dienes, Gasper, Gohm, & Isbell, 2001; Schwarz & Clore, 1983).*

Unconscious affective reactions are registered as conscious affective feelings, which provide information for explicit judgments and decisions. Because the information is internal, spontaneous, and experiential, it tends to be credible and compelling. Thus, one may be informed by feelings that one has fallen in love, that one hates, or that one does not care. Such conscious feeling may often be the direct basis for explicit evaluative judgments. An elaboration of this view of the affect-as-information account of liking might be something like the following:

Implicit liking may be caused by implicit affect (e.g., dopamine and perhaps other neurochemicals) toward implicit neural representations of attitude objects. We may become aware of the liking if we experience feelings in response to thoughts of attitude objects. We construct explicit judgments of the liking or disliking of attitude objects by using such conscious thoughts and feelings as information about our implicit evaluations and attitudes.

Conscious consideration of decision alternatives allows that the relevance and importance of alternatives can be subjectively registered, which may often be helpful in decision-making. Explicit decisions may be made when subjective experiences are sufficient for us to realize that we have decided. As in being asked, "Are you feeling feverish?" or "Are you still mad?", often the only way to know if a decision has been made is to consult one's feelings.

For big decisions, such as buying a car or a house, choosing a college or a job, or deciding whether to marry someone, we often expect to be visited by an affective indication of the right decision. Individuals sometimes make comments such as, "We knew that was the house for us as soon as we saw it," or "I fell in love with the University during my first visit." And couples may recall intense romantic moments to reinforce their commitment. People also use their affect as information when making small decisions. An acquaintance who went shoe shopping but returned empty-handed commented that although many shoes seemed fine, nothing moved her to buy. One implication of this analysis is that important decisions not associated with strong conscious feelings pose problems for the individual. We may have a hard time deciding, and if forced by time to decide without the subjective experience that says, "This is it," we may vacillate and experience post-decisional worry. For example, a young man reported feeling depressed after choosing a college to attend, because he never experienced a rush of feelings telling him that he had made the correct decision.

In summary, we have argued that conscious feelings might be correlated with, but not causal in the formation of implicit liking or implicit decisions. If so, then the functions served by the consciousness of attitude objects and associated feelings may be primarily informational, insuring explicit judgments and choices that are consistent with

already formed implicit judgments and choices. These considerations focus on the valence dimension wherein positive and negative feelings provide information about goodness and badness. But what about the arousal dimension?

### **Affect-as-Importance**

*Feelings of arousal convey information about urgency and importance. We propose that conscious feelings of arousal play a role in attention, and that unconscious components of arousal play a role in memory.*

An enduring observation about conscious emotional experiences is that they have both valence and arousal components (Wundt, 1897). They are often shown as independent, bi-polar dimensions (Barrett, this volume; Russell, 2003). If the valence component provides embodied evaluation information, the arousal component can be thought of as providing importance information (Frijda, Ortony, Sonnemons, & Clore, 1992).

Two things happen when events are marked with arousal as being urgent or important: they commandeer attention (Simon, 1967), and they become memorable (Cahill & McGaugh, 1998). These are fascinating processes, but for current purposes the question is, “Are they mediated by conscious experience?” Our tentative answer is, “Yes” in the case of attention and “No” in the case of memory.

***Feelings Trigger Attention.*** Attention appears to be sense driven in humans and other animals. Thus, bright lights and loud noises readily capture our attention. It seems plausible that the same principles govern the effect of emotional cues on attention. One’s attention is commandeered by subjective experiences that are intense and have a fast rise time. Surprising someone by firing a gun or clapping one’s hand loudly behind the person’s head completely disrupts what they were doing. In a similar manner the experience of fright, anxiety, disgust, embarrassment, or joy is likely to rivet one’s attention on the object of the emotion. Both external sensory stimuli and internal emotional stimuli have this capacity. As with external stimulation, the greater the intensity of these internal feelings, the more completely they should command attention and redirect limited attentional resources (Simon, 1967). We assume that only strong stimuli exercise such control and hence are unlikely to remain unconscious. The parallel ways in which attention is guided by both external sensory and internal emotional stimuli leads to the speculation that the quasi-sensory processes of the emotional system evolved to make use of sensory operating principles. In any case, one function of conscious emotional feelings appears to be to commandeer attention and reset the cognitive processing agenda as outlined by Simon (1967).

It should be mentioned that some investigators (e.g., Öhman, this volume) present compelling data that the affective guidance of attention occurs unconsciously. On the other hand, after reviewing literature on attentional capture, Pashler et al. (2001) conclude that: “A variety of proposals for ‘wired-in’ attention capture by particular stimulus attributes have been effectively challenged; attention, it turns out, is subject to a far greater degree of top-down control than was suspected 10 years ago (p. 648).”

In addition to guiding attention, the arousal component of affect also has dramatic effects on how memorable experiences are. However, despite the fact that arousal is experienced, the active agent in memory consolidation may not be the experience of arousal, but the neurochemistry underlying those feelings, as discussed next.

