Could fish feel pain? A wider perspective

*Commentary on **Key** on Fish Pain*

Yew-Kwang Ng
Division of Economics
Nanyang Technological University

Abstract: Key's (2016) target article provides some strong arguments but also makes some logical mistakes. The arguments are not sufficient to support a definite conclusion that fish cannot feel pain. A multi-faceted perspective taking into account brain structure, chemical secretion in brain, animal behavior, and evolutionary biology may be useful and appears, at least in some aspects, to suggest the opposite conclusion from that of the target article.

Yew-Kwang Ng ykng@ntu.edu.sg is Winsemius professor in economics at Nanyang Technological University. He is a fellow of the Academy of Social Sciences in Australia and Distinguished Fellow of the Economic Society of Australia. Yew-Kwang's recent books include: *Common Mistakes in Economics by the Public, Students, Economists and Nobel Laureates* (open access); and *Happinessism*. http://www.ntu.edu.sg/home/ykng/

Whether fish can feel pain is a very important question both conceptually and practically, affecting our appropriate treatment, including consumption, of them. The target article by Key (2016) thus tackles an important issue. It also provides a very specific view with some strong arguments. However, in my view, they are not strong enough to support the definite conclusion that fish cannot feel pain.

A different if not opposite view (e.g., Panksepp 2011, Mashour & Alkire 2013, Damasio & Carvalho 2013) is that the capacity for feeling pain evolved very early in evolutionary history — that at least all mammals and probably all vertebrates have that capacity, and that it is located deep in the lower brain structures like the brain stem, rather than in the cerebral cortex not possessed by fish. Strong evidence has also been given to support this opposite view. Key also provides strong evidence in favor of his view and discusses this opposite view. The evidence, though strong, is not conclusive for either side, at least in itself. Thus, there is a need to take a wider perspective considering other relevant facets. Before discussing this perspective (not exhaustively), I will touch on some problems of Key's arguments.

Having acknowledged the overall strength of his arguments, I will focus on the problems. The most important is that the arguments are not sufficient to support a definite negative conclusion that fish do not feel pain. True, the feeling of pain in humans may involve the several factors and the corresponding neuroanatomical features discussed by Key that fish do not possess. However, we cannot conclude that a jet plane cannot fly because it does not have a propeller (to use a well-known analogy). Logically, a condition A sufficient to give rise to B needs

not be a necessary condition for B. Thus, many researchers believe that the telencephalon and pallium in fish may be performing functions equivalent to some functions of our cerebral cortex.

There is another logical mistake. Key argues that "neither the medial pallium nor the whole pallium is required for escape behaviours from electric shock stimuli in fish. Therefore, given that the pallium is not even involved in nociceptive behaviours, it could not be inferred to play a role in pain" (Portavella et al., 2004). Using the same logic, one could argue: "The arm withdrawal reflex in humans is effected by the spinal cord. Therefore, given that the human brain is not even involved in the nociceptive behavior of the arm withdrawal reflex, it could not be inferred to play a role in pain." What is not involved in a lower function needs not be incapable of a higher function.

What is essential to explain the feeling of pain, or in fact any other conscious feeling, is the capability for subjectivity. Despite the significant advances in neuroscience (as eloquently outlined by, e.g., Ramachandran 2012) in the last two to three decades, the explanation of this "hard problem" of consciousness is nowhere in sight. This does not mean that contributions like Key's target article are useless or cannot cast some useful light on the hard problem. We should be cautious, however, not to insist on a definite conclusion without sufficient justification. A definite conclusion is difficult if not impossible to achieve at this stage of our knowledge. We may nevertheless obtain a better perspective by taking different facets into account.

One method is to examine the secretion of chemicals in the brain indicative of certain feelings (like pain) in humans. For example, using this method, Fossat (2014) showed that even invertebrate crayfish appear to be capable of anxiety, indicating that the spectrum of animal species capable of affective feelings is likely to be very wide. If some invertebrates are capable of anxiety, the claim that fish (a vertebrate) cannot feel pain (a more basic feeling than anxiety) must be treated with caution.

Another method is the observation of animal behavior to see whether they appear to be capable of feeling or even sentient states (e.g., moral feelings) higher than just basic conscious feelings. Though we should be cautious to avoid being misguided by our tendency towards anthropomorphism, some insights are possible. For informative and interesting accounts of the many impressive capacities for feeling, including even moral feelings of many animal species, see Balcombe (2010) and Bekoff (2013).

Lastly, I want to mention the use of evolutionary biology to help us answer the difficult question of which species are capable of consciousness. Key also mentions and uses evolutionary biology; however, he does not use the following useful principle I advanced two decades ago (Ng 1995). As also discussed in Ng (2016), using compelling axioms based on the principles of evolutionary biology, I show that a species must be flexible for its members to be capable of affective feelings. Roughly speaking, the brain mechanism giving rise to feelings must consume energy. If these feelings do not affect the flexible choices of the species, they do not contribute to their survival and reproductive fitness, and hence cannot survive evolutionary competition. In evolutionary equilibrium, such species would have been eliminated by natural selection. Thus, affective

species (those capable of having affects like pain and pleasure) must be flexible, that is, not having all their behavior hard-wired genetically. This turns the difficult question about consciousness into one about flexible behavior (still difficult but less so). If we can establish that the behavior of a species is completely inflexible, we may regard its members as not capable of feelings, including pain. In contrast, species capable of flexible choices are presumed to be capable of welfare (positive or negative).

Using the principle above, the question of whether fish feel pain is related to whether fish are capable of making flexible choices, but Key does not address this issue. Perhaps future researchers will pay more attention to this?

References

Balcombe, J. (2010). *Second Nature*, Palgrave Macmillan.

Bekoff, M. (2013). *Why Dogs Hump and Bees Get Depressed*, New World Library.

Damasio, A. & Carvalho, G.B. (2013). The nature of feelings: evolutionary and neurobiological origins. Nature Reviews Neuroscience, 14:143-152.

Fossat, P., Bacqué-Cazenave, J., De Deurwaerdère, P., Delbecque, J-P. and Cattaert, D. (2014). Anxiety-like behavior in crayfish is controlled by serotonin, *Science,* 13 June 2014, 344(6189): 1293-1297.

Key, B. (2016). Why fish do not feel pain. *Animal Sentience* 2016.003.

Mashoura, G. A. and Alkire, M. T. (2013). Evolution of consciousness: Phylogeny, ontogeny, and emergence from general anesthesia. www.pnas.org/cgi/doi/10.1073/pnas.1301188110

Ng, Y-K. (1995). Towards welfare biology: Evolutionary economics of animal consciousness and suffering, *Biology and Philosophy*, 10: 255-285.

Ng, Y-K. (2016). How welfare biology and common sense may help reduce animal suffering. *Animal Sentience* 2016.007.

Panksepp, J. (2011). Cross-species affective neuroscience decoding of the primal affective experiences of humans and related animals. PLoS ONE 6(9): e21236. doi:10.1371/journal.pone.0021236.

Portavella, M., Torres, B. and Salas, C. (2004). Avoidance response in goldfish: Emotional and temporal involvement of medial and lateral telencephalic pallium. *Journal of Neuroscience*, 24:2335-2342.

Ramachrandan, V.S. (2012). *The Tell-Tale Brain,* Windmill Books, London.