

LETTER TO THE EDITOR

Reply: Response to ‘Minimally conscious state or cortically mediated state?’

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Sir,

I read with interest the letter by Bayne and colleagues (2018) on my recent reinterpretation of the minimally conscious state (MCS) as a cortically mediated state (CMS).

In their letter, Bayne *et al.* agreed on my demonstration of MCS being rather a CMS, and on the necessity to create a new classification combining behavioural and functional brain-imaging criteria, but they disagreed on adopting this new CMS label based on several concerns (Naccache, 2017; Bayne *et al.*, 2018).

First, they raised the issue that criteria used to label the MCS “also inform us with certainty that the patient is still alive, but no-one would suggest that the MCS should be relabelled the ‘Still Alive State’”. Here, Bayne *et al.* missed a crucial point that I could have framed more explicitly: the label that we attribute to a given patient corresponds to the richer state we were able to observe with certitude when examining this patient. So, when we say that a patient is in an MCS, we also imply that we couldn’t find reliable evidence in favour of a richer state. Thus describing a patient as being in an MCS also means that there is no evidence that this patient is in a conscious exit-MCS. Likewise diagnosing a patient as being in a vegetative state (VS) also implies that there is no evidence that the patient is in an MCS, even if vegetative functions that are preserved in VS are also obviously preserved in MCS patients. Similarly, stating that a patient is in a CMS means that he/she expresses complex behaviours which necessarily recruit cortical networks (contrarily to what we observe in the behaviour of a VS patient), but without any additional certitude about the conscious versus unconscious type of

these cortically-mediated behaviours. Indeed, many cortically mediated behaviours and cognitive processes do occur unconsciously, both during conscious and unconscious states. So the CMS label keeps its relevance to differentiate close but distinct states, in difference with a useless label such as the ‘Still Alive State’ common to all categories at stake.

Second, Bayne *et al.* worried about the absence of EMCS in the new classification I proposed. I reassure them: patients who are in a behavioural EMCS fall, in this proposed new classification, in the conscious 4b category given that functional communication enables to be sure of the existence of subjective reports. Actually, this point was mentioned in my article: ‘At the top of this classification, the label 4b corresponds to the current exit-MCS label’.

Bayne *et al.* then discussed the utility of such a CMS valid label for care-givers and relatives of patients who: ‘are not interested in whether the patient’s behaviours are cortically mediated; instead, they want to know whether these behaviours are accompanied by experiences (and if so, what those experiences are like)’. I fully agree with the premises of this point. But when confronted with these complex situations of patients showing rich behaviours but unable to engage in functional communication, we have no choice but to face and to address this complexity. To do so, our first duty deals with clarity: using words that we can explain and define. I doubt ‘minimally conscious’ is a clear expression, pending the question of what is ‘minimal’ here, and pending the absence of consensus about the definition of ‘consciousness’ (see below). The use of an ambiguous wording opens many misunderstandings. Moreover, my experience with

families and caregivers leads me not to underestimate their great ability to understand the following core principle when clearly explained to them: organized patterns of cortical activity (such as the ones translating into cortically mediated behaviours) are mandatory for conscious states, but this necessary condition is not sufficient. As mentioned above, some complex cortically mediated behaviours can occur in unconscious patients. As I wrote: “Once we redefine the MCS as a CMS, rather than a direct and univocal evidence of conscious processing (conscious but ‘minimal’), these problems and misunderstandings should be addressed more easily. This could be a clear starting point to then explain the much less clear issue of consciousness in the concerned patient”. Please note, that my proposed classification does not avoid addressing the central issue of consciousness, but tries to address it on firm and clear grounds.

Finally, Bayne *et al.* questioned the self-reportability definition of consciousness I adopted. This refers to a rich, longstanding, philosophical psychological and scientific debate that is clearly out of the scope of this concise response. However, I would like to emphasize the following three points.

First, self-reportability is consensual (an individual able to self-report is consensually defined as being conscious), whereas the ‘aware without self-reportability but still conscious state’ proposed by Bayne *et al.* is much looser. At the extreme, disentangling conscious from unconscious non self-reported experiences may turn out to be impossible to test (and maybe even to define) within the Bayne *et al.* perspective, and may finally resemble to the irrelevant ‘Still Alive State’ they mentioned. One risk inherent to this posture consists precisely in throwing ‘the baby [here, the psychological importance of subjective reports in consciousness] out with the bathwater [motivated by the search of an exhaustive definition of consciousness]’. In other terms, when Bayne *et al.* qualify my view on consciousness as being ‘conservative’ by sticking to reportability, I consider their statement as a compliment: being conservative means here taking conscious subjective thoughts seriously and rigorously. No need to mention that dignity of patients is not affected by the clinical label used to describe him/her.

Second, and contrarily to the apparent claims of Bayne *et al.*, reportability can be probed in ‘infants, brain-damaged patients and non-human animals’. For instance, Cowey and Stoerig (1995) magisterially designed a blindsight-inspired visual paradigm enabling the probing of subjective perceptual reports in macaque monkeys. Similarly, subjective reports can be explored in aphasic patients, in paralysed or non-communicating patients (Bekinschtein *et al.*, 2008), or even in the mute disconnected right hemisphere of a split-brain patient (Gazzaniga *et al.*, 1977) using innovative behavioural or physiological methods. In the same vein, once a neural signature of conscious access is defined (Sergent *et al.*, 2005), one can look for it, and find it, in 5-month-old young infants (Kouider *et al.*, 2013), in non-communicating patients (Bekinschtein *et al.*, 2009), or in non-human primates (Uhrig *et al.*, 2014), in order to reveal the functionality of

this core mechanism of reportability. A reportability definition of consciousness may therefore be psychologically much richer than intuitively thought, and cover a much larger perimeter of situations than expected.

Third, I agree on the multidimensional view of consciousness proposed by Bayne and his colleagues (Bayne *et al.*, 2016), but from a different perspective. Pragmatically, we recently showed that probing conscious processing in patients through the manipulation of several (rather than only one) cognitive dimensions within the same EEG protocol enabled us to increase diagnostic sensitivity (Sergent *et al.*, 2017). Conceptually, the multidimensional view of consciousness is not incompatible with the existence of one core process showing an ‘all-or-none’ property (reportability present or absent), combined with multiple other components (e.g. language, episodic memory, executive functions, etc.) the functionality of which would contribute to a taxonomy of various conscious states. Such a multidimensional view of patients can be derived from the global workspace theory of consciousness (Dehaene and Naccache, 2001). Therefore, adopting a multidimensional view on consciousness (Bayne *et al.*, 2017) does not preclude the ability to differentiate between various conscious and non-conscious fine-grained states based on presence/absence of self-reportability in behavioural and brain imaging data.

As a conclusion, this diversity of conceptual views on consciousness further strengthens the importance of building and explaining our clinical diagnoses on firm grounds, and to describe fairly what is observed with certitude. Reinterpreting MCS as CMS could contribute to this clarification, as well as our respective calls for a new classification combining behavioural evidence with functional brain-imaging data. This perspective could open a dialectic and progressive improvement in the way we describe, understand, name, explain, and ultimately try to cure, patients affected with disorders of consciousness.

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