

RELUCTANT COMMENT ON FOX et al. (2012):
ON BEING DRAGGED INTO THE NOEC SQUABBLE

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For some time, the unsoundness of no observed effect concentrations (NOECs) has been apparent to any professional who spent enough time reading the literature. All that remains to be done by the regulatory community is a negotiated phase-out. And the sooner, the better.

Given this belief, I was surprised to read in a prepublication copy of the Fox et al. Learned Discourse (this issue) that I had provided supportive comment about NOEC usefulness. Fox et al. state that Newman and Clements (2008) “reinforce [the insufficient data justification for the NOEC] with (in our view, flawed) advice that ‘hypothesis testing is preferable to modeling if one has no understanding of the relationship between the effect and the toxicant concentration’” although they later ask the rhetorical question “is it not better to confront these uncertainties at the onset of an investigation?” Overlooking the awkward confounding of 2 of my disparate points, the advice contained in the quote was offered about general data analysis in our science, not NOEC use in applied environmental toxicology and risk assessment. Substantial details followed in that and my other publications that essentially concur with what Fox et al. now propose. Perhaps due to their eagerness to criticize a particular point in the NOEC argument, my advice was reframed as a contribution to the NOEC debate. Comments by Wayne Landis, Fox’s co-chair of a recent Berlin Society of Environmental Toxicology and Chemistry session on the issue, similarly misconstrue my thoughts.

Having been dragged into the squabble, let me be very clear that I do not, and never did, support the fundamentally wrongheaded NOEC approach. However, more to the point, I have little interest in counting coup over the NOEC’s dead body. The facts are clearly stated and the issue is now one for skilled negotiators of regulatory change.

The white whale tasks me... Yet he is but a mask. ‘Tis the thing behind the mask I chiefly hate;... the malignant thing... that maws and mutilates.

Moby Dick; or, The Whale

The NOEC is only a manifestation of what does task me, that being our pervasive misuse of the conventional null hypothesis significance test (NHST) and consequent weakened inferences. Most NHSTs apply a traditional α of 0.05 with an ill-defined β and an effect size of zero difference or correlation. Outcomes of NHSTs are either, defined as significant or not, or categorized as not significant ($p > 0.05$), significant ($0.01 < p \leq 0.05$), or highly significant ($p \leq 0.01$). Such convention is now being questioned throughout the social and natural sciences (Fidler et al. 2004, Gigerenzer 2004), and it seems sensible to spend a good deal of effort reexamining its use in our field (Newman 2008, 2012). That is the central theme of my relevant publications in which changes and alternatives to our NHST practices are proposed (Newman 2008; Newman and Clements 2008, pages 168–180, 820–826^{Q1}; Newman 2010, pages 243–244^{Q2}; Newman 2012, Chapter 5 and Appendix 27^{Q3}). Some discuss the NOEC as an evident NHST misapplication (e.g., Newman 1995, pages 197–201^{Q4}) but the main focus is application of NHST and alternatives in the sciences of ecotoxicology and environmental chemistry. I encourage readers to explore this broader, and potentially much more malignant, problem in our science. Unlike the scientifically moribund NOEC, that NHST beast still lurks unchallenged throughout our scientific practices, mawing and mutilating inferences.

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