

David R. Lenorovitz, PhD, CPE
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Education:

- State University of New York at Buffalo, 1975, PhD, Human Factors / Industrial Engineering
- State University of New York at Buffalo, 1972, M.S., Human Factors / Industrial Engineering
- State University of New York at Binghamton, 1967, B.A., Experimental Psychology

Certification: Certified Professional Ergonomist (CPE), Certificate No. 217, originally issued, in 1993 by the Board of Certification in Professional Ergonomics (BCPE). Re-certification / Continuance of Certification (CoC) as a CPE was awarded by the BCPE in 2000 and, most recently, on 8/5/2015 -- covering the period from 06/2015 through 06/2020.

Experience:

LENPRO Services, Inc., President, 09/91 – Present

Dr. Lenorovitz is the president and chief scientist of this professional ergonomic consulting corporation. Over the past twelve years, Dr. Lenorovitz has been engaged in the practice of providing forensic human factors consulting services via LENPRO Services, Inc. Cases worked on have included performing human factors analyses and providing recommendations and expert opinions regarding the need for appropriate and adequate warnings, signals, labels, safety recommendations, and operating instructions in the context of foreseeable product-related, industry-related, and worksite-related hazards. Cases have encompassed the analysis of reasonable and safe operator behavior in the use of or interaction with: automotive vehicles; recreational vehicles, public transportation systems; marine environment navigation and steering equipment; the proper handling of certain chemical cleaning solvents and other toxic materials; proper usage of chemical laboratory safety (ventilation) equipment; set-up and operation of metal-milling machines; safety procedures in suspended

personnel platforms; overhead crane, and mobile hydraulic crane operations and maintenance; maintenance and repair of hydraulic pumping equipment; and pedestrian trip, misstep and fall incidents in building interiors, on sidewalks, at building entrances /exits, and on stairways. Other cases have centered around human factors issues involved in the erection and use of construction scaffolding; accidents involving heavy equipment, construction, road paving, and road maintenance operations; riding lawn mower tip-over incidents; automobile / bicycle / tractor-trailer / forklift vehicle visibility incidents; passenger car and motorcycle tire repairs and other maintenance tasks, football helmet protection and warnings issues, use of portable droplight/trouble lights in automobile service garages, rollover and passenger ejection issues associated with specialized recreational vehicles (PWCs and UTVs), and human factors considerations in providing visual and auditory warnings /alarms.

Dr. Lenorovitz has developed, analyzed, and evaluated the adequacy of warning labels and warnings systems provided for the above machinery, equipment, and user-interactive systems, as well as for consumer products such as walk-behind lawnmower attachments, and the application of personal hygiene, fragrance, and cosmetic dusting powders. Dr. Lenorovitz has also published papers, lectured about, and organized technical panel discussion sessions with professional peers regarding the proper design and implementation of hazard warnings and warning systems, and has designed and developed tools to aid warnings experts in their evaluations of the adequacy of planned and existing warnings.

**BAE SYSTEMS, Inc., Senior Human Factors Scientist, Systems Analyst,
08/03 – 9/05 (Retired)**

Dr. Lenorovitz provided human factors support to the FAA's Air Traffic Operations – Terminal organization (ATO-T). Until his retirement, he provided HF analysis and support to various ATO-T programs (e.g., ASDE-X, RWSL, ASR-9, and ASR-11) as well as coordinating with the Air Traffic Terminal Enhancement and Modernization (ATEAM) group on all HF matters. These HF support activities included participation in program reviews, critical analyses of HF requirements and specifications, review of operational testing procedures, monitoring of test results, identification of HF risks and assessment of risk mitigation alternatives, and other HF activities throughout the systems acquisition and management life cycle. He also represented ATO-T organizational and program interests at HF professional meetings and workshops, and in interactions with other FAA HF-related organizations (e.g., the FAA's Safety Hazard Analysis Requirements Integration Team, FAA's WJHTC HF Lab, and the FAA HF Acquisition Working Group). Specific areas or dimensions of HF support included: human-machine allocation of system functions; anthropometrics and biomechanics; computer-human interface (CHI) design; design of display and control systems; effective user manuals and documentation; identification of required user knowledge, skills, and abilities; user and maintainer training; specification of input/output devices; assessment and verification of operational suitability; establishment of operational and

maintenance procedures; establishing information requirements and presentation/communication of critical information; preventing/mitigating user exposure to safety and health hazards; establishing adequate users' workspaces and working environments; assessing and managing user workload levels; and designing systems for the effective presentation of user alert/warning/alarm information.

