

ENNIO MINGOLLA

Professor

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EDUCATION University of Connecticut, PhD, 1983
Experimental Psychology; Related area: Computer Science

Boston University, MEd, 1978
Educational Media and Technology

Peace Corps Training, Kakata, Liberia, 1974
Secondary Education

Harvard College, AB, 1973
Philosophy and Social Relations (Honors)

POSITIONS

2018-present **Professor**, Department of Communication Sciences and Disorders
(previously known as Department of Speech-Language Pathology and
Audiology, Northeastern University)

2012-present **Professor and Chair**, Department of Communication Sciences and
Disorders, Northeastern University

2012-present **Professor of Psychology**, Northeastern University

2011-2012 **Professor**, Department of Psychology, Boston University

2009-2012 **Director**, CELEST (Center of Excellence for Learning in Education,
Science, and Technology, and NSF Science of Learning Center)

2008-2011 **Chair**, Cognitive and Neural Systems Department, Boston University

1999-2011 **Professor**, Cognitive and Neural Systems Department and
Psychology Department, Boston University
Acting Chair, (CNS) 1995/1996 and 2002/2003

2007-2009 **Co-Director**, CELEST

- 1992-1998 **Associate Professor**, Cognitive and Neural Systems Department and Psychology Department, Boston University
- 1988-1992 **Assistant Professor**, Cognitive and Neural Systems Department and Psychology Department, Boston University
- 1985-1988 **Research Associate**, Adjunct, Psychology Department, Brandeis University
- 1983-1988 **Research Associate**, Center for Adaptive Systems, Boston University
- 1978-1983 **Teaching Assistant and Graduate Fellow**
Department of Psychology, University of Connecticut
- 1975-1978 **Analyst** (applied social science research)
Abt Associates, Inc., Cambridge, Massachusetts
- 1973-1974 **Peace Corps Volunteer**, Liberia

OTHER EXPERIENCE

Visiting Professor; 2009
Department of Psychology, University of Padova, Italy

Visiting Professor; 2001
Faculty of Philosophy, University of Trieste, Italy

Visiting Scholar; 1994-1995
Department of Psychology, Harvard University

HONORS

Ninth Annual Kanizsa Lecture, Trieste, Italy, October 26, 2001

Helmholtz Award, 2007, from the International Neural Network Society for achievement in research on sensation and perception

FUNDED GRANTS AND CONTRACTS

Principal investigator of Northeastern University subcontract (Hewlett-Packard Enterprise: OAK Sentient Prime Contract # 15-C-0249) \$59,447, 2015-2016.

Principal investigator of research contract from Hewlett-Packard Corporation (HP Labs), The Development of an Active Vision Model Capable of Performing Goal-Driven Visual Search, \$150,000. 2014-2015.

Principal investigator of Office of Naval Research award ONR N00014-13-1-0092, Biologically-Inspired Flow Field Computation for Sensing and Control of Ground Vehicles, 2012–2016, \$576,624.

Principal Investigator of subcontract to Northeastern University, \$370,656, 2013-2013. Main award: National Science Foundation (NSF) renewal SMA-0835976, “CELEST: A Center of Excellence for Learning in Education, Science, and Technology” 2010–2015, \$20,900,000.

Principal investigator of Air Force Office of Scientific Research award #000464-001, “Visual depth perception from motion through texture accretion and deletion, 2012-2014, \$481,305.

Recipient of gift of \$25,000 from Hewlett-Packard Corporation (HP Labs) to support research, 2013.

Co-principal investigator of research contract from Hewlett-Packard (HP Labs), Whole brain modeling with Cog ex Machina applied to an unmanned helicopter, 2012, \$325,000.

Principal investigator of Air Force Research Lab award BAA-10-07-RIKA, subcontracted through Neurala LLC, Adaptive laminar computing on scalable heterogeneous hardware for image understanding, 2011–2012, \$190,888.

Principal investigator of Office of Naval Research award ONR N00014-11-1-0535, Biologically-Inspired Flow Field Computation for Sensing and Control of Ground Vehicles, 2011–2014, \$1,511,005.

Co-principal investigator of National Science Foundation (NSF) award SMA-1011904, “The 2010 inter-Science of Learning Centers Conference” 2010–2011, \$99,874.

Principal investigator of National Science Foundation (NSF) renewal award SMA-0835976, “CELEST: A Center of Excellence for Learning in Education, Science, and Technology” 2010–2015, \$20,900,000.

Principal investigator of National Science Foundation (NSF) award SBE-0354378, “CELEST: A Center of Excellence for Learning in Education, Science, and Technology”, 2009–2010, \$20,737,181.

