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## Truly minimal criteria for animal sentience

Commentary on [Crump et al](#) on *Decapod Sentience*

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**Abstract:** The criteria for determining animal sentience proposed in the target article are sensible but they lack an explicit functional justification for the focus on pain. This commentary provides an abbreviated account of the most basic functional principles that underpin animal sentience and articulates some minimal criteria for determining its presence.

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**1. Introduction.** It is difficult (if not impossible) to determine whether something is present in an organism if we do not know what that ‘something’ is. To determine whether an organism is conscious, therefore, we need to define what ‘consciousness’ is. There are two ways of doing so: phenomenologically and functionally.

The most widely accepted phenomenological definition of consciousness is Nagel’s (1974): “An organism has conscious mental states if and only if there is something it is like to *be* that organism – something it is like *for* the organism.” The difficulty with this definition (when using it as a criterion for the presence of consciousness) is the insurmountable ‘problem of other minds’: only the organism itself knows whether or not there is ‘something it is like’ to be it. This problem obliges us to use functional criteria instead.

In light of this problem, many neuroscientists declare ‘reportability’ to be the best empirical criterion for determining the presence of consciousness (e.g., Naccache, 2021). However, not only does this preclude non-verbal organisms, almost by definition, but it is a remarkably weak criterion in itself. For example, it is easy to instantiate false reportability in a zombie. That is presumably why, when one is required to demonstrate that one is not a robot, e.g., on the internet, one is not asked to simply attest to the fact; instead, one is required to successfully perform a mental task (usually a disambiguation task).

**2. Beyond Reportability.** Not surprisingly, therefore, Crump et al focus on functions other than reportability; but the *principles* underpinning their selection are not explained. Why focus so much on pain? Is it not conceivable that there might be something it is like to be an organism which does not feel pain? Why is pain so special? In what sense does it differ from vision, which – as we know -- readily goes on unconsciously?

The fundamental sense in which pain differs is that it is a variety of affective *feeling* as well as being a variety of perception. Pain entails not only the perception of a particular type

of stimulus but also the organism's *subjective response* to that stimulus. Considerations such as these led me recently to propose that a minimal functional definition of consciousness should focus on raw feeling in general, rather than pain in particular (Solms & Friston, 2018, Solms, 2019, Solms, 2021). This proposal was based not only on the logical fact that all feelings are felt, by definition ('unconscious feeling' is an oxymoron), but also on the empirical fact that the brain mechanisms of raw feeling are inextricable from the centrencephalic mechanisms that sustain consciousness as a whole (see Solms, 2021, for review). In short, feeling appears to be the elemental (and prerequisite) form of consciousness.

To illustrate the functional mechanism of feeling (i.e., what it *does*), Merker (2007) used the example of air hunger. Respiratory control normally goes on unconsciously, until the organism encounters *unexpected* situations (e.g., a carbon dioxide filled room) in which respiratory reflexes cease to maintain blood gasses within their viable homeostatic bounds. At this point, the need for oxygen (felt as air hunger, a.k.a. respiratory distress or suffocation alarm) forcibly intrudes upon consciousness. Why? What does the feeling of your blood gas balance add to their normal autonomic control? It adds the capacity for *choice*, which underpins voluntary (as opposed to automatic) action. You have never been in a burning building before, let alone this particular one, so you have no pre-existing means to maintain your viable blood gas balance in these circumstances. Feeling provides the necessary basis for selecting what to do; it tells you whether your selected action policy is leading to improving or deteriorating conditions. Here, deteriorating blood-gas values (registered as increasing feeling of suffocation alarm) predict imminent death, and improving ones (registered as decreasing feeling of alarm, i.e., as relief) predict survival. So, feeling orients the organism's actions within the value system that underwrites all life, namely, that it is 'bad' to die and 'good' to survive. The crucial leap here is to recognise that these values apply, in any given instance, only to and for the organism (to paraphrase Nagel). In other words, they are inherently subjective. This is what licenses us to adopt the viewpoint of the organism.

In addition, feeling registers to and for the organism *which* of its many component survival needs is currently the most salient. Homeostatic deviations cannot be reduced to a common denominator. If 4/10 of air hunger could be added to 6/10 of thirst, say, to yield 10/20 of total need, then we could survive by drinking alone, which is patently not the case. For this reason, an organism's component needs must be treated as categorical variables, not as continuous ones. And categorical variables are distinguished *qualitatively*. That is why suffocation alarm feels different from thirst, which feels different, in turn, from pain, and so on. This, I have argued (Solms, 2021), is the fundamental basis for qualia. This is what feeling is for: it registers, to and for the organism (i.e., subjectively), how well or badly it is doing with respect to a currently prioritised category of need (i.e., qualitatively). Through 'felt uncertainty', the organism modulates its confidence in a current action policy, and changes it as required, and learns from the experience.

**3. Principled Minimal Criteria.** On this basis, I propose the following minimal functional criteria for determining the presence of feeling (in general, as opposed to air hunger, or pain, etc., in particular):

- (1) The organism must be alive; which need not imply that it possesses a brain or nervous system (there are many other ways of transmitting and integrating information in the service of goal-directed action). *This criterion dictates only that the organism will (on average) act in ways that ensure its continued existence.*

**(2)** The organism must have multiple component survival needs, each of which must be satisfied in its own right, and it must have the capacity to prioritise those needs. *This criterion dictates that the organism's needs will be treated as categorical variables.*

**(3)** The organism must have the capacity to satisfy its multiple needs – by trial and error -- in unpredicted situations (e.g., novel situations), using voluntary behaviour. *This is the critical criterion. It is difficult to imagine how such behaviour can occur except through subjective modulation of its success or failure within a phenotypic preference distribution. This modulation, it seems to me, just is feeling (from the viewpoint of the organism).*

Less critical, but obviously adaptive, is:

**(4)** The organism must have the capacity to learn from such experiences. *This is Thorndike's 'law of effect'.*

Also not critical, but equally adaptive, are:

**(5)** The organism must have the capacity to extend felt experience onto perception. This implies a capacity to 'feel like this *about that*'. *Admittedly, it is difficult to operationalise this criterion in terms of observable behaviour.*

**(6)** The organism must have the capacity to plan; that is, to act voluntarily in virtual realities, in addition to actual ones. *This is the capacity for thinking, a.k.a. working memory.*

The last three criteria reflect the fact that consciousness admits of degrees. Not all conscious organisms are equally conscious.

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