

result, which would mean that the action potential occurred after the time the person reported making a decision, then we might have empirical evidence for something like consciousness influencing conflicting situations relative to non-conflicting situations.

Origins of emotional consciousness

doi:10.1017/S0140525X15002174, e187

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Abstract: While the field of emotions research has benefited from new developments in neuroscience, many theoretical questions remain unsolved. We propose that integrating our iterative reprocessing (IR) framework with the passive frame theory (PFT) may help unify competing theoretical perspectives of emotion. Specifically, we propose that PFT and the IR framework offer a point of origin for emotional experience.

The nature of emotional experience continues to captivate scientists and human society in general. With modern neuroscientific methods, there is renewed progress in uncovering mechanisms underlying emotional experience. That said, the field remains divided by fundamental, theoretical disputes and a lack of consensus on the definition of emotion or what constitutes emotional experience. We propose that integrating our iterative reprocessing (IR) framework with the passive frame theory (PFT) of consciousness may help unify competing theoretical perspectives of emotional experience. Because emotions can be conceptualized as multimodal synchronizations of component processes that direct action, we suggest here that a theory of consciousness in the service of action is informative for the understanding of emotional experience.

Basic emotion theorists propose that a limited set of basic emotions evolved as adaptive, whole body responses to environmental challenges (Ekman 1992). In contrast, psychological constructivists propose that emotions arise from the interaction of basic processes, such as interpretations of ongoing mental activity, or core affect, organized through semantic conceptualization (Barrett 2006; Russell 2003). Specifically, psychological constructivists see emotions as conceptual interpretations of core affect, defined by *valence* (positive or negative) and *arousal* (intensity), where differentiated emotions arise when states are categorized. Similarly, appraisal theorists propose that emotions arise from specific cognitive interpretations, such as whether an event is relevant to current concerns (see Ellsworth & Scherer 2003). Critically, for some (e.g., Frijda et al. 1989), *action tendencies* associated with a cognitive interpretation fundamentally constitute the emotional experience. Although these later perspectives provide formal cognitive models of emotion, they are often silent with regard to how and when these processes of interpretation arise in our subjective experience.

Our view of emotion is part of a growing consensus that the distinction between emotion and cognition is a false dichotomy (Cunningham & Kirkland 2012); if we define cognition as information processing, it follows that emotion is a type of cognition. The IR framework exploits this perspective to understand emotion as the emergent result of hierarchically organized, dynamic, neural processes (Cunningham et al. 2013). Central to this framework, information is processed through iterative cycles as individuals interact with their environment, and each iteration provides richer evaluations and more nuanced interpretation of

information being acquired. Critically, the goal of the mind is to settle into a stable, predictive, internal representation of the environment, similar to a system going from a high to low entropy state. We propose that when percepts with conflicting action tendencies arise in this iterative cycle, the entropy or degree of randomness increases (Clark 2013; Friston 2010), triggering what people label as emotion. This coincides with Morsella et al.'s proposal that conflicting representations can re-iterate through the conscious field to guide coherent action.

Importantly, the brain attempts to reduce overall entropy in its information processing in order to maintain stability. One way to maintain stability is by selecting and executing actions that resolve ongoing conflict, or emotion, which relaxes the system into a stable, lower entropy configuration. This process of conflict resolution occurs dynamically and continuously as new percepts perturb the system (Spivey 2008). This perspective links with Morsella et al.'s PFT; emotional consciousness results from the dynamics of conflicting options for action. In this sense, the only difference between consciousness and emotional consciousness is the conceptualization of the current conscious state as being emotional. We believe that PFT has implications for our understanding of emotional consciousness, whereby what we often label emotional experience emerges, at least in part, from conflicting representations that often direct voluntary action.

This perspective incorporates the role of cognitive interpretations emphasized in constructivist and appraisal models, in that conscious emotional experience is an interpretation of unconscious mental states. This view can also incorporate the role of valence and arousal used in constructive models of emotion. Rather than assuming that these are basic dimensions of core affect that get interpreted, we instead propose that components of the conflict resolution process can emerge into consciousness and be interpreted as valence and arousal. In addition, this view highlights the importance of action tendencies for emotional experience; emotions arise into consciousness in response to conflicting action tendencies, and, as conscious contents, can further guide voluntary action.

This formalization integrates with our IR framework, which emphasizes the dynamic unfolding of affective-cognitive processes. Within this framework, information is able to flow both forward and backward within hierarchical systems, where previous iterations serve as inputs to the overall process or conscious field. We propose that the origins of emotional experience lie directly within consciousness as outlined by Morsella and colleagues. We believe that PFT and the IR framework offer emotion theory a point of origin from which we might form an integrative theory of emotional experience.

Conscious olfaction: Content, function, and localization

doi:10.1017/S0140525X15002186, e188

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Abstract: The target article's emphasis on olfaction is a welcome reminder of the multimodal nature of conscious experience. Here, I explore the distinctive and even unique attributes of our sense of smell from the point of view of their bearing on and fit with a subcortical locus of sensory experience.

In outlining a conceptual framework bearing on the organization and function of consciousness, Morsella et al. highlight the olfactory system as a test-bed and challenge for consciousness theory.

A trenchant comparison between olfaction and other senses has been provided by Köster (2002). For present purposes, olfaction stands out among our exteroceptive modalities in four principal respects: