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Against the "non-sensory" view of affective valence

Contra a visão "não sensorial" da valência afetiva

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ABSTRACT

Valence is a key construct in the affective sciences and in the philosophy of emotion. Carruthers (2011, 2017) has recently offered an account of the nature of valence. He defends a (representational) version of what might be called the *non-sensory signal theory of valence* (NSS). According to the latter, valence is identified with inner signals—which are not themselves perceptual nor conceptual states of any sort—which mark sensory representations as good or bad. In this paper, I argue that Carruthers's version of NSS is problematic on its own, independently of the plausibility of competing theories of valence. Carruthers's arguments to the effect that valence is non-sensory fail to rule out the hypothesis that, together with arousal, valence might also be grounded in bodily, sensory representations. Carruthers's claim that valence is not a sensory item in the furniture of the mind needs to be then more thoroughly substantiated.

Keywords: affect, valence, arousal, interoception.

RESUMO

A valência é uma construção fundamental nas ciências dos afetos e na filosofia da emoção. Carruthers (2011, 2017) ofereceu recentemente uma explicação da natureza da valência. Ele defende uma versão (representacional) do que pode ser chamado de teoria do sinal não sensorial da valência (NSS). De acordo com este último, a valência é identificada com sinais internos – que não são estados perceptivos ou conceituais de qualquer tipo – que marcam as representações sensoriais como boas ou más. Neste artigo, argumento que a versão de Carruthers do NSS é problemática por si só, independentemente da plausibilidade das teorias de valência concorrentes. Os argumentos de Carruthers no sentido de que a valência é não-sensorial não descartam a hipótese de que, juntamente com a excitação, a valência também possa estar fundamentada em representações sensoriais do corpo. A alegação de Carruthers de que a valência não é um item sensorial na mobília da mente precisa ser mais bem substanciada.

Palavras-chave: afeto, valência, excitação, interocepção.

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Introduction

Emotions are classified as either positive emotions or negative emotions in virtue of the character of their valence. Not only emotions have valence as a component. For example, "homeostatic motivations" also exhibit a positive and negative character, such as hunger and thirst, which are negatively valenced. Moods are also valenced, such as depression and anxiety, which typically have negative valence as a component. In fact, valence (together with arousal) is a defining dimension of affective states in general. As Carruthers (2017) emphasizes, determining the nature of valence is key then for understanding the nature of affect.

Carruthers (2011, 2017) has recently offered an account of the nature of valence. He defends a (representational) version of what might be called the *non-sensory signal theory of valence* (NSS). According to the latter, valence is identified with inner signals—which are not themselves perceptual nor conceptual states of any sort—which mark sensory representations as good or bad. In line with a certain tradition in the affective sciences, in this kind of account valence is then taken to be something that "attaches" to sensory/perceptual representations, so valence is something "extra" to sensory representations themselves.

In this paper, I argue that Carruthers's version of NSS is problematic on its own, independently of the plausibility of competing theories of valence. Carruthers's arguments to the effect that valence is non-sensory fail to rule out the hypothesis that, together with arousal, valence might also be grounded in bodily, sensory representations (i.e. interoceptive representations). Carruthers's claim that valence is not a sensory item in the furniture of the mind needs to be then more thoroughly substantiated. Thus, even though NSS might be the case, Carruthers arguments are not compelling in showing why such claim might be on track.

I begin by briefly characterizing the notion of valence. In the next section, I present the relevant aspects of Carruthers's version of NSS. That is, I thoroughly present and motivate only those aspects of Carruthers's view which are the target of my arguments: the claim that valence is a *non-sensory* signal. Finally, I discuss why Carruthers's arguments for his version of NSS fail to show that valence is a non-sensory phenomenon.

Characterizing valence

We strive to have certain kinds of emotions and we strive to avoid having other kinds of emotions. Certain emotions are agreeable, while other emotions are disagreeable. Certain emotions feel good, while other emotions feel bad. That is, there are positive emotions and negative emotions. For example, joy, pride, love, and amusement typically are positive emotions, while anger, fear, guilt, and contempt typically are negative emotions. Emotions are classified in this way in virtue of the character of their valence. Certain emotions are positive emotions since they have as a component positive valence, and certain emotions are negative emotions since they have as a component negative valence[2] (e.g., Barrett, 2006; Prinz, 2004, 2010).

Valence is not only part of our folk psychological understanding of the nature of emotion, but it is also a construct that plays a fundamental role in the scientific study of emotion (see, e.g., Barrett, 2006; Russell, 2003; Berridge and Kringelbach, 2015), to the point that, for some theorists, valence is one of the main building blocks of emotion and affect in general (Barrett, 2006; Russell, 2003). So note that the notion of valence in which I am interested in this paper is a non-normative notion that plays an explanatory role in psychology. Thus, contrary to a possible reading of what some researchers have pointed out (e.g., Charland, 2005; Picard, 1997; Solomon, 2003), when it is said, in the affective sciences, that an emotion is *positive* or *negative* (i.e. that it has positive or negative valence) it is *not* being said that such an emotion is positive or negative in the sense of being *good* or *bad* normatively, in any ethical or prudential sense. In the sense in which I am interested in this paper, valence is neither an ethical nor a prudential construct; it is a descriptive psychological construct that plays an explanatory role in the affective sciences. Then, just as Carruthers (2017) does, I am going to simply assume that there is such a thing as valence and that it does play a role in our best current theories about emotion and affect in general.

The non-sensory signal theory of valence: Carruthers's version

What might be called the *non-sensory signal theory* (NSS) (e.g., Carruthers, 2011, 2017; Prinz, 2004, 2010) identifies valence with motivating inner signals which mark sensory representations as good or bad (wanted or unwanted). The signals in question are not themselves perceptual nor conceptual states of any sort.

These views align with a certain tradition in the affective sciences which consists in regarding the affective, valenced aspect of sensory/perceptual experiences as something that "attaches" to sensory/perceptual representations. In other words, the valenced aspect of a sensory experience is regarded as something "extra" to the sensory representations themselves. For example, according to the tradition in question, eating a sweet cake feels good because an affective mental item (valence) gets attached to the sensory representation of sweetness, where the latter being a distinct mental item from the former. That is, only when sensory/perceptual

[2] Note that this way of characterizing valence leaves open the possibility that a certain emotion type *E* can have different valence value on different occasions.

representations (e.g., sweetness, a landscape, music, etc.) have a "hedonic gloss" added by affect is that those representations become something that feels good (or bad). Such a "hedonic gloss" is considered to be a non-sensory item in the furniture of the mind, distinct from any sort of sensory/perceptual representation or high-level piece of knowledge (see, e.g., Berridge and Kringelbach, 2010, p. 9).

In this paper, I focus on critically discussing Carruthers's version of NSS for the following reasons. Firstly, Carruthers's version of NSS is the most recent philosophical proposal on the nature of valence. Secondly, NSS has several explanatory advantages (Prinz, 2004, 2010), and arguably for this kind of theory the philosophically most careful arguments have been developed. It is relevant then to show that Carruthers's arguments to the effect that valence is non-sensory are problematic, so that the version of NSS in question turns out not to be fully compelling as it stands. Now, as I mentioned above, NSS aligns with the traditional view that valence is something that "attaches" to sensory/perceptual representations, endowing the latter with a "hedonic gloss" that makes such representations feel good or bad. Then, by arguing that Carruthers's version of NSS needs to be substantiated, I will be also suggesting that the relevant aspect of the tradition in question should be revised.

Let's get down to business. According to Carruthers (2011, p. 126-135; 2017), valence consists in an inner non-sensory signal that confers value (good or bad) to attended stimuli. This non-sensory signal inherently motivates the pursuit or avoidance of such stimuli. Even more, in Carruthers's account, it is assumed that valence is (nomologically) essential for motivating all sorts of intentional actions in the external environment. Consequently, in Carruthers's view, valence signals get generally attached to representations of *external* events (e.g., your partner arriving home safe), rather than to inner bodily states, as in other similar views on the nature of valence (e.g., Prinz, 2004, 2010). This makes that the link between valence and intentional action in the environment is much closer compared to other accounts (see Prinz, 2004, p. 191-196).

More importantly, Carruthers (2011, 2017) adheres to the generally accepted view that affect consists in valence and arousal (e.g., Barrett, 2006; Barrett and Bliss-Moreau, 2009; Russell, 2003) and that emotions have affect as a component. He also adheres to the view that affect is to a major extent dependent on inner bodily perception (i.e. interoception). Nonetheless, as I mentioned above, in Carruthers's view, valence signals are *non-sensory* signals. For, according to Carruthers, valence and arousal are separate causal mechanisms in the furniture of the affective mind and represented physiological changes constitute arousal, not valence. When we experience physiological changes, we do not then have the experience of valence, but of arousal. However, valence makes attended events good or bad, making thus a contribution to the phenomenology of the experience of such events.

Furthermore, in Carruthers's view, valence is also a *non-conceptual* signal. For it confers value without deploying high-level abstract knowledge, such as the concepts GOOD or BAD. In this account, the positive and negative valence value of a certain experience is a non-conceptual representation of the goodness and badness of the object of such an experience, respectively. In a word, in this view valence is a non-sensory, non-conceptual indicator of value.

Carruthers emphasizes the role that valence plays in decision-making. Closely following Damasio (1994), Carruthers claims that, during decision-making, valence signals get attached to representations of considered options, making the latter attractive or repellent. In Carruthers's account, during decision-making, valence signals serve as a "common currency" that allows the system to compare the value of options and choose among them. That is why patients with lesions in regions which Carruthers associates with valence, such as the orbitofrontal cortex (OFC), show poor decision-making capacities (Damasio, 1994). However, contrary to Damasio (1994), Carruthers holds that valence does not amount to sensory, interoceptive representations.

Carruthers (2011, 2017) offers no *positive* evidence for the view that valence is non-sensory. However, Carruthers (2011) does offer positive evidence and arguments for the claim that valence is non-conceptual. He offers as evidence the famous Iowa Gambling Task studies. As Carruthers remarks, in these studies subjects *see* some decks as bad, without conceptually *judging* them to be bad. Thus, so the argument goes, valence is not conceptual in nature. Among other arguments for the claim that valence is non-conceptual, Carruthers (2017) argues for this claim based on the assumption that phenomenally conscious states only have non-conceptual contents and that valence can be phenomenally conscious. Thus, so the argument goes, valence must be non-conceptual. However, considering that I have no quarrels with the claim that valence is non-conceptual (and representational) and I agree with it, I am not going to discuss what this piece of evidence suggests regarding the nature of valence and the soundness of this argument. In this paper, I am concerned with the claim that valence is non-sensory.

Even though Carruthers offers no positive evidence for the view that valence is non-sensory, he does have arguments *against* the view that valence is sensory. I discuss these arguments below.

Problems for Carruthers's view

Carruthers's arguments to the effect that valence does not amount to a sensory signal are problematic. As I commented above, Carruthers (2011, 2017) endorses the generally accepted view that affect—i.e., "core affect" (e.g., Barrett, 2006)—is constituted by valence and arousal. Now, according to Carruthers, valence and arousal are separate causal mechanisms in the furniture of the affective mind. While represented physiological changes ("interoceptive percepts") constitute arousal, valence amounts to a non-conceptual indicator of value, not grounded in any sensory modality. Let's call this

the *independence claim*: valence and arousal are separate causal mechanisms of affect.

One of the main reasons Carruthers puts forward to support the independence claim is that dimensional approaches to emotion arrange emotions in a circumplex graph, in which the "core affective states" of valence and arousal are represented as independent, *orthogonal* dimensions (e.g., Barrett, 2006; Russell, 2003). Thus, "it is implausible that the former should reduce to the latter" (Carruthers, 2011, p. 130). Considering that arousal is the dimension of "core affect" which is uncontroversially grounded in sensory, interoceptive representations, valence should then be taken to be a non-sensory signal, not grounded in interoception.

A key problem with this argument is that it mistakenly takes reports of affective states to evince the nature of the causal mechanism responsible for affect. Probably because, in some dimensional approaches to emotion (e.g., Russell, 2003; Barrett, 2006), linguistic analyses of questionnaires and extended *reports* of valence and arousal are graphically represented as orthogonal *descriptive* dimensions of affect in a circumplex graph (e.g., Russell, 2003), the above argument mistakenly takes valence and arousal to be independent *causal* components of "core affect" (Barrett, 2006), realized by separate causal mechanisms. That is, it is simply a mistake to infer that valence and arousal are realized by independent causal mechanisms of "core affect" from the fact that linguistic analyses of reports of "core affect" result in a circumplex graph, where valence and arousal figure as orthogonal descriptive dimensions. The circumplex model is designed to capture what people say about their own psychology, about their own subjective experience regarding affective states. The circumplex model does not then track the way in which the causal mechanisms responsible for those reports are related. Dimensional theorists of emotion explicitly recognize this point (e.g., Kuppens *et al.*, 2013; Russell and Barrett, 1999). In fact, nothing in the circumplex model of affect, which Carruthers (2011, 2017) endorses, prevents that valence and arousal are essentially unified at the *causal* level, both being grounded in bodily, interoceptive representations. In other words, nothing prevents that, for example, arousal is a component part of the mental state that constitutes valence, or that "core affect" amounts to valence *at* certain levels of arousal, i.e. that, at the causal level, the latter is not an independent aspect of "core affect", but simply amounts to the intensity that valence can take. Note that I am not endorsing the view that valence is grounded in interoceptive representations. I am only claiming that the argument in question fails to rule out this hypothesis.

Certainly, as some dimensional theorists have found (Barrett *et al.*, 2004), one can consciously *focus* more on one descriptive dimension than the other, as Carruthers (2011) notes. However, let me insist, nothing in the circumplex model of affect prevents both valence and arousal from being realized by represented physiological changes ("interoceptive percepts") at the *causal* level. In fact, this is what dimensional theorists seem to endorse (e.g., Russell and Barrett, 1999, p. 814-815; Barrett, 2015, p. 45; 2006). Carruthers fails to consider then the possibility that valence and arousal might be essentially unified. As Barrett and Bliss-Moreau remark,

> *Core affect is a state of pleasure or displeasure with some degree of arousal (Barrett, 2006; Russell, 2003; Russell and Barrett, 1999). Together, valence and arousal form a unified state, so although it is possible to focus on one property or the other, people cannot feel pleasant or unpleasant in a way that is isolated from their degree of arousal (Barrett and Bliss-Moreau, 2009, p. 171).*

For example, it could be the case that valence and arousal are unified in the sense that arousal, instead of being a separate construct from valence, simply corresponds to the intensity or "volume" taken by the perceived physiological changes which (hypothetically) realize valence, so that arousal cannot take place without valence being constituted.

The fact that one can consciously focus more on one descriptive dimension (arousal) than the other (valence) will not do the job for the defender of the independence claim. Carruthers is impressed by this fact: people who are better at detecting their own heartbeats tend to exhibit more *arousal focus* than *valence focus* (Barrett *et al.*, 2004). The notions of arousal focus and valence focus simply refer to the emphasis that subjects place on words related to arousal and valence during emotion reports, so that arousal and valence emerge as important aspects in the verbal descriptions of affect in an individual over time (Barrett and Bliss-Moreau, 2009). Then, considering that heartbeat detection is taken to be an indicator of *interoceptive accuracy* (see Garfinkel *et al.*, 2015), one might be led to conclude that arousal, rather than valence, is the aspect of "core affect" that is grounded in interoceptive perception (see also Dunn *et al.*, 2010).

The above argument does suggest that the claim that arousal is closely related to bodily perception might be the case. However, notice that I am not disputing this claim (in fact, I agree with it). I am concerned here with the nature of valence, independently of the issue of the nature of arousal, and the above argument only suggests that arousal is closely related to bodily perception. More precisely, the above argument does *not* speak against the claim that valence could also consist in bodily perception. The above evidence is consistent with the claim that, for example, valence consists in the perception of a *pattern* of inner bodily changes, which includes several changes besides changes in heart-rate, so that a single variable (e.g., heart rate) is valence-neutral by itself. In other words, the evidence in question is consistent with the hypothesis that valence value is determined by the overall whole-body shape taken by the evolving inner bodily landscape, in which several physiological dimensions interact (e.g., Damasio, 1994, p. 263; 2003), while arousal is determined only by heart rate perception (or the perception of heart rate plus a small subset of physiological changes). If this were the case,

valence would also be grounded in a sensory system, contrary to NSS. Thus, this kind of evidence will not do the job for the defender of NSS. Certainly, heart rate seems to be a reliable indicator of arousal. However, heart-rate is just one dimension of a pattern of changes in the inner physiological milieu. Thus, considering that changes in heart rate might be critical for arousal but not much for valence value, it is certainly expected that people who are good at paying effortful attention to their heartbeats also exhibit an emphasis on the descriptive dimension of arousal during verbal reports. But this fact, let me insist, is silent with respect to whether valence is non-sensory at the causal level.