***Epinephrine Release Triggers Memory Consolidation.*** McGaugh and colleagues

(e.g., Cahill & McGaugh, 1998) have shown that the release of epinephrine after learning is associated with enhanced memory after a period of time. For example, Cahill and colleagues (Cahill, Haier, Fallon, Alkire, Tang, Keator, Wu, & McGaugh, 1996) showed emotionally evocative film clips depicting themes of animal mutilation or violent crime. Later, these were much better recalled than neutral clips from the same films. The emotional clips were arousing, whereas the neutral clips were similar in style but not arousing. As participants watched the films, the glucose utilization in the brain was measured by positron emission tomography (PET). Three weeks later they were telephoned and asked to recall the films. One set of results concerned the relationship between recall and amygdala activity. Amygdala activity during emotional scene was related to later recall of emotional, but not of nonemotional, scenes. Thus, although neutral experiences can be remembered without involving stress-hormones or the amygdala, for emotional experiences, stress hormones stimulate the amygdala to influence storage in memory.

The enhancement of memory by arousal occurs even when the arousal is irrelevant and comes after learning. For example, after a list of words had already been studied, a bloody film about pulling teeth produced 10% better memory twenty-four hours later than a control film about dental care (Nielson, 2003; Pearson, 2002). Arousal in response to experiences presumably gives them greater weight than other information during storage so that the most important experiences yield the strongest memories (Christianson & Loftus, 1991). When an event triggers the release of the stress hormone adrenaline, the adrenaline activates the amygdala, which tags that experience for storage.

With respect to questions of consciousness, it is notable that animal data also show memory enhancement when adrenalin is administered after aversive training. The effect occurs when administered at about the time adrenalin would have been released by aversive stimulation under normal conditions. Although there may be conscious concomitants of adrenaline injections, even in rats, the processes that result in memory consolidation presumably occur at a neuro-chemical, rather than an experiential level. However, it is possible that behavioral components contribute to memorability. Experienced arousal tends to attract attention to relevant stimuli, and such increased attention has essentially the same effect on memory as practice does.

In summary, the research of the McGaugh group suggests that affective arousal may be more important in memory than previously realized. Since it would be disadvantageous to remember everything, a primary task of the organism is to appraise what is critical to retain and what is not. Part of that process appears to involve the adrenaline of affective arousal.

The goal of the larger section was to think broadly about the relative roles of conscious and unconscious affect in judgment, decision-making, attention, and memory. The importance of affective processes in these cognitive processes raises larger questions about how we should think about the relation between affect and cognition. We turn next to this topic, which has dominated much of the past twenty-five years of affect research.

#### **Sin # 4: Preferences Precede Inferences**

*In this section, we review recent evidence suggesting that popular ideas about the primacy of affect have been overstated. Some evidence suggests that preferences do need inferences and that the “automatic evaluation effect” may often be an “automatic categorization effect.”*



A new age of affect in psychology was announced by two important papers published in the early 1980s. Zajonc's (1980) "Preferences need no inferences" paper marked his receipt of the APA Distinguished Scientist Award, and the very next year, Bower (1981) marked his receipt of the same award with his paper "Mood and memory." Both were important in the development of current affective science, but in a sense they made opposite points. Whereas Bower argued that we could use what we know about cognitive processing to understand emotional phenomena, Zajonc argued that affect and cognition are processed independently. In particular, he argued that things are evaluated affectively before they are categorized cognitively.

Affective priming is a phenomenon that seemed consistent with that independence hypothesis. Evaluative priming words can be shown to speed up the processing of similarly valenced target words even though they have no descriptive meaning in common (e.g., Bargh, 1997). This phenomenon was found even for stimuli that were only slightly positive or negative in value, including nonsense syllables, and even on nonevaluative tasks. Such data seemed to be interpreted as evidence of the primacy of affect.

The initial demonstration of automatic evaluation was an affective priming study by Fazio, Sanbonmatsu, Powell, and Kardes (1986). Participants were asked to evaluate target words after other evaluative words were shown about 300 milliseconds earlier. After positive prime words (e.g., friend), people were faster to evaluate other positive words (e.g., birthday) than negative words (e.g., pain). At the relatively short intervals used, the evaluative influences were assumed to be automatic. Bargh (1997) reviewed similar results, which he refers to as the "automatic evaluation effect." However, neurological and new behavioral suggest otherwise. For example, Rolls (1999) argued cogently that objects must first be categorized descriptively before they are analyzed affectively. In addition, new data (Storbeck and Robinson, 2004b) also cast a very different light on the issue.

The fact that evaluative priming occurs in the absence of any descriptive relationship among primes and targets turns out to be a limitation rather than a strength of evaluative priming studies. If people categorize whatever they see, experimental designs that expose them to words with nothing in common but evaluation may force evaluative priming.

As a test of this hypothesis, Storbeck and Robinson (2004b) repeated standard priming studies, but varied the categorical as well as the evaluative similarity between primes and targets. Thus, their words included positive and negative animal words (e.g., puppy, spider) but also positive and negative texture words (e.g., silky, rough) or religious words (e.g., angel, Hell). In three different priming paradigms – evaluative, descriptive, and lexical decision tasks -- they found robust descriptive priming, but no evaluative priming. Evaluative priming was found only when they used traditional stimulus word sets that prevented respondents from engaging in descriptive categorization (see De Houwer & Randell, 2004, for similar findings with pronunciation tasks).

