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Education

1986 PhD in Psychology, University of California at San Diego
1982 MA in Psychology, University of California at San Diego
1980 AB in Physics (*cum laude* general studies), Harvard University
1975 US Math Olympiad Summer Program, Rutgers University

Employment

2021-2023 Magnit (formerly PRO Unlimited), onsite contractor at Apple Inc.
2018-2022 Independent contractor to UCB (supporting NSF-funded TELLab project)
1987-2021 Computer engineer, NASA Ames Research Center
1986-1987 National Research Council post-doctoral associate, NASA Ames Research Center
1980-1986 Research and teaching assistant, Department of Psychology, UC San Diego
1982-1983 Research assistant, AT&T Bell Laboratories, Murray Hill NJ
1980 Research assistant, Division of Applied Sciences, Harvard University

Teaching

1991 Introduction to Computer Science, UC Santa Cruz
1991 Data Structures, UC Santa Cruz
1990 Sensation & Perception, Cal. State Hayward (Contra Costa campus)
1980-1986 Teaching assistant, Department of Psychology, UC San Diego
courses taught: sensory laboratory, neuropsychology

Professional societies

2020-present	Association for Computing Machinery (ACM)
2001-present	Vision Sciences Society (VSS)
1984-present	Optica (formerly Optical Society of America, OSA)
2005-present	Society for Information Display (SID)
1982-2001	Association for Research in Vision and Ophthalmology (ARVO)

Professional service

Conference organization

2015	Chair, local organizing committee, OSA Fall Vision Meeting
2013-2016	Chair/Vice-chair, Vision technical committee, Vision and Color division, OSA
2012-present	Co-organizer, VSS satellite workshop on Computational and Mathematical Models in Vision (MODVIS)
2011-2014	Program co-chair, ACM Symposium on Eye Tracking Research and Applications
2009-2010	Area chair, ACM Symposium on Eye Tracking Research and Applications
2004-present	Program committee, SPIE/IS&T Conference on Human Vision and Electronic Imaging
2005-present	Program committee (Applied Vision subcommittee) Society for Information Display
2006-2012	Program committee, International Symposium on Visual Computing

Standards committees

2013-2016	COGAIN technical committee for eye tracker data quality standardization
2016-present	ICDM - International Committee for Display Metrology

Ad hoc reviewing

Journal of Vision ("exceptional reviewer")
Vision Research
Journal of the Optical Society of America, A
Displays
Biomedical Optics Express
IEEE Transactions on Biomedical Engineering
Physiological Measurement
Optics Letters

Honors & awards

2009 NASA group achievement award, Constellation Training Facility team

1983-1985 IBM graduate fellowship

1984 NIH travel scholarship to attend International School of Biophysics (Italy)

1983 ARVO travel fellowship

Software

2009,2016 QuIP - An interactive environment for QUick Image Processing. The QuIP interpreter provides a convenient interface to libraries for image processing, graphics, image acquisition, and control of other pieces of laboratory hardware. The systems runs on unix-like systems (linux, Mac OSX), and Apple iOS. GPU acceleration is provided with either CUDA or OpenCL.
https://github.com/nasa/QuIP

Publications

Journal articles & proceedings papers

2020 Mulligan, J. B. (2020). "Evaluation of tablet-based methods for assessment of contrast sensitivity." in Rogowitz, B. E. Pappas, T. N., and de Ridder, H. (eds.), *Proc. IS&T Int'l. Symp. on Electronic Imaging: Human Vision and Electronic Imaging*, pp. 210-1 - 210-7, https://doi.org/10.2352/ISSN.2470-1173.2020.11.HVEI-210.

Arsintescu, L., Chachad, R., Gregory, K. B., Mulligan, J. B. and Flynn-Evans, E. E. (2020). "The relationship between workload, performance and fatigue in a short-haul airline." *Chronobiology International*,
DOI: 10.1080/07420528.2020.1804924. PDF

2018 Mulligan, J. B. (2018). "Statistical identifications of fixations in noisy eye movement data." in Rogowitz, B. E. Pappas, T. N., and de Ridder, H. (eds.), *Human Vision and Electronic Imaging 2018, IS&T International Symposium on Electronic Imaging 2018*.