Crown Consulting, Inc., Principal Human Factors Scientist, 09/97 – 05/03

Dr. Lenorovitz was Crown's Chief Human Factors Analyst for the FAA's Oceanic ATC Advanced Technologies and Procedures (ATOP) program. He led a team of five HF analysts in performing extensive task analyses on both the Air Traffic (AT) and Airway Facilities (AF) ATOP user populations. These data and findings were used as baselines in developing system requirements and specifications, evaluating CHI designs, and in planning and conducting operationally-based empirical studies of controller workload and performance levels. Dr. Lenorovitz also helped analyze and evaluate vendors' system designs, and provided HF consultation to both AF and AT user teams. These user team support efforts helped to ensure that both major user groups (controllers and maintainers), and their respective bargaining unit representatives (NATCA and PASS) were given the benefit of ergonomic science principles and best human factors practices throughout the ATOP CHI design, development, and testing processes. Other HF support projects included the Standard Terminal Approach Replacement System (STARS), and the Multi-Sector Oceanic Data Link (MS-ODL) System. Areas of common focus in these HF support efforts included conducting HF assessments of controller workstations, assessing adequacy of the display design technology being proposed, evaluating overall CHI design, ensuring the efficacy and safety of the controller work environment, and analyzing and documenting the impacts of these systems and procedures on controller workload and performance. Also common to these efforts were defining HF requirements and incorporating HF-related specifications in accordance with FAA Order 9550.8, HF-STD-001, and MIL-HDBK-4855A.

CTA Inc. (Computer Technology Associates), Chief Ergonomic Scientist, 10/83 – 9/97

As Task Lead for the FAA's Oceanic Service Workload Metrics Project, Dr. Lenorovitz did extensive job/ task analyses, workload analyses, and task network simulation modeling of the tasks performed by Oceanic Air Traffic Controllers. These job analysis, description, and documentation efforts formed the basis of understanding about controller needs and requirements, and were invaluable in the formulation of CHI requirements and design elements for several Oceanic ATC system upgrades and enhancements. He also served as HF Technical Lead for CHI requirements development and evaluation of designs for the USAF's Pilot Selection and Classification System (PSACS), the FAA's Automated En Route Air Traffic Control (AERA) system, the BLM's Target

System Upgrade, and the USAF-ESD's Peaceshield Air Defense System. He was also Principal Investigator for CTA's Rapid Intelligent Prototyping Laboratory (RIPL) research projects.

Martin Marietta Aerospace, Chief Ergonomic Scientist, 12/75 – 10/83

Had lead responsibility for USI requirements analysis and design of various government projects, including a classified intelligence information handling system, a remotely piloted spacecraft display and control system, and a space flight simulation and astronaut training system for the Manned Maneuvering Unit (MMU) program. He also served as head of the Man-Computer Interaction Laboratory (MCIL) and PI for the Interactive Dialogue Synthesizer (IDS) IRAD Task.

Bell Telephone Laboratories, Member of Technical Staff, 09/73 – 06/75

Defined and developed work positions for the (BISCUS-FACS) data base conversion project. He was responsible for job definition, design, and development of user performance aids. Also collected / analyzed user and system performance data, and evaluated USI effectiveness.

State University of New York at Buffalo, Instructor/Research Assistant, 09/67 – 09/73

Dr. Lenorovitz was an instructor within the Industrial Engineering Department, teaching an Experimental Foundations of Human Factors Engineering course to senior undergraduate students. He also assisted in conducting human factors and applied psychological research studies funded by the National Institutes of Mental Health and the Department of Justice / Law Enforcement Assistance Administration. Research topics included human memory and cognition, computer simulation models of short-term memory, and visual memory/recognition memory for faces.

Articles and Publications

Professional publications / presentations include 6 book chapters, 17 peer-reviewed proceedings/journal articles/professional group position papers, 2 thesis-related publications, 7 professional meeting presentations, and numerous proprietary industrial technical reports. (See publication listing on subsequent pages.)

