

Wright State University

CORE Scholar

International Symposium on Aviation
Psychology - 2021

International Symposium on Aviation
Psychology

5-1-2021

A Salute to Robert Key Dismukes: A Mentor for Translational Research in Human Factors

Janeen Adrion Kochan

Follow this and additional works at: https://corescholar.libraries.wright.edu/isap_2021



Part of the [Other Psychiatry and Psychology Commons](#)

Repository Citation

Kochan, J. A. (2021). A Salute to Robert Key Dismukes: A Mentor for Translational Research in Human Factors. *60th International Symposium on Aviation Psychology*, 220-225.
https://corescholar.libraries.wright.edu/isap_2021/37

This Article is brought to you for free and open access by the International Symposium on Aviation Psychology at CORE Scholar. It has been accepted for inclusion in International Symposium on Aviation Psychology - 2021 by an authorized administrator of CORE Scholar. For more information, please contact library-corescholar@wright.edu.

A SALUTE TO ROBERT KEY DISMUKES:
A MENTOR FOR TRANSLATIONAL RESEARCH IN HUMAN FACTORS

Janeen Adrion Kochan
Aviation Research, Training, and Services, Inc.
Winter Haven, FL

As the fields of study associated with human factors (aviation psychology, cognitive systems engineering, engineering psychology, etc.) become broader in scope, the drive to bring the findings from academic research to those who can benefit from study findings must also expand. This paper honors Robert Key Dismukes, Ph.D., through a case study that illustrates how the bridge from research to practice (and back to research) can be built and how human factors professionals can translate and share what they know with new scientists, target populations, and the public at large. This review of Dr. Dismukes' work demonstrates how the findings from human factors research can be brought to the operational world with a focus on his mentorship and modeling of ethical science.

The year was 1997 and the airline had just suffered their first fatal accident the previous December. The mandate for US FAA Crew Resource Management (CRM) training had not yet taken effect. The impending requirement had been published in the Federal Register on 14 June 1996 to become effective 19 March 1998 (14 CFR 121.404). Although the airline had a voluntary "Cockpit Resource Management" class, it was still in the day where CRM was considered charm school (Helmreich & Foushee, 2010). It was obvious that there was little interest in the topic from the lack of luster in the few-hour class presentation and the pilots' lack of interest. Furthermore, it was clear that there was a need to respond to circumstances noted in the accident report (NTSB, 1997) and to prepare for the new CRM training requirement. The training team decided to leverage the use of more Line Oriented Flight Training (LOFT) which required effective debriefings with the crews. Although published guidance (Advisory Circular 120-51E) includes information about LOFT debriefings, additional resources were needed to adequately train the instructor pilots on *how to* conduct an effective LOFT debriefing. Additional resources were also needed to create research and science-based training materials for the CRM classroom and simulator scenario development. Fortunately, there were publications with just the information needed for facilitating these debriefings (Dismukes et al., 2000).

Translational Research

Many useful findings are brought to the operational world through agencies and organizations that have contracted for research. However, this is not necessarily *translating* the findings directly into suggestions, instructions, procedures, or practices that are useful to end users. Although formal translational research methods were first mentioned in the medical field in the 1970s (Wolf, 1974), the identification and definition of the construct is still illusive (Austin, 2018; Krueger et al., 2019). Little interest was shown in the topic until the 2000s which is still contained primarily to the biomedical and associated clinical arenas, with little or no activity in direct human factors research (Krueger et al., 2019). However, as the vignette above suggests, there can be informal avenues to disseminate

needed information. It is these informal pathways that were utilized by Dr. Dismukes and his colleagues thus making critical materials available to the training team at the airline.

Fleming et al. (2008) expanded upon the traditional ‘from bench to bedside’ definition of translational medicine to include a feedback loop from the users, in this case the community and public health practitioners. In their framework for translational research, the inclusion of follow-up with the users of the clinical research findings through evidence-based practice and patient utilization provides for assessment of the entire process. Thus, the formalized process of translation in biomedical models is moving beyond the linear path from basic research, applied research, preclinical, clinical, and standard practice of care to include aspects of traditional human factors (Pettibone et al., 2018). As applied to human factors research, the idea would be to bring the research findings to the field, and then assess whether the findings accomplished the intended goal(s). The monitoring of unintended (positive and negative) consequences would be integral to the feedback loop. Knowing the audience and the needs of the end user is important in the assessment of success (or failure) of a program that is brought forth from the research community. Not only did Dr. Dismukes investigate human performance from a basic and applied perspective, he put forth the effort to know his audience, the problem space, and the conditions surrounding the humans and teams that could benefit from his research findings. In aviation, he earned an Airline Transport Pilot certificate for airplane multiengine land with type ratings in the Boeing 737 and Cessna 500 (Citation) and Commercial Pilot privileges for airplane single engine land and glider. He was also a tow pilot for gliders as well as a Certified Flight Instructor for glider and competed in (and won) numerous glider contests over the years. A colleague points out that Dr. Dismukes “embedded himself with the troops” by participating in airline pilot training so that he could understand the operational context and personally relate to the demands and pressures of the domain (I. Barshi, personal communication, March 5, 2021).