Flynn-Evans, E. E., Arsintescu, L., Gregory, K., Mulligan, J., Nowinski, J. and Feary, M. (2018). "Sleep and neurobehavioral performance vary by work start time during non-traditional day shifts." *Sleep Health*, v. 4, pp. 476-484,
https://doi.org/10.1016/j.sleh.2018.08.002.

2017 Mulligan, J. B. (2017). "Illusory variations in apparent dot brightness induced by density modulations." In Shapiro, A. G., and Todorovic, D. (eds.), *Oxford Compendium of Visual Illusions*, Oxford University Press, Oxford.

Arsintescu, L., Mulligan, J. B., and Flynn-Evans, E. E. (2017). "Evaluation of psychomotor vigilance task for touch screen devices." *Human Factors*, DOI:10.1177/0018720816688394. PDF

2016 Mulligan, J. B. (2016). "A method for rapid measurement of contrast sensitivity on mobile touch-screens." in Rogowitz, B. E. Pappas, T. N., and de Ridder, H. (eds.), *Human Vision and Electronic Imaging 2016, IS&T International Symposium on Electronic Imaging 2016*, pp. HVEI-104.1 - HVEI-104.6. PDF

2013 Mulligan, J. B., Stevenson, S. B., and Cormack, L. K. (2013). "Reflexive and voluntary control of smooth eye movements." in Rogowitz, B. E. Pappas, T. N., and de Ridder, H. (eds.), *Human Vision and Electronic Imaging XVIII*, Proc. SPIE, v. 8651. PDF

2012 Mulligan, J. B. (2012). "A GPU-accelerated software eye tracking system." *Proc. ACM Symposium on Eye Tracking Research and Applications* (ETRA), pp. 265-268. PDF

2010 Mulligan, J. B., and Gabayan, K. N. (2010). "Robust optical eye detection during head movement." *Proc. ACM Symposium on Eye Tracking Research and Applications* (ETRA), pp. 129-132. PDF

McDermott, K. C., Malkoc, G., Mulligan, J. B., and Webster, M. A. (2010). "Adaptation and visual salience." *J. Vis.*, v. 10(13), pp. 1-32.

2009 Mulligan, J. B. (2009). "Presentation of calibrated images on the web." in Rogowitz, B. E. and Pappas, T. N. (eds.), *Human Vision and Electronic Imaging XIV*, Proc. SPIE, v. 7240. PDF

Ahumada, A. J., Jr., Kaiser, M. K., and Mulligan, J. B. (2009). "The dynamic range of visual imagery in space." in Rogowitz, B. E. and Pappas, T. N. (eds.), *Human Vision and Electronic Imaging XIV*, Proc. SPIE, v. 7240.

Mulligan, J. B. (2009) "Motion parallax enhances depth in a perspective air-traffic display." *SID Symposium Digest of Technical Papers*, v. 40(1), pp. 1231-1233. PDF

2008 Mulligan, J. B. (2008). "Measurement of eye velocity using active illumination." *Proc. ACM Symposium on Eye Tracking Research and Applications* (ETRA), pp. 35-38. PDF

2008 Hamoud, R. I. and Mulligan, J. B., (2008). "Introduction to Eye Monitoring." In Hamoud, R. I. (ed.), *Passive Eye Monitoring*, Springer-Verlag, Berlin.

2006 Mulligan, J. B. (2006). "Optical eye models for gaze tracking." *Proc. ACM Symposium on Eye Tracking Research and Applications* (ETRA), p. 51. PDF

McDermott, K., Mulligan, J. B., Bebis, G., and Webster, M. A. (2006). "Visual search and eye movements in novel and familiar contexts." in Rogowitz, B. E., Pappas, T. N., and Daly, S. J. (eds.), *Human Vision and Electronic Imaging XI*, Proc. SPIE, v. 6057.