Honors, Awards, and Professional Memberships

He was: named to the Tau Beta Pi, Engineering Honor Society; a National Academy of Sciences appointee to National Research Council Committee on S/W Human Factors. He has held (and/or holds) elected/appointed offices in the National Human Factors and Ergonomics Society (HFES), the HFES Forensics Professional Group, the HFES Computer Systems Technical Group, the HFES Rocky Mountain Chapter, and the HFES Western New York Chapter. He also received multiple achievement awards citing innovation, teamwork, and performance excellence on various FAA project teams. He has also held memberships in the Society for Information Display, and the Association for Computing Machinery.

Dr. Lenorovitz is also a current member of the Safety Technical Group (STG), the Computer Systems Technical Group (CSTG), the Product Design Technical Group (PDTG), and the Forensics Professional Group (FPG) of the HFES. Additionally, he is currently serving as a Director of the HFES Rocky Mountain Chapter, has held an appointment as Chair of the HFES Chapter Affairs Committee, and served as the 2012-2014 Chair of the HFES Forensics Professional Group.

Military Experience

18 NOV 1968 – 25 JUN 1973	New York Army National Guard; Buffalo, NY
25 JUN 1973 – 17 NOV 1974	New Jersey Army National Guard; West Plainfield, NJ

Ranks Held: Private, E-1, through Sergeant, E-5; Honorably Discharged from both NY and NJ ARNGUS; Positions: Basic Combat Engineer / Heavy Duty Truck Driver / Squad Leader; Military Training Areas: Bridge Construction; Explosives and Demolition; Military Construction and Rigging; Tactics, Reconnaissance, and Intelligence; Individual and Crew-Served Weapons; NCO Leadership School.

Professional Publications/Citations for

David R. Lenorovitz

Books/Papers/Reports:

Lenorovitz, D. R., & Sussman, E. D.

- 1972 The discrimination of similarities and differences in facial appearances: A pilot study. Pp. 292-295 in A. Zavala and J. J. Paley, eds., ***Personal Appearance Identification***. Springfield, IL: Charles C. Thomas.

Lenorovitz, D. R.

- 1972 The discrimination of similarities and differences in facial appearances: A multidimensional scaling approach. Unpublished master's thesis, State University of New York at Buffalo.

Laughery, K. R., Fessler, P. K., **Lenorovitz, D. R.**, & Yoblick, D. A.

- 1974 Time delay and similarity effects in facial recognition. ***Journal of Applied Psychology***, 59, 490-496.

Lenorovitz, D. R.

- 1975 ***Development of a prototype computer assisted system to be used as an aid in facial recognition tasks***. Doctoral dissertation. State University of New York at Buffalo. Ann Arbor, MI: University Microfilms, No. 36-3.

Lenorovitz, D. R.

- 1977 Response time requirements for interactive computer systems: Human factors considerations of cognitive psychology and human information processing. TFCC Technical Memorandum TN-6010162. Denver, CO: Martin Marietta Aerospace Corporation.

Lenorovitz, D. R., & Ramsey, H. R.

- 1977 A dialogue simulation tool for use in the design of interactive computer systems. Pp. 95-99 in ***Proceedings of the Human Factors Society 21st Annual Meeting***. Santa Monica, CA: Human Factors Society.

Hanau, P. R., & **Lenorovitz, D. R.**

- 1980(a) Prototyping and simulation tools for user/computer dialogue design. Pp. 271-278 in ***SIGGRAPH '80 Proceedings***. New York:

Association for Computing Machinery, Special Interest Group on Graphics.

Hanau, P. R., & **Lenorovitz, D. R.**

1980(b) A prototyping and simulation approach to interactive computer system design. Pp. 572-578 in ***Proceedings of the 17th Design Automation Conference***. Minneapolis, MN: Association for Computing Machinery, Special Interest Group on Design Automation.

Lenorovitz, D. R. & Laughery, K. R.

1983 A witness-computer interactive system for searching mug-files. Pp. 38-63 in G. L. Wells and E. F. Loftus, eds., ***Eyewitness Testimony: Psychological Perspectives***. New York: Cambridge Press.

Lenorovitz, D. R., Phillips, M. D., Ardrey, R. S., & Kloster, G. V.

1984 A taxonomic approach to characterizing human-computer interfaces. Pp. 111-116 in G. Salvendy, ed., ***Human Computer Interaction***. Amsterdam, Holland: Elsevier.

Lenorovitz, D. R., & Reaux, R. A.

1986 Integrating human factors guidance information within the USI design/rapid prototyping process. Pp. 926-934 in the ***Proceedings of the 38th National Aerospace and Electronics Conference***. Dayton, OH: Institute of Electrical and Electronics Engineers.

