Art reception as an interoceptive embodied predictive experience

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Abstract: In the Distancing-Embracing model an explanation is proposed for the apparent paradox that is the enjoyment of negative emotional states in art reception. Here, we argue for the advantages of grounding the psychological dynamics described in the model in established and empirically testable frameworks of brain functioning by thinking of art reception as an embodied experience guided by predictive coding.

With the Distancing-Embracing model, Menninghaus et al. propose a compelling account of the psychological dynamics associated with self-sought hedonic exposure to negative emotions in art reception. However, we suggest that the model could benefit from the integration with current neurocognitive frameworks of brain functioning, namely, embodied cognition accounts and predictive

processing theories.

Prevalent embodied cognition accounts argue that we perceive the world through our bodies. Not only is the awareness of oneself as being “here” and “now” grounded on the perception of our own body, but emotional experiences are also tightly connected to the dynamic representation of the body in the brain. Interoceptive signals arising from the inner body are known to intensify emotional experience (Critchley & Harrison 2013) and bias perception and behavior (Azevedo et al. 2017), even when we are not aware of it. The ability to resonate and engage with others’ actions and emotions is also connected to body representations. Converging evidence shows that when perceiving an action or emotion, either positive or negative, the observer uses his or her own body and neural architecture responsible for first-person experience to simulate and represent that of the target (Gallese & Sinigaglia 2011). Regarding art reception, recent research has shown that the appreciation of artwork, such as a painting or dance, is partially grounded in the embodied simulation of the actions and emotions represented, as revealed by activity in sensorimotor cortices, limbic, and reward regions (Blood & Zatorre 2001; Calvo-Merino et al. 2005; Freedberg & Gallese 2007).

Importantly, the embodiment of others’ emotions does not constitute the entire vicarious experience, but rather a fast and powerful mechanism to pre-reflectively resonate and engage with others. Indeed, numerous factors such as perceived similarity with the target, the context and motivations modulate vicarious emotional sharing and may even lead to the experience of emotions antagonistic to those of the target, as the experience of pleasure at the perception of other’s pain (Cikara et al. 2011). In art reception, such modulating factors are evident in different patterns of brain and physiological responses observed across experts and non-experts (Christensen et al. 2016; Cross et al. 2011; Kirk et al. 2009a) and, more generally, in the fundamental Distancing mechanisms that allow

experiencing emotions through the lenses of art schemata. Thus, considering the body as a vehicle for art reception may help to understand the neurophysiological mechanisms underlying the experience of emotion in art and ground the psychological dynamics described in the Distancing-Embracing model in an established and testable framework. Moreover, studying art reception through the lens of embodied experience may also inform and advance the understanding of motivated vicarious experience of other's emotions in real-life situations, particularly in instances in which observers distance themselves from the target and/or experience incongruent emotions.

Predictive processing theories invert the classical conceptualization of the brain as a passive bottom-up processor of sensory information. Instead, they propose that the brain is a hierarchical inference machine, constantly attempting to predict its inputs from the environment (Clark 2013). Incompatibilities between the brain's predictions and incoming sensory data give rise to "prediction errors" that need to be minimized by, for example, updating the brain's generative models (or predictions) or balancing the weight given to sensory information. In art reception, the ambiguities and violation of expectancies that characterize most artwork – whether they are violations of canonical forms and shapes in visual arts; variation in timing, intensity, or timbre in music; or chills in a movie – generate prediction errors that need to be minimized. Recent theoretical proposals (e.g., Salimpoor et al. 2015; Van de Cruys & Wagemans 2011) and initial empirical evidence (e.g. Salimpoor et al. 2013) propose that art production and appreciation lie precisely on the generation and resolution of such prediction errors. Not only predictive errors and their minimization are rewarding per se, as evidenced by the release of dopamine and activation of brain reward systems (e.g. Salimpoor et al. 2015), but art recipients take pleasure in the resolution of the perceptual/cognitive ambiguities and challenges posed by art.

Crucially, prediction errors are not exclusive to the exteroceptive domain – vision, hearing, touch – but also emerge from interoceptive sensations (Barrett et al. 2016). Changes in physiological states, such as heart rate and respiratory rhythm, caused by, for example, the perception of a moment of intense passion or acute fear in a film, give rise to interoceptive prediction errors that inform the brain of substantial unexpected physiological changes that need to be dealt with to restore homeostatic equilibrium. If the mismatch between predictions and interoceptive prediction errors is significant enough, the changes in the interoceptive body will come to the individual's awareness who may, for example, engage in emotion regulation processes to reduce physiological arousal or reinforce the art-related Distancing cognitive schemes that allow a "safe" and pleasurable experience of intense emotional states. Importantly, given the fundamental role of the brain in homeostatic regulation, these prediction errors have important motivational relevance and constitute the basis for the subjective experience of emotions (Barrett et al. 2016).

We propose that the experience of emotion in art reception relies to a great extent on the continuous updating of predictive models of ongoing (interoceptive) bodily states as we respond to the prediction errors that the artwork imposes on us. Most of the phenomena described in the model's components – compositional interplays of positive and negative emotions and mixed emotions as mediators of negative emotions – are indeed particularly powerful instances of violation of expectations, with strong motivational content and substantial changes in the representation of physiological states. Ambivalent emotions, the description of an act of sacrifice in a novel, the sudden happy twist in a film, or the building up and release of tension in a horror movie or musical piece are all likely to induce substantial interoceptive prediction errors that need to be explained away, rendering art reception a rich embodied experience. It is this embodied response to art that explains how it moves us in ways that cannot be easily explained by considering only the beholders' exteroceptive perceptual

system and their cognition.

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