Butlin, Patrick (2022) Sentience criteria to persuade the reasonable sceptic.
Animal Sentience 32(21)

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Sentience criteria to persuade the reasonable sceptic
Commentary on **Crump et al.** on *Decapod Sentience*

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Abstract: When presented with evidence that Crump et al.'s criteria are satisfied for the animals in some taxon, a sceptic could reasonably continue to suspend judgement about whether those animals are sentient. This is because the criteria refer to abilities which are associated with sentience in humans, but it is not clear that sentience is necessary for these abilities. The criteria could be strengthed by requiring evidence of a contrast in performance between cases in which information is carried by felt and unfelt states.

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1. Introduction. Crump et al.'s target article proposes a new set of criteria for pain experience, designed to be suitable for assessing evidence of sentience in invertebrates, and in this case applied to decapod crustaceans. In assessing these criteria we should bear in mind that different evidential standards may be appropriate for different purposes. For example, one of the authors has previously argued that, for the purpose of formulating animal protection legislation, the evidential bar for sentience should be set at an intentionally low level (Birch 2017). This precautionary approach is intended to reduce the risk that uncertainty will lead to inadequate protections for animals who are in fact sentient. One way to evaluate Crump et al.'s criteria would be to ask whether they set a suitable evidential bar for protection.

A different purpose for which Crump et al.'s criteria might be used is to determine whether a person should *believe* that the animals in some taxon are sentient. Believing something is not the same as taking it to be true for a limited practical purpose (such as formulating legislation). For a person unfamiliar with the literature on decapod behaviour and cognition, a reasonable attitude would be to suspend judgement because they would be unable to justify believing either that decapods are sentient or that they are not. So we can also evaluate Crump et al.'s criteria by asking whether such a person should change their view, and believe that decapods are sentient, if they learned that all or most of the criteria were satisfied.

According to Crump et al., high confidence that seven or eight of their eight criteria are satisfied would amount to 'very strong evidence' of sentience (p. 9). This suggests that, in their view, one should believe that the animals in a taxon are sentient if they meet this standard. I am not so sure. In this commentary I will argue that it would be reasonable to continue to suspend judgement even if all eight of their criteria were met.

2. The criteria. Crump et al.'s criterion 1 is that the animal has nociceptors. Criteria 2 and 3 are that the animal has brain regions that integrate information from different sensory sources, and that neural pathways connect nociceptors with these regions. Criterion 4 concerns the modulation of the animal's behaviour in response to noxious stimuli by endogenous neurotransmitters and putative local anaesthetics, analgesics and other drugs. Criteria 5 and 6 are that the animal shows motivational trade-offs leading to flexible decision-making and flexible self-protective behaviour. Criterion 7 is that it shows associative learning, and criterion 8 is that it shows that it values putative analgesics or anaesthetics.

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1. **Nociception**

2. **Sensory integration**

3. **Integrated nociception**

4. **Analgesia**: (a) endogenous (b) exogenous

5. **Motivational trade-offs**

6. **Flexible self-protection**

7. **Associative Learning**

8. **Analgesia preference**: (a) self-administer (b) location (c) prioritised

Eight criteria for pain sentience
(Crump et al., 2022, §2.2)

Crump et al. acknowledge that criterion 1 could easily be satisfied by a non-sentient animal. In other cases, however, their criteria are designed to avoid this feature. For example, they emphasise that criteria 5 and 6 are not satisfied by behaviour based on interaction between reflexes, since it is assumed that reflexive behaviour does not require sentience. Similarly, they emphasise that habituation and sensitisation are not sufficient to meet criterion 7, because these too are considered to be possible without sentience. This emphasis is clearly important, but we can reasonably ask for more. What is the positive argument for the view that an animal that satisfies the criteria is very likely to be sentient? Why should we think that flexible decision-making, for instance, could not be achieved by a non-sentient animal?

