Gregory S. Francis

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ACADEMIC POSITIONS	**Professor of Psychological Sciences**	2005–present

Purdue University

Primary interests involve computational modeling of perceptual and cognitive systems with neural networks. Recent research has linked the temporal properties of a neural network model for visual perception with psychophysical and neurophysiological data on dynamic human vision and visual afterimages. Another primary interest explores statistical issues in experimental psychology, especially publication bias. A secondary research interest explores methods of applying quantitative models of cognition to the design of human-computer interfaces. A tertiary research interest is the development of Internet activities for teaching psychology and statistics.

Visiting Professor   October 2013–July 2015
École Polytechnique Fédérale de Lausanne, Switzerland

Visiting Adjunct Professor   Summer 2008
Korea University, Seoul, South Korea

Visiting Professor   June 2006–May 2007
École Polytechnique Fédérale de Lausanne, Switzerland

Associate Professor of Psychological Sciences   1999–2005
Purdue University

Fellow: Hanse Wissenschaftskolleg   August 2000–May 2001
Delmenhorst, Germany

Consultant: U.S. Army Aeromedical Research Laboratory   1996-2008
Fort Rucker, Alabama

Member of Purdue University Neuroscience   1995–present
Purdue University

Assistant Professor of Psychological Sciences   1993–1999
Purdue University

EDUCATION

PhD, Cognitive and Neural Systems   1989-93
Boston University

BS *magna cum laude*, Mathematics and Physics   1985-89
Butler University, Indianapolis

AWARDS

- *Vision Research* Top Reviewer 2006–2007. For exceptional contribution to the quality of the journal *Vision Research*.
- University Scholar, Purdue University 2006-2011.
- James C. Naylor Award for Teaching Excellence, Department of Psychological Sciences, Purdue University (2004).

- Best paper in the Crew Stations & Human Factors session at the American Helicopter Society International Forum 59 (May 2003).
- National Science Foundation Graduate Fellowship 1989-92.

OTHER EXPERIENCE

Peer Review

Associate Editor *Consciousness & Cognition* (2017–present).

Statistics/Methods Advisor for the journal *Psychological Science* (2016–present).

Member of NSF/PAC College of Reviewers (2013–2014).

Editor in Chief for *Behavior Research Methods* (2010–2014).

Editorial board *Journal of Experimental Psychology: Human Perception & Performance* (2011-present).

Editorial board *Frontiers in Cognition* (2010–present).

Editorial board *Neural Networks* (2009–present).

Associate Editor *Frontiers in Cognitive Science* (2010–2012).

Editor Elect for *Behavior Research Methods* (2008–2009).

Consulting editor for *Behavior Research Methods* (1998–2009, 2014–present).

Guest editor for special issue on "Visual masking and the dynamics of human perception, cognition, and consciousness" for *Advances in Cognitive Psychology* (2007).

Professional Society Memberships
Vision Sciences Society
Psychonomic Society
Society for Mathematical Psychology

PUBLICATIONS

1. Yeonan-Kim, J. & Francis, G. (in press). Retinal spatiotemporal dynamics on emergence of visual persistence and afterimages, *Psychological Review*.
2. Doerig, A., Bornet, A., Rosenholtz, R., Francis, G., Clarke, A.M. & Herzog, M.H. (in press). Beyond Bouma's window: How to explain global aspects of crowding? *PLOS Computational Biology*.
3. Herzog, M. H., Francis, G. & Clarke, A. M. (in press). *The essentials of statistics and experimental design for everyone with many examples from medicine and bioengineering: How to not lie with statistics*, Springer Publishing.
4. Stettler, M. & Francis, G. (2018). Using a model of human visual perception to improve deep learning. *Neural Networks*, **104**, 40–49.
5. Francis, G. (2018). Excess success for a study on visual search and autism: Motivation to change how scientists analyse data. In E. B. Torres and C. Whyatt (Eds.) *Autism: The Movement Sensing Perspective*. CRC Press.
6. Francis, G. (2018). The various roles of replication in scientific research. In V. Zeigler-Hill and T. Shackelford (Eds.) *The SAGE Handbook of Personality and Individual Differences: Part 2 Research Strategies for Studying Personality and Individual Differences*. SAGE.

7. Francis, G. & Clarke, A. M. (2017). Electronic response to Zelano et al. Nasal Respiration Entrains Human Limbic Oscillations and Modulates Cognitive Function. *Journal of Neuroscience*, **36**(49), DOI: https://doi.org/10.1523/JNEUROSCI.2586-16.2016.

8. Francis, G., Manassi, M. & Herzog, M.H. (2017). Neural dynamics of grouping and segmentation explain properties of visual crowding. *Psychological Review*, **124**(4), 483–504.

9. Grzeczkowski, L., Clarke, A. M., Francis, G., Mast, F. W. & Herzog, M. H. (2017). About individual differences in vision. *Vision Research*, **141**, 282–292.

10. Francis, G. (2017). Comment on: Conceptualizing and evaluating the replication of research results. *Journal of Experimental Social Psychology*, **69**, 241–243.

11. Francis, G. (2017). Equivalent statistics and data interpretation, *Behavior Research Methods*, **49**(4), 1524–1538.

12. Francis, G. (2016). Implications of "too good to be true" for replication, theoretical claims, and experimental design: An example using prominent studies of racial bias, *Frontiers in Psychology*. doi: 10.3389/fpsyg.2016.01382.

13. Francis, G. (2016). Confirming the appearance of excess success: Reply to van Boxtel and Koch (2016), *Psychonomic Bulletin & Review*, **23**(6), 2010–2013.

14. Zhang, X., Fang, K. & Francis, G. (2016). How to optimize switch virtual keyboards to trade off speed and accuracy. *Cognitive Research: Principles and Implications*, **1**, 6. doi:10.1186/s41235-016-0007-6.

15. Francis, G. (2015). Contour erasure and filling-in: Old simulations account for most new observations. *i-Perception*, **6**(2), 116–126. doi:10.1068/i0684

16. Manassi, M. Hermens, F., Francis, G. & Herzog, M. H. (2015). Release of crowding by pattern completion. *Journal of Vision*, **15**, 1–15. doi: 10.1167/15.8.16

17. Francis, G. (2015). Excess success for three related papers on racial bias, *Frontiers in Psychology: Personality and Social Psychology*, **6**, 512. doi: 10.3389/fpsyg.2015.00512

18. Francis, G., Tanzman, J. & Matthews, W. J. (2014). Excess success for psychology articles in the journal Science. *PLOS One*, **9**(12): e114255. DOI: 10.1371/journal.pone.0114255.

19. Francis, G. (2014). Too much success for recent groundbreaking epigenetic experiments. *Genetics*, **198**(2), 449–451.

20. Clarke, A. M., Herzog, M. H. & Francis, G. (2014). Visual crowding illustrates the inadequacy of local versus global and feedforward versus feedback distinctions in modelling visual perception. *Frontiers in Psychology: Perception Science*, **5**, 1193. doi: 10.3389/fpsyg.2014.01193.

21. Francis, G. (2014). The frequency of excess success for articles in Psychological Science. *Psychonomic Bulletin & Review*, **21**, 1180–1187.

22. Bachmann, T. & Francis, G. (2013). *Visual Masking: Studying Perception, Attention, and Consciousness*, Elsevier: San Diego.

23. Francis, G. (2013). We should focus on the biases that matter: A reply to commentaries. *Journal of Mathematical Psychology*, **57**, 190–195.

24. Francis, G. (2013). Replication, statistical consistency, and publication bias. *Journal of Mathematical Psychology*, **57**, 153–169.

25. Francis, G. (2013). We don't need replication, but we do need more data. *European Journal of Personality*, **27**, 125–126.

26. Francis, G. (2013). Publication bias in "Red, Rank, and Romance in Women Viewing Men" by Elliot *et al.* (2010). *Journal of Experimental Psychology: General*, **142**, 292–296.

