International Journal of Aviation Sciences (IJAS)

Volume 1 | Issue 1 Article 9

2016

More on Applied Research Categories Pertaining to Aviation

David Trafimow
New Mexico State University - Main Campus

More on Applied Research Categories Pertaining to Aviation

David Trafimow*
New Mexico State University, USA
dtrafimo@nmsu.edu

Submitted February 12, 2016

I thank Deaton (2016), Fanjoy (2016), Leib (2016), and Sidor (2016) for their commentaries on my target article (Trafimow, 2016). In many such back-and-forth sequences, the discourse sometimes becomes adversarial. In this case, although there were a few places where I believe my target article is accidentally mischaracterized, or where I otherwise do not agree with what is stated, there can be little doubt that, in the main, the commentaries were written in the spirit of cooperation rather than confrontation. Therefore, instead of spending time on "setting the record straight" in the few places where this might be indicated, my goal is integrative—to build bridges between statements in the commentaries and in the target article.

To commence, consider first Deaton's (2016) excellent point that sometimes one has to "get the theory box checked," (p. 24) not because the theory actually is important for the contribution to be made, but because it is necessary for publication in many journals. A sentence from Fanjoy is consistent with Deaton: "New applied researchers, after a somewhat less than exhaustive review of the literature, frequently latch onto any theory that sort of meets the requirement to establish a hypothesis without a careful examination of theory validity" (Fanjoy, 2016, p. 12). These statements point to the importance of Category IV and are precisely what I had in mind when I suggested that category and when I cited Landauer's (1991) observation about the lack of usefulness of theory for many applications. The ritualistic inclusion of theory in a paper when the theory actually is irrelevant or tangential is not helpful for advancing the aviation area or any applied area.

To continue along this line of integration, let us now add Sidor and Leib to the discussion. Sidor (2016) correctly points to aviation research as a largely technical (not necessarily theoretical) enterprise, and Leib (2016) identifies three different groups of researchers that conduct aviation research and suggests that many researchers do not have a theoretical outlook. Taking all of these remarks together, along with the original discussion of Category IV in the target article (Trafimow, 2016), suggests that it would be useful to devote more thinking to how research can contribute in this category. Consistent with all of the commentaries, this seems like a good place to ask whether Category IV can be divided into subcategories. One possibility is to use Leib's (2016) groups of researchers as a starting point, and another possibility is to think in terms of Sidor's (2016) technical areas. Regardless of whether these or other starting points prove useful for subdividing Category IV, that such subdivision would be desirable seems very consistent with all four of the commentaries. This seems like a good place to call for conceptual efforts in that direction.

Another issue that comes up in the commentaries is the potential role of work in Categories I-III for improvements in aviation research. While everyone, including myself, agrees that theory is not a requirement for useful applications in aviation research, the commentaries indicated an openness to it. For example, Deaton (2016) makes general remarks about the potential utility of a good theoretical foundation and Sidor (2016) provides examples such as using Newton's theory in combination with auxiliary assumptions for the invention of jet engines. As Sidor shows, it is easy to list examples of good applied research in aviation where theory plays an important role and where theory does not. Having said this, however, I would assert that when theory-based applications work, the extent of the advance tends to be larger than when applications are not theory-based. Consider again an example from Sidor (2016) that airplanes fly at all depends on Bernoulli and Newton and shows off the immense potential of theory-based research. I accept Sidor's example of research on electronic flight bags as not being theory-based, but note that if flying were impossible in the first place nobody would be worried about electronic flight bags. (Sidor (2016) characterizes this work as not being in any category, not even Category IV, because there is no practical accomplishment. I would suggest, however, that if this research were to continue not to result in a practical accomplishment, it no longer would continue to be valued; in the end, the value of this research will be determined largely by the practical end that comes of it, which fits Category IV rather well.) To be sure, Sidor's examples might not be representative, but I actually believe they are not all that unrepresentative either. Additionally, the extra impact of theory-based applications over applications that are not theory based serves as a general rule for applied research across many domains.