In an attempt to further clarify the terms associated with translational research and translational science, Austin (2018) explains that the definition of *translation* is “the process of turning observations in the laboratory, clinic and community into interventions that improve the health of individuals and the public – from diagnostics and therapeutics to medical procedures and behavioural changes” (p. 455). While *translational research* focuses on a specific case or disease, *translational science* is concerned with the general case or disease. Therefore, individual translational research projects can be aggregated to contribute to translational science as well as to test principles associated with translational science. Dr. Dismukes’ body of research into pilot expertise and memory produced a number of studies with findings that he moved into the real-world of flying. One of the best examples (see also Table 1) was his academic work on prospective memory (Dismukes, 2006) that was translated to usable tips for pilots (Dismukes, 2015).

The medical model of formal translational research and translational science deals almost exclusively with bringing therapeutics and biomedical devices to the end users in healthcare. Similarly, a human factors model would consist of tools, equipment (hardware/software/interfaces), technologies, policies, procedures, processes, and training methodologies that could be applied (translated) to the applicable domain(s) of interest.

Indeed, the healthcare industry could benefit from human factors translational research as well. Though the concept of translational research has a variety of ethical perspectives to consider (DeRenzo, et al., 2020) and inherent gaps in the process as identified in the healthcare arena, it is clear that the concept is worthy of consideration in human factors research (Rubio et al., 2010). As early as 1977, Dr. Dismukes' writings communicated clearly about the ethics of research (Dismukes, 1977; 1979; 1980) and that thread was woven tightly throughout his research career making his mentoring of particular value.

Teaching Translational Research through Mentoring

So where does mentoring fit in? First, there is very little teaching of *how to do* translational research or translational science (Rubio, 2010). This is not to say that research findings cannot find their way to a target audience or end-user of the information. There are many avenues in place to contract for human factors work with the aim of providing information for use in a particular domain. However, those avenues are often long-and-winding roads where the information may not arrive intact and may be fraught with delays, potentially leaving a hazard unchecked. It is unknown what may be lost in translation without a clear path and someone who understands the spectrum of the journey. Dr. Dismukes made it part of his research methods to keep the usefulness of his studies in mind. One colleague notes that, "the most important idea that Key tried to impress upon any of us who worked with him in a collaborative setting in the research lab was to really think deeply about an issue or question being proposed, especially in terms of how it might be applied or used in as many other settings or applications as possible in order to get the most out of an investigation" (K. Jobe, personal communication, March 15, 2021). He was known to apply research findings in meetings such as using the "sixty-second rule" (to wait a full 60-seconds before answering a question) (Dismukes et al., 2000).

Through a unique and open style, Dr. Dismukes taught others the value of and techniques for translating research that could facilitate the usefulness of their work. This was not generally accomplished through a formal mentoring program or process, but was highly effective. Walk-the-walk, teach by example, practice what is preached, are all phrases that could be applied to Dr. Dismukes. Whereas mentoring is another construct that has a multitude of definitions and by definition is multi-faceted (Dominguez & Kochan, 2020), there is no doubt that Dr. Dismukes was a skilled mentor. Typical behaviors and processes used in mentoring such as taking time to hear the mentee (protégé), modeling good values and ethics, showing how to do things by example, and sharing tacit knowledge (Budd, 2007; Irby et. al., 2020) were his standard operating procedures. Mentoring research often focuses on the dynamics of the relationship between the mentor and mentee in a particular context (Budd, 2007; Janssen et al., 2016), temporal influences, culture, and developmental mechanisms (Irby et al., 2020; Janssen et al., 2016). But, there is only brief mention of *how to do* informal mentoring as demonstrated expertly by Dr. Dismukes whether at his office at NASA or at the Williams Soaring Center where he was known to be able to share his expertise with the pilots in a way that made sense to them.