Principal investigator of Defense Advanced Research Projects Agency (DARPA) subcontract to Hewlett-Packard (HP): “SyNAPSE: Systems of Neuromorphic Adaptive Plastic Scalable Electronics” 2009-2011 \$1,547,740 (Phase 1)

Co-principal investigator of Defense Advanced Research Projects Agency (DARPA) subcontract to HRL Laboratories LLC: “SyNAPSE: Systems of Neuromorphic Adaptive Plastic Scalable Electronics” 2008-2009 \$358,966 (Phase 0).

Co-principal investigator of Defense Advanced Research Projects Agency (DARPA) subcontract to Hewlett-Packard (HP): “SyNAPSE: Systems of Neuromorphic Adaptive Plastic Scalable Electronics” 2008-2009 \$479,118 (Phase 0).

Principal investigator of National Geospatial-Intelligence Agency (NGA) competitive extension of grant NMA201-01-1-2016: “Biologically Inspired Approaches to Automated Feature Extraction and Target Recognition” 2004-2006; \$318,448.

Investigator on National Science Foundation (NSF) award SBE-0354378, “CELEST: A Center of Excellence for Learning in Education, Science, and Technology” (Stephen Grossberg, PI), 2004-2009, \$20,130,006.

Co-principal investigator of National Imagery and Mapping Agency (NIMA) grant NMA501-03-1-2030 “Unconstrained Goal-based Visual Scene Analysis: Neural Model Development and Psychophysical Testing” 2003-2005, \$200,000.

Principal investigator of National Science Foundation (NSF) grant BCS-02-35398: “Neural Mechanisms of Motion Integration and Segmentation” 2003-2006; \$324,380.

Principal investigator of National Imagery and Mapping Agency (NIMA) grant NMA201-01-1-2016: “Biologically Inspired Approaches to Automated Feature Extraction and Target Recognition” 2001-2004; \$438,855.

Investigator on Office of Naval Research (ONR) grant N00014-01-1-0624: “A MURI Center for Intelligent Biomimetic Image Processing and Classification” (Stephen Grossberg, PI) 2001-2006; \$3,500,000.

Principal investigator of National Imagery and Mapping Agency (NIMA) grant NMA202-98-K-1090: “Visual Search and Object Identification in Time-Varying Imagery” 1998-2000; \$196,000.

Co-principal investigator of Army Research Office (ARO) grant DAA-04-95-1-0057: “Instrumentation for Research on Human Visual Search, Target Detection, and Recognition” 1995-1996; \$100,000.

Investigator on Defense Advanced Projects Research Agency/Office of Naval Research (DARPA/ONR) grant N00014-95-1-0409: “A MURI Center for Automated Vision and Sensing Systems” (Stephen Grossberg, PI) 1995-2000; \$4,800,000.

Principal investigator of HNC Inc. subcontract SC-94-001: “A Biologically Inspired Hierarchical Neural Network System for LADAR Object Classification” 1993-1995; \$186,400.

Principal investigator of Office of Naval Research (ONR) grant N00014-94-1-0597: “Context-Sensitive Visual Processing: Segmentation and Grouping, Visual Search, and 3-D Surface Perception” 1994-1997; \$260,000.

Principal investigator of Brigham and Women's Hospital subcontract BWH-777011: "Modeling of Visual Search" 1993-1996; \$67,527.

Principal investigator of Northeast Consortium for Engineering Education (NCEE) subcontract A303-21-93: "Texture Representation and Use in Mid-Level Machine Vision" 1993-1994; \$37,300.

Co-principal investigator of Air Force Office of Scientific Research (AFOSR) grant F49620-92-J-0334: "Neural Models of Motion Perception" 1992-1995; \$173,146.

Co-author with other consortium members and Stephen Grossberg (PI) of Air Force Office of Scientific Research (AFOSR) University Research Initiative (URI) grant 90-0175: "Renewal of a University Research Initiative to Support a Boston-Area Consortium for Research on the Cognitive, Perceptual, and Neural Bases of Skilled Performance" 1990-1993; \$791,250.

Co-author with other consortium members and Stephen Grossberg (PI) of Air Force Office of Scientific Research (AFOSR) University Research Initiative (URI) grant F49620-87-C-0018: "The Cognitive, Perceptual, and Neural Bases of Skilled Performance" 1986-1989; \$1,419,886.

Supported by Air Force Office of Scientific Research (AFOSR) grant 85-0149: "Perceptual Dynamics, Real-Time Image Processing, and Neural Architectures" (Stephen Grossberg, PI) 1985-1987; \$263,078.