27. Shive, J. & Francis, G. (2013). Choosing colors for map display icons using models of visual search. *Human Factors: The Journal of Human Factors and Ergonomics Society*, **55**, 373–396. doi: 10.1177/0018720812459341.

28. Francis, G. (2012). Publication bias and the failure of replication in experimental psychology. *Psychonomic Bulletin & Review*, **19**(6), 975–991.

29. Francis, G. (2012). The psychology of replication and replication in psychology. *Perspectives on Psychological Science*, **7**(6), 580–589.

30. Francis, G. (2012). Evidence that publication bias contaminated studies relating social class and unethical behavior. *Proceedings of the National Academy of Sciences*, 109:E1587.

31. Francis, G. (2012). Replication Initiative: Beware Misinterpretation. *Science*. **336** (6083), 802.

32. Francis, G. & Kim, J. (2012). Simulations of induced visual scene fading with boundary offset and filling-in. *Vision Research*, **62**, 181–191.

33. Francis, G. (2012). Too good to be true: Publication bias in two prominent studies from experimental psychology. *Psychonomic Bulletin & Review*, **19**, 151–156.

34. Francis, G. (2012). The same old New Look: Publication bias in a study of wishful seeing. *i-Perception*, **3**(3), 176–178.

35. Francis, G. & Johnson, E. (2011). Speed-accuracy tradeoffs in specialized keyboards. *International Journal of Human-Computer Studies*, **69**, 526–538.

36. Kim, J. & Francis, G. (2011). Color selection, color capture, and afterimage filling-in. *Journal of Vision*, **11**(3):22, http://www.journalofvision.org/content/11/3/23/, doi:10.1167/11.3.23.

37. Rüter, J., Francis, G., Frehe, P., & Herzog, M.H. (2011). Testing dynamical models of vision. *Vision Research*, **51**, 343–351.

38. Francis, G. & Wede, J. (2010). Properties of long-range illusory contours produced by offset-arcs. *Perception*, **30**, 1466–1475.

39. Francis, G., Bias, K. & Shive, J. (2010). The psychological four color mapping problem. *Journal of Experimental Psychology: Applied*, **16**, 109–123.

40. Francis, G. (2010). Modeling filling-in of afterimages. *Attention, Perception & Psychophysics*, **72**, 19–22.

41. Dombrowe, I., Hermens, F., Francis, G., & Herzog, M. H. (2009). The roles of mask luminance and perceptual grouping in visual backward masking. *Journal of Vision*, **9**(11):22, 1–11, http://journalofvision.org/9/11/22/, doi:10.1167/9.11.22.

42. Francis, G., Rash, C. E. & Russo, M. B. (2009). The human-machine interface challenge. In (Eds. C.E. Rash, M.B. Russo, T.R Letowski, & E.T. Schmeisser), *Helmet-Mounted Displays: Sensory, Perceptual and Cognitive Issues*. U. S. Army Aeromedical Research Laboratory: Fort Rucker, AL. pp. 29–44.

43. Francis, G. & Rash, C. E. (2009). Cognitive factors. In (Eds. C.E. Rash, M.B. Russo, T.R Letowski, & E.T. Schmeisser), *Helmet-Mounted Displays: Sensory, Perceptual and Cognitive Issues*. U. S. Army Aeromedical Research Laboratory: Fort Rucker, AL. pp. 619–673.

44. Hermens, F., Herzog, M. H. & Francis, G. (2009). Combining simultaneous with temporal masking. *Journal of Experimental Psychology: Human Perception and Performance*, **35**(4), 977–988.

45. Francis, G. (2009). Cortical dynamics of figure-ground segmentation: Shine-through. *Vision Research*, **49**, 140–163.

46. Francis, G. & Cho, Y. S. (2008). Effects of temporal integration on the shape of visual backward masking functions. *Journal of Experimental Psychology: Human Perception & Performance*, **34**, 1116–1128.

47. Shive, J. & Francis, G. (2008). Applying models of visual search to map display design. *International Journal of Human-Computer Studies*, **66** (2), 67–77.

48. VanHorn, D. R. & Francis, G. (2007). Orientation tuning of a two-stimulus afterimage: Implications for theories of filling-in. *Advances in Cognitive Psychology*, **3**, 375–387.

49. Wede, J. & Francis, G. (2007). Attentional effects on afterimages: Theory and data. *Vision Research*, **47**, 2249–2258.

50. Francis, G. (2007). What should a quantitative model of masking look like and why would we want it? *Advances in Cognitive Psychology*, **3**, 21–31.

51. Ansorge, U., Francis, G., Herzog, M. H. & Ogmen, H. (2007). Visual masking and the dynamics of human perception, cognition, and consciousness: A century of progress, a contemporary synthesis, and future directions. *Advances in Cognitive Psychology*, **3**, 1–8.

52. Francis, G. & Cho, Y. S. (2007). Testing models of object substitution with backward masking. *Perception & Psychophysics*, **69**, 263–275.

53. Duangudom, V., Francis, G. & Herzog, M. H. (2007). What is the strength of a mask in visual metacontrast masking? *Journal of Vision*, **7**, 1–10. doi: 10.1167/7.1.7

54. Wede, J. & Francis, G. (2006). The time course of visual afterimages: Data and theory. *Perception*, **35**, 1155–1170.

55. Francis, G. & Oxtoby, C. (2006). Building and testing optimized keyboards for specific text entry. *Human Factors*, **48**, 279–287.

56. Francis, G. & Cho, Y. S. (2005). Quantitative models of backward masking. In H. Ögmen & B. Breitmeyer (Eds.) *The First Half Second: The Microgenesis and Temporal Dynamics of Unconscious and Conscious Visual Processes*, (pp. 111–126). Cambridge, MA: MIT Press.

57. Rash, C. & Francis, G. (2005). Keyboard evaluation for the UH-60M helicopter. Fort Rucker, Alabama: US Army Aeromedical Research Laboratory. *USAARL Report* No. 2005-13. [Distribution is restricted to U.S. government agencies only.]

58. Francis, G., & Rash, C. (2005). Analysis and design of keyboards for the AH-64D helicopter. Fort Rucker, Alabama: US Army Aeromedical Research Laboratory. *USAARL Report* No. 2005-11.

59. Francis, G. & Schoonveld, W. (2005). Using afterimages for orientation and color to explore mechanisms of visual filling-in. *Perception & Psychophysics*, **67**, 383–397.

60. Francis, G., Neath, I., & Goodwin, S. (2005). *Social Psychology Online Laboratory*. http://soclab.wadsworth.com. Wadsworth Publishing. (Textbook)

61. Pizlo, Z., Li, Y. & Francis, G. (2005). A new look at binocular stereopsis. *Vision Research*, **45**, 2244–2255.

62. Surprenant, A. M., Francis, G. & Neath, I. (2005). *CogLab Reader*. Wadsworth Publishing, Belmont: CA. (Textbook)

63. Francis, G. & Ericson, J. (2004). Using afterimages to test neural mechanisms for perceptual filling-in. *Neural Networks*, **17**, 737–752. [Invited article]

64. Francis, G., Rothmayer, M. & Hermens, F. (2004). Analysis and test of laws for backward (metacontrast) masking. *Spatial Vision*, **17**, 163–186.

65. Francis, G. & Herzog, M. (2004). Testing quantitative models of backward masking. *Psychonomic Bulletin & Review*, **11**, 104–112.

66. Francis, G. (2003). Online simulations of models for backward masking. *Behavior, Research Methods, Instruments & Computers*, **35**, 512–519.

67. Francis, G. (2003). MFDTool: A software program for designing optimal multifunction displays. *Behavior, Research Methods, Instruments & Computers*, **35**, 236–243.

68. Francis, G. (2003). Developing a new quantitative account of backward masking. *Cognitive Psychology*, **46**, 198–226.

69. Rash, C., Francis, G., LeDuc, P., & Adam, G. (2003). Pilot attitudes in comparing U.S. Army glass cockpit and traditional crew station designs. *Proceedings of the 2003 Human Factors and Ergonomics Society*, Vol.47, pp. 179–182.