Lenorovitz, D. R., & Phillips, M. D.

1987 Human factors requirements engineering for air traffic control systems. Pp. 1771-1789 in G. Salvendy, ed., ***Handbook of Human Factors***. New York: John Wiley.

Bashinski, H. S., **Lenorovitz, D. R.**, & Dunkle, D. C.

1989 Defining man-machine interface requirements for air traffic control static information displays. ***Proceedings of the 5th International Symposium on Aviation Psychology***. Columbus, OH: Ohio State University Department of Aviation.

Lenorovitz, D. R., Olason, S. C., Krois, P. K., & Tobey, W. K.

1991 Customizing the ATC computer-human interface via the use of controller preference. ***Proceedings of the 6th International Symposium on Aviation Psychology***. Columbus, OH: Ohio State University Department of Aviation.

- Krois, P. K., **Lenorovitz, D. R.**, McKeon, P. S., Snyder, C. S., Tobey, W. K., & Bishinski, H. S. 1992 Air traffic control facility lighting. Pp. 551-555 in ***Proceedings of the Human Factors Society 35th Annual Meeting***. Santa Monica, CA: Human Factors Society.
- Glasgow, M., Gerry, V., Jones, R., **Lenorovitz, D.R.**, & Merkle, M. 2002 Ocean 21™ – The future of FAA oceanic air traffic control. In ***ICAO Journal***, 57, No. 3, 18-21. Montreal: International Civil Aviation Organization.
- Lenorovitz, D. R.** & Karnes, E.W. 2008 Human Factors/Ergonomics (HFE) Issues re an Automated Marine Navigation System: A Case of an Auto-Pilot Defect, and/or One of Human Pilot Error? ***Proceedings of the 2nd International Conference on Applied Human Factors and Ergonomics***. AHFE International, Louisville, KY: USA Publishing.
- Karnes, E.W., **Lenorovitz, D. R.**, & Leonard, S.D. 2010 Reliance on warnings as the sole remedy for certain hazards: Some circumstances where that just doesn't work. Pp 1017 – 1027 in Karwowski, W. & Salvendy, G. (eds) ***Advances in Human Factors, Ergonomics, and Safety in Manufacturing and Service Industries***. Taylor & Francis, Boca Raton, FL. [Also appears in: ***Proceedings of the 3rd International Conference on Applied Human Factors and Ergonomics (AHFE)***. AHFE International, Louisville, KY: USA Publishing.]
- Lenorovitz, D.R.**, Leonard, S.D., & Karnes, E.W. 2012 Ratings checklist for warnings: A prototype tool to aid experts in the adequacy evaluation of proposed or existing warnings. ***Proceedings of the International Ergonomics Association -- 18th World Congress on Ergonomics***, Recife, Brazil, February 12 – 16, 2012.
- Karnes, E.W., Leonard, S.D., & **Lenorovitz, D.R.** 2012 Ride-on lawnmower warnings: Slope measurements and safety-by separation. ***Proceedings of the International Ergonomics Association -- 18th World Congress on Ergonomics***, Recife, Brazil, February 12 – 16, 2012.

Lenorovitz, D.R., Karnes, E.W., & Leonard, S.D.

- 2012 Mitigating product hazards via user warnings alone: When/why “warnings-only” approaches are likely to fail. ***Human Factors and Ergonomics in Manufacturing and Services Industries***. April 24, 2012 [e-published ahead of print].

Karnes, E.W., Leonard, S.D., & **Lenorovitz, D.R.**

- 2013 Silicosis hazards: Explicit versus non-explicit Warnings. ***Proceedings of the XXVth Annual International Occupational Ergonomics and Safety Conference***, Atlanta, GA, Pp. 176-180.

Leonard, S.D., Karnes, E.W., & **Lenorovitz, D.R.**

- 2013 Knowledge is limited about automobile hazards and warnings. ***Proceedings of the XXVth Annual International Occupational Ergonomics and Safety Conference***, Atlanta, GA, June 6-7, 2013, Pp. 139-142.

Lenorovitz, D.R., & Karnes, E.W.

- 2014 Warnings Issues in forensic human factors. Chapter 4 in: Nemire, K., Cohen, J., & Cohen, H.H. (Eds.) ***HFES Guide to Forensic Human Factors***. Santa Monica, CA: Human Factors and Ergonomics Society.

