



Contents lists available at ScienceDirect

Food Quality and Preference

journal homepage: www.elsevier.com/locate/foodqual

Commentary

Unconscious emotional processing

David Sander^{*}, Sylvain Delplanque

Swiss Center for Affective Sciences and Laboratory for the Study of Emotion Elicitation and Expression, FPSE, University of Geneva, Switzerland



A B S T R A C T

In their opinion paper, Thomson and Coates mention that their title: “*Are unconscious emotions important in product assessment? How can we access them?*”, “presents several immediate challenges”. We agree, and we suggest that an interesting challenge already starts with the definition of what an unconscious emotion is. In particular, one may ask: what is unconscious in a so-called “unconscious emotion”? In this commentary, we first discuss the very construct of “unconscious emotion.” Then, we discuss this construct with respect to componential approaches to emotion, and we argue that the construct of “unconscious emotion” is subject to debate because the feeling component is typically considered as constitutive of an emotion. We conclude that it may be particularly useful for future research not to focus on “unconscious emotions” but rather on specific “unconscious emotional processes”, and how to measure them using a hypothesis-driven approach.

1. Introduction

The questions of whether emotions can be nonconscious, and more generally of whether some aspects of an emotion can be unconscious, are key questions in affective sciences that have been discussed by scholars from various theoretical approaches (see e.g., Clore, LeDoux, Zajonc, Davidson, & Ekman, 1994; Grandjean, Sander, & Scherer, 2008; Kihlstrom, Mulvaney, Tobias, & Tobis, 2000; Lambie & Marcel, 2002; see also chapters in Barrett, Niedenthal, & Winkielman, 2005; Winkielman & Berridge, 2004). Experimental research on unconscious emotional processes has largely focused on ways in which emotions may be elicited without the individual being aware of the emotion elicitation process. Such unconscious elicitation has typically been attributed either to automatic appraisals or to the existence of subcortical neural pathways that could elicit emotional responses based on sensory processing. For instance, even before the well-known work of LeDoux (see LeDoux, 1996) suggesting the existence of a dedicated “low-road” to the amygdala subserving some emotional responses to stimuli in the absence of awareness of these stimuli, the view that the brain is equipped with phylogenetically old pathways for emotions was taken as evidence that individuals are not always aware of the emotion elicitation process (see e.g., Zajonc, 1980). Consistently, Kihlstrom’s analysis of the unconscious mind led him and his colleagues to work on the emotional unconscious that they defined as the condition in which “one may be consciously aware of his or her emotional state yet unaware of its source in current or past experience.” (Kihlstrom et al., 2000, p. 37). These authors mainly concluded that individuals may be unaware of the percepts, memories, and thoughts which give rise to their emotions. In their early

influential work on what they call “unconscious emotions,” Berridge and Winkielman went even further: not only did they suggest that eliciting processes may be unconscious, but also that the emotional response could be unconscious (Berridge & Winkielman, 2003; Winkielman & Berridge, 2004). More specifically, they raised “the possibility that even in humans some causes of emotion, and perhaps even some emotional reactions themselves, might not be accessible to conscious awareness” (Winkielman & Berridge, 2009, p. 395). Their work particularly focused on the key dimension of valence, suggesting the existence of a “genuinely unconscious affect, in the sense of a valenced (positive/negative) reaction that is strong enough to alter behavior and physiology, but of which people are not subjectively aware.” (Winkielman & Berridge, 2009, p. 396). It is interesting to note here that although they acknowledge that evidence has mainly accumulated with respect to unconscious liking, they argue that the construct of “unconscious emotion” applies to individual emotions (e.g., happiness, sadness or fear), and not only to valence. This view is consistent with the way Öhman, Flykt, and Lundqvist (2000) have also used the term “unconscious emotion” with a focus on fear. Indeed, they also suggested that some emotional responses could be elicited without the individual being aware 1) of the elicitation (e.g., through pre-attentive mechanisms) or 2) of some aspects of the fear response (e.g., that are not available to introspection). Although from another theoretical perspective, Lambie and Marcel (2002) also proposed that an “unconscious” emotion is a case in which several aspects of the emotion are present but in which there is an apparent lack of phenomenology or awareness. The fact that some emotional processing is performed unconsciously is supported by an accumulation of empirical evidence showing for instance that emotional attention may allow participants to