70. Francis, G., & Rash, C. (2003). Optimization of keyboard design for specialized text entry. *Proceedings of the 2003 Human Factors and Ergonomics Society*, Vol 47, pp. 734–736.

71. Francis, G., Neath, I., MacKewn, A. & Goldthwaite, D. (2003). *CogLab on a CD*. Wadsworth Publishing. (Textbook)

72. Francis, G. & Rothmayer, M. (2003). Interactions of afterimages for orientation and color: Experimental data and model simulations. *Perception & Psychophysics*, **65**, 508–522.

73. Rash, C.E., Francis, G., Adam, G.E., & LeDuc, P.A. (2003). Pilot attitudes on glass and traditional cockpits in the U.S. Army's AH-64 Apache helicopter. *Proceedings of the American Helicopter Society - Forum 59*, Vol. I, pp. 154-177.

74. Francis, G. & Hermens, F. (2002). Comment on: Competition for consciousness among visual events: The psychophysics of reentrant visual processes, by Di Lollo, Enns and Rensink (2000). *Journal of Experimental Psychology: General*, **131**, 590–593.

75. Francis, G. (2002). Masking. In Lynn Nadel and Robert Goldstein (Eds.), *Encyclopedia of cognitive science*. London: Macmillan Publishers Ltd.

76. Francis, G. & Rash, C. E. (2002). A software tool to optimize information on multifunction displays. *Gateway*, **XIII**, No. 3, pp. 3–4.

77. Liu, B., Francis, G., & Salvendy, G. (2002). Applying models of visual search to menu design. *International Journal of Human-Computer Studies*, **56**, 307–330.

78. Francis, G., & Rash, C. E. (2002). MFDTool (Version 1.3): A software tool for optimizing hierarchical information on multifunction displays. *USAARL Report*, No. 2002-22. Fort Rucker, AL. U.S. Army Aeromedical Research Laboratory.

79. Francis, G., Rash, C. E., Adam, G. E., LeDuc, P. A., & Archie, S. L. (2002). A comparison of AH-64D and OH-58D pilot attitudes toward glass cockpit crewstation designs. *USAARL Report*, No. 2003-02. Fort Rucker, AL. U.S. Army Aeromedical Research Laboratory.

80. Francis, G., Rash, C. E., LeDuc, P. A., Adam, G. E., Archie, S. L., Lewis, L. J., Reynolds, B. S., & Suggs, C. L. (2002). A comparison of AH-64 pilot attitudes toward traditional and glass cockpit crewstation designs. *USAARL Report*, No. 2002-21. Fort Rucker, AL. U.S. Army Aeromedical Research Laboratory.

81. Francis, G. (2001). *CogLab Instructor Manual*. Wadsworth Publishing. http://coglab.wadsworth.com/InstructorManual.pdf. (Textbook)

82. Francis, G. (2001). *CogLab Student Manual*. Wadsworth Publishing. http://coglab.wadsworth.com/StudentManual.pdf. (Textbook)

83. Rash, C. E., Suggs, C. L., LeDuc, P. A., Adam, G. E., Manning, S. D., Francis, G., Noback, R. (2001). Accident Rates in Glass Cockpit Model U.S. Army Rotary-Wing Aircraft. *USAARL Report*, No. 2001-12. Fort Rucker, AL. U.S. Army Aeromedical Research Laboratory.

84. Francis, G. & Kim, H. (2001). Perceived motion in orientational afterimages: Direction and speed. *Vision Research*, **41**, 161–172.

85. Francis, G. (2000). Quantitative theories of metacontrast masking. *Psychological Review*, **107**, 768–785.

86. Francis, G. (2000). Designing multifunction displays: An optimization approach. *International Journal of Cognitive Ergonomics*, **4**, 107–124.

87. Francis, G., Neath, I., & Surprenant, A. M. (2000). The cognitive psychology online laboratory. In M. H. Birnbaum (Ed.), *Psychological Experiments on the Internet*. New York: Academic Press.

88. Kim, H. & Francis, G. (2000). Perceived motion in complementary afterimages: verification of a neural network theory. *Spatial Vision*, **13**, 67–86.

89. Francis, G. (1999). Spatial frequency and visual persistence: Cortical reset. *Spatial Vision*, **12**, 31–50.

90. Francis, G. (1999). A software tool for the design of multifunction displays. *USAARL Report*, No. 99-20. Fort Rucker, AL. U.S. Army Aeromedical Research Laboratory.

91. Francis, G. & Kim, H. (1999). Motion parallel to line orientation: Disambiguation of motion percepts. *Perception*, **28**, 1243–1255.

92. Stevenson, A., Francis, G., & Kim, H. (1999). Java experiments for introductory psychology courses. *Behavior Research Methods, Instruments, & Computers*, **31**, 99–106.

93. Reardon, M. J. & Francis, G. (1999). Reducing the risk of aviator-multifunction display interface problems with human factor models and optimization design methods. *SAFE Journal*, **29**, 100–106.

94. Francis, G. (1998). Designing optimal hierarchies for information retrieval with multifunction displays. *USAARL Report*, No. 98-33. Fort Rucker, AL. U.S. Army Aeromedical Research Laboratory.

95. Francis, G. (1998). Neural network dynamics of cortical inhibition: Metacontrast masking. *Journal of Information Sciences*, **107**, 287–296.

96. Francis, G. (1998). Optimization of hierarchical information designs for aircraft MFDs. Final report DAAH04-96-C-0086, TCN 98046. U. S. Army Research Office.

97. Kim, H. & Francis, G. (1998). A computational and perceptual account of motion lines. *Perception*, **27**, 785–797.

98. Francis, G. (1997). Cortical dynamics of lateral inhibition: Metacontrast masking. *Psychological Review*, **104**, 572–594.

99. Francis, G. & Reardon, M. (1997). Aircraft multifunction display and control systems: A new quantitative human factors design method for organizing functions and display contents. *USAARL Report*, No. 97-18. Fort Rucker, AL. U.S. Army Aeromedical Research Laboratory.

100. Francis, G. (1996). Cortical dynamics of lateral inhibition: Visual persistence and ISI. *Perception & Psychophysics*, **58**, 1103–1109.

101. Francis, G. (1996). Cortical dynamics of visual persistence and temporal integration. *Perception & Psychophysics*, **58**, 1203–1212.

102. Francis, G. & Grossberg, S. (1996). Cortical dynamics of form and motion integration: Persistence, apparent motion, and illusory contours. *Vision Research*, **36**, 149–174.

103. Francis, G. & Grossberg, S. (1996). Cortical dynamics of boundary segmentation and reset: Persistence, afterimages, and residual traces. *Perception*, **25**, 543–567.

104. Francis, G. (1995). Neural dynamics of cortical inhibition: Metacontrast masking. *Proceedings of Second Annual Joint Conference on Information Sciences*, 285–288 .

105. Francis, G. (1994). *Cortical models of visual perception: Dynamics of form and motion segmentation.* Ann Arbor, MI: UMI Dissertation services.

106. Francis, G. (1994). Neural networks for short-term pattern storage. *Proceedings of the 1994 World Congress on Neural Networks, II*, 454–459.

107. Francis, G. & Grossberg, S. (1994). How do representations of visual form organize our percepts of visual motion? In A. Ram & K. Eiselt (Eds.), *Proceedings of the 1994 Cognitive Science Conference*, 330–334.

108. Francis, G., Grossberg, S., & Mingolla, E. (1994). Cortical dynamics of feature binding and reset: Control of visual persistence. *Vision Research*, **34**, 1089–1104.

109. Francis, G., Grossberg, S., & Mingolla, E. (1993). Dynamic formation and reset of coherent visual segmentations by neural networks. In R. Mammone (Ed.) *Artificial Neural Networks for Speech and Vision.* London: Chapman & Hall.