A large body of memory research also suggests that declarative memory is organized descriptively, not evaluatively (e.g., McRae & Boisvert, 1998). Indeed, it seems implausible that nature would have saddled us with a memory system in which any slightly positive or negative stimulus would activate all other positive or negative

concepts without regard to their descriptive category. To the extent that they speak to issues of cognition and emotion generally, Storbeck and Robinson's (2004b) results are more compatible with cognitive appraisal theory than with affective primacy theory. That is, evaluative responding may not routinely occur before semantic categorization. Indeed, the data suggest an "automatic categorization effect," rather than an "automatic evaluation effect." If the stimulus conditions allow for a categorical distinction among primes (e.g., animals versus texture-related words), such a categorical distinction will be used and evaluative aspects are unlikely to influence performance.

In this section, we reviewed results that cast a new light on the meaning of affective priming. A growing number of psychologists, economists, marketing, and politically-oriented investigators cite affective priming as evidence of the primacy of affect within their domains. For example, political scientists working on the cutting edge (e.g., Lodge & Taber, in press)<sup>1</sup> have used the names of political figures and policies as priming stimuli with semantically unrelated target words. For the subset of respondents sufficiently sophisticated to have relevant opinions, they found the usual speed advantage after evaluatively congruent primes when respondents evaluate targets. The investigators rightly conclude that such effects show that political figures are attitude objects, that is, that people react to them evaluatively. However, following standard psychological interpretation, these and other authors see wider implications in their findings. For example, since the non-political target words are dissimilar in content to the political primes, they interpret their results as evidence for the "primacy of affect (Zajonc, 1980; Murphy & Zajonc, 1993)." They suggest that, "cognitive and affective systems follow separate ... pathways in the brain, with feelings following a quick and dirty route (Le Doux, 1996)." They see their results as a strong test because their method breaks "any reasonable cognitive connection between the attitudinal prime and the target concepts." This often repeated reasoning fails to recognize that semantic priming is more robust than affective priming. In the end, affective priming appears to be simply a subvariety of general semantic priming, and is not evidence of "affective primacy" in any shape or form (Storbeck & Robinson, 2004a, b).

#### Sin # 5: Expressive Actions Have Fixed Effects

*This section suggests that there probably are no direct and unmediated effects of expressive and motor actions on affect, and that appearances to the contrary may depend on meaning supplied by the context of the muscle movements.*

Both Darwin and James are often cited in studies concerned with expressive action and emotion. However, it is not clear that either believed that actions cause emotions. James (1890) did say that "we are afraid because we run," but his point was that running is part of fear, rather than that motor actions cause emotions. Similarly, Darwin (1872) believed that expressions amplify emotions, but did not generally hold that expressions *cause* emotions. Nevertheless, there is a general belief that emotional expressions, gestures, and actions such as smiles, nods, and arm flexion might elicit affect directly without cognitive mediation.

---

<sup>3</sup> The point of citing the excellent work by Lodge and associates is not to criticize it, but to show that misinterpretations by us psychologists inevitably affects even the best work in other fields that draw on psychology.

Some studies of self-produced facial actions do suggest that smiling elicits positive affect (Laird, 1974), and that head nods leads to persuasion (Wells & Petty, 1980). For example, individuals in a well-known study by Strack, Martin, and Stepper (1988) were asked to hold a pencil in their mouths while viewing cartoons. The pencil-in-the-mouth method unobtrusively got people to flex the muscles involved in smiling, which increased their enjoyment of cartoons. This clever experiment clearly showed that expressions such as smiling can intensify relevant affect. However, it did not necessarily show the kind of direct relationship between action and affect that is often assumed. The problem is that muscle contraction within a single context, such as rating cartoons, leaves us uncertain about whether smiles elicit enjoyment generally or whether they elicit enjoyment in the context of viewing cartoons.

To examine this issue, Tamir and colleagues (Tamir, Robinson, Clore, Martin, & Whitaker, 2004) varied the context of expressions and gestures. In multiple experiments, they examined actions such as head shaking and brow furrowing, but found no support for a direct link (i.e., main effect) from motor action to affect. Although affective influences were readily observed, they varied depending on the cognitive context provided. For example, the effect of head shaking on affect was examined as participants watched one of two films. One showed an ex-con who had murdered a young girl in a psychotic delusion. He is shown arguing that he is perfectly fine and should be free to live wherever he wants, without scrutiny from his new neighbors. The other clip showed a pregnant young heroin addict who explains her wretched situation. Head shaking, manipulated in an irrelevant manner, did influence feelings toward the protagonists, but in opposite ways with reference to the two targets. Those shaking their heads while watching the murder clip judged the character more responsible for his actions and were more angry. In contrast, head shaking during the addict clip functioned as commiseration regarding her sad plight and resulted in greater sympathy rather than greater anger. Another of these studies examined the effects of subliminally presented smiles. Again, the results varied by context. In a competitive game, the smiles appeared either as the participant's performance was being scored or while his or her competitor was being scored. In the former group, unconscious smiles increased participant's estimates of how well they had done. By contrast, in the latter group, unconscious smiles decreased participant's estimates of how well they had done. A third study examined the effects of brow tension on decisional confidence. Again, the effects reversed depending on the contextual variable that was manipulated.

