

Comment on Pitts et al. 2018

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Recurrent Processing Theory (RPT) v. Global Neuronal Workspace Theory (GNWT): On the dissociation between consciousness and attention

(Forthcoming commentary in *Philosophical Transactions of the Royal Society B: Biological Sciences*)

The relationship between attention and consciousness is one that is crucial for understanding perception and different types of conscious experience, and we commend this analysis of the topic by Pitts, Lutsyshyna, and Hillyard (2018). We have also examined this relationship closely (e.g., Montemayor & Haladjian, 2015) and would like to point out a few potential contradictions in the Pitts et al. paper that require clarification, particularly in the attempt to reconcile aspects of recurrent processing theory (RPT) with global neuronal workspace theory (GNWT).

One of the main debates regarding the relationship between consciousness and attention is between single dissociation views that claim there cannot be consciousness without attention and double dissociation views that claim there can be consciousness in the absence of attention (Mack, Clarke, & Erol, 2018). The single dissociation view is defended by proponents of GNWT, and the double dissociation view by supporters of RPT. One problem with the authors' argumentation is that they seem to be misinterpreting the strength of RPT's commitment to the double dissociation view, which leads to contradictions in their paper.

Thus, the authors' conclusion that RPT can be compatible with a single dissociation view (GNWT) is problematic for various reasons. First, the authors are not clear about whether or not RPT should be defined in terms of a single or double dissociation view. For example, in Section 2, references 17 and 18 describe studies on how *top-down attention* specifically relates to consciousness, which is argued to demonstrate a double dissociation, but this conclusion is weakened and could be interpreted as a single dissociation when other forms of attention are considered (as the authors describe in Section 3). Second, and most importantly, the generally accepted definition of RPT entails a double dissociation (i.e., a mutual independence of consciousness and attention), as it is supposed to assume the distinction between phenomenal

consciousness and other forms of cognitive access. Also related to RPT is Block's (1995) distinction between access and phenomenal consciousness, which entails double dissociation, at least in Block's own interpretation of this distinction. Although the authors seem to initially accept this definition, they proceed to contradict it when asserting that their arguments can reconcile aspects of GNWT and RPT.

Another potential contradiction is found in Section 3, where they outline the relationship between consciousness and attention according to GNWT and RPT. The authors say: "Positing a dependence of consciousness on (some type of) attention does not automatically imply an 'access-only' view of consciousness". Such a dependence, however, entails a single dissociation view because consciousness (either access or phenomenal) depends on attention ("early" or "late), and this dependence is incompatible with RPT, under the standard understanding of RPT (e.g., Lamme, 2003). Moreover, the authors assume that attention requires some sort of recurrent process to bias signal processing, and later, in Figure 1, they include recurrent processing in the "preconscious / zero attention" cell—it is not clear what they mean with this. In any case, RPT according to its proponents, entails double dissociation, and therefore, these arguments by the authors are not supportive of RPT.

They continue: "In our current view, phenomenal consciousness is distinct from access consciousness, and each may depend on different attentional mechanisms. This view is consistent with specific aspects of both RPT and GNWT" (Section 3). This claim contradicts the way RPT and GNWT are understood because, as just mentioned, the standard interpretation of RPT is a double dissociation view. If phenomenal consciousness depends on any type of attention, then this is a single dissociation view because only attention can occur without consciousness, not the other way around. This does not change if one multiplies the types of attention at stake, as long as one agrees on the definition of attention as selective processing of information that provides access to contents (Montemayor & Haladjian, 2015). Phenomenal consciousness loses its fundamental status if it is made dependent on any type of attentional cognitive access. It could be the case that phenomenal consciousness relies simply on signal/information processing, and that it is not dependent on recurrent processes of attention. For instance, attention may require agency and motivation (Fairweather & Montemayor, 2017) and consciousness may occur without it. But this possibility is also incompatible with the authors' view because of their claim that consciousness is dependent on some type of attention.

Similarly, the authors say: “phenomenal consciousness may be more basic, arise at earlier time-points and depend on more localized types of processing (consistent with RPT), while still being critically dependent on some variety of attention (consistent with GNWT).” Again, this contradicts both the definition of phenomenal consciousness as primitive (as defined by the main proponents of RPT) and the basic tenets of RPT. This is not really a conciliatory view, but one that is either contradictory or which only favours GNWT (or essentially claiming that RPT is a single dissociation view). The authors also follow Koch’s definition of phenomenal consciousness, and Koch endorses a double dissociation view, so their own definition of phenomenal consciousness entails double dissociation. The authors are confused about this, as they think a single dissociation view (e.g., Dehaene & Naccache, 2001) is compatible with the definition by Koch of phenomenal consciousness (Koch, 2004; Koch & Tsuchiya, 2007). It could be that the source of the confusion is that Koch talks about “top-down” attention, but the taxonomy presented by the authors does not explain how to reconcile a different (not top-down) type of attention with Koch’s explicit assertion that consciousness and attention are independent.

In terms of their studies and the proposed taxonomy for investigating levels of attention in relation to different forms of consciousness, their proposal is generally a good idea. We are, however, a little sceptical if it is possible to study a true “no attention” condition (i.e., is there a clear distinction between minimal attention and no attention?). They do state that the horizontal axis of this taxonomy in Figure 1, which “depicts different ‘amounts’ of attention, is oversimplified” and that attention “undoubtedly varies along many more dimensions than plotted here” (Section 4). Nevertheless, we still require a solid example of “zero attention”. The best examples described are the use of the attentional blink paradigm and the inattentional blindness paradigm, which they say provide “little or no attention to the critical stimuli”; however, inattentional blindness is still not the best evidence for demonstrating the complete absence of attention (e.g., even when you completely ignore the gorilla in the scene, attention can be suppressing such stimuli because you are focused on the primary task).

To summarise, it is indeed a critical topic to explore how attention and consciousness are dissociated, as many authors have done. It is also critical to understand how popular theories fall into different dissociation views (e.g., see Haladjian & Montemayor, 2013; Montemayor & Haladjian, 2015). The main oversight of this paper is that the central dispute among authors is between the single and double dissociation views, not between different interpretations of the

single dissociation view—the view that consciousness depends on attention, even if attention is defined in multiple ways. Moreover, in order to establish a genuine “no attention” condition in such studies, there needs to be a better understanding and detection of the neural processes that unquestionably indicate the presence of attentional processing, both the enhancing and suppressive aspects of attention—a challenge not yet achieved by our tools (so at best, only “minimal attention” conditions can be claimed).

Regardless of which theory is the best neural model of consciousness, if empirical studies indicate that consciousness relies on the earliest forms of attention, this would favour a single dissociation view. A new taxonomy is clearly needed, and non-attentional processes may play a key role. But more careful definitions, a detailed analysis of the dissociation between consciousness and attention, and a clear characterization of non-attentional processing must be in place. If RPT is true in the end, then the taxonomy should include primitive forms of consciousness that do not depend on forms of attention. We agree with the authors that a spectrum of dissociation between consciousness and attention should be tested in order to better understand the relationship between the two, but we also think this should be informed by evolutionary considerations (Haladjian & Montemayor, 2015; Montemayor & Haladjian, 2015). These questions should be investigated in order to support either GNWT or RPT. The authors’ present proposal, however, is not enough to do this, and ultimately is biased towards GNWT because of its commitment to a single dissociation view.

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