110. Francis, G. & Fuller, K. (1991). Using neural networks to solve coding theory problems. *Journal of Undergraduate Mathematics*, **23**, 55-58.

PATENTS

Francis, G., Rash, C. E., & Reardon, M. J. (2001). *Multifunction display design tool.* U.S. Provisional Patent Application Number 60/223,867. Washington, DC: U.S. Patent and Trademark Office. Filed 07/20/2001.

COMPUTER PROGRAMS

- *Cognitive Psychology Online Laboratory (CogLab)*: CogLab is a set of interactive experiments that allows students to experience classic experiments in cognitive psychology. The experiments are available on the Internet, so they can be worked on at any time and any place in the world. CogLab is marketed by Cengage Publishing at http://coglab.cengage.com/

- *MFDTool*: MFDTool is a program that allows human computer interaction designers to optimize the interface for a multifunction display (MFD), like a cash machine, or computer in an aircraft cockpit. MFDTool is available at http://www.psych.purdue.edu/~gfrancis/MFDTool/ This tool has lead to a patent (US 7,779,359).

- *Models of backward masking*: A set of Java programs that are available on the Internet provides computer simulations of quantitative models of backward masking. The simulations are available at http://www.psych.purdue.edu/~gfrancis/Publications/BackwardMasking/

- *Social Psychology Online Laboratory*: Social Psych Lab is a set of interactive experiments that allows students to experience classic experiments in social psychology. The experiments are available on the Internet, so they can be worked on at any time and any place in the world. Social Psych Lab was marketed by Wadsworth Publishing, but is now discontinued.

- *Virtual Psychology Laboratory*: This a set of interactive experiments allows students to experience classic experiments in introductory psychology. The experiments are available on the Internet, so they can be worked on at any time and any place in the world. The Virtual Psychology Laboratory is marketed by Cengage Publishing.

- *IntroStats Online*: This web textbook is a modification of a freely available web-based textbook created by David Lane at Rice University. It differs in that students log in to the site and their reading durations are monitored to insure that students actually spend time on each assigned web page. It can be found at http://introstatsonline.com IntroStats Online is marketed by SAGE Publishing.

- *STATLAB: Online Statistics Laboratory*: STATLAB Online is a set of interactive experiments that allows students to experience classic experiments in psychology and then carry out a statistical analysis on their own data. The experiments are available on the Internet, so they can be worked on at any time and any place in the world. STATLAB Online is marketed by SAGE Publishing at http://statlabonline.com

THESES DIRECTED

PhD

1. Kim, Hyungjun. (1999). *Neural networks in space and time: A new cue to motion perception.* Ph.D. thesis.

2. Liu, Baili. (2000). *Modeling the design of visual search tasks in human-computer interaction.* Ph.D. thesis. (Dr. Francis served as co-chair with Gavriel Salvendy of Industrial Engineering at Purdue University.)

3. Shive, Joshua. (2008). *Applying computational models of visual search to map display design.* Ph.D. thesis. [Now an assistant professor at Tennessee State University]

4. Wede, Joshua. (2008). *The effect of attention on the perception of illusory contours.* Ph.D. thesis. [Now an instructor at Penn State University]

5. VanHorn, Daniel, R. (2009). *The Effects of Stimulus Contrast, Background Intensity, and Stimulus Duration on Switch Visual Afterimages* . Ph.D. thesis. [Now an associate professor at North Central College]

6. Kim, Jihyun. (2013). *A computational model of the spatiotemporal dynamics of retinal processing explains perceptual properties of visual persistence and afterimages* . Ph.D. thesis. [Now a post doc at Universitat Pompeu Fabra, Spain]

MS

1. Rothmayer, Mark. (2003). *Comparing and contrasting laws of backward masking.* M.S. thesis.

2. Shive, Joshua. (2005). *Applying models of visual search to map design.* M.S. thesis.

3. VanHorn, Daniel, R. (2005). *Orientation tuning of orientation afterimages.* M.S. thesis.

4. Wede, Joshua. (2006). *The role of selective visual attention in the formation of visual afterimages: Experimental data and model simulations.* M.S. thesis.

5. Zhang, Xiao (Cosmo). (2014). *Optimization of switch virtual keyboard by using computational modelling.* M.S. thesis.

CONFERENCE PRESENTATIONS

1. Francis, G., Bornet, A., Doerig, A. & Herzog, M. H. Perceptual Grouping and Segmentation: Uncrowding. Vision Sciences Society annual meeting. St. Pete Beach, FL. May 2017.

2. Herzog, M. H., Cretenoud, A., Francis, G. & Grzeckzkowski, L. The Structure of Visual Space. Vision Sciences Society annual meeting. St. Pete Beach, FL. May 2017.

3. Bornet, A., Doerig, A., Herzog, M. H. & Francis, G. Crowding asymmetries in a neural model of image segmentation. Vision Sciences Society annual meeting. St. Pete Beach, FL. May 2017.

4. Doerig, A. C., Clarke, A., Francis, G. & Herzog, M. H. Models of crowding: A comparative study. European Conference on Visual Perception. Barcelona, Spain. 28 August – 01 September, 2016.

5. Francis, G., Manassi, M. & Herzog, M. H. Cortical Dynamics of Perceptual Grouping and Segmentation: Crowding. Vision Sciences Society annual meeting. St. Pete Beach, FL. May 13, 2016.

6. Francis, G. A neural circuit for visual information spreading. ModVis. St. Pete Beach, FL. May 13, 2016.

7. Francis, G. A small part of the Human Brain Project: Neural dynamics of visual segmentation. Forty-first Annual Interdisciplinary Conference. Breckenridge, CO. February 5, 2016.

8. Francis, G. Cortical Dynamics of Perceptual Grouping and Segmentation: Crowding. Psychonomic Society 56th Annual Meeting. Chicago, IL. November 21, 2015.

9. Francis, G. Cortical dynamics of perceptual grouping and segmentation: Crowding. Models of cortical networks and function: A farewell symposium for Prof. Gregory Francis. Geneva, Switzerland. July 7, 2015.

10. Francis, G. Five questions about QRPs. Annual Meeting for the Association for Psychological Science. New York, NY. May 2015.

11. Francis, G. Contour erasure and filling-in: Old simulations account for most new observations. Vision Sciences Society annual meeting. St. Pete Beach, FL. May 2015.

12. Herzog, M. H., Manassi, M., Hermens, F. & Francis, G. Crowding, patterns, and recurrent processing. Vision Sciences Society annual meeting. St. Pete Beach, FL. May 2015.

13. Francis, G. A NEST-based simulation of visual processing. First NEST User Workshop. Geneva, Switzerland. April 2015.

14. Francis, G. Thoughts from a cognitive psychologist. "Are we building the right thing? - Requirements from theory for simulation environments and neuromorphic computing." European Institute for Theoretical Neuroscience, Paris, France. March 2–4, 2015.

15. Francis, G. A cortical model explains human responses to doubly illusory contours. Human Brain Project Summit. Heidelberg, Germany. September 2014.

16. Francis, G. Specific learning effects from non-specific mechanisms in visual perception. Perceptual Learning Workshop, Jongny, Switzerland, August 2014.

17. Francis, G. Cargo cult thinking in psychological science, 36th Annual Cognitive Science Conference. Part of a symposium on "Crisis in Cognitive Science? Rise of the Undead Theories," Quebec City, July 2014.

18. Francis, G. & Zhang, X. Modeling an design of optimal switch keyboards. 47th Annual Meeting of the Society for Mathematical Psychology, Quebec City, July 2014.

19. Zhang, X. & Francis, G. Optimization of Switch Keyboards. *The 15th ACM SIGACCESS (Association for Computing Machinery, Special Interest Group on Accessible Computing) International Conference on Computers and Accessibility.* Bellevue, Washington, October 21–23, 2013.

20. Francis, G. Publication bias, modeling, and theorizing in vision science. ModVis. Naples, FL. May 8, 2013.

21. Francis, G. Publication and verification bias in vision science. Vision Sciences Society annual meeting. Naples, FL. May 2013.