These contextual effects are useful to contrast with standard social cognition theorizing concerning the influence of expressive movements on affect, judgment, and memory. In their essay entitled, "Of men and mackerels," Dijksterhuis, Bargh, and Miedema (2000) argue that expressive effects have automatic and invariable effects on affect, judgment, and behavior. They argue that the influence of expressive cues is fixed and that people can minimize them only by exercising conscious control. The data of Tamir et al. (2004) suggest that such an account is incorrect, and that people have surprising capacities to contextualize unconscious expressive cues. Thus, the link between expressive cues and affective reactions appears to be flexible rather than fixed. To predict how automatic affective cues will influence affect, judgment, or behavior, it is important to know something about the context in which such automatic affective cues are manipulated.

Other experiments have examined the idea that arm flexion and extension influence attitudes toward novel stimuli. In a well-known series of experiments Cacioppo, Priester, and Berntson (1993) examined the effects of arm flexion and extension on attitudes toward novel stimuli. Arm flexion (as in approach) consisted of pressing gently down on a table top or exercise bar, and arm extension (as in avoidance) consisted of pressing up from the bottom of the table or exercise bar. They found that evaluations of novel Chinese ideographs were more positive if such stimuli were encoded during approach-related behaviors (flexion) rather than during avoidance-related behaviors (extension). Do such effects implicate invariant affective programs triggered by expressive cues?

A recent series of studies by Centerbar and Clore (2004) examined the “fixed” consequences of such expressive cues, while simultaneously manipulating contextual variables. They found that the effect of arm contraction on attitudes was not direct, but rather depended on the valence of the attitude object. Chinese ideographs were preselected based on differences in how positive or negative other participants rated them. They found that flexion (approach) behaviors led to *higher* liking judgments for the positive stimuli but *lower* liking judgments for the negative stimuli. Conversely, extension (avoidance) led to *lower* ratings of positive stimuli, but *higher* ratings of negative stimuli. That is, when people's approach-avoidance motor actions matched their motivational orientation towards positive and negative stimuli, their attitudes toward the stimuli were more positive. There were no direct effects of arm contraction on attitudes. Related reversals have been obtained by using primed positive or negative concepts as the mental context (Centerbar, 2003). In those studies, the direction of effects of approach-avoidance motor action again depended completely on the cognitive context at the time.

In summary, muscle contractions relevant to approach-avoidance (Centerbar & Clore, 2004) point to the same conclusions as prior studies related to expression and gesture (Tamir, et al, 2003). Affect is elicited not by the muscles but by the mind. In both sets of studies, the same actions were shown to have opposite affective consequences simply by changing the mental context. Even when affective cues are unconscious, these results suggest that they nevertheless gain power primarily through interpretive (i.e., cognitive) processes (Clore & Colcombe, 2003). Indeed, investigators of implicit attitudes (e.g., Glaser & Banaji, 1999; Lowery, Hardin, & Sinclair, 2001) seem to have arrived at a similar conclusion. Affective reactions, even those that are presumed to be automatic and to reflect unconscious content, are contingent on the cognitive context active at the time of measurement. The results suggest that humans are remarkably inferential creatures, and that affective consequences depend on sophisticated unconscious inference processes.

#### Sin # 6: Low Route Stimulation Causes Human Emotion

*In this section we review literature suggesting that the “low route” to emotion is largely irrelevant to human emotion.*

The one universal citation in discussions of unconscious emotion is to LeDoux's (1996) low route to emotion. That important research established aversive conditioning in rats without participation of the visual cortex by pairing changes in illumination with electric shock (LeDoux, Romanski, & Xagoraris, 1989). They proposed that emotional responses could be elicited via a sub-cortical path going directly from the sensory

thalamus to the amygdala without first going to the cerebral cortex. That is, fear relevant responses could be triggered before one could feel fear or identify the conditioned stimulus. Emotional responses could thus fire without one knowing either that one was afraid or what one was afraid of.

This work is routinely cited, not only by psychologists but also by scholars in marketing, economics, law, and political science. Despite the absence of appropriate research related to human emotion, it has become accepted wisdom that human emotions are often triggered via this low route. Storbeck and Robinson (2004a) have recently reviewed relevant literature to assess such conclusions. They suggest that the low route probably has limited relevance for human emotion. Some of their points include the following: (1) Only very simple stimuli such as light vs. dark can be detected without involvement of the visual cortex. Hence, the low route cannot in principle explain the kinds of effects seen in social psychological studies of emotion using such complex stimuli as facial expressions, emotional pictures, words, or the stimuli used in studies of mere exposure. (2) The low route pathway studied by LeDoux among rats may not exist or be active among primates and humans (Dolan, 2000, Kudo, Glendenning, Frost, & Masterson, 1986). (3) Despite demonstrating that emotional conditioning is possible via a subcortical route among rats, LeDoux (1996) himself views the cortical route as more important in most emotional situations, even among rats. (4) Research from a variety of perspectives converges on the conclusion that cortical involvement via output from area IT (inferior temporal area) in the visual cortex is critical for the amygdala to respond to affectively significant stimuli (Fukuda, Ono, & Nakamura, 1987; Rolls, 1999). Conversely, there seems to be no evidence that the amygdala is important for the categorization, identification, or recognition of stimuli. These facts favor the view that with visual stimuli, semantic processing is necessary for affect retrieval.

