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## How much of a pain would a crustacean “common currency” really be?

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

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**Abstract:** We should be suspicious of the idea that experiencing pain could enable animals to trade off different motivations in a common currency. It is not even clear that *humans* have a common motivational currency reflected in evaluative experience. Instead, pain may capture attention, inhibiting attention to competing motivations and needs, thereby making genuine trade-offs *harder*. Our criteria for pain in invertebrates should be part of a more subtle theory of the relationship between pain and decision-making.

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Crump et al.’s (2022) extensive, rigorous, and even-handed survey of the literature on sentience in decapod crustaceans in this journal, alongside their government report (Birch et al., 2021), are very valuable contributions to academic and public discourse on animal sentience. Crump et al. propose eight empirical criteria for inferring that a species can experience negatively valenced states. These criteria do not rest on any one specific theory of sentience; this is a strength, given the abundance of theoretical options in the field. However, such criteria do require a rationale. I will argue that more detailed theorising is needed than Crump et al. provide. We should expect the relationship between pain and motivational tradeoffs (Crump et al.’s Criterion 5) to be much more subtle than the authors (and many others in the field) suggest.

Pain is not simply centrally processed nociception, or even nociception made conscious. It matters how nociception is processed. Crump et al.’s Criterion 5 attempts to help further specify the relevant kind of processing:

*“The animal shows motivational trade-offs, in which the negative value of a noxious or threatening stimulus is weighed (traded-off) against the positive value of an opportunity for reward, leading to flexible decision-making. Enough flexibility must be shown to indicate centralized, integrative processing of information involving an evaluative common currency.”* (Crump et al., 2022, p. 17)

The rationale for this criterion seems to lie in the idea that consciousness is to be understood in terms of centralised integration of sensory-motor activity to produce flexible behaviour. However, whereas pain may well be involved in other forms of integration, I will try to argue that pain does not typically enable tradeoffs on the basis of a common currency, at least in the human cognitive economy.

The idea that evaluative experience functions to enable tradeoffs between disparate needs has defenders (e.g. Cabanac 1996) and seems to motivate interesting experiments on invertebrate decision-making (e.g., Elwood, 2022; Gibbons et al., 2022). Criterion 5 is endorsed specifically by many of the other commentators (Brown, 2022; Irvine, 2022; Jablonka & Ginsburg, 2022; Montemayor, 2022; Walters, 2022; Woodruff, 2022). The idea of

a common currency, however, is a strong theoretical commitment and has come in for sustained criticism (Hayden & Niv, 2021). We do have to make decisions in situations where competing considerations favour different options. But it is not a foregone conclusion that we do so by converting those competing considerations into a single currency — whether felt valence or anything else.

The common currency idea is intuitively suspect. In some cases, evaluative aspects of our experience do let us compare them directly: I might be able to tell directly that the pain in my toe is not as severe as the pain in my knee, or that one apple tastes better than another. However, many cases are not like this. You might have one positive experience when eating apples and another for oranges. But is it really plausible that to decide between apples and oranges, or to know how many apples one orange is worth to you, you simply consult a single dimension shared between the two experiences? How about more complex and varied goods — comparing apples to petting dogs, puns, pushpin, or poetry? In these cases, if there is any appropriate economic metaphor for *my* experience, it would seem to be either fluctuating exchange rates or a haphazard barter system.

Here is an alternative picture of decision-making (cf. Hayden & Niv, 2021). We often use heuristics and bottom-up attentional mechanisms to *avoid* the need for a common currency. Sometimes heuristics help us to consider multiple disparate options and decide that one is best: for example, I might select one fruit rather than another by looking at them all and selecting whichever produces a positive association first; or I might choose between apartments to rent based on a checklist of just five of the many features I care about. Our mechanisms for choice often work instead by helping us to ignore a vast array of options. When deciding how to get to work, I might consider the bus and cycling, but it will not occur to me to take a taxi to the nearest horse auction and buy an animal to ride to campus. I do not assign this option a low value in a common currency: I do not consider it at all. Doing so would be at best time-consuming, and there might not turn out to *be* a common currency for all of these options in any case. The tradeoffs I do make between the options I do consider (bus and bicycle) may be performed implicitly via stored heuristics (if it's raining, take the bus) rather than via explicit evaluative experience.

This suggests an alternative account of *pain's* function: Pain may command our attention by *inhibiting* attention to competing needs, desires and potential actions, with more intense pains inhibiting more competing activity. One might take this to mean that pain allows for “implicit tradeoffs,” carried out at the level of different stimuli competing for attention. But this would be extremely misleading. During painful experience we can be *worse* at tradeoffs in the traditional sense, insofar as we ignore rather than weigh relevant options. Pain enables decision-making that is swift rather than subtle. In some cases we *can* exert top-down control, inhibiting pain's effects on decision-making and intentionally retaining focus on other issues, enough to make genuine tradeoffs. But that requires effort; it occurs despite pain rather than because of it, and may well be beyond the abilities of some pain-experiencing species. Tradeoffs in which multiple options are weighed *explicitly* against one another are interesting indicators of *sophisticated decision-making*, which may in turn be morally significant in its own right; but that need not involve anything like pain or even consciousness. Behaviour that can be understood as implementing *implicit* tradeoffs could in turn have many different causal mechanisms.

This view still ties pain — as opposed to mere nociception — to centralised integration of information. Commanding attention facilitates the integration of information concerning an aversive stimulus with information relevant to its cessation, just not with information

about competing needs. And it suggests that pain will only show up in relatively complex systems which do have competing needs between which attention can be allocated, ruling out some of the species that Crump et al. deem unlikely to be sentient. Yet this is a kind of integration rather different from the kind Criterion 5 instructs us to seek.

Perhaps pain helps with tradeoffs over longer timescales, via learning about the relative values of different options. This is plausible, but it risks collapsing into a criterion 7 (associative learning) rather than providing an independent line of evidence. It is also noteworthy that decision-making based on previously experienced pain is frequently distorted: we often make decisions based solely on the peak and end of a painful experience, ignoring all the other moments of that experience and even its duration (Kahneman et al., 1993). Extreme distress can also cause overlearning of negative associations and ultimately post-traumatic stress disorder (Shalev et al., 2017).

I have merely sketched a competing view of pain's relationship to decision-making. But this is enough to see that we can only have confidence in claims about the function of valenced states like pain given a better-developed theory. There is great uncertainty here, and we need a more systematic rationale for any criteria for sentience, alongside careful distinctions between different valenced states and their different functions. Future experimental designs inspired by Crump et al.'s inspiring work should aim to develop or at least cohere with such theorising.

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