The Case Study

An investigation into Dr. Dismukes publications was conducted to provide evidence of his work in translational research, mentoring, and ethical science. All publicly available information and

documents were located through online searches on Google Scholar, ResearchGate, the Hunt Library, Swisscows, and the NASA Ames website using key words Robert Key Dismukes, R. Key Dismukes, and Key Dismukes. Publications with Dr. Dismukes as an author were reviewed and categorized as *strictly research*, *research and operational*, or *operationally focused* where content of strictly research papers had been translated to be of use to those in the field.

Results

A total of 127 publications (to include books, book chapters, papers, and other publications) were found. Of the 127 publications, 83 were strictly research, 30 operationally focused, and 14 were written for both the research and operational audience. This indicates that over one-third of the publications brought scientific research results to the operational world and over half of his publications were of use to an operational audience. Academic or basic research projects that were clearly translated into information for end users were also noted and examples of such are displayed in Table 1. It is noteworthy that the translation time from the academic research to the outlet for the end-users is very short which is illustrative of Dr. Dismukes' goal of making the findings from his work available to all.

Table 1.

Dismukes' Examples of Translating Human Factors Research

Academic Research Papers	Translated to:	Operational Outlet or Another Domain
Dismukes, R. K. (2006). Concurrent Task Management and Prospective Memory: Pilot Error as a Model for the Vulnerability of Experts. <i>Proceedings of the Human Factors and Ergonomics Society 50th Annual Meeting</i> (pp. 903-114). San Francisco, CA: HFES.		Dismukes, R. K. (2010). Remembrance of things future: Prospective memory in laboratory, workplace, and everyday settings. In D. H. Harris (Ed.), <i>Reviews of human factors and ergonomics</i> , 6, 79-122. Santa Monica, CA: Human Factors and Ergonomics Society.
Dismukes, R. (2012). Prospective memory in workplace and everyday situations. <i>Current Directions in Psychological Science</i> , 21(4), 215-220.		Dismukes, R. K. (2015). Cognition, aging, and the soaring pilot. <i>Soaring</i> 79 (10) 35-37.
Dismukes, R. K. & Berman, B. (2010). <i>Checklists and monitoring in the cockpit: Why crucial defenses sometimes fail</i> . NASA Technical Memorandum (NASA TM-2010-216396). Moffett Field, CA: NASA Ames Research Center.		Berman, B. A. & Dismukes, R. K. (2010). Designing a better mousetrap. <i>AeroSafety World</i> , 12-17, July 2010.
McDonnell, L., Jobe, K., & Dismukes, R. K., (1997) Facilitating LOS Debriefings: A Training Manual (NASA Technical Memorandum 112192). <i>Moffett Field, CA: National Aeronautics and Space Administration</i> .		Dismukes R. K., & Smith, G. (2000). <i>Facilitation and debriefing in aviation training and operations</i> . Aldershot, UK: Ashgate.

Conclusion

As informal mentoring can be as helpful as formal mentoring for students and incoming colleagues (Irby et al., 2020; Janssen et al., 2020), so can the idea of informal roads to translational research for the human factors community. More formal methods and guidance on how to move our human factors and aviation psychology research into practice should prove to be useful, but in the meantime every effort to share our findings where they may best take root in a timely manner should be considered. As one of Dr. Dismukes later mentees, I found his model of ethical research and his style of mentoring to be precious gems in my research and flying journey. I know I speak for many that this world is a better place and aviation is safer because of the contributions of Dr. Robert Key Dismukes.

Acknowledgements

The views expressed in this paper are solely those of the author and are not associated with any other organization or entity. I would like to thank Dr. William Adrion, Dr. Barbara Burian, Dr. Jessica Cruit, and Michaela Satter for their reviews of earlier versions of this paper.