22. Kim, J. & Francis, G. A computational model of retinal circuitry predicts stimulus duration and intensity effects on visual persistence and afterimages. Vision Sciences Society annual meeting. Naples, FL. May 2013.

23. Francis, G. The failure of successful replication in psychology. Beyond Questionable Research Practices: Symposium on Good Research Practice in Behavioral Sciences. Royal Flemish Academy of Belgium for Science and the Arts, Brussels, Belgium. February 5, 2013.

24. Francis, G. We're all doing it wrong: Replication and data analysis in psychological science. Psychonomic Society annual meeting. Minneapolis, MN. November 16, 2012.

25. Francis, G. Replication in psychology and the psychology of replication. Psychonomic Society annual meeting. Minneapolis, MN. November 16, 2012.

26. Francis, G. It doesn't replicate, great!: Reasons for a failure to replicate in experimental psychology. Society for Computers in Psychology annual meeting. Minneapolis, MN. November 15, 2012.

27. Francis, G. The psychology of replication and replication in psychology. Society for Mathematical Psychology annual meeting, Columbus, OH. July 2012.

28. Francis, G. Too good to be true: Publication bias in experimental psychology. Midwestern Cognitive Science Conference, Bloomington, IN. May 2012.

29. Francis, G., Johnson, E. & Anderson, K. Optimized Keyboards For Locked-in Patients. Psychonomic Society annual meeting. Seattle, WA. November 2011.

30. Francis, G., Johnson, E. & Anderson, K. Optimized Keyboards For Locked-in Patients. Psychonomic Society annual meeting. Seattle, WA. November 2011.

31. Kim, J. & Francis, G. Filling-in of an afterimage in depth planes. Vision Sciences Society annual meeting. Naples, FL. May 2011.

32. Francis, G. & Kim, J. A model of visual fading of complex images. Vision Sciences Society annual meeting. Naples, FL. May 2011.

33. Kim, J. & Francis, G. Color filling in in afterimages. Psychonomic Society annual meeting. St. Louis, MO. November 2010.

34. Francis, G. & Johnson, E. Speed-accuracy trade-offs with specialized keyboards. Psychonomic Society annual meeting. St. Louis, MO. November 2010.

35. Francis, G. & Kim, J. Filling-in with afterimages: Modeling and predictions. Vision Sciences Society annual meeting. Naples, FL. May 2010.

36. Francis, G. The psychological four color mapping problem. Psychonomic Society annual meeting. Boston, MA. November 2009.

37. Francis, G. Explaining the new with the old: Spreading colors, afterimages, and boundaries. Vision Sciences Society annual meeting. Naples, FL. May 2009.

38. VanHorn, D. R. & Francis, G. Transitions from negative to switch color afterimages. Vision Sciences Society annual meeting. Naples, FL. May 2009.

39. Francis, G. & Wede, J. Exogenous attention strengthens illusory contours. Psychonomic Society annual meeting. Chicago, IL. November 2008.

40. Francis, G. Cortical dynamics of visual perception: Fundamental principles and computational bottlenecks. Workshop on Learning and Dynamics in Vision (and beyond). Glion, Switzerland. October 27-28, 2008.

41. Francis, G. Cortical dynamics of figure-ground segmentation: Shine-through. Vision Sciences Society annual meeting. Naples, FL. May 2008.

42. Shive, J. & Francis, G. Applying models of visual search to map design. Vision Sciences Society annual meeting. Naples, FL. May 2008.

43. VanHorn, D. R. & Francis, G. Switch color afterimages depend on the luminance of the viewing surface. Vision Sciences Society annual meeting. Naples, FL. May 2008.

44. Wede, J. & Francis, G. Attention increases the perceived strength of illusory contours. Vision Sciences Society annual meeting. Naples, FL. May 2008.

45. Francis, G. Cortical dynamics of figure-ground segmentation: Shine-through. Optical Society of America Fall Vision Meeting. Berkeley, CA. September 2007.

46. Herzog, M., Duangudom, V. & Francis, G. Spatial layout determines metacontrast masking. Vision Sciences Society annual meeting. Sarasota, FL. May 2007.

47. VanHorn, D. R. & Francis, G. Switch afterimages suggest cortical and retinal mechanisms. Vision Sciences Society annual meeting. Sarasota, FL. May 2007.

48. Wede, J. L. & Francis, G. Cortical dynamics of negative afterimages: Spatial properties of the inducer. Vision Sciences Society annual meeting. Sarasota, FL. May 2007.

49. Francis, G. & Wede, J. L. Attentional effects on two stimulus afterimages: Theory and data. European Conference on Visual Perception. St. Petersburg, Russia. August 2006.

50. Francis, G. What should a quantitative model of masking look like and why would we want it? Workshop on Visual masking and the dynamics of vision and consciousness. Hanse-Wissenschaftskolleg, Delmenhorst, Germany. June 27–30, 2006.

51. Ericson, J. & Francis, G. Dichoptic transfer of a two-stimulus afterimage. Vision Sciences Society annual meeting. Sarasota, FL. May 2006.

52. VanHorn, D. R. & Francis, G. Orientation tuning of visual afterimages. Vision Sciences Society annual meeting. Sarasota, FL. May 2006.

53. Wede, J. L. & Francis, G. The role of selective visual attention in the formation of visual afterimages: Experimental data and model simulations. Vision Sciences Society annual meeting. Sarasota, FL. May 2006.

54. Francis, G. & Rash, C. E. Development and test of optimal keyboard layout for specialized text entry in U.S. Army helicopters. Human Factors and Ergonomics Society 49th Annual Meeting. Orlando, FL. September 26–30, 2005.

55. Francis, G. & Rash, C. E. Development of optimized keyboards for rotary-wing aircraft. American Helicopter Society, Forum 61. Grapevine, TX. June 1–3, 2005.

56. Francis, G. The role of temporal integration in backward masking. Vision Sciences Society annual meeting. Sarasota, FL. May 2005.

57. Cho, Y. & Francis, G. The highs and lows of temporal integration in backward masking. Vision Sciences Society annual meeting. Sarasota, FL. May 2005.

58. Shive, J. & Francis, G. Applying models of visual search to map design. Vision Sciences Society annual meeting. Sarasota, FL. May 2005.

59. Francis, G. & Cho, Y. Computational models of object substitution. Early Cognitive Vision Workshop, Isle of Skye, Scotland, UK. May 28 – June 1, 2004.

60. Cho, Y. & Francis, G. Evidence for integration in Type A and B backward masking. Vision Sciences Society annual meeting. Sarasota, FL. April–May 2004.

61. Ericson, J. & Francis, G. The spatial spread of filling-in for afterimages produced from orthogonal pairs of stimuli. Vision Sciences Society annual meeting. Sarasota, FL. April–May 2004.

62. Francis, G. & Schoonveld, W. The perceived color of afterimages produced from orthogonal pairs of stimuli. Vision Sciences Society annual meeting. Sarasota, FL. April–May 2004.

63. Pizlo, Z., Francis, G., & Li, Y. Evidence of two mechanisms for binocular depth perception. Vision Sciences Society annual meeting. Sarasota, FL. April–May 2004.

64. Wede, J. L. & Francis, G. The time course of afterimages dependent on orientation and color. Vision Sciences Society annual meeting. Sarasota, FL. April–May 2004.

65. Francis, G. Computational models of visual masking. Invited talk at *The First Half Second* Workshop; sponsored by the National Institutes of Health. Houston, TX. November 1-3, 2003.

66. Francis, G. & Rash, C. E. Optimization of keyboard design for specialized text entry. Paper presented at the Human Factors and Ergonomics Society 47th Annual Meeting. Denver, CO. October 13–17, 2003.

67. Rash, C. E., Adam, G. E., LeDuc, P. A. & Francis, G. Pilot attitudes in comparing U.S. Army glass cockpit and traditional crew station designs. Poster presented at the Human Factors and Ergonomics Society 47th Annual Meeting. Denver, CO. October 13–17, 2003.