It is not possible to reproduce the detailed review of relevant literature presented by Storbeck and Robinson (2004a) and interested readers are referred to this paper for a more detailed analysis. There is no reason to suppose, of course, that the semantic processing alluded to is conscious. However, they make clear that the weight of research indicates that the low route could not be the unconscious evaluator proposed by Bargh (1997) and Zajonc (2000).

Sin # 7: Emotions occur too quickly to require appraisals.

*In this section, we suggest that appraisal theories concern the psychological structure of emotion differentiation. They are not process models as critics seem to assume. Thus, the fact that emotion elicitation arises from heuristic or associative processes has no bearing on the validity of appraisal theory.*

Questions about appraisal theory inevitably creep into discussions of emotion. For example, Prinz (this volume) suggests that appraisals are no more necessary for emotion than for pain. He suggests that since we do not appraise our wounds before feeling pain, we need not assume that we appraise emotional events before feeling happy or sad? In fact, pain receptors under the skin do offer a kind of “appraisal” of the extent of tissue damage. But the main reason the analogy fails is that we have no comparable receptors for detecting psychological injury, so that some sort of psychological appraisal is required.

More importantly, critics often misunderstand the assertions of appraisal theory in a fundamental way, a misunderstanding which appraisal theorists themselves have

unwittingly promoted (Frijda, personal communication July 7, 2004). As a rule, appraisal theories are not models of the processes involved in emotion elicitation, as the critics often assume. Scherer (1984) does have an interesting process account, but most appraisal theories focus on the rules that differentiate one emotion from another. They ask what kinds of situations elicit sadness rather than shame. When does pride arise rather than hope? They do not assume that we need explicit knowledge of the rules in order to feel sad or proud any more than we need explicit knowledge of the rules of syntax in order to communicate. Indeed, the analogy between the rules of appraisal and the rules of syntax is a powerful one.

What are the implications of the fact that people speak correctly and effortlessly regardless of whether they know the rules of grammar? Would anyone argue that language use does not depend on syntactical rules, even though people do not think about such rules before they speak? Similarly, what are the implications of the fact that people who no know nothing about the law can spot an injustice just as fast as a doctor of jurisprudence? We hold people accountable to the law, despite our knowledge that they do not routinely consult laws before acting. Further, despite the fact that many concepts and categories have necessary and sufficient conditions for their correct application, people may use them correctly without consulting such conditions. For example, the category “grandmother” applies if and only if a person is a mother of a parent. But when looking for a grandmother, we might simply point to the nearest, older woman with white hair wearing an apron and carrying a plate of cookies. What’s going on here?

We suggest that there is confusion between assertions about the underlying structure of domains and assertions about how we negotiate them. Failure to make such distinctions would lead one to conclude that only linguists can speak, only lawyers know the difference between right and wrong, and only appraisal theorists can feel emotions. But the rules of syntax, the rules of law, and the rules of appraisal theory are assertions about the structure of utterances, of justice, and of emotion, respectively. They are not process models of speaking, judging, or feeling, even though they are basic for understanding those processes.

As particular kinds of embodied evaluations, emotions necessarily involve some sort of appraisal, but the term carries no implications about how such evaluations are made. Sloman (1996) has proposed two kinds of reasoning: rule-based and associative reasoning. Clore and Ortony (2000; see also Smith, this volume) used this distinction to resolve misunderstandings about appraisal theory. They note that there are two routes to emotional appraisal (“reinstatement” and “computation”). Although people can compute bottom-up evaluations of events in real-time, people generally rely instead on associations between present and past. Thus, prior emotion-types are reinstated when current situations remind us of past situations; that is, when they elicit appraisals (and hence emotions) typical of an earlier situation. In these cases, as LeDoux (1996) notes succinctly, “Emotion *is* memory.”

This duality characterizes cognitive processes generally. In addition to two forms of reasoning and two kinds of emotional appraisal, there are two modes of categorization: prototype-based and theory-based categorization, as seen in the grandmother example above (Clore & Ortony, 1991). Prototype, case-based, or exemplar-based categorization is different from theory-based categorization in which features might be implicitly mapped onto the defining features of particular categories. The point is that cognitive

processes -- whether in emotion, categorization, or reasoning – come in two flavors. Top-down, heuristic, and associational processes may be fast but error prone, and bottom-up, computational processes that are slower but more reliable.

Why two different kinds of processes? Clore and Ortony (2000) suggest that the two routes to emotional appraisal and categorization serve different behavioral functions: preparedness and flexibility. Preparedness requires speed of processing, so that categorizing current situations on the basis of the similarity of its surface features to those of prototypic emotional situations allows preparation of a reaction before the identity of a stimulus has been fully established. But flexibility of response is also part of what emotion offers (Scherer, 1984). Flexibility is better achieved through rule-based processing. When preparation is accompanied by subjective experience, emotions offer an alternative to reflexive action, a mind-body way-station that allows additional environmental and memorial information to modify action.