^{*} Corresponding author: University of Geneva, Swiss Center for Affective Sciences, Chemin des Mines, 9, Campus Biotech, Geneva CH-1202, Switzerland.
E-mail address: david.sander@unige.ch (D. Sander).

<https://doi.org/10.1016/j.foodqual.2021.104177>

Received 29 December 2020; Received in revised form 29 December 2020; Accepted 7 January 2021

Available online 28 January 2021

0950-3293/© 2021 Elsevier Ltd. All rights reserved.

orient their attention towards emotional stimuli independently of voluntary attention (see Vuilleumier, 2005) both for negative and positive stimuli (see Pool, Brosch, Delplanque, & Sander, 2016), and that patients with neglect or with blindsight are still able to perform some evaluations on emotional stimuli, and even to respond with emotional expressions and autonomic reactions to stimuli that they did not consciously perceive. For instance, the term “affective blindsight” has been created to describe the ability of patients who suffer from cortical blindness to still be able to react to some affective stimuli (for review see Celegnin, de Gelder, & Tamietto, 2015). Such results are consistent with Smith & Lane’s cognitive neuroscience perspective on the construct of unconscious emotions (Smith & Lane, 2016). These authors considered that dissociations between explicit and implicit processing observed for various cognitive processes (e.g., memory) could be applied to emotion. Relying on the work in neuroscience and psychophysiology, they for instance suggest that automatic appraisals can elicit some forms of emotional responses that are not accessible to consciousness, but can still be tested with physiological measures. With a focus on the relationship between affect and consciousness in humans and animals, Paul et al. (2020) recently proposed to define an “unconscious emotion” as: “an affective response powerful enough to influence preference/liking related behaviour, but not registered consciously by participants as an actual felt state (p. 761)”. They also argued that effects of emotion on decision-making may proceed via routes that do not require conscious experience of emotion. To synthesize the definitions and approaches of what an unconscious emotion is, we think that the definition proposed by Winkielman and Hofree (2012) is particularly consensual: “An emotion typically involves a change in several components – physiology, cognition, motivation, behavior, and a change in consciousness. Unconscious emotions lack the key feature of consciousness. The absence of consciousness can come in the form of (1) unawareness of the stimulus eliciting the emotion or (2) unawareness of the emotion itself, producing an emotion that is not subjectively felt.”

It seems to us that this approach is globally consistent with important tenets of the appraisal and multi-componential perspective that we have briefly presented in the current special issue (Delplanque & Sander, 2021); according to this framework, many emotional processes can be computed unconsciously, but full-blown emotions are consciously felt. According to this view, a feeling is not an emotion in itself, but is a necessary (but not sufficient) component to define an emotion. There are a very large number of implicit processes occurring during the elicitation and differentiation of an emotion. These processes may not benefit from conscious access but they may be revealed and studied with specific methods (e.g., with specific tasks using brain imaging techniques). In particular, the four components of emotion that have been suggested to function at levels that are not necessarily conscious but to feed the conscious feeling through synchronization are: 1) appraisal processes, 2) motor expressions, 3) the autonomic responses, and 4) action tendencies (see Grandjean, Sander, & Scherer, 2008). These components mobilise physiological processes which computations and outcomes are not accessible to consciousness in the vast majority of cases. However, they can sometimes be available to consciousness. This theoretical approach suggests that the conscious emotional experience emerges as a function of multilevel, appraisal-driven response synchronization that serves a “monitoring function, integrating all information about the continuous patterns of change in all other components, as well as their coherence, and then building an integrative conscious representation (p. 486)” (Grandjean, Sander, & Scherer, 2008). One may or may not be able to report these feeling verbally, but the quality of this subjective experience can at least be characterised by the fundamental dimensions introduced by Thomson and Coates (2020), in particular those of valence and arousal. These dimensions are typically used by individuals to describe the conscious aspect of the experienced emotion, but also of other affective responses such as moods. For instance, the core affect is, by definition, always accessible to consciousness in emotions and moods (Russell, 2003). The literature concerning affective dimensions is particularly vast as