It could still be argued that the claim that valence consists in the perception of such patterns of inner bodily changes rests on a confusion, because arousal, but not valence, is the aspect of affect that is traditionally taken to consist in such a pattern of bodily changes. Carruthers endorses a view along these lines:

> *arousal is constitutive of the "fight or flight" preparations undertaken by the body in response to threat. […] It consists of a variety of autonomic changes in heart rate, blood pressure, activity in the sweat glands, and levels of adrenaline and other chemicals in the bloodstream, as well as behavioral changes in posture, muscle tension, breathing rate, and so on (Carruthers, 2011, p. 127).*

Note that this sort of view is precisely what "arousal theory" proposed under the label "general sympathetic arousal". However, even though this conception of the notion of "arousal" is still rather uncritically endorsed in some corners of psychology, this conception of arousal is not tenable anymore. Let me briefly explain.

According to arousal theory, general sympathetic arousal underlies such "fight-or-flight" responses via a single mechanism that controls several measures of sympathetic/autonomic effectors. This conception of arousal emerged from mid-twenty century research on the brainstem reticular formation, which was hypothesized to be realized by the so-called ascending reticular activating system, basis of the sort of activation (arousal) responsible for the "fight-or-flight" responses that Carruthers has in mind. It was thought that the brain structure in question was a functionally homogenous structure and that it had activational (arousal) effects without any sort of specificity.

This conception of arousal is deeply problematic. A key prediction of this approach is that physiological measures of sympathetic activity (such as electro-dermal response and heart rate) should significantly co-vary within and across individuals. However, that turns out not to be the case (see Berntson and Cacioppo, 2007; Cacioppo *et al.*, 1991; Lacey, 1956, 1967). On the other hand, the many variables involved during autonomic control do not exhibit some sort of single continuum of activation or arousal that could be involved in a simple "fight or flight" mechanism (Berntson and Cacioppo, 2007). In other words, there is no *patterned* set of autonomic responses that constitutes a unified arousal system. In fact, the reticular formation, the supposedly key functionally homogeneous neural basis of the arousal system, is composed of several structures, each of them with its own functional profile (Sarter *et al.*, 2003). Thus, the notion of arousal on which Carruthers relies seems to be problematic. In fact, it has been shown that certain autonomic measures do not reflect arousal at all, but rather reflect valence properties. For example, cardiac activity, blood pressure, and skin conductance duration are likely to reflect affective valence (see Cacioppo *et al.*, 2000) (also the startle response and facial EMG indicate valence rather than arousal; Mauss and Robinson, 2009). In a word, considering that the notion of arousal as general sympathetic activation does not hold, the claim that arousal, but not valence, consists in the perception of a pattern of physiological changes is undermined.

Carruthers's view faces another related problem. Remember that one of the reasons that Carruthers puts forward for the independence claim—i.e., the claim that valence and arousal are separate causal mechanisms, being arousal the one constituted by represented physiological changes—is that interoceptively *accurate* people (Garfinkel *et al.*, 2015) tend to exhibit more arousal focus than valence focus (Barrett *et al.*, 2004).

As I mentioned above, *interoceptive accuracy* is typically measured by heartbeat detection tasks. In one version of this task, subjects are asked to determine whether their own heartbeats are synchronized with a metronome (Barrett *et al.*, 2004). Interoceptive accuracy is also measured by asking subjects to count their heartbeats, and then their responses are compared to the actual number of heartbeats as measured by ECG (Ehlers and Breuer, 1992; Schandry, 1981). Interoceptive accuracy only tells us then how good an individual is in effortfully attending and keeping track of the consciously accessible outputs of interoceptive processing (i.e. already formed "interoceptive percepts"). In this sense, this kind of task is meta-representational: subjects must form "beliefs" about already formed interoceptive representations. Thus, interoceptive accuracy tells us nothing about the *causal* mechanism of interoceptive percept formation itself, or whether it is working properly (i.e. delivering proper interoceptive percepts), neither whether it is hyperfunctioning or hypofunctioning in individuals high in arousal focus. These aspects are the relevant ones, if the goal is to determine whether either arousal or valence (or both) are constituted, at the causal level, by the perception of the physiological inner milieu. Then, the fact that individuals high in arousal focus tend to exhibit high interoceptive accuracy is silent about whether either arousal or valence (or both) are constituted, at the causal level, by bodily perception. In order to conclude that arousal, but not valence, is constituted by interoceptive perception, it needs to be shown, at least, that interventions in the functionings of the causal mechanism responsible for interoception