References

- Austin, C. P. (2018). Translating translation. *Nature Reviews*, Volume 17, July 2018.
- Budd, F. C. (2007). Mentoring in the U.S. Air Force: A cornerstone for success through organizational transformation. *Performance Improvement*, Volume 46, No. 3, March 2007. DOI: 10.1002/pfi.112
- DeRenzo, E. G., Singer, E. A., & Moss, J. (2020). Special issues raised by evolving areas of clinical research. In E. G. DeRenzo, E. A. Singer & J. Moss (Eds.), *Ethical considerations when preparing a clinical research protocol* (2nd ed., pp. 271-298). Elsevier. <https://doi.org/10.1016/B978-0-12-386935-7.09989-8>
- Dismukes, R. K. (2015). Cognition, aging, and the soaring pilot. *Soaring* 79 (10) 35-37.
- Dismukes, R. K. (2006). Concurrent task management and prospective memory: Pilot error as a model for the vulnerability of experts. *Proceedings of the Human Factors and Ergonomics Society 50th Annual Meeting* (pp. 903-114).
- Dismukes, R. K. (1980). The Supreme Court and patenting life: life is patently not human-made. *Hastings Center Report* 10(5):11.
- Dismukes, R. K. (1979). What should society expect from scientists? *Bulletin of Atomic Scientists* 35(9):19. Reprinted in *Current* (1980) 220:23. DOI: 10.1080/00963402.1979.11458658
- Dismukes, R. K. (1977). Recombinant DNA: a proposal for regulation. *Hastings Center Report* 7:25. Reprinted in *Bioethics: Selected Readings*. T. A. Shannon (1980) (revised). New York: Paulist Press.

- Dominguez, N. & Kochan, F. (2020). Defining mentoring: An elusive search for meaning and a path for the future. In (Eds.) B. Irby, J. N. Boswell, L. J. Searby, F. Kochan, R. Garza, & N. Abdelrahman *The Wiley international handbook of mentoring: Paradigms, practices, programs, and possibilities* (pp. 1-18). Wiley. DOI:[10.1002/9781119142973.ch1](https://doi.org/10.1002/9781119142973.ch1)
- Federal Aviation Administration. (2004). Advisory Circular No. 120-51E, *Crew Resource Management Training*, 1/22/04, AFS-210.
- Fleming, E. S., Perkins, J., Easa, D., Conde, J. G., Baker, R. S., Southerland, W. M., Dottin, R., Benabe, J. E., Ofili, E. O., Bond, V. C., McClure, S. A., Sayre, M. H., Beanan, M. J., & Noris, K. C. (2008). The role of translational research in addressing health disparities: A conceptual framework. *Ethnicity & Disease*, Volume 18, Spring 2008.
- Helmreich, R. L., & Foushee, H. C. (2010). Why CRM? Empirical and theoretical bases of human factors training. In E. L. Wiener, B. G. Kanki, & R. L. Helmreich (Eds.), *Crew Resource Management* (2nd ed., pp. 3-57). Academic Press. <https://doi.org/10.1016/B978-0-12-374946-8.10001-9>
- Irby, B., Boswell, J. N., Searby, L. J., Kochan, F., Garza, R., & Abdelrahman, N. (Ed.). (2020). *The Wiley international handbook of mentoring: Paradigms, Practices, Programs, and Possibilities*. Wiley.
- Janssen, S. , van Vuuren, M., & de Jong, M. D. T. (2016). Informal mentoring at work: A review and suggestions for future research. *International Journal of Management Reviews*, Vol. 18, 498–517. DOI: 10.1111/ijmr.12069
- Krueger, A. K., Hendriks, B., & Gauch, S. (2019). The multiple meanings of translational research in (bio)medical research. *History and Philosophy of the Life Sciences* 41, 57. <https://doi-org.ezproxy.libproxy.db.erau.edu/10.1007/s40656-019-0293-7>
- National Transportation Safety Board (NTSB) (1997). Public Docket. *ABX Air (Airborne Express), Douglas DC-9-63, N827AX, Narrows, Virginia, December 22, 1996. NTSB/AAR-97/05*. Washington, D.C., National Transportation Safety Board.
- Pettibone, K. G., Balshaw, D. M., Dilworth, C., Drew, C. H., Hall, J. E., Heacock, M., Latoni, A. R., McAllister, K. A., O’Fallon, L. R., Thompson, C., Walder, N. J., Wolfe, M. S., Wright, D. S., & Collman, G. W. (2018). Expanding the concept of translational research: making a place for environmental health sciences. *Environmental Health Perspectives* 126(7):07450.
- Rubio, D. M., Schoenbaum, E. E., Lee, L. S., Schteingart, D. E., Marantz, P. R., Anderson, K. E., Platt, L. D., Baez, A., & Esposito, K. (2010). Defining translational research: Implications for training. *Academy of Medicine*, 85:470-5.
- Wolf, S. (1974). Editorial: the real gap between bench and bedside. *New England Journal of Medicine*, 290 (1974), pp. 802-803.