68. Cho, Y. & Francis, G. Backward masking with sparse masks: Models and experiments. Vision Sciences Society annual meeting. Sarasota, FL. May 2003.

69. Rash, C. E., Adam, G. E., LeDuc, P. A. & Francis, G. Pilot attitudes on glass and traditional cockpits in the U.S. Army's AH-64 Apache helicopter. Paper presented at the American Helicopter Society 59th Annual Forum. Phoenix, AZ. May 6–8, 2003.

70. Francis, G. & Schoonveld, W. Interactions of afterimages for orientation and color: New results force model revisions. Vision Sciences Society annual meeting. Sarasota, FL. May 2003.

71. Francis, G. The completion-persistence dilemma in recurrent neural networks. Hoosier Mental Life. West Lafayette, IN. April 2003.

72. Francis, G. & Rothmayer, M. Testing laws of backward masking: Support for an ISI-law. Paper presented at the Psychonomics Society Annual Meeting. Kansas City, MO. November 2002.

73. Francis, G. MFDTool: A program for building optimally designed displays. Paper presented at the annual meeting of the Society of Computers in Psychology. Kansas City, MO. November 2002.

74. Francis, G. Developing a new quantitative account of backward masking. Poster presented at the Vision Sciences Society annual meeting. Sarasota, FL. May 2002.

75. Francis, G. Quantitative models of backward masking: They are all correct...no wait...they are all incorrect. The Twenty-Eighth Annual Interdisciplinary Conference. Jackson Hole, Wyoming. February 2–7, 2002.

76. Francis, G. Quantitative Models of Visual Backward Masking: They are all Correct...No wait...They are all Incorrect. Mini-conference on Mathematical Psychology. Purdue University, November 10–11, 2001.

77. Rothmayer, M. & Francis, G. Modal percepts from complementary afterimages. Poster presented at the annual meeting of the Association for Research in Vision and Opthalmology. Ft. Lauderdale, FL. April 29–May 5, 2001.

78. Francis, G. & Rash, C. E. Optimization of information presentation on multifunction displays. Human Factors and Ergonomics Society Europe Chapter Annual Meeting 2000, Maastricht, The Netherlands. November 1–3, 2000.

79. Francis, G. Mathematical models of metacontrast masking. 31st European Mathematical Psychology Group Meeting, Graz, Austria. September 3–7, 2000.

80. Francis, G. & Rash, C. E. Optimization of information presentation on multifunction displays. SPIE AeroSense, Orlando, FL; April 24–28, 2000.

81. Francis, G. & Kim, H. A speed aftereffect in orientation afterimages. Poster presented at the annual meeting of the Association for Research in Vision and Ophthalmology, Ft. Lauderdale, FL; April 29–May 5, 2000.

82. Francis, G. & Kim, H. Motion lines bias ambiguous motion percepts. Poster presented at the annual meeting of the Association for Research in Vision and Ophthalmology, Ft. Lauderdale, FL; May 9–14, 1999.

83. Kim, H. & Francis, G. Perceived motion in complementary afterimages. Poster presented at the annual meeting of the Association for Research in Vision and Ophthalmology, Ft. Lauderdale, FL; May 9–14, 1999.

84. Kim, H. & Francis, G. A new motion cue: Verification of a neural network simulation. The 31st Annual Meeting of the Society for Mathematical Psychology, Nashville, TN; August 6–9, 1998.

85. Francis, G. Metacontrast masking without delays: A general theory. The 31st Annual Meeting of the Society for Mathematical Psychology, Nashville, TN; August 6–9, 1998.

86. Francis, G. Testing an explanation of metacontrast masking. Poster presented at the annual meeting of the Association for Research in Vision and Ophthalmology, Ft. Lauderdale, FL; May 11–16, 1997.

87. Kim, H. & Francis, G. A computational theory of motion lines. Poster presented at the annual meeting of the Association for Research in Vision and Ophthalmology, Ft. Lauderdale, FL; May 11–16, 1997.

88. Francis, G. Optimization of multifunction displays. Paper presented at the Department of Defense, Human Factors and Engineering Technical Advisory Group, Orlando, FL; November 3, 1997.

89. Francis, G. Cortical dynamics of lateral inhibition: Metacontrast masking. Poster presented at the annual meeting of the Association for Research in Vision and Ophthalmology, Ft. Lauderdale, FL; April 21–26, 1996.

90. Francis, G. Neural network dynamics of inhibition: metacontrast masking. Paper presented at the Midwest AI and Cognitive Science Conference, Bloomington, IN; April 26–28, 1996.

91. Francis, G. Multifunction display design: A quantitative design method. Paper presented at the Department of Defense, Human Factors and Engineering Technical Advisory Group, Baltimore, MD; November 4, 1996.

92. Francs, G. Cortical dynamics of lateral inhibition: Visual persistence and ISI. Poster presented at the annual meeting of the Association for Research in Vision and Ophthalmology, Ft. Lauderdale, FL; May 14–19, 1995.

93. Grossberg, S. & Francis, G. Cortical dynamics of form and motion integration: Persistence, apparent motion, and illusory contours. Poster presented at the annual meeting of the Association for Research in Vision and Ophthalmology, Ft. Lauderdale, FL; May 14–19, 1995.

94. Francis, G. Neural dynamics of cortical inhibition: Metacontrast masking. Paper presented at the Second Annual Joint Conference on Information Sciences, Wilmington, NC; September 28 – October 1, 1995.

95. Francis, G. Neural networks for short term pattern storage. Poster presented at the World Congress on Neural Networks, San Diego, CA; June 5–9, 1994.

96. Francis, G. & Grossberg, S. How do representations of visual form organize our percepts of visual motion? Paper presented at annual meeting of the Cognitive Science Society, Atlanta, GA; August 13–16, 1994.

97. Francis, G., Grossberg, S., & Mingolla, E. Neural dynamics of reset and binding of rapidly changing forms: Control of visual persistence. Poster presented at the annual meeting of the Association for Research in Vision and Ophthalmology, Sarasota, FL; May 3–8, 1992.

COLLOQUIA AND INVITED TALKS

1. "Using a model of visual perception to improve deep learning." Ecole Polytechnique Federale de Lausanne, Switzerland; December 12, 2017.

2. "A few things life scientists should know about statistics." Ecole Polytechnique Federale de Lausanne, Switzerland; December 8, 2017.

3. "The psychology of replication and replication in psychology." Microsoft Research, Redmond, CA; July 1, 2016.

4. "The psychology of replication and replication in psychology." Hamburg University, Germany; June 18, 2015.

5. "Cortical dynamics of perceptual grouping and segmentation: Crowding." École Polytechnique Fédérale de Lausanne, Switzerland; May 7, 2015.

6. "Pitfalls and traps when using statistics in psychological science." École Polytechnique Fédérale de Lausanne, Switzerland; February 6, 2015.

7. "The psychology of replication and replication in psychology." Ghent University, Belgium; January 30, 2015.

8. "WP11.1 Future Neuroscience." Human Brain Project, First Year Review, Brussels, Belgium; January 27, 2015.

9. "The psychology of replication and replication in psychology." University of Tübingen, Germany; June 18, 2015.

10. "The psychology of replication and replication in psychology." University of Lausanne, Switzerland; October 2, 2014.

11. "Cargo Cult Thinking in Psychological Science." University of Bern, Switzerland; March 27, 2014.

12. "The Frequency of Flawed Findings in Psychological Science." Tilberg University, The Netherlands; March 20, 2014.

13. "Replication, data analysis, and theorizing in psychological science." Tilberg University, The Netherlands; March 18, 2014.

14. "Cargo Cult Thinking in Psychological Science." University of Aberdeen, United Kingdom; February 27, 2014.

15. "The frequency of flawed findings in psychological science." National Science Foundation Workshop on Promoting Robust and Replicable Science; February 20, 2014.