2005 Mulligan, J. B. (2005). "A tree-structured model of visual appearance applied to gaze-tracking." In Bebis, G., Boyle, R., Koracin, D., and Parvin, B. (eds.), *First International Symposium on Visual Computing*, Springer Lecture Notes on Computer Science v. 3804, pp. 303-312. PDF

Mulligan, J. B., and Brolly, X. L. C. (2005). "Pilot behavior and course deviations during precision flight." in Rogowitz, B. E. and Pappas, T. N. (eds.), *Human Vision and Electronic Imaging X*, Proc. SPIE, v. 5666, pp. 362-373. PDF

2004 Mulligan, J. B., and Brolly, X. L. C. (2004). "Surface determination by photometric ranging." *Conference on Computer Vision and Pattern Recognition Workshop* (CVPRW04), v. 3, pp. 40-47. PDF

Brolly, X. L. C., and Mulligan, J. B. (2004). "Implicit calibration of a remote gaze tracker." *Conference on Computer Vision and Pattern Recognition Workshop* (CVPRW04), v. 8, pp. 134-141. PDF

Meyer, G. F., Mulligan, J. B., and Wuerger, S. M. (2004). "Continuous audio-visual digit recognition using N-best decision fusion." *Information Fusion*, v. 5(2), pp. 91-101.

2003 Brolly, X. L. C., Stratelos, C., and Mulligan, J. B. (2003). "Model-based head pose estimation for air-traffic controllers." *Proc. IEEE International Conf. on Image Processing* (ICIP), Barcelona, Spain, v. 3, pp 113-116. PDF

2002 Mulligan, J. B., (2002). "A software-based eye tracking system for the study of air-traffic displays." *Proc. ACM Symposium on Eye Tracking Research and Applications* (ETRA), pp. 69-76. PDF

Mulligan, J. B., (2002). "Vision-based approaches to digital halftoning." *Proc. 55th Annual Conference of the Society for Imaging Science and Technology*, Portland OR, pp. 1-4. PDF

2001 Mulligan, J. B., (2001). "Sensory processing delays measured with the eye movement correlogram." in Kaminski, H. J., and Leigh, R. J. (eds.), "Neurobiology of eye movements: from molecules to behavior." *Annals of the New York Academy of Science*, v. 956, pp. 476-478.

1999 Watson, A. B., Hu, Q. J., McGowan, J. F. III, and Mulligan, J. B., (1999). "Design and performance of a digital video quality metric." *Human Vision and Electronic Imaging IV*, Proc. SPIE, v. 3644, pp. 168-174.

1997 Mulligan, J. B., (1997). "Application of Motion-JPEG to dynamic stimulus presentation." *Spatial Vision*, v. 11, pp. 19-32. PDF

Mulligan, J. B., (1997). "Image processing for improved eye tracking accuracy." *Behavior Research Methods, Instrumentation and Computers*, v. 29, pp. 54-65. PDF

Mulligan, J. B., (1997). "Application of temporal error diffusion to motion JPEG." in Rogowitz, B. E. and Pappas, T. N. (eds.), *Human Vision and Electronic Imaging II*, Proc. SPIE, v. 3016, pp. 288-295.

Mulligan, J. B., (1997). "Recovery of motion parameters from distortions in scanned images." in Le Moigne, J. (ed.), *Proc. Image Registration Workshop*, NASA Goddard Space Flight Center, Greenbelt, Maryland, November 20-21, 1997. NASA Publication # CP-1998-206853. PDF

1996 Beutter, B. R., Mulligan, J. B., and Stone, L. S., (1996). "The barberplaid illusion: plaid motion is biased by elongated apertures." *Vision Res.*, v. 36, pp. 3061-3075.

Mulligan, J. B., (1996). "When are supercomputers worth the bother?" *Behavior Research Methods, Instrumentation and Computers*, v. 28, pp. 239-240.

1995 Mulligan, J. B., and Beutter, B. R., (1995). "Eye-movement tracking using compressed video images." *Vision Science and its Applications*, 1995 Technical Digest Series, v. 1, Optical Society of America, pp. 163-166.

1994 Mulligan, J. B., and MacLeod, D. I. A., (1994). "In search of an optoretinogram." *Vision Science and its Applications*, 1994 Technical Digest Series, v. 2, Optical Society of America, pp. 167-170.

1993 Mulligan, J. B., (1993). "Nonlinear combination rules and the perception of motion transparency." *Vision Res.*, v. 33, pp. 2021-2030. PDF

Mulligan, J. B., (1993). "Methods for spatiotemporal dithering." *SID International Symposium Digest of Technical Papers*, v. 24, pp. 155-158.