In summary, appraisal theories specify the psychological situations that give rise to anger, fear, shame, pride, and so on. But such theories do not address whether a person's appraisal of an event arises instantaneously on the basis of clang associations or is the product of years of psychotherapy. Humans negotiate the world using simple rules of thumb or heuristics because formal cost-benefit calculations, even when possible are generally infeasible. But understanding emotions requires more than simply mapping those rules of thumb. Theorists also ask about the underlying cognitive structure of emotions with respect to which such heuristics have evolved. The mental health of individuals and the survival of the species ultimately depend on how well the distinctions afforded by those rules of thumb map differences among important psychological situations. Appraisal theories are attempts to characterize those important differences in the cognitive structure of emotions and emotional situations.

#### Conclusions

We have reviewed research by ourselves and others on seven commonly encountered assumptions relevant to unconscious affect. We termed such assumptions “sins” because we wish to state, somewhat strongly, that the presumed evidence for (or in some cases the logic of) such assumptions is weak or ambiguous. Our goal is to encourage a critical perspective toward explicit assumptions about the independence of affect from cognition and toward implicit assumptions that the evolution of emotional processes came to a halt very early in our phylogenetic history. In concluding, it is worth revisiting our suggestions, albeit briefly.

Sin # 1. There are Unconscious Emotions. We agree with Freud (1915), James (1890), and LeDoux (1996) that although most emotional processes are unconscious, properly speaking, there are not unconscious emotions. We cautioned that the experience of cognitive psychologists studying memory implies that unconscious emotion, like implicit memory, may not be a coherent category.

Sin # 2. Unconsciousness Emotional Stimuli are Stronger than Conscious Ones. Investigators sometimes assume that differences in conscious and unconscious priming mean that affect is most potent when unconscious. We argued that such results concern not strength but the spread of effects when the source of affective stimulation is not salient. Indeed, there is every reason to believe that conscious affect is more potent than unconscious affect.

Sin # 3. Conscious Feelings Cause Liking. We offer an account of the affect-as-information approach that suggests that unconscious affective and neural connections, rather than conscious feelings and thoughts, may be responsible for implicit judgments and decisions. Affective feelings then provide information about implicit processes for making explicit judgments and decisions. If the valence component of feelings signifies value, the arousal component signifies importance. We suggested that conscious arousal may guide attention, whereas unconscious arousal creates memorability.

Sin # 4. Preferences Precede Inferences. We described research indicating that semantic priming may be more robust than affective priming, and that evaluative aspects of encoding typically follow, rather than precede semantic encoding operations.

Sin # 5. Expressive Actions Have Fixed Effects. We presented research suggesting that contrary to widespread assumptions, the meaning and influence of affective expression and action depends on the mental context at the time.

Sin # 6. Low Route Stimulation Causes Human Emotion: An idea that has captured the imagination of science writers is that emotion is triggered via a fast “low route” (LeDoux, 1996) that does not involve cortical processing. We noted that some evidence indicates that this particular low route may not exist in humans. Further, limitations in its processing capacity make it unable to handle the effects of stimuli known to elicit human emotion.

Sin # 7. Emotions occur too quickly to require appraisals. We note that appraisal theories address the underlying structure of emotion variation, not the process of emotion elicitation, as critics often assume. Since they are evaluative reactions, emotions necessarily require appraisals, and these are typically fast, unconscious, and based on simple associations. We suggested that it is helpful to view the relation between appraisal theory and everyday emotion elicitation as similar to the relation between the rules of syntax and everyday speech.

### References

- Bargh, J.A. (1997). The automaticity of everyday life. In R.S. Wyer (Ed.), *Advances in social cognition* (Vol. 10, pp. 1-61). Mahwah, NJ: Erlbaum.
- Bornstein, R.F. (1989) Exposure and affect: Overview and meta-analysis of research, 1968-1987. *Psychological Bulletin*, 106, 265-289.
- Bower, G. H. (1981). Mood and memory. *American Psychologist*, 36, 129-148.
- Cacioppo, J. T., Priester, J. R., & Berntson, G. G. (1993). Rudimentary determinants of attitudes. II: Arm flexion and extension have differential effects on attitudes. *Journal of Personality and Social Psychology*, 65, 5-17.
- Cahill, L., Haier, R.J., Fallon, J., Alkire, M.T., Tang, C., Keator, D., Wu, J., & McGaugh, J.L. (1996). Amygdala activity at encoding correlated with long-term, free recall of emotional information. *Proceedings of the National Academy of Sciences*, 93, 8016-8021.
- Cahill, L. & McGaugh, J.L. (1998). Mechanisms of emotional arousal and lasting declarative memory. *Trends in Neuroscience*, 21, 294-299.
- Centerbar, D. B. (2003). *Contextual meaning of isometric arm flexion and extension and implications for affective processing*. Unpublished doctoral dissertation, University of Virginia.