Supported by Air Force Office of Scientific Research (AFOSR) grant F49628-83-C0066: "Nonlinear Dynamics of Multi-Channel Binocular Vision" (Stephen Grossberg, PI) 1983-1985; \$132,853.

PROFESSIONAL ACTIVITIES

Member of the editorial board of the journals *Neural Networks* (1987-1999), *Ecological Psychology* (since 1991-2016), *Applied Intelligence* (1995), and *Computational Intelligence and Neuroscience* (2011-2015).

Co-organizer of a session at the 3rd Workshop on Human and Machine Vision, Boston, November 1985.

Visiting Professor, Faculty of Philosophy, University of Trieste, Italy, May 1987.

Session co-chair at the 1987 IEEE First Annual International Conference on Neural Networks.

Technical panelist for the 1987-1988 DARPA Neural Network Study.

Member of the Program Committee for the first annual meeting of the International Neural Network Society (INNS), Boston, 1988.

Co-organizer of a meeting on Visual Form and Motion Perception, Boston, March 1988.

Session chair at the International Joint Conference on Neural Networks (IJCNN), Washington DC, January 1990.

Member of Special Review Committee for grant proposals in Mathematical, Computational, and Theoretical Neuroscience for National Institute of Mental Health (NIMH) and National Institute of Health (NIH), March and November, 1991.

Session co-chair at the International Joint Conference on Neural Networks (IJCNN), Baltimore MD, June 1992.

Visiting Scholar, Department of Psychology, Harvard University, 1994-1995.

Visiting Professor, Faculty of Philosophy, University of Trieste, Italy, May 1995.

Visiting Professor, Department of Psychology, University of Padua, Italy; supported in part by the University of Padua/Boston University Faculty Exchange Program, May 1995.

Organizer of a team residency funded by the Rockefeller Foundation in Bellagio, Italy, June 1995.

Elected member of the Governing Board (1992-1995), International Society for Ecological Psychology.

Member of the Program Committee for the 13th International Conference on Pattern Recognition, Vienna, Austria, August 1996.

Member of International Advisory Board for the International Workshop on Soft Computing in Industry (IWSCI'99), June 16-18, 1999, Muroran, Hokkaido, Japan.

Member of Presidential University Graduate Fellowship Committee, Boston University, 1996 to 2000.

Session Chair, International Conference on Cognitive and Neural Systems, 2003 to 2007.

Abstract referee, annual meeting of the Vision Sciences Society, 2006 to the present.

REVIEWER (manuscripts and grant proposals)

Air Force Office of Scientific Research (AFOSR)

Journal of Experimental Psychology: Human Perception and Performance

Israel Science Foundation

National Institute of Health (NIH)

National Institute of Mental Health (NIMH)

National Science Foundation (NSF)

Neural Computation

Neuron

Office of Naval Research (ONR)

Perception

Perception & Psychophysics

Psychological Review

Spatial Vision

Trends in Cognitive Science

Vision Research

CONSULTANT (image processing and graphic display design)

Clients have included E.I. du Pont de Nemours, Inc.; HNC, Inc.; HRL, Inc.; MITRE Corp.; MIT Lincoln Laboratory; Pacific Sierra Research, Inc.; and Enkidu Research, Inc.

RESEARCH INTERESTS

Theoretical: Models of visual perception, including boundary completion and perceptual grouping (articles 8, 13, 14, 32, 39, 41, 45, 50, 53, 63, 67, 71, and 79), textural segmentation (articles 9 and 11), shape-from-shading and texture (articles 15 and 76), motion perception (articles 19, 20, 21, 22, 25, 28, 37, 51, 55, 60, 66, 72, and 77), optic flow and navigation (articles 62, 81, 82, and 83), feature binding and persistence (articles 34 and 35), brightness perception (articles 42, 44, and 54), eye movements (article 65), visual search (articles 31 and 36), the McCollough effect (article 68), and visual attention (article 84).

Empirical: Visual psychophysics, including shape-from-shading (articles 4, 10, and 48), motion perception (articles 1, 24, 57, and 58), illusory contours (articles 29 and 80); perceptual optics and computer graphics (articles 5, 6, and 12); optic flow (article 56); lightness and brightness (articles 46, 64, 73, and 75), texture segmentation (articles 43 and 61), and multi-object tracking (article 69).

Applications: Computer vision and image processing (articles 16, 17, 21, 23, 27, 33, 40, 47, 59, and 79).