I take it that hypotheses about how sentience facilitates cognitive functions in humans would be central to this argument (see p. 3 of the target article, and the discussion of associative learning on p. 7, for relevant comments). The criteria emphasise integration of information from different sources, flexible behaviour, and associative learning, which roughly correspond to three abilities that Birch (2022) lists as plausibly facilitated by sentience in humans.[1] The general form of the argument seems to be that if crustaceans have abilities that require sentience in humans, then they are likely to be sentient.

3. Assessment of the criteria. Several authors have recently offered grounds to resist arguments of this form, or proposed methods for finding stronger evidence of sentience. These authors tend to use the language of consciousness rather than sentience, and I will

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[1] These three abilities are cross-modal learning, rapid reversal learning, and trace conditioning. The criteria also emphasis responses to analgesics, but see Irvine (2020) for an argument that sensitivity to analgesia is of relatively little evidential value, and that abilities relating to sentience in general are more significant in the identification of pain experience.

describe their views in the language they use, but I take these terms to be closely related. 'Consciousness' here refers to what philosophers call 'phenomenal consciousness'. For an animal to be sentient is for it to be capable of conscious (felt) states. Such an animal might also be called conscious, and a non-sentient animal may be described as nonconscious. Conscious processes involve conscious states, while unconscious processes do not.

In the most notable response to the form of argument just sketched, Browning and Veit (2020) emphasise the difference between *unconscious* processes in conscious (sentient) animals and *nonconscious* processes in non-sentient animals. They argue that evidence that a function cannot be performed through an unconscious process in a conscious animal does not show that a similar function cannot be performed in a nonconscious animal which has evolved or developed differently.

In addition to this, Skora et al. (2021) provide evidence that instrumental conditioning requires consciousness in humans but they argue that this does not imply that evidence of instrumental conditioning in simpler animals supports the view that they are sentient. Instead, they suggest that instrumental conditioning may be 'optimised for more complex and flexible decision-making' in humans in a way which requires consciousness, while taking a simpler form, which does not require consciousness, in some other animals. Shea and Frith (2016) argue that consciousness facilitates tasks of certain kinds, rather than being necessary for any, thus supporting Browning and Veit's view that we should be open to the possibility that nonconscious animals have ways to perform functions which are facilitated by consciousness in humans.

It could therefore be reasonable to continue to suspend judgement, despite good evidence that Crump et al.'s criteria are satisfied. Someone who took this attitude could be described as a 'reasonable sceptic'.

Criteria which would make such an attitude unreasonable might incorporate a further idea proposed in the recent literature. Birch (2022) proposes that particularly strong evidence of consciousness would come from studies showing a contrast in performance, in a cluster of consciousness-linked abilities, between cases of putatively conscious and unconscious perception of stimuli. He suggests that masking procedures analogous to those that cause unconscious perception in humans could be used; these might selectively switch off consciousness-linked abilities in animals which exhibited those abilities when the same stimuli were not masked. This would be evidence for a contrast between two kinds of states in the animal's mind which would play a similar functional role to the conscious/unconscious contrast in humans. The same method is advocated by Crump in Birch et al. (2022) and by Crump and Birch (2021). I have also previously argued that strong evidence is provided by contrasts in behaviour that are best explained by a distinction between conscious and unconscious states, with reference to studies of taste aversion conditioning and incentive learning (Butlin 2020).

At this point one might ask whether a failure to find evidence of a contrast should be considered evidence that animals in the taxon in question are not sentient. Of course, failures to find evidence will often be explained by the limitations of particular attempts, so should not immediately be taken to show that no contrast exists, or that the animals are not sentient. However, an approach to the study of non-human consciousness should ideally include a principled method to establish negative conclusions (Shevlin 2021). The possibility that

consistent failures to find evidence of a contrast should be taken as a negative marker seems worthy of consideration.

4. Conclusion. I have argued that the sentience criteria offered by Crump et al. are too weak to persuade a reasonable sceptic of crustacean sentience. These criteria require evidence of the presence of sentience-linked abilities which are described in fairly broad terms. The sceptic could argue that it is plausible that a non-sentient animal could possess such abilities, appealing to Browning and Veit's unconscious/nonconscious distinction. More compelling criteria would incorporate a requirement for evidence of a contrast in performance.

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