researchers have investigated not only the number of dimensions but also the various levels at which they may be involved. Most dimensional models of the conscious emotional experience find their origin in Wundt’s (1905) proposal that feelings can be described by three dimensions: pleasantness–unpleasantness, excitement–inhibition, and tension–relaxation. Since Aristotle, the pleasantness dimension is considered as key for emotion, and different types and levels of “valence” have been suggested (for discussions, see Man, Nohlen, Melo, & Cunningham, 2017; Shuman, Sander, & Scherer, 2013). For instance, most appraisal theories suggest the existence of two types of valence: 1) intrinsic pleasantness (pleasant or unpleasant) of the event itself, which was born from “genetic pre-wiring” or over-learned associations and 2) the goal-conduciveness (conductive or obstructive) of this event for the individual. For example, a bar of chocolate can be intrinsically pleasant for an individual but may be goal-obstructive for this individual if he/she likes chocolate but is on a diet or if he/she has already eaten too much chocolate. This explains why satiety diminishes a general self-reported liking. Importantly, these appraisals are proposed to take place at several levels of processing, and to typically operate at an unconscious level. For instance, Moors (2010) presents experimental studies suggesting that appraisal processes can be automatic. As further evidence, Mumenthaler & Sander (2015) recently suggested that the social appraisal process can be unconscious too. It can also be argued that measures of three components of the emotional response may also reveal the presence of unconscious emotional processes. For instance, participants are not necessarily conscious of their pupil dilation, electrodermal responses, change in vocal expression or action tendency (e.g., Morsella & Bargh, 2011).

From what we have grasped concerning Thomson and Coates’ approach (Thomson & Coates, 2020), the objective of the methodology they used is to identify emotion-related concepts that are not related to valence in order to better characterise potential product characteristics/benefits. This approach seems to us very interesting in the study of emotion-related concepts, but it seems to us conceptually challenging to relate such verbal associations to the construct of unconscious emotions. Our understanding is that the analysis strategy adopted by the authors consists of reducing the number of variables created by associations between concepts and emotion labels. This “data-driven” strategy consists in the application of exploratory, confirmatory factor or principal component analyses that isolate latent variables, components or dimensions on which the concepts are distributed. This strategy is at the heart of the construction of dimensional models. The data thus analysed reveal a first dimension (ranked in importance of explained variance) representing the valence and a second orthogonal dimension representing arousal/activation. It may be noted here that the orthogonality of the valence and arousal dimensions typically postulated in the field is a hotly debated topic as there is a natural correlation between the intensity of valence and the intensity of arousal, and recent evidence suggests for instance that arousal is not separable from valence in its ability to predict arousal-related neural activity (Haj Ali, Anderson, & Kron, 2020). In the analysis performed by the authors, the circumplex model appears, even when participants classify concepts that are not emotion instances (see Russell, 1980). Interestingly, a third dimension appears. Obviously, with this type of analysis, the meaning of the dimension is subject to interpretation. Considering the terms that characterise this third dimension, it seems to us that they correspond quite well, at least for some concepts (“bold”, “dominant”, “in-control”, “determined” and “headstrong”) to the third dimension typically observed when investigating the meaning of affective terms, namely the potency/control dimension (see Osgood & Suci, 1955): the individual’s sense of power or control over the eliciting event, which is very important to describe feeling with few dimensions (see Fontaine, Scherer, Roesch, & Ellsworth, 2007). In our opinion, the methodology developed by the authors does not characterise unconscious emotions, but rather has the merits to reveal implicit associations of numerous concepts with the fundamental dimensions of the conscious affective