TEACHING EXPERIENCE

Development and teaching of introductory and advanced graduate courses in human vision, including units on neural modeling, computational vision, physiology and psychophysics.

Organization of graduate seminars in computational vision, computer graphics, and visual psychophysics.

Co-developer and teacher of an undergraduate course in perception (with J.T. Todd, at Brandeis University, 1985-1986).

Development and teaching of several intensive short courses (2 to 12 hours) in neural modeling of visual processes; constituencies have included undergraduates, graduates, and professionals.

PROFESSIONAL SOCIETIES

International Neural Network Society
 International Society for Ecological Psychology
 Vision Sciences Society

DISSERTATION

The perception of shape and illuminant direction from shading. University of Connecticut, 1983.

PATENT

Co-holder of United States Patent #4803736, February 7, 1989 “Neural Networks for Machine Vision.”

PEER-REVIEWED PUBLICATIONS

1. Mingolla, E. and Todd, J.T. (1981). The rotating square illusion. *Perception and Psychophysics*, **29**(5), 487-492.
2. Shaw, R.E., Mark, L.S., Jenkins, D.H., and Mingolla, E. (1982). A dynamic geometry for predicting growth of gross craniofacial morphology. In A. Dixon and B. Sarnat (Eds.), **Factors and mechanisms in bone growth**. New York: Alan R. Liss, Inc.
3. Shaw, R.E. and Mingolla, E. (1982). Ecologizing world graphs: Comments on Liebhlich and Arbib's “Multiple representations of space underlying behavior.” *Behavioral and Brain Sciences*, **5**, 648-650.
4. Todd, J.T. and Mingolla, E. (1983). The perception of surface curvature and direction of illumination from patterns of shading. *Journal of Experimental Psychology: Human Perception and Performance*, **9**(4), 583-595.
5. Todd, J.T. and Mingolla, E. (1984). The simulation of curved surfaces from patterns of optical texture. *Journal of Experimental Psychology: Human Perception and Performance*, **10**(5), 734-739.
6. Mingolla, E. and Todd, J.T. (1984). Computational techniques for the graphic simulation of quadric surfaces. *Journal of Experimental Psychology: Human Perception and Performance*, **10**(5), 740-745.
7. Mingolla, E. and Hamilton, G. (1985). Report of the work group on visual information. In R.E. Shaw and W. Warren (Eds.), In **Proceedings of the first international conference on event perception**. Hillsdale, NJ: Erlbaum Associates, pp.251-258.

8. Grossberg, S. and Mingolla, E. (1985). Neural dynamics of form perception: Boundary completion, illusory figures, and neon color spreading. *Psychological Review*, **92**(2), 173-211.
9. Grossberg, S. and Mingolla, E. (1985). Neural dynamics of perceptual grouping: Textures, boundaries, and emergent segmentations. *Perception and Psychophysics*, **38**(2), 141-171.
10. Mingolla, E. and Todd, J.T. (1986). Perception of solid shape from shading. *Biological Cybernetics*, **53**, 137-151. Reprinted in B.K.P. Horn and M.J. Brooks (Eds.), **Shape from shading**. Cambridge, MA: MIT Press, 1989, pp.409-441.
11. Grossberg, S. and Mingolla, E. (1986). Computer simulation of neural networks for perceptual psychology. *Behavior Research Methods, Instruments, and Computers*, **18**, 601-607.
12. Mingolla, E. (1986). Computer graphics and surface perception. *Behavior Research Methods, Instruments, and Computers*, **18**, 531-534.
13. Grossberg, S. and Mingolla, E. (1986). A neural theory of preattentive visual information processing: Emergent segmentation, cooperative-competitive computation, and parallel memory storage. In E. Clementi and S. Chin (Eds.), **Structure and dynamics of nucleic acids, proteins, and membranes**. New York: Plenum Press, pp.355-401.
14. Grossberg, S. and Mingolla, E. (1987). The role of illusory contours in visual segmentation. In S. Petry and G. Meyer (Eds.), **The perception of illusory contours**. New York: Springer-Verlag, pp.116-125.
15. Grossberg, S. and Mingolla, E. (1987). Neural dynamics of surface perception: Boundary webs, illuminants, and shape-from-shading. *Computer Vision, Graphics, and Image Processing*, **37**, 116-165.
16. Grossberg, S. and Mingolla, E. (1987). A neural network architecture for preattentive vision: Multiple scale segmentation and regularization. In M. Caudill and C. Butler (Eds.), **Proceedings of the IEEE international conference on neural networks**, **IV**, 177-184.
17. Grossberg, S., Mingolla, E., and Todorovic, D. (1989). A neural network architecture for preattentive vision. *IEEE Transactions on Biomedical Engineering*, **36**, 65-84.
18. Mingolla, E. and Bullock, D. (1989). Book Review: Neurocomputing: Foundations of research, J.A. Anderson and E. Rosenfeld (Eds.). *Neural Networks*, **2**, 405-409.
19. Grossberg, S. and Mingolla, E. (1990). Neural dynamics of motion segmentation: Direction fields, apertures, and resonant grouping. In M. Caudill (Ed.), **Proceedings of the international joint conference on neural networks**, January, **I**, 11-14. Hillsdale, NJ: Erlbaum Associates.
20. Grossberg, S. and Mingolla, E. (1990). Neural dynamics of motion segmentation. In **Proceedings of graphics interface/vision interface 90**, Halifax, Nova Scotia, May 17, 1990. Toronto: Canadian Information Processing Society, pp.112-119.