- Centerbar, D. B. & Clore, G. L. (2004). *Do Approach-Avoidance Actions Create Attitudes?* Unpublished manuscript.
- Christianson, S. A., & Loftus, E. F. (1991). Remembering emotional events: The fate of detail information. *Cognition and Emotion*, 5, 81-108.
- Clore, G. L., & Colcombe, S. (2003). The parallel worlds of affective concepts and feelings. In J. Musch & K. C. Klauer (Eds.), *The psychology of evaluation: Affective processes in cognition and emotion* (pp. 335-369). Mahwah, NJ: Erlbaum.
- Clore, G. L., & Ortony, A. (1991). What more is there to emotion concepts than prototypes? *Journal of Personality and Social Psychology*, 60, 48-50.
- Clore, G. L. & Ortony, A. (2000). Cognition in emotion: Always, sometimes, or never? In R. D. Lane & L. Nadel (Eds.), *Cognitive neuroscience of emotion. Series in affective science* (pp. 24-61). New York, NY: Oxford University Press.
- Clore, G. L., Wyer R. S., Dienes, B., Gasper, K., Gohm, C., & Isbell, L. (2001). Affective Feelings as Feedback: Some Cognitive Consequences. In L. L. Martin & G. L. Clore (Eds.), *Theories of mood and cognition: A user's handbook* (pp. 27-62). Mahwah, NJ: Erlbaum.
- Conrad, C. (1974). Context effects in sentence comprehension: A study of the subjective lexicon. *Memory & Cognition*, 2, 130-138.
- Darwin, C. (1872). *The expression of emotion in man and animals*. Chicago: University of Chicago Press. (reprint 1965).
- Dehaene, S., & Naccache, L. (2001). Towards a cognitive neuroscience of consciousness: Basic evidence and a workspace framework. *Cognition*, 79, 1-37.
- Dehaene, S., Naccache, L., Cohen, L., Bihan, D.L., Mangin, J.F., Poline, J.B., & Riviere, D. (2001). Cerebral mechanisms of word masking and unconscious repetition priming. *Nature Neuroscience*, 4, 752-758.
- De Houwer, J., & Randell, R. (2004). Robust affective priming in a conditional pronunciation task: Evidence for the semantic representation of evaluative information. *Cognition & Emotion*, 18, 251-264.
- Dijksterhuis, A., Bargh, J.A., & Miedema, J. (2000). Of men and mackerels: Attention and automatic behavior. In H. Bless & J.P. Forgas (Eds.), *Subjective experience in social cognition and behavior* (pp. 36-51). Philadelphia: Psychology Press.
- Dolan, R. (2000). Functional neuroimaging of the amygdala during emotional processing and learning. In J. P. Aggleton (Ed.), *The amygdala: A functional analysis* (pp. 631-654). New York, NY: Oxford University Press.
- Dolan, R. & Vuilleumier P., (2003). Amygdala automaticity in emotional processing. *Annals of the New York Academy of Sciences*, 985, 348-355.
- Edelman, G. M., (1989). *The Remembered Present: A Biological Theory of Consciousness*. Basic Books.
- Fazio, R. H., Sanbonmatsu, D. M., Powell, M. C., & Kardes, F. R. (1986). On the automatic activation of attitudes. *Journal of Personality and Social Psychology*, 50, 229-238.
- Freud, S. (1915). Instincts and their vicissitudes. In E. Jones (Ed.) *Sigmund Freud: Collected papers*. Vol. 4., New York: Basic Books, 1959.
- Frijda, N., Ortony, A., Sonnemans, J., & Clore, G. (1992) The complexity of intensity: Issues concerning the structure of emotion intensity. In M. Clark (Ed.), *Emotion*.