experience. For instance, using concepts that correspond to non-valence dimensions, it is possible to characterize products essentially on the dimensions of arousal and control. This is effectively a means of dissociating products which are similar in terms of valence/liking but could be differentiated on the other two dimensions. All this without asking the consumer to use emotion terms. However, it seems to us important to keep in mind that while the meaning of the terms used can indeed be associated to fundamental dimensions of feelings, they also describe other, non-emotional, aspects. Let us remember for instance that even arousal is not specific to emotion; for instance, Duffy (1957) defined arousal as “a condition conceived to vary in continuum from a low point in sleep to a high point during extreme effort or intense excitement. (p. 267)” Consequently, if a difference is observed between products on the use of these terms, it cannot be attributed solely to differences in emotion. However, if hypotheses-driven changes are also measured in the other four components of emotion, using implicit measures, it seems to us that it would increase the probability to conclude that a product actually induces unconscious emotional processes.

References

- Barrett, L. F., Niedenthal, P. M., & Winkielman, P. (Eds.). (2005). *Emotion and consciousness*. The Guilford Press.
- Berridge, K. C., & Winkielman, P. (2003). What is an unconscious emotion? (The case for unconscious “liking”). *Cognition & Emotion*, 17, 181–211. <https://doi.org/10.1080/02699930302289>
- Celeghin, A., de Gelder, B., & Tamietto, M. (2015). From affective blindsight to emotional consciousness. *Consciousness and Cognition*, 36, 414–425. <https://doi.org/10.1016/j.concog.2015.05.007>
- Clore, G. L., LeDoux, J. E., Zajonc, R. B., Davidson, R. J., & Ekman, P. (1994). Can emotions be nonconscious? In P. Ekman, & R. J. Davidson (Eds.), *Series in affective science. The nature of emotion: Fundamental questions* (pp. 283–299). Oxford University Press.
- Delplanque, S., & Sander, D. (2021). A fascinating but risky case of reverse inference: From measures to emotions! *Food Quality and Preference*, Article 104183. <https://doi.org/10.1016/j.foodqual.2021.104183>
- Duffy, E. (1957). The psychological significance of the concept of “arousal” or “activation”. *Psychological Review*, 64, 265–275. <https://doi.org/10.1037/h0048837>
- Fontaine, J., Scherer, K., Roesch, E., & Ellsworth, P. (2007). The world of emotions is not two-dimensional. *Psychological Science*, 18, 1050–1057. <https://doi.org/10.1111/j.1467-9280.2007.02024.x>
- Grandjean, D., Sander, D., & Scherer, K. R. (2008). Conscious emotional experience emerges as a function of multilevel, appraisal-driven response synchronization. *Consciousness & Cognition*, 17, 484–495. <https://doi.org/10.1016/j.concog.2008.03.019>
- Haj Ali, H., Anderson, K. A., & Kron, A. (2020). Comparing three models of arousal in the human brain. *Social Cognitive and Affective Neuroscience*, 15, 1–11. <https://doi.org/10.1093/scan/nsaa012>
- Kihlstrom, J. F., Mulvaney, S., Tobias, B. A., & Tobis, I. P. (2000). The emotional unconscious. In E. Eich (Ed.), *Cognition & emotion*. New York: Oxford University Press.
- Lambie, J., & Marcel, A. (2002). Consciousness and the varieties of emotion experience: a theoretical framework. *Psychological Review*, 109, 219–259. <https://doi.org/10.1037/0033-295x.109.2.219>
- LeDoux, J. E. (1996). *The emotional brain: The mysterious underpinnings of emotional life*. Simon & Schuster.