Mulligan, J. B., (1993). "Improving digital halftones by exploiting visual system properties." in Singh, A. (ed.), Conference record, *27th Asilomar conference on Signals, Systems and Computers*, IEEE Computer Society Press, pp. 961-965. PDF

1992 Mulligan, J. B., (1992). "Anisotropy in an ambiguous kinetic depth effect." *J. Opt. Soc. Am. A*, v. 9, pp. 521-529. PDF

Mulligan, J. B., and Ahumada, A. J., Jr., (1992). "Principled halftoning based on human vision models." in Rogowitz, B. E. (ed.), *Human Vision, Visual Processing, and Visual Display III*, Proc. SPIE, v. 1666, pp. 109-121. PDF

Mulligan, J. B., and Ahumada, A. J. Jr., (1992). "Principled methods for color dithering based on models of the human visual system." *SID International Symposium Digest of Technical Papers*, v. 23, pp. 194-197.

1991 Mulligan, J. B. and MacLeod, D. I. A., (1991). "Visual sensitivity to spatially sampled modulation in human observers." *Vision Res.*, v. 31, pp. 895-905. PDF

Ahumada, A. J., Jr., and Mulligan, J. B., (1991). "Network compensation for missing sensors." in Rogowitz, B. E., Brill, M. H., and Allebach, J. P. (eds.), *Human Vision, Visual Processing, and Visual Display II*, Proc. SPIE, v. 1453, pp. 134-146.

1990 Stone, L. S., Watson, A. B., and Mulligan, J. B., (1990). "Effect of contrast on the perceived direction of a moving plaid." *Vision Res.*, v. 30, pp. 1049-1067.

Ahumada, A. J., Jr., and Mulligan, J. B., (1990). "Learning receptor positions from imperfectly known motions." in Rogowitz, B. E., and Allebach, J. P. (eds.), *Human Vision and Electronic Imaging: Models, Methods, and Applications*, Proc. SPIE, v. 1249, pp. 124-134.

Mulligan, J. B., (1990). "Digital halftoning methods for selectively partitioning error into achromatic and chromatic channels." in Rogowitz, B. E., and Allebach, J. P. (eds.), *Human Vision and Electronic Imaging: Models, Methods, and Applications*, Proc. SPIE, v. 1249, pp. 261-270. PDF

1989 Mulligan, J. B., and Stone, L. S., (1989). "Halftoning method for the generation of motion stimuli." *J. Opt. Soc. Am.*, v. 6, pp. 1217-1227. PDF

Ahumada, A. J., Jr., and Mulligan, J. B., (1989). "Learning in interpolation networks for irregular sampling: some convergence properties." *OSA Topical Meeting on Applied Vision*, 1989 Technical Digest Series, v. 16, pp. WC3-1 - WC3-4.

Stone, L. S., Watson, A. B., and Mulligan, J. B., (1989). *Effect of contrast on the perception of direction of a moving pattern.* NASA Tech. Memo. #102234.

1988 Mulligan, J. B., and MacLeod, D. I. A., (1988). "Reciprocity between luminance and dot density in the perception of brightness." *Vision Res.*, v. 28, 503-519. PDF

Mulligan, J. B., and Stone, L. S., (1988), *Efficient use of bit planes in the generation of motion stimuli.* NASA Tech. Memo. #101022.

1986 Mulligan J. B., (1986). "Optimizing stereo separation in color television anaglyphs." *Perception*, v. 15, pp. 27-36.

Mulligan J. B., (1986). "Minimizing quantization errors in a digitally controlled CRT." *Color Res. Appl.* (suppl.), v. 11, pp. S47-S51.

1985 Nakayama K., Silverman G., MacLeod D. I. A., and Mulligan J. B., (1985). "Sensitivity to shearing and compressive motion in random dots." *Perception*, v. 14, pp. 225-238.

1982 Stromeyer C. F. III, Mulligan J. B., Birch D. G., and Dawson B. M., (1982). "Adaptation to polarized light in humans." *Vision Res.*, v. 22, pp. 217-224.

Last updated: June 23, 2023 • Typeset in XeLaTeX