give rise to modifications in arousal, but not in valence, and that triggering a state of arousal determines modifications in the interoceptive system, without altering valence properties. Considering what the constructs of interoceptive accuracy and arousal focus really tell us, they are not much useful for the defender of the independence claim. It is worth also considering that, insofar as it is operationalized by heartbeat detection tasks, interoceptive accuracy does not reflect what might be called "*general* interoceptive accuracy". That is, accuracy not only with respect to heartbeat activity, but with respect to the activity of the whole pattern of physiological variables that constitute the physiological landscape of an organism. A more interesting correlation then for the defender of the independence claim—even though not much useful for the reasons presented in the above paragraph—would be a correlation between "general interoceptive accuracy" and arousal focus. This is the case since, as I mentioned above, the claim that arousal is determined only by heart rate perception is compatible with the claim that valence is grounded in interoceptive perception. The idea here is that heart rate perception is critical for arousal, while valence is constituted by the perception of a whole pattern of physiological changes, and not just by the single variable of heart rate. Thus, the fact that good heartbeat detectors exhibit high arousal focus does not point towards the independence claim. The defender of the latter would prefer to find a correlation between good whole-body perceivers and arousal focus. There is no such evidence. Moreover, as it is usually remarked, it is unclear whether consciously monitoring heartbeats indicates *interoceptive* accuracy or a somatic, exteroceptive capacity: The "beats" that are monitored by subjects during the heartbeat detection task could simply be reflecting the activation of somatic, non-interoceptive receptors on the chest wall. Appealing to the correlation between arousal focus and interoceptive accuracy will not do the job for the defender of the independence claim.

Carruthers (2011, p. 130) puts forward another argument for the *independence claim*. As is well-known, after the lesion, OFC/vmPFC patients lose their capacity to respond appropriately to rewards and punishers, which has severe consequences for their personal lives and social interactions (Damasio, 2003). However, they retain their ability for cold reasoning. The standard explanation of the behavior of OFC/vmPFC patients is that they lose the capacity to associate valenced responses with representations of behavioral options, which is key for normal decision-making. The upshot of this is that valenced responses are required for decision-making, and that malfunctioning of OFC/vmPFC compromises the ability to use such responses to guide decision-making. Carruthers argues that if valence were grounded in representations of bodily changes, people who tend not to explicitly focus attention on their heart rate would show aberrant decision-making abilities in the way shown by patients with OFC/vmPFC lesions. But they do not. Then, so the argument goes, valence is not grounded in representations of bodily changes. Valence should then amount to a non-sensory signal, while arousal is the dimension of "core affect" that is grounded in representations of bodily, physiological changes.

There are several problems with this argument. Let me point to two of the most salient of them. In the first place, the fact that OFC/vmPFC patients show poor decision-making abilities seems to favor the view that valence is grounded in representations of the body. Determining that something is positive or negative, beneficial or harmful, is key for decision-making. In Damasio's account, given its rich connections with regions involved in visceral representation and control, the OFC/vmPFC, during decision-making, plays the role of linking representations of external situations with representations of bodily, physiological responses. In this account, bodily responses are precisely the kind of responses that inform about whether something is beneficial or harmful: positively valenced bodily responses assign positive value to considered behavioral options, while negatively valenced bodily responses assign negative value to them. Insofar as OFC/vmPFC patients fail to link the valenced input from the body that informs about value with their considered options, they fail to behave appropriately. That is, the standard explanation of the pattern of behavior shown by these patients assumes that bodily responses determine valence value (Damasio, 1994), rather than determining arousal or another affective construct.