The point easily can be seen by considering the long-run of the history of science and technological applications. Throughout most of human history, the development of useful applications was a slow process. To be sure, there were technological developments, such as those pertaining to the use of fire, in the early history of humanity. And yet, if one takes the span of written history (from approximately 3500 B.C. until now), a curious pattern emerges. The development of technological applications was slow from 3500 B.C. until what we might term the post Galilean era (post 1600 A.D.), when the pace of technological applications accelerated continuously. This is not to say that there were no technological applications prior to Galileo. There were, including the important discoveries of the stirrup and gunpowder (see Trafimow, 2014, for a discussion). However, it was not until the post Galileo era that technological development accelerated at a monotonically increasing pace. The reason for this, of course, stems from the systematic development of science, due to luminaries such as Galileo, Kepler, Newton, and so on. Science and technology go together like ham and eggs; important scientific advances practically always have led to important applications. The reverse also is true; applications often have led to scientific advances. For example, some of Galileo's scientific advances came about by dint of his having (re)invented the telescope, a technological application of obvious importance. In summary, although science is not a requirement for the development of technological applications, without scientific advance, technological applications tend to be of the hit-or-miss variety; whereas, with scientific advance, progress at the technological level is much surer, systematic, impactful, and interactive with science.

There is a reason for the historical aside. Because of the wide agreement—myself included—that

many advances in aviation are not theory-based, it is possible to take this fact in the direction of concluding that aviation researchers should be satisfied with that and should not attempt theory-based research. I would like to warn against that; hence, my historical aside. Given the huge role that scientific theories have played in the ever accelerating pace of technological advancement in human history post Galileo, it would seem implausible to argue that aviation research is an exception and that theory should be ignored there. Nor do I interpret the commentaries as arguing this. But it does seem worth taking a bit of space here to make the point that in human written history, theory-based applications have been the ones with the biggest bang, and I see no reason to assume that aviation research is an exception to this. On the contrary, Sidor's (2016) examples provide support in the domain of aviation research too.

This leads to one more point. Given the thrust of the commentaries, it seems that there is consensus that most aviation research is not theory-based. While not disputing that such research can be valuable, the trend of human written history post Galileo suggests that theory-based applications are likely to be more important, over the long-run, than applications that are not theory-based. Even the reader who disagrees with this might, perhaps, consider whether the preponderance of aviation research that is not theory-based, according to the commentaries, is an indication that aviation researchers are not fulfilling their potentialities. Perhaps the lack of research in Categories I-III is an indication, as Leib (2016) suggested, of a lack of balance in aviation research. Possibly, the lack of balance indicates a tendency to take the easy or quick way to grants, publications, and so on, when the area might be better served by having a few more researchers take a theoretical perspective and conduct work in Categories I-III.

In conclusion, I would like to summarize with two directions for future research in the aviation arena. First, it would be desirable for aviation researchers to further subdivide Category IV in the target article (Trafimow, 2016) into different types of applied research that are not theory-based. In this way, the taxonomy proposed in the target article would be modified to better reflect the aviation research that actually is being conducted. Second, aviation researchers should consider what the expert commentators themselves seem to see as a paucity of theory-based research in the aviation area relative to research that is not theory-based. Is this a desirable state of affairs? If not (and it is not), what can be done about it? Thought devoted to these issues likely would benefit not only aviation research specifically, but applied research more generally.

References

Deaton, J. E. (2016). When to link theory and research: A commentary on Trafimow (2016). *International Journal of Aviation Sciences*, *1*(1), 24-26.

Fanjoy, R. O. (2016). Rethinking the value of applied research and researcher accountability: A commentary on Trafimow. *International Journal of Aviation Sciences, 1*(1), 12-14.

Landauer, T. K. (1991). Let's get real: A position paper on the role of cognitive psychology in the design of humanly useful and usable systems. In J. Carroll (Ed.), *Designing interaction: Psychology at the Human-Computer Interface* (pp. 60-73). New York: Cambridge University Press.

Leib, S. (2016). The academic side of applied aviation research: A commentary on Trafimow (2016). *International Journal of Aviation Sciences, 1*(1), 19-23.

Sidor, C. (2016). Applied Research Categories Within Aviation: A commentary on Trafimow (2016). *International Journal of Aviation Sciences, 1*(1), 15-18.

Trafimow, D. (2014). Is it inevitable that societies exploit useful technologies? *Frontiers in Theoretical and Philosophical Psychology, 5*, 224. doi: 10.3389/fpsyg.2014.00224

Trafimow, D. (2016). A taxonomy of applied research categories as an aid to research pertaining to aviation. *International Journal of Aviation Sciences, 1*(1), 1-11.

Biography

David Trafimow is a Distinguished Achievement Professor of psychology at New Mexico State University, a Fellow of the Association for Psychological Science, Executive Editor of the Journal of General Psychology, and also for Basic and Applied Social Psychology. He received his Ph.D. in psychology from the University of Illinois at Urbana-Champaign in 1993. His current research interests include attribution, attitudes, cross-cultural research, ethics, morality, philosophy and philosophy of science, methodology, and potential performance theory.