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John E. Deaton
Florida Institute of Technology - Melbourne

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John E. Deaton*
Florida Institute of Technology, USA
jdeaton@fit.edu

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Trafimow (2016) presents a compelling taxonomy of four distinct research categories into which applied research can fall. He makes the case that "quality" applied research should be theoretically grounded. While this perspective at first glance is bound to raise considerable emotion from researchers working in applied areas like aviation, I do not believe Trafimow (2016) is saying all research that is not theoretically grounded is useless. My understanding of Trafimow's (2016) essay is that research should be linked to theory if and when it is relevant.

First we have to examine the term "quality". What is quality research? What criteria do we use to assess quality research? If research is accepted in a peer reviewed journal, does that, by definition, make it of high quality? We all know that is not the case. I would rather we disregard the term quality for the time being, and examine whether research in general needs to be grounded in theory. I think the issue gets muddied if we now have to define what we mean by "quality" research.

In all fairness, Trafimow (2016) does include a category (Category IV) that puts forth the idea that all research does not require theoretical underpinnings. He gives the example of the invention of the paper clip, and concedes the idea that research can be conducted in the absence of science. I think we all know that is the case. We can probably come up with numerous examples of research that does not require a theoretical perspective. So I do not believe Trafimow (2016) is actually saying ALL research must be supported by "theory" (another term that may be problematic to define). If we can't all agree on the definition of theory then it is going to be difficult to clearly assess the role theory plays in research.

As a thesis/dissertation advisor for many graduate students, I certainly go along with mainstream thought that research needs to be grounded in theory. That is usually one of the first questions I ask my students: "What theoretical perspective will be used to support your findings and/or guide your hypotheses? To be honest, most of the aviation research that I oversee can be associated with some theoretical perspective, and I encourage my students to explore the possible theories that may apply to their research. However, on some occasions I find myself searching for an appropriate theory to fit the situation just to "get the theory box checked" even when theory is not actually relevant.

For example, recently a graduate student came to me with a potential thesis topic in which he wanted to develop a prototype interface for a hydrogen-powered aircraft. Such an interface,

given this rather new technology, will most likely be considerably different from traditional interfaces (i.e., cockpit displays) for existing aircraft given that this technology will require the display of information not usually required in traditionally gas-powered aircraft. Obviously, this was an important topic, and one that certainly would fit the definition of applied research. I saw this research as primarily one of interface design along with some usability evaluation. Theory did not seem to me to be relevant here. Granted, there are certainly design principles that could be identified that would assist in the design of the interface/cockpit display, and the student made liberal use of this body of information, but theory….I suppose there is theory behind the design principles, but I am not sure this would add anything of value to this investigation. How far back do you want to go in the chain to discover if theory is driving the development of interface design principles? I am just not convinced there is any value added in doing so. We see a similar analogy when we discuss whether accidents are the result of operator error or merely mechanical malfunctions. If you go back far enough in the causal chain you will find that even in situations in which there is a definitive mechanical error one could logically put forth the idea that it was still operator error in the sense that the aircraft part that failed was certainly designed and manufactured by a human. So who is really at fault here? I do not think we gain much from such a discussion. I certainly do not see these discussions of relevance in mishap reports. Note: Perhaps this issue should be brought up in mishap investigations; we are by far too quick to blame the operator/pilot when the root cause of the mishap may fall to some factor earlier in the causal chain of events.

So where does that leave us? No doubt, theory is important; when theory adds something to the investigation insofar as predicting outcomes and/or the development of hypotheses, I think it should be included. But I do not think it should be the criteria for establishing whether research is good or poor or in the words of Trafimow (2016) “quality” research. A better way of looking at this is to identify whether theory is ***relevant*** to the topic. In some cases it will be, in other cases it will not be. Quality has nothing to do with the decision in my opinion. Research with no underlying theory is not automatically of poor quality; it may merely be research that does not need theory to explain the results. I am sure if we thought long and hard enough we could probably come up with a theory for constructing a paper clip. But when all is said and done, who cares?

References

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Biography

Dr. John E. Deaton is a Professor in the College of Aeronautics at the Florida Institute of Technology where he serves as the Chair of the Human Factors program. Dr. Deaton received his Ph.D. from The Catholic University of America in Applied Experimental Psychology in 1988. Dr. Deaton has nearly 30 years of experience working in the area of human performance, human factors engineering, decision support, cockpit automation, and training systems analysis. Dr. Deaton, a retired Navy Commander who was designated a Navy Aerospace Experimental Psychologist, was also a semi-finalist for NASA's Astronaut Training Program. He has participated in numerous DoD and FAA sponsored projects both during his Navy career as well as current position in which he is working with Buzz Aldrin and his team as part of the Buzz Aldrin Space Institute (BASI).