Duncan, J.R., Hornick, R.J., Karnes, E.W., Nemire, K.E., Olsen, R.A., Wogalter, M.S., & **Lenorovitz, D.R.**, (Ed.)

- 2014 Position Paper Supporting Human Factors and Ergonomics Practitioners in Forensics. Forensics Professional Group (FPG) of the Human Factors and Ergonomics Society (HFES). Paper is accessible via the following website: hfesforensic.org

Zackowitz, I., **Lenorovitz, D.R.**, Borzendowski, S., Rice, V., Calkins, L., Feeley C., Milewski, J., & Farmer, J.

- 2016 Mock Trial: A Demonstration of human factors professionals testifying on a children’s transportation safety product. Pp. 466-469 in ***Proceedings of the Human Factors Society 60th Annual Meeting***. Santa Monica, CA: Human Factors Society.

Karnes, E.W., Leonard, S.D., & **Lenorovitz, D.R.**

- 2018 PWC Off-Throttle Steering Hazards: Attempted Remedy; Failure; and Then Success. ***Proceedings of the International Ergonomics Association -- 20th World Congress on Ergonomics***, Florence, Italy, August 26 – 30, 2018.

Lenorovitz, D.R., Karnes, E.W., & Wogalter, M.S.

- 2019 ROPS, seatbelts, and the unexpected rollover. Chapter 19 in: Wogalter, M.S. (Ed.) ***Forensic Human Factors: Case Studies and Analysis***. Boca Raton, FL: CRC/Taylor & Francis.

Lenorovitz, D.R.

- 2019 The medium is the message: Warning presentation matters. Chapter 12 in: Wogalter, M.S. (Ed.) ***Forensic Human Factors: Case Studies and Analysis***. Boca Raton, FL: CRC/Taylor & Francis.

Lenorovitz, D.R., Karnes, E.W., & Haygood, B.

- (In Press) Personal watercraft (PWC) injury hazards – analyses, technical advancements, and continuing safety challenges. ***Theoretical Issues in Ergonomics Science***. London: Taylor & Francis Group.

Professional Meeting Presentations:

Lenorovitz, D. R.

1973 CAPSAR: A prototype computer-assisted photographic search and retrieval system for use in facial recognition. Paper presented at the 17th Annual Meeting of the Human Factors Society, Washington, D. C.

Lenorovitz, D. R., & Blue, R. A.

1976 An analytic technique for dialogue and display development in the design of interactive command and control computer systems. Paper presented at the 37th Military Operations Research Symposium, San Antonio, TX.

Hanau, P. R., **Lenorovitz, D. R.**, & Ray, A. M.

1978 Interactive computer graphics modeling in control systems design for a remotely piloted spacecraft. Paper presented at the 22nd Annual Meeting of the Human Factors Society, Detroit, MI.

Koros, A.S., Mogford, R.H., **Lenorovitz, D.R.**, Jones, M., & Kopardekar, P.H.

1999 Computer-Human Interface Evaluation of the Multi-Sector Oceanic Data Link System. Poster-board Presentation at the 43rd Annual Meeting of the Human Factors Society, Houston, TX.

Lenorovitz, D. R., Leonard, S.D., & Karnes, E.W.

2009 Human Factors/Ergonomics (HFE) Issues re an Automated Marine Navigation System: A Case of an Auto-Pilot Defect, and/or One of Human Pilot Error? Paper presented at the 10/15/09 Meeting of the Rocky Mountain Chapter of the Human Factors and Ergonomics Society.

Lenorovitz, D. R., Karnes, E.W., & Leonard, S.D.

2013 Application of a warnings adequacy assessment tool. In, Kalsher, M., Chair, Discussion panel session titled "Current Issues in Warnings: Selected Case Studies and Applications"; abstracts of individual discussion presentations appear in the ***Proceedings of the Human Factors Society 57th Annual Meeting***. Santa Monica, CA: Human Factors and Ergonomics Society.

Leonard, S.D., Karnes, E.W., & **Lenorovitz, D. R.**

2013 Practical problems associated with inadequate warning placement. In, Kalsher, M., Chair, Discussion panel session titled

"Current Issues in Warnings: Selected Case Studies and Applications"; abstracts of individual discussion presentations appear in the ***Proceedings of the Human Factors Society 57th Annual Meeting***. Santa Monica, CA: Human Factors and Ergonomics Society.