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## Strong Claims, Feeble Evidence: A Rejoinder to Falk et al. (2010)

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### Abstract

The criticisms of Falk et al. (2010) are addressed, and the question of whether claims made by Falk et al. (2007) are valid is revisited. This rebuttal contends that Falk et al. (2007) misconstrue Popper's role in philosophy of science and hence do not provide a strong test of their hypothesis. Falk et al. (2010) claim that they never made causal statements about the impact of zoo and aquarium visits in their 2007 study. Yet, this commentary shows that Falk et al. (2007) draw several unsupported, strong causal conclusions. The criticism that primary documents were not used in Marino et al. (2010) is also addressed, as this refutation demonstrates that the analysis was based on all available documents. Finally, this commentary aims, through its criticisms of Falk et al. (2007), to catalyze better-quality research on the effects of zoo and aquarium visits.

### Keywords

aquarium, Association of Zoos and Aquariums, attitudes, AZA, education, methodology, validity, zoo

"A wise man [and, we might add, a wise woman]," Hume (2007) reminds us, "proportions his belief to the evidence" (p. 492). In this brief commentary, we address the criticisms of Falk et al. (2010) and revisit the question of whether the strong claims of Falk et al. (2007) are supported by evidence.

First, Falk et al. (2007) seriously misconstrue the role of Popper's (1959) thinking in contemporary philosophy of science and its relevance to our arguments. They are correct that Popper's falsifiability criterion failed as an iron-clad demarcation criterion between science and nonscience. But the thrust of Popper's argument—that scientific hypotheses must be subjected to strong tests to be meaningful—still holds (see O'Donohue et al., 2007; Meehl, 1978; Bartley, 1962). As we (Marino et al., 2010) noted, Falk et al.'s methodology

relied largely on a post-only, retrospective-pre design, which fails to control for a host of sources of error and hence does not permit a strong test of their causal hypothesis. As Colosi and Dunifon (2006) observe, this method “is generally not regarded by social scientists as a rigorous or credible method to capture outcomes” (p. 5).

Second, Falk et al. (2010) now deny having drawn causal inferences regarding the impact of zoo and aquarium visits. Yet, even a casual inspection of their writings reveals otherwise. Falk et al. (2007) assert that “we have reliable data validating the positive *impact* [italics added] zoos and aquariums have in *changing* [italics added] visitors’ feelings and attitudes about conservation” (p. 5). Moreover, they concluded that “going to AZA-accredited zoos and aquariums in North America *does have a measurable impact* [italics added] on the conservation attitudes and understanding of adult visitors” (p. 3). These conclusions go well beyond their data and belie their insistence that they never intended to advance causal assertions. Of course, without such assertions, their central thesis—namely, that their research demonstrates the educational value of zoo and aquarium visits—collapses.

Third, Falk et al. (2010) contend that we based our critique on an online summary rather than primary documents. Nevertheless, the “primary” documents they cite are a proposal, a non-peer-reviewed technical report, and a 2008 paper that does not directly address the AZA study. We are frankly at a loss to understand what Falk et al. mean by primary or real sources, especially because they did not cite any additional sources relevant to our critique. In fact, Falk sent us a copy of the study instrument, and we reviewed ancillary materials known as the Visitor Impact Toolbox. Therefore, we based our study critique on the most detailed information available.

In conclusion, we hope that readers will hold Falk and colleagues to high scholarly standards. Science, as McFall (1996) observed, is about humility—not making assertions that outstrip the data. Regrettably, Falk et al. (2010) violate this cardinal principle by advancing claims regarding the effectiveness of zoo and aquarium visits that are not backed by evidence. We look forward to an appropriate assessment of these claims in adequately designed studies that are free of serious interpretational shortcomings.

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