In the second place, it is simply a mistake to infer that a certain mechanism is malfunctioning from the fact that its outputs tend not to be explicitly attended. Thus, just as the fact that some people do not tend to explicitly focus on the phonetic properties of their spoken language does not imply that their mechanism of language production is malfunctioning, the fact that some people fail to explicitly focus on their heart rate does not imply that their mechanism responsible for bodily representation is malfunctioning. It is not surprising then that such people do not behave as OFC/vmPFC patients.

Finally, following Schroeder (2004), Carruthers (2011) also argues that valence value is not determined by interoceptive representations on the basis of cases such as skydiving. In the case of skydiving, the same physiological changes (those that skydiving supposedly typically triggers) occur in both someone who enjoys the experience and in someone who dislikes the experience (Schroeder, 2004). The same pattern of bodily changes can give rise to positive and negative valence. Valence is not then grounded in bodily perception. The independence claim holds.

I am not convinced by this line of reasoning. Assuming for the sake of argument that skydiving does trigger the same pattern of bodily changes both in someone who enjoys the experience ("positive skydiving") and in someone who dislikes the experience ("negative skydiving"), there still is an alternative take on this kind of case.

Positive and negative skydiving can be seen as involving *different* bodily experiences, as the *same* pattern of bodily changes can give rise to different bodily percepts ("intero-

ceptive percepts"). Attentional mechanisms can straightforwardly account for this phenomenon. Attentional modulation plays a key role during percept formation. Very roughly, in some influential accounts (e.g., Clark, 2013; Hohwy, 2013), during percept formation, attentional modulation (roughly, inferring "precisions") determines which aspects of the incoming sensory signal are given more weight (i.e. amplified) and which aspects of the incoming sensory signal are ignored (see Clark, 2013; Hohwy, 2013). Several contextual factors influence such differential regime of weights assignment. For example, descending sensory expectations based on multilevel stored knowledge about the faced situation (see Clark, 2013; Hohwy, 2013). To take a typical example, from the same noisy stimuli, such as white noise, given different contextual cues, one can form either the auditory percept of a familiar song, or the percept of a conversation, or just random tones. In this sort of case, expectations triggered by contextual cues determine which aspects of the incoming sensory array are (subpersonally) taken to be relevant and which aspects of the incoming sensory array can be taken to be just noise, relative to the expectation in question. There is no reason to deny that this process of expectation-based weight assignment also occurs in the case of percepts of the inner condition of the body. Now, let's assume that positive and negative skydiving involve different context-sensitive expectations about the "likability" of the coming experience. Let's say that, regarding the prospects of skydiving, one person feels excited and that the other person feels afraid, so that the former expects the experience to be good, while the latter expects the experience to be bad. Considering that such differing expectations imply different assignments of precisions relative to the (purportedly) same input stimuli, the percept that results from this process will be composed of different features, thus changing the configuration of the percept that will eventually be experienced. That is, given different kinds of context-sensitive sensory expectations, by differentially weighting different aspects of the *same* pattern of bodily changes via attentional mechanisms, the kind of interoceptive percept of the body formed in the case of positive skydiving can differ from the percept of the body formed in the case of negative skydiving. Thus, if this view is on track, in the case in question the pattern of bodily changes characteristic of skydiving is *not* perceived as the same type of bodily state. Carruthers' argument fails then to establish its conclusion, simply because, in this account, skydiving does *not* count as a case in which the *same* bodily percept involves different valence values. Cases such as skydiving do not rule out then the possibility that valence, together with arousal, is also realized by representations in the interoceptive system[3].

Conclusion

As I attempted to show in this paper, Carruthers's version of NSS is problematic on its own, independently of the plausibility of competing theories of valence. The arguments provided by Carruthers are not successful in showing that the independence claim holds. That is, his arguments to the effect that valence is non-sensory fail to rule out the hypothesis that, together with arousal, valence might also be grounded in bodily, sensory representations. Carruthers's version of NSS needs to be then more thoroughly substantiated. Thus, even though NSS might be the case, Carruthers's arguments are not compelling in showing why this view might be on track.

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[3] Carruthers (2011) puts forward some other arguments regarding the nature of valence, such as the argument based on the case of pain asymbolia, in which subjects still experience pain, but in a non-affective sort of fashion. However, these arguments deal with the issue of whether valence ((dis)pleasure) has a distinctive phenomenology on its own. Such arguments do *not* deal with what I called "the independence claim". The latter is the target of the arguments of this section.

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