- Review of personality and social psychology, Vol. 13* (pp. 60-89). Newbury Park, CA: Sage.
- Fukuda, M., Ono, T., & Nakamura, K. (1987). Functional relations among inferior temporal cortex, amygdala, and lateral hypothalamus in monkey operant feeding behavior. *Journal of Neurophysiology*, *57*, 1060-1077.
- Glaser, J., & Banaji, M. R. (1999). When fair is foul and foul is fair: Reverse priming in automatic evaluation. *Journal of Personality and Social Psychology*, *77*, 669-687.
- Graf, P., & Schacter, D. L. (1985). Implicit and explicit memory for new associations in normal and amnesic subjects. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *11*, 501-518.
- Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology*, *74*, 1464-1480.
- James, W. (1884). What is an emotion? *Mind*, *9*, 188-205
- James, W. (1890). *Principles of psychology*. New York: Holt.
- Kudo, M., Glendenning, K., Frost, S., & Masterson, R. (1986). Origin of mammalian thalamocortical projections. I. Telencephalic projection of the medial geniculate body in the opossum (*Didelphis virginiana*). *Journal of Comparative Neurology*, *245*, 176-197.
- Laird, J.D. (1974). Self attribution of emotion: The effects of expressive behavior on the quality of emotional experience. *Journal of Personality and Social Psychology*, *29*, 475-486.
- LeDoux, J. (1996). *The emotional brain: The mysterious underpinnings of emotional life*. New York, NY: Simon and Schuster, Inc.
- LeDoux, J., Romanski, L., & Xagoraris, A. (1989). Indelibility of subcortical emotional memories. *Journal of Cognitive Neuroscience*, *1*, 238-243.
- Lodge, M. & Taber, C.S. (in press). Implicit affect for political candidates, parties, and issues: An experimental test of the hot cognition hypothesis. *Political Psychology*.
- Lowery, B., Hardin, C. & Sinclair, S. (2001). Social influence effects on automatic racial prejudice. *Journal of Personality and Social Psychology*, *81*, 842-855.
- McRae, K., & Boisvert, S. 1998. Automatic semantic similarity priming. *Journal of Experimental Psychology: Learning, Memory and Cognition*, *24*, 3, 558-572.
- Murphy, S. T., & Zajonc, R. B. (1993). Affect, cognition, and awareness: Affective priming with optimal and suboptimal stimulus exposures. *Journal of Personality and Social Psychology*, *64*, 723-739.
- Neely, J. (1991). Semantic priming effects in visual word recognition: A selective review of current findings and theories. In D. Besner & G. Humphreys (Eds.), *Basic processing in reading: visual word recognition* (pp. 264-336). Hillsdale, NJ: Lawrence Erlbaum Association, Inc.
- Nielson, K. (Nov. 17, 2003). *Society for Neuroscience*. Orlando, Florida.
- Pashler, H., Johnston, J., & Ruthruff, E. (2001). Attention and performance. In *Annual Review of Psychology*, *52*, 629-651, New York: Academic Press.
- Pavlov, I. P. (1960). *Conditioned reflexes*. Trans. 1927. New York: Dover.
- Pearson, H. (2002). Bloody teeth boost memory. *Nature: Science Update*. Nature News Service.

- Robinson, M. D. (2004). Personality as performance. Categorization tendencies and their correlates. *Current Directions in Psychological Science*, 13, 127-129.
- Rolls, E. T. (1999). *The Brain and Emotion*. Oxford, UK: Oxford University Press.
- Roser, M. & Gazzaniga, M. S. (2004). Automatic brains, interpretive minds. *Current Directions in Psychological Science*, 13, 56-59.
- Russell, J. A. (2003). Core affect and the psychological construction of emotion. *Psychological Review*, 110, 145-172.
- Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology*, 45, 513-523.
- Scherer, K. R. (1984). On the nature and function of emotion: A component process approach. In K. R. Scherer & P. Ekman (Eds.), *Approaches to emotion* (pp. 293-317). Hillsdale, N.J.: Lawrence Erlbaum Associates
- Simon, H.A. (1967). Motivational and emotional controls of cognition. *Psychological Review*, 74, 29-39.
- Sloman, S. A. (1996). The empirical case for two systems of reasoning. *Psychological Bulletin*, 119, 3-22.
- Squire, L. R., & Zola-Morgan, S. (1991). The medial temporal lobe memory system. *Science*, 253, 1380-1386.
- Storbeck, J. & Robinson, M.D. (2004a). *Semantic Processing Precedes Affect Retrieval in Visual Processing: A Comparative Review*. Unpublished manuscript.
- Storbeck, J. & Robinson, M. D. (2004b). Preferences and inferences in encoding visual objects: A systematic comparison of semantic and affective priming. *Personality and Social Psychology Bulletin*, 30, 81-93.
- Strack, F., Martin, L. L., & Stepper, S. (1988). Inhibiting and facilitating conditions of the human smile: A nonobtrusive test of the facial feedback hypothesis. *Journal of Personality and Social Psychology*, 54, 768-777.
- Tamir, M., Robinson, M. D., Clore, G. L., Martin, L. L., & Whitaker, D. (2004). Are we puppets on a string?: The contextual meaning of unconscious expressive cues. *Personality and Social Psychology Bulletin*, 30, 237-249.
- Whalen, PJ (1998). Fear, vigilance, and ambiguity: Initial neuroimaging studies of the human amygdala. *Current Directions in Psychological Science*, 7, 177-188
- Wegner, D. M. (2002). *The illusion of conscious will*. Cambridge, MA: MIT Press.
- Wells, G. & Petty, R. (1980). The effects of overt head movements on persuasion: Compatibility and incompatibility of responses. *Basic and Applied Social Psychology*, 1, 219-230.
- Willingham, D. B. & Preuss, L. (1995). The death of implicit memory. *Psyche*, 2(15), October 1995. <http://psyche.cs.monash.edu.au/v2/psyche-2-15-willingham.html>
- Wilson, T. D. (2002). *Strangers to ourselves: Discovering the adaptive unconscious*. Cambridge MA: Belknap/Harvard Press.
- Wundt, W. (1897). *Outlines of psychology*. Leipzig: William Englemann.
- Zajonc, R. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, 35, 151-175.
- Zajonc, R. (2000). Feeling and thinking: Closing the debate over the independence of affect. In J. P. Forgas (Ed). *Feeling and thinking: The role of affect in social*

*cognition. Studies in emotion and social interaction, Vol. 2.* (pp. 31-58). New York, NY: Cambridge University Press.

---

<sup>1</sup> Thanks to Piotr Winkielman for these words which succinctly summarize our initial point. In addition, thanks to Piotr for years of friendly debate about the issues addressed in this volume.