21. Mingolla, E. (1991). Neural dynamics of static and motion visual segmentation. In R. Plamondon and E.H.D. Chang (Eds.), **Pattern recognition: Architectures, algorithms, and applications**. Singapore: World Scientific Publishers.
22. Mingolla, E. (1991). Neural dynamics of motion segmentation and grouping. In R. Lippmann, J. Moody, and D.S. Touretsky (Eds.), **Advances in neural information processing systems**. San Diego: Morgan Kaufman.
23. Cruthirds, D., Gove, A., Grossberg, S., and Mingolla, E. (1991). Preattentive texture segmentation and grouping by the Boundary Contour System. In **Proceedings of the international joint conference on neural networks**, Seattle, I, 655-660. Piscataway, NJ: IEEE Service Center.
24. Mingolla, E., Todd, J.T., and Norman, J.F. (1992). The perception of globally coherent motion. *Vision Research*, **32**(6), 1015-1031.
25. Grossberg, S. and Mingolla, E. (1992). Neural dynamics of visual motion perception: Local detection and global grouping. In G.A. Carpenter and S. Grossberg (Eds.), **Neural networks for vision and image processing**. Cambridge, MA: MIT Press, pp.293-342.
26. Mingolla, E. and Gaudiano, P. (1992). Dinamica neurale della percezione visiva. *Sistemi Intelligenti*, **IV**, 75-99.
27. Cruthirds, D., Gove, A., Grossberg, S., Mingolla, E., Nowak, N., and Williamson, J. (1992). Processing of synthetic aperture radar images by the Boundary Contour System and Feature Contour System. In **Proceedings of the international joint conference on neural networks**, Baltimore, IV, 414-419. Piscataway, NJ: IEEE Service Center.
28. Grossberg, S. and Mingolla, E. (1993). Neural dynamics of motion segmentation: Direction fields, apertures, and resonant grouping. *Perception and Psychophysics*, **53**(3), 243-278.
29. Leshner, G.W. and Mingolla, E. (1993). The role of edges and line-ends in illusory contour formation. *Vision Research*, **33**(16), 2253-2270.
30. Gove, A., Grossberg, S., and Mingolla, E. (1993). Brightness perception, illusory contours and corticogeniculate feedback. In **Proceedings of the world congress on neural networks**, Portland, I, 25-28. Hillsdale, NJ: Erlbaum Associates.
31. Grossberg, S., Mingolla, E., and Ross, W.D. (1993). A neural theory of visual search: Recursive attention to segmentations and surfaces. In **Proceedings of the world congress on neural networks**, Portland, I, 36-41. Hillsdale, NJ: Erlbaum Associates.
32. Francis, G., Grossberg, S., and Mingolla, E. (1993). Dynamic reset of persistent visual segmentations by neural networks. In **Proceedings of the world congress on neural networks**, Portland, II, 108-111. Hillsdale, NJ: Erlbaum Associates.