16. "Cargo Cult Thinking in Psychological Science." École Polytechnique Fédérale de Lausanne, Switzerland; December 18, 2013.

17. "Cargo Cult Thinking in Psychological Science." University of Munich, Germany; November 15, 2013.

18. "Simulations of induced visual scene fading with boundary offset and filling-in." École Polytechnique Fédérale de Lausanne, Switzerland; November 7, 2013.

19. "Cargo Cult Thinking in *Psychological Science*." University of Toronto; August 26, 2013.

20. "The psychology of replication and replication in psychology." Michigan State University; April 29, 2013.

21. "The psychology of replication and replication in psychology." Rensselaer Polytechnic Institute; March 6, 2013.

22. "The psychology of replication and replication in psychology." University of Illinois, Champagne-Urbana; September 28, 2012.

23. "The psychology of replication and replication in psychology." École Polytechnique Fédérale de Lausanne, Switzerland; June 1, 2012.

24. "The psychology of replication and replication in psychology." Katholieke Universiteit Leuven, Belgium; June 1, 2012.

25. 'Promoting both basic and applied cognitive psychology." Eidgenössische Technische Hochschule Zürich, Switzerland; January 17, 2012.

26. "Too good to be true: Publication bias and the failure of replication in experimental psychology." École Polytechnique Fédérale de Lausanne, Switzerland; January 16, 2012.

27. "Visual perception of color: Filling-in, boundaries, and afterimages." University of Louisville, March 7, 2011.

28. "How do you know something is a perceptual illusion?" Purdue Winer Memorial Lectures, Purdue University; October 31, 2010.

29. "Speed-accuracy tradeoffs in specialized keyboards." Cognitive & Learning/Memory colloquia series, Purdue University; October 13, 2010.

30. "Human color perception and the psychological four color mapping problem." Directorate General Information Society and Media, European Commission, Brussels, Belgium; June 17, 2010.

31. "Human color perception and the psychological four color mapping problem." Proctor & Gamble, Cincinnati, OH; June 11, 2010.

32. "Color capture and color afterimages from invisible inducers." Cognitive & Learning/Memory colloquia series, Purdue University; January 27, 2010.

33. "Recent advancements in understanding of visual perception in the human brain and how it relates to computerized image analysis." NI Week 2009 Vision Summit; National Instruments; Austin, TX; August 4, 2009.

34. "The psychological four-color mapping problem." Cognitive & Learning/Memory colloquia series, Purdue University; February 11, 2009.

35. "Making sense of masking: Backward masking, masking functions, and temporal integration." Korea University, Seoul, South Korea; August 5, 2008.

36. "The attention paradox and modes of visual perception." ATR Computational Neuroscience Laboratories, Kyoto, Japan; June 25, 2008.

37. "Human perception and image analysis." Proctor & Gamble, Cincinnati, OH; June 2, 2008.

38. "Making sense of masking." Cognitive & Learning/Memory colloquia series, Purdue University; March 26, 2008.

39. "Human visibility and it's relation to computer algorithms." Industrial Imaging Workshop, Proctor & Gamble, Cincinnati, OH; February 12, 2008.

40. "Cortical dynamics of figure-ground segmentation: Shine through." Cognitive & Learning/Memory colloquia series, Purdue University; August 29, 2007.

41. "The Language of the Mind 1: A neural network model of visual perception: After-responses and afterimages." Universitá di Sassari, Italy; May 21, 2007.

42. "The Language of the Mind 2: Cortical dynamics of figure-ground segmentation: Shine through." Universitá di Sassari, Italy; May 22, 2007.

43. "Cortical dynamics of figure-ground segmentation: Shine through." École Polytechnique Fédérale de Lausanne, Switzerland; May 2, 2007.

44. "A neural network model of visual perception: After-responses and afterimages." Ludwig-Maximilians-Universität München; Germany; April 30, 2007.

45. "A neural network model of visual perception: After-responses and afterimages." École Polytechnique Fédérale de Lausanne, Switzerland; November 10, 2006.

46. "Using models from cognitive psychology to create optimized displays." École Polytechnique Fédérale de Lausanne, Switzerland; July 12, 2006.

47. "Using models from cognitive psychology to create optimized displays." Human Factors and Ergonomics Society Purdue Student Chapter, Purdue University; March 1, 2006.

48. "Visual afterimages: A model and experiments." Cognitive & Learning/Memory colloquia series, Purdue University; February 21, 2006.

49. "Using after-responses to study the visual system." CNS@15, Grossberg@65, Cognitive & Neural Systems, Boston University; Septebmer 16–17, 2005.

50. "The completion-persistence dilemma in recurrent neural networks for visual perception." École Polytechnique Fédérale de Lausanne, Switzerland; June 22, 2005.

51. "Creation and test of optimal keyboards." U. S. Army Aeromedical Research Laboratory; July 22, 2004.

52. "Accident rates in glass cockpit U. S. Army rotary wing aircraft." Cognitive & Learning/Memory colloquia series, Purdue University; November 12, 2003.

53. "Interactions between the dynamics of boundary and surface systems: An unusual visual afterimage." Cognitive & Learning/Memory colloquia series, Purdue University; September 18, 2002.

54. "Theories of backward masking." Indiana University; July 2, 2002.

55. "Quantitative models of backward masking: They are all correct...no wait...they are all incorrect." Cognitive & Learning/Memory colloquia series, Purdue University; September 19, 2001.

56. "A quantitative analysis of backward masking." University of California, Irvine; January 18, 2001.

57. "The completion-persistence problem in neural networks: An interesting solution in visual perception." Technische Universität Braunschweig; Braunschweig, Germany; December 12, 2000.

58. "The completion-persistence problem in neural networks: An interesting solution in visual perception." Martin-Luther-Universität Halle-Wittenberg; Germany; December 5, 2000.

59. "New properties of orientation afterimages." University of Bremen; Germany, November 22, 2000.

60. "The completion-persistence problem in neural networks: An interesting solution in visual perception." University of Oldenburg; Germany; October 30, 2000.

61. "Orientational afterimages: Evidence for FACADE." Cognitive and Neural Systems, 10th Anniversary Celebration, Boston University; May 23, 2000.

62. "Quantitative models of metacontrast masking: They're all the same." Cognitive & Learning/Memory colloquia series, Purdue University; September 1, 1999.

63. "MFD Tool: A software aid for the design of multifunction displays." United States Army Aeromedical Research Laboratory, Fort Rucker, AL; August 11, 1999.

64. "The completion–persistence dilemma for neural networks: A solution and its implications." Colloquium at Psychology Department, University of Notre Dame. South Bend, IN; September 14, 1998.

65. "Optimization of hierarchical information designs for aircraft MFDs." United States Army Aeromedical Research Laboratory, Fort Rucker, AL; August 4, 1998.

66. "The completion–persistence dilemma: A solution and its implications." Psychological Sciences Departmental colloquium, Purdue University, April 17, 1998.

67. "The cognitive psychology on-line Java-based laboratory." Teaching, Learning, and Technology Showcase. Purdue University; March 3, 1998.

68. "The completion–persistence dilemma in recurrent neural networks." Triangle Area Neural Network Society, Triangle Research Park, NC; February 5, 1998.

69. "Optimal hierarchical layout in MFDs." Cognitive & Learning/Memory colloquia series, Purdue University; October 15, 1997.

70. "Optimal hierarchical layout in MFDs." United States Army Aeromedical Research Laboratory, Fort Rucker, AL; July 31, 1997.

71. "Metacontrast masking: Theory and data." CAS/CNS colloquia series, Boston University; May 5, 1997.

72. "SOA and maximal metacontrast masking." Cognitive & Learning/Memory colloquia series, Purdue University; March 19, 1997.

73. "Multifunction display design: A review of human factors issues and a new quantitative design method." Cognitive & Learning/Memory colloquia series, Purdue University; September 11, 1996.

74. "Multifunction display design: A review of human factors issues and a new quantitative design method." United States Army Aeromedical Research Laboratory, Fort Rucker, AL; August 1, 1996.

75. "Cortical dynamics of visual persistence and temporal integration." Cognitive & Learning/Memory colloquia series, Purdue University; January 24, 1996.

76. "Cortical dynamics of lateral inhibition: Metacontrast masking." Cognitive & Learning/Memory colloquia series, Purdue University; September 20, 1995.

77. "Cortical dynamics of neon color spreading and temporal integration." Cognitive Science colloquia series, Indiana University; September 6, 1995.

78. "Cortical dynamics of visual persistence and temporal integration." Quantitative psychology colloquia series, Purdue University; April 10, 1995.

79. "Cortical dynamics of binding and reset: Persistence of residual traces and orientational aftereffects." Cognitive & Learning/Memory colloquia series, Purdue University; September 7, 1994.

80. "Cortical dynamics of lateral inhibition: Visual persistence and ISI." Hoosier mental life, Purdue University; August, 1994.

81. "Dynamics of form and motion integration." Cognitive & Learning/Memory colloquia series, Purdue University; March 2, 1994.

82. "Analysis and synthesis of neural networks for short term memory." Cognitive & Learning/Memory colloquia series, Purdue University; November 10, 1993.

83. "Analysis and synthesis of neural networks for short term memory." Department of mathematical sciences colloquium, Butler University, Indianapolis; October 28, 1993.

GRANTS AND CONTRACT WORK

1. *Making Brain Science Studies accessible to all with the Nautilus system g.Nautilus 32.* (PI: Juan P. Wachs, Co-PIs: Brad Duerstock, Shannon McMullen, Greg Francis, Richard Voyles, Tahira Reid, Joaquin Goni, Leah Jamieson, Melba Crawford & Abhijit Deshmukh) Supported by the Laboratory & University Core Facility Research Equipment Program, Purdue University. $66,000.

2. *Reducing bias in empirical research by utilizing replication to estimate extent of bias produced by common practices in social and behavioural sciences.* (PI: Scott Feld, Co-PI: Greg Francis). Supported by the Transdisciplinary and Interdisciplinary Research Grant, Purdue University. $16,000.

3. *Human Brain Project.* Part of the "Future Neuroscience" team while on a sabbatical and research leave in Switzerland. From the approximately €250 million of funding from the European Commission for the first 2.5 years of the ten-year project, GF received funding of approximately 100,000 CHF.

4. *Optimally designed switch keyboards for spinal cord and brain injury patients.* Indiana Spinal Cord and Brain Injury Research Grant Program. 2013–2015. $120,000.

5. *Perception-based Engineering (PBE) Community in the ICPT Signature Area.* April 2008–2009. (Co-PIs: G. T. Chiu, P. Davies, G. Francis, Z. Pizlo, R. Proctor, & H. Tan). Supported by the Purdue University College of Engineering. $25,000.

6. *Strategies for Optimizing Visual Search of Map Displays.* Purdue Research Foundation. June 1, 2006 - May 31, 2007. $15,292.

7. *Cognitive issues of visual processing with helmet-mounted displays (HMDs).* United States Army Aeromedical Research Laboratory, Fort Rucker, AL. July 2007 – March 2008. $15,000.

8. *Using a Supercomputer to Develop a Unified Model of Visual Perception.* Roche Research Foundation: Guest Scientist Program. 1 September 2006 to 31 December 2006. 25,000 CHF.

9. *Modeling visual perception with the Blue Brain supercomputer.* Swiss National Science Foundation: Individual Short Visit. June 1, 2006 – August 31, 2006. 13,000 CHF.

10. U.S. Army Summer Faculty Research and Engineering Program. Carried out research for the United States Army Aeromedical Research Laboratory, Fort Rucker, AL. May-December 2006. $10,000.

11. *Strategies for Optimizing Visual Search of Map Displays.* Purdue Research Foundation. June 1, 2006 – May 31, 2007. $14,040.

12. *Visual masking and the dynamics of human perception, cognition, and consciousness* a workshop at the Hanse-Wissenschaftskolleg, Delmenhorst, Germany. June 27–30, 2006. (Co-PIs: Ulrich Ansorge, Universität Bielefeld; Gregory Francis, Purdue University; Michael Herzog, École Polytechnique Fédérale Lausanne; Haluk Ogmen, University of Houston.) Supported by the Volkswagon Foundation (VolkswagenStiftung). €25,300. Also supported by the Hanse-Wissenschaftskolleg: €5,200.

13. U.S. Army Summer Faculty Research and Engineering Program. Carried out research for the United States Army Aeromedical Research Laboratory, Fort Rucker, AL. May-December 2005. $22,000.

14. U.S. Army Summer Faculty Research and Engineering Program. Carried out research at the United States Army Aeromedical Research Laboratory, Fort Rucker, AL. Summer 2004. $14,009.

15. Purdue Research Foundation International Travel Grant. For travel to the "Early Cognitive Vision Workshop" Isle of Skye, Scotland, May 28–June 1, 2004. $1018.

16. *Objects in flow: Streaming and integration.* NATO Collaborative Linkage Grant. PI: Michael Herzog, University of Bremen, Germany. (Co-PIs: Archil Kezeli, Georgian Academy of Sciences, Tbilisi, Georgia; Gregory Francis, Purdue University, West Lafayette, IN, USA; and Talis Bachmann, University of Tartu, Tallinn, Estonia.) January 2004–2006. €17,500.

17. U.S. Army Summer Faculty Research and Engineering Program. Carried out research at the United States Army Aeromedical Research Laboratory, Fort Rucker, AL. Summer 2003. $13,495.

18. *Support for projects in an honors section of cognitive psychology.* Funded by the School of Liberal Arts, Purdue University. October 2002–October 2003. $750.

19. U.S. Army Summer Faculty Research and Engineering Program. Carried out research at the United States Army Aeromedical Research Laboratory, Fort Rucker, AL. Summer 2002. $10,610.

20. *Quantitative investigations of backward masking.* Funded by the National Science Foundation. August 1, 2001 to July 31, 2004. $120,392.

21. U.S. Army Summer Faculty Research and Engineering Program. Carried out research at the United States Army Aeromedical Research Laboratory, Fort Rucker, AL. Summer 2001. $16,000.

22. U.S. Army Summer Faculty Research and Engineering Program. Carried out research at the United States Army Aeromedical Research Laboratory, Fort Rucker, AL. Summer 2000. $17,000.

23. *Neurobiologically-based system for object segmentation and recognition.* Consultant for Physical Optics Corporation; Torrance, CA. Small Business Research Initiative Phase I. Funded by the National Image Mapping Agency, January–September 1999. Total grant funded for $100,000. Dr. Francis was budgeted for $15,000 of that total to support and work with a Purdue graduate student on the research project.

24. U.S. Army Summer Faculty Research and Engineering Program. Carried out research at the United States Army Aeromedical Research Laboratory, Fort Rucker, AL. Summer 1999. $11,000.

25. *Web-based interactive instruction for cognitive psychology.* (Co-PI with I. Neath & A. Surprenant). Funded by the Multimedia Instructional Development Center, Purdue University, 1998. Summer 1998 to Summer 1999. $14,484. (GF was budgeted for $4,518 of the total.)

26. U.S. Army Summer Faculty Research and Engineering Program. Carried out research at the United States Army Aeromedical Research Laboratory, Fort Rucker, AL. Summer 1998. $17,061.

27. *Multimedia instruction for cognitive psychology.* Funded by the Multimedia Instructional Development Center, Purdue University, 1997. $11,000.

28. U.S. Army Summer Faculty Research and Engineering Program. Carried out research at the United States Army Aeromedical Research Laboratory, Fort Rucker, AL. Summer 1997. $16,681.

29. U.S. Army Summer Faculty Research and Engineering Program. Carried out research at the United States Army Aeromedical Research Laboratory, Fort Rucker, AL. Summer 1996. $15,861.

30. Department of Psychological Sciences, Purdue University, grant competition for junior faculty, 1995. $2000.