- Mumenthaler, C., & Sander, D. (2015). Automatic integration of social information in emotion recognition. *Journal of Experimental Psychology: General*, 144, 392–399. <https://doi.org/10.1037/xge0000059>
- Man, V., Nohlen, H. U., Melo, H., & Cunningham, W. A. (2017). Hierarchical brain systems support multiple representations of valence and mixed affect. *Emotion Review*, 9, 124–132. <https://doi.org/10.1177/1754073916667237>
- Moors, A. (2010). Automatic constructive appraisal as a candidate cause of emotion. *Emotion Review*, 2, 139–156. <https://doi.org/10.1177/1754073909351755>
- Morsella, E., & Bargh, J. A. (2011). Unconscious action tendencies: Sources of “unintegrated” action. In J. Decety, & J. T. Cacioppo (Eds.), *Oxford library of psychology. The Oxford handbook of social neuroscience* (pp. 335–347). Oxford University Press.
- Öhman, A., Flykt, A., & Lundqvist, D. (2000). Unconscious emotion: Evolutionary perspectives, psychophysiological data and neuropsychological mechanisms. In R. D. Lane, & L. Nadel (Eds.), *Series in affective science. Cognitive neuroscience of emotion* (pp. 296–327). Oxford University Press.
- Osgood, C. E., & Suci, G. J. (1955). Factor analysis of meaning. *Journal of Experimental Psychology*, 50, 325–338. <https://doi.org/10.1037/h0043965>
- Pool, E., Brosch, T., Delplanque, S., & Sander, D. (2016). Attentional bias for positive emotional stimuli: A meta-analytic investigation. *Psychological Bulletin*, 142, 79–106. <https://doi.org/10.1037/bul000026>
- Paul, E. S., Sher, S., Tamietto, M., Winkielman, P., & Mendl, M. T. (2020). Towards a comparative science of emotion: Affect and consciousness in humans and animals. *Neuroscience & Biobehavioral Reviews*, 108, 749–770. <https://doi.org/10.1016/j.neubiorev.2019.11.014>
- Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology*, 39(6), 1161–1178. <https://doi.org/10.1037/h0077714>
- Russell, J. A. (2003). Core affect and the psychological construction of emotion. *Psychological Review*, 110, 145–172. <https://doi.org/10.1037/0033-295X.110.1.145>
- Shuman, V., Sander, D., & Scherer, K. R. (2013). Levels of valence. *Frontiers in Psychology*, 4, 261. <https://doi.org/10.3389/fpsyg.2013.00261>
- Smith, R., & Lane, R. D. (2016). Unconscious emotion: A cognitive neuroscientific perspective. *Neuroscience & Biobehavioral Reviews*, 69, 216–238. <https://doi.org/10.1016/j.neubiorev.2016.08.013>
- Thomson, D. M., & Coates, T. (2020). Are unconscious emotions important in product assessment? How can we access them? *Food Quality and Preference*, Article 104123. <https://doi.org/10.1016/j.foodqual.2020.104123>
- Vuilleumier, P. (2005). How brains beware: Neural mechanisms of emotional attention. *Trends in Cognitive Sciences*, 9, 585–594. <https://doi.org/10.1016/j.tics.2005.10.011>
- Winkielman, P., & Berridge, K. C. (2004). Unconscious emotion. *Current Directions in Psychological Science*, 13, 120–123. <https://doi.org/10.1111/j.0963-7214.2004.00288.x>
- Winkielman, P., & Berridge, K. C. (2009). Unconscious emotions. In D. Sander, & K. R. Scherer (Eds.), *The Oxford companion to emotion and the affective sciences*. Oxford: Oxford University Press.
- Winkielman, P., & Hofree, G. (2012). Unconscious Emotion. In N. M. Seal (Ed.), *Encyclopedia of the sciences of learning*. Boston, MA: Springer.
- Wundt, V. W. (1905). Grundzüge der physiologischen Psychologie. Principles of physiological psychology. *Nature*, 71, 529–530. <https://doi.org/10.1038/071529a0>
- Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, 35, 151–175. <https://doi.org/10.1037/0003-066X.35.2.151>