

AS WE SEE IT

Welfare of aquatic organisms: Is there some faith-based HARKing going on here?

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ABSTRACT: Much of the literature on aquatic animal welfare is flawed by 4 non-mutually exclusive (and often inter-related) biases: under-reporting/ignoring of negative results, faith-based research and/or interpretations, Hypothesizing After the Results are Known (HARKing), and inflating the science boundary. These biases have an insidious impact on the credibility of the 'science' surrounding aquatic animal welfare. While concerns about the welfare of aquatic organisms are valid, research on this topic should be grounded in the scientific method, embrace negative results, avoid faith-based interpretations of experimental results and/or HARKing, and strictly respect the science boundary.

KEY WORDS: Animal welfare · Pain · Suffering · Sentience · Feelings-based · Publication bias · Negative results · Inflating the science boundary

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INTRODUCTION

Welfare-centred discussions surrounding cognition, sentience, emotions, feelings, pain, and suffering in aquatic animals strain and blur the lines between science and ethics/morals/philosophy. We took this up previously in the introduction to a Diseases of Aquatic Organisms Special devoted to aquatic animal welfare (Browman & Skiftesvik 2007). Several analogous discussions, reflecting the growing scientific and societal importance of aquatic animal welfare, have followed (e.g. Cragg et al. 2008, Belebony 2008, Kaiser & Huntingford 2009 and the articles that they introduce: Smith 2009, Braithwaite 2010, Diggles et al. 2011).

In our view, much of the published literature that is reviewed, interpreted and debated in these fora is flawed by 4 non-mutually exclusive (and often inter-related) biases: under-reporting/ignoring of negative results, faith-based research and/or interpretations, Hypothesizing After the Results are Known (HARKing), and inflation of the science boundary (but see also the sobering additional issues raised by Ioannidis 2005 and Schooler 2011). As will be clear from reading these

articles, and those cited below, these biases are ubiquitous in science; they are by no means restricted to the literature on aquatic animal welfare. We have refrained from giving specific examples of articles that fall into one or more of the 4 bias categories because that would be polarizing and, therefore, counter-productive. Rather, our intention is to sensitize readers to these issues so that they are better-placed to critically assess the *scientific* merits of research articles on welfare-related aspects of aquatic animal physiology and/or behaviour that purportedly support (or refute) the different sides of the welfare issue.

DEFINING THE BIASES

Under-reporting of negative results

Negative results—those that do not support a research hypothesis—can provide more balance for a subject area thus far supported only (or primarily) by positive results; they may indicate that a subject area is not as mature or clearly defined as previously sus-

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pected, that a particular line of research is not worth further efforts, or that our current methodologies are inadequate for producing a definitive result (that is, a degenerating research program; sensu Lakatos 1978). Lakatos (1978) and Gould (1993) assert that positive results tell more interesting stories than negative results and are, therefore, easier to write about and more interesting to read; that is, a privileging of the positive. They contend that this may lead to a bias that acts against the propagation of negative results in the scholarly literature (see also Browman 1999 and articles about 'selective reporting' and 'publication bias' in science). Following from this, it is essential that authors on all sides of the welfare argument present a balanced discussion of the evidence, even that which does not support their argument (that is, in this context, a negative result). Editors and reviewers should insist that authors present and discuss—openly, honestly and rigorously—research by other workers that is inconsistent with their results and/or their interpretations. Readers should be critical of articles that do not take up alternative explanations/evidence. We further suggest that research intended to *falsify* pain-sentience-suffering in aquatic organisms is possibly more important than research intended to support it, simply because falsification tests are often less equivocal.

Faith-based research

Hilborn (2006, p. 554) asserts that '...there is a strong movement of faith-based acceptance of ideas, and a search for data that support these ideas, rather than critical and skeptical analysis of the evidence, (see also Gould 1978). We suggest that there is an analogous movement in the welfare literature. Readers should, therefore, be skeptical of articles in which hypotheses are tested using operationally undefinable variables (e.g. 'suffering', 'sentience', 'pain', and see below) and when the interpretations and conclusions presented in those articles appear to be faith-based and lacking a balanced discussion of evidence and explanations that are inconsistent with the author's.

HARKing

Kerr (1998) reminds us that scientific research is based upon the hypothetico-deductive approach: one deduces or derives an explicit and testable hypothesis from prevailing theory. He defines HARKing as '...presenting a *post hoc* hypothesis (i.e. one based on or informed by one's results) in one's research report as if it were, in fact, an *a priori* hypothesis'. It should be

clear to any objective reader that there is a lot of HARKing going on in the welfare literature. It should also be noted that authors who HARK are often doing a disservice to their data—that is, the evidence would be stronger if presented following the scientific method, without HARKing.

Inflating the science boundary (ISB)

Habermas (1984) warns against a tendency, rooted in the human desire for control, to redefine political, social or cultural phenomena into technical ones. This phenomenon, referred to as ISB, represents a shift—or a blurring of boundaries—in what is/is not considered scientific knowledge and who is/is not considered a scientist. Issues such as aquatic animal welfare, which are associated with complex political, social and cultural behaviour on the part of the actors on all sides of the argument, are magnets for ISB. The ISB problem is exacerbated when actors seek to obscure rather than clarify the distinction between technical and political, social or cultural phenomena. Using words such as 'feel', 'pain', 'suffer', 'conscious', 'sentience', 'humane', 'just' in 'scientific' articles purportedly supporting the 'feelings-based' approach to aquatic animal welfare represents the very definition of ISB (see also Stevens 2008, p. 115–116). These words cannot be operationally defined and, therefore, they are incompatible with the scientific process. Readers should be vigilantly attentive to the presence of ISB in the 'scientific' welfare literature.

SUMMARY

All of the issues raised above severely reduce the credibility of much of the published research on all sides of the welfare literature. While concerns about the welfare of aquatic organisms are valid, research on this topic should be grounded in the scientific method, embrace negative results, avoid faith-based interpretations of experimental results and/or HARKing, and strictly respect the science boundary. Discipline and vigilance in this regard is essential since the 'science' attached to welfare issues is (sometimes selectively) used to support legislation with far-reaching consequences for the manner in which aquatic animals are sampled in the field, experimented upon in the laboratory, cultured in aquaculture, and captured in commercial and sports fishing (see Diggles et al. 2011 for examples of such legislation). Therefore, we hope that this essay will serve as a focal point for further discussion of the nature of the science being conducted on aquatic animal welfare.

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