33. Grossberg, S., Mingolla, E., and Williamson, J. (1993). Processing of synthetic aperture radar images by a multiscale boundary contour system and feature contour system. In **Proceedings of the world congress on neural networks**, Portland, **III**, 785-788. Hillsdale, NJ: Erlbaum Associates.
34. Francis, G., Grossberg, S., and 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 and Hall Publishers, pp.474-501.
35. Francis, G., Grossberg, S., and Mingolla, E. (1994). Cortical dynamics of feature binding and reset: Control of visual persistence. *Vision Research*, **34**(8), 1089-1104.
36. Grossberg, S., Mingolla, E., and Ross, W.D. (1994). A neural theory of attentive visual search: Interactions of visual, spatial, and object representations. *Psychological Review*, **101**(3), 470-489.
37. Grossberg, S. and Mingolla, E. (1994). Visual motion perception. In V.S. Ramachandran (Ed.), **Encyclopedia of human behavior, Volume 4**. New York: Academic Press, pp.469-486.
38. Mingolla, E., Neumann, H., and Pessoa, L. (1994). A multi-scale network model of brightness perception. In **Proceedings of the world congress on neural networks**, San Diego, **IV**, 299-306. Hillsdale, NJ: Erlbaum Associates.
39. Leshner, G.W. and Mingolla, E. (1995). Illusory contour formation. In M.A. Arbib (Ed.), **Handbook of brain theory and neural networks**. Cambridge, MA: MIT Press, pp.481-483.
40. Grossberg, S., Mingolla, E., and Williamson, J. (1995). Synthetic aperture radar processing by a multiple scale neural system for boundary and surface representation. *Neural Networks* (Special Issue on Automatic Target Recognition), **8**(7/8), 1005-1028.
41. Gove, A., Grossberg, S., and Mingolla, E. (1995). Brightness perception, illusory contours, and corticogeniculate feedback. *Visual Neuroscience*, **12**, 1027-1052.
42. Pessoa, L., Mingolla, E., and Neumann, H. (1995). A contrast and luminance-driven multiscale network model of brightness perception. *Vision Research*, **35**, 2201-2223.
43. Mingolla, E. (1995). Neural mechanisms of brightness perception and visual search. In **Proceedings of the world congress on neural networks**, Washington.
44. Grossberg, S., Mingolla, E., and Williamson, J. (1995). A multiple scale neural system for boundary and surface representation of SAR data. In **Proceedings of the IEEE workshop on neural networks for signal processing**, New York.
45. Pessoa, L., Beck, J., and Mingolla, E. (1996). Perceived texture segregation in chromatic element-arrangement patterns: High intensity interference. *Vision Research*, **36**(12), 1745-1760.

46. Pessoa, L., Mingolla, E., and Arend, L. (1996). The perception of lightness in 3-D curved objects. *Perception and Psychophysics*, **58**(8), 1293-1305.
47. Mingolla, E. (1996). Recent results in early visual processing. Invited article in **Proceedings of the international workshop on soft computing in industry**, Muroran, Hokkaido, Japan.
48. Mingolla, E. (1997). A multi-scale network model of brightness perception. In C. Taddei-Ferretti (Ed.), **Biocybernetics of vision: Integrative mechanisms and cognitive processes**. Singapore: World Scientific Publishers.
49. Mingolla, E. (1997). Recent results in emergent visual segmentation. In C. Taddei-Ferretti (Ed.), **Biocybernetics of vision: Integrative mechanisms and cognitive processes**. Singapore: World Scientific Publishers.
50. Grossberg, S., Mingolla, E., and Ross, W.D. (1997). Visual brain and visual perception: How does the cortex do perceptual grouping? *Trends in Neurosciences*, **20**(3), 106-111.
51. Chey, J., Grossberg, S. and Mingolla, E. (1997). Neural dynamics of motion grouping: From aperture ambiguity to object speed and direction. *Journal of the Optical Society of America A*, **14**(10), 2570-2594.
52. Bressan, P., Mingolla, E., Spillmann, L. and Watanabe, T. (1997). Neon color spreading: A review. *Perception*, **26**(11), 1353-1366.
53. Ross, W.D. and Mingolla, E. (1998). Recent progress in modeling neural mechanisms of form and color vision. Invited article for a Special Issue of the *Journal of Image and Vision Computing*, **16**(6), 447-461.
54. Neumann, H., Pessoa, L., and Mingolla, E. (1998). A neural network architecture of brightness perception: Non-linear contrast detection and geometry-driven diffusion. *Journal of Image and Vision Computing*, **16**(6), 423-446.
55. Chey, J., Grossberg, S., and Mingolla, E. (1998). Neural dynamics of motion processing and speed discrimination. *Vision Research*, **38**, 2769-2786.
56. Pack, C. and Mingolla, E. (1998). Global induced motion and visual stability in an optic flow illusion. *Vision Research*, **38**, 3083-3093.
57. Lidén, L. and Mingolla, E. (1998). Monocular occlusion cues alter the influence of terminator motion in the barber pole phenomenon. *Vision Research*, **38**, 3883-3898.
58. Grunewald, A. and Mingolla, E. (1998). Motion aftereffect due to interocular sum of adaptation to linear motion. *Vision Research*, **38**, 2863-2971.

59. Mingolla, E., Ross, W.D., and Grossberg, S. (1999). A neural network for enhancing boundaries and surfaces in synthetic aperture radar images. *Neural Networks*, **12**, 499-511.
60. Baloch, A., Grossberg, S., Mingolla, E., and Nogueira, C.A.M. (1999). A neural model of first-order and second-order motion perception and magnocellular dynamics. *Journal of the Optical Society of America A*, **16**(5), 953-978.
61. Oddo, S., Beck, J., and Mingolla, E. (1999). Texture segregation in chromatic element-arrangement patterns. *Spatial Vision*, **12**(4), 421-459.
62. Grossberg, S., Mingolla, E., and Pack, C. (1999). A neural model of attentive visual navigation by cortical area MST: Heading and time-to-contact. *Cerebral Cortex*, **9**(8), 878-895.
63. Ross, W.D., Grossberg, S., and Mingolla, E. (2000). Visual cortical mechanisms of perceptual grouping: Interacting layers, networks, columns, and maps. *Neural Networks*, **13**(6), 571-588.
64. Mingolla, E., Todd, J.T., and Norman, J.F. (2001). Perception of lightness of glossy surfaces. In B. Rogowitz and N. Pappas (Eds.), **Proceedings of SPIE: Human vision and electronic imaging VI**, Vol. 4299, pp.302-311.
65. Pack, C., Grossberg, S., and Mingolla, E. (2001). A neural model of smooth pursuit control and motion perception by cortical area MST. *Journal of Cognitive Neuroscience*, **13**(1), 102-120.
66. Grossberg, S., Mingolla, E., and Viswanathan, L. (2001). Neural dynamics of motion integration and segmentation within and across apertures. *Vision Research*, **41**(19), 2521-2553.
67. Neumann, H. and Mingolla, E. (2001). Computational neural models of spatial integration in perceptual grouping. In T.F. Shipley and P.J. Kellman (Eds.), **From fragments to objects: Grouping and segmentation in vision**. Amsterdam: Elsevier, pp.353-400.
68. Grossberg, S., Hwang, S., and Mingolla, E. (2002). Thalamocortical dynamics of the McCollough effect: Boundary-surface alignment through perceptual learning. *Vision Research*, **42**, 1259-1286.
69. Viswanathan, L. and Mingolla, E. (2002). Dynamics of attention in depth: Evidence from multi-element tracking. *Perception*, **31**, 1415-1437.
70. Mingolla, E. (2002). Le unità della visione. *Sistemi Intelligenti*, Anno XIV, No. 3, 461-480 (in Italian).
71. Neumann, H. and Mingolla, E. (2003). Contour and surface perception. In M.A. Arbib (Ed.), **Handbook of brain theory and neural networks, II**. Cambridge, MA: MIT Press, pp.271-276.
72. Mingolla, E. (2003). Neural models of motion integration and segmentation. *Neural Networks*, **16**(5/6), 939-945.

73. Todd, J.T., Norman, J.F., and Mingolla, E. (2004). Lightness constancy in the presence of specular highlights. *Psychological Science*, **15**(1), 33-39.
74. Carpenter, G.A., Martens, S., Mingolla, E., Ogas, O.J., and Sai, C. (2005). Biologically inspired approaches to automated feature extraction and target recognition. *Proceedings of the 33rd Workshop on Applied Imagery Pattern Recognition (AIPR 2004)*, October 13-15, 2004, Washington, DC. Piscataway, NJ: IEEE.
75. Berzhanskaya, J., Swaminathan, G., Beck, J., and Mingolla, E. (2005). Remote effects of highlights on gloss perception. *Perception*, **34**(5), 565-75.
76. Grossberg, S., Kuhlmann, L., and Mingolla, E. (2007). A neural model of 3D shape-from texture: Multiple-scale filtering, boundary grouping, and surface filling-in. *Vision Research*, **47**(5), 634-672.
77. Berzhanskaya, J., Grossberg, S., and Mingolla, E. (2007). Laminar cortical dynamics of visual form and motion interactions during coherent object motion perception. *Spatial Vision*, **20**(4), 337-395.
78. Neumann, H., Yazdanbakhsh, A., and Mingolla, E. (2007). Seeing surfaces: The brain's vision of the world. *Physics of Life Reviews*, **4**(3), 189-222.
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101. Gori, S Giora, E. Yazdanbakhsh, A, and Mingolla, E. (2013) The novelty of the "Accordion Grating Illusion". *Neural Networks*, Volume: 39 Page: 52.
102. Layton, OW, Mingolla, E, and Yazdanbakhsh, A. (2104) Neural dynamics of feedforward and feedback processing in figure-ground segregation. *Frontiers in psychology*, 5: 972. doi: 10.3389/fpsyg.2014.00972
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104. Chandler, B. and Mingolla, E. (2016) Mitigation of Effects of occlusion on object recognition with deep neural networks through low-level image completion. *Computational Intelligence and Neuroscience*. Volume 2016 (2016), Article ID 6425257, 15 pages <http://dx.doi.org/10.1155/2016/6425257>

CONFERENCE AND INVITED PRESENTATIONS

The rotating square illusion (with J.T. Todd). Annual meeting of the Eastern Psychological Association, Hartford, Connecticut, 1980.

Information in shaded visual displays. Meeting of the International Society for Ecological Psychology, Hartford, Connecticut, October 1982.

The perception of surface curvature and direction of illumination from patterns of shading (with J.T. Todd). Meeting of the Psychonomic Society, Minneapolis, Minnesota, November 1982.

Colloquium at the Dartmouth College Department of Psychology, February 1984.

Neural dynamics of contour completion: Illusory figures and neon color spreading (with S. Grossberg). Poster presented at the meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, May 1984.

The perception of three dimensional form from shaded images (with J.T. Todd). Meeting of the Psychonomic Society, San Antonio, Texas, November 1984.

Colloquium at the New York University Special Interest Seminar on Computational Vision in Psychology, May 1985.

Neural dynamics of boundary completion and textural grouping: Emergent segmentations and contour visibility (with S. Grossberg). Presented at the International Conference on Illusory Contours, Adelphi University, New York, November 1985.

Neural dynamics of perceptual grouping: Textures, boundaries, and emergent segmentations (with S. Grossberg). Poster presented at the meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, April 1986.

Colloquium at the Boston University Computer Science Department, April 1986.

Colloquium at the Vanderbilt University Psychology Department, May 1986.

Textural grouping, cortical dynamics, and computer vision (with S. Grossberg). Presented at the annual meeting of the American Mathematical Society (AMS), New Orleans, Louisiana, January 1986.

Neural dynamics of perceptual grouping: Boundaries, textures, and emergent segmentations. Invited presentation at the International Symposium on Structure and Dynamics in Biomolecules, Riva Del Garda, Italy, August-September 1986.

Perception of 3-dimensional form from shading and occlusion contours (with J.T. Todd and F. Reichel). Presented (by Todd) at the annual meeting of the Psychonomic Society, New Orleans, 1986.

Colloquium at the Psychology Research Series of the Veterans Administration Medical Center, Boston, February 1987.

Colloquium at the Northeastern University Psychology Department, April 1987.

Neural dynamics of perceptual grouping. Invited presentation at the International Workshop on Biomathematics and Related Computational Problems, Capri, Italy, May 1987.

Neural networks for computational vision. A tutorial session presented at the IEEE First Annual International Conference on Neural Networks, San Diego, June 1987.

A neural network architecture for preattentive vision: Multiple scale segmentation and regularization (with S. Grossberg). Paper presented at the IEEE First Annual International Conference on Neural Networks, San Diego, June 1987.

Lightness perception for curved surfaces. Fourth International Conference on Perception and Action, Trieste, Italy, August 1987.

Neural dynamics of emergent visual segmentations. Invited presentation at the annual meeting of the International Society for Ecological Psychology, Hartford, Connecticut, October 1987.

Colloquium at the Harvard-Radcliffe Undergraduate Cognitive Science Society, November 1987.

Recent results in emergent visual segmentation. Invited presentation at a topical meeting: "Visual Form and Motion: Psychophysics, Computation, and Neural Networks", Boston University, March 1988.

Colloquium at the Brown University Department of Cognitive and Linguistic Sciences, February 1988.

Colloquium at Concordia University, Montreal, March 1988.

Invited presentation at the Florida State University Program in Psychobiology and Neuroscience: Symposium on Computers, Neurons, Brains, and Cognition, Tallahassee, Florida, April 1988.

Context-sensitive noise suppression and regularization in a neural network model of preattentive visual segmentation (with S. Grossberg). Poster presented at the meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, May 1988.

Colloquium given at the NASA Goddard Space Flight Center, Greenbelt, Maryland, June 1988.

Recent results in emergent segmentation. Invited presentation, International Neural Network Society (INNS) annual meeting, Boston, September 1988.

Distinguishing shape from highlights. Invited presentation at Scarborough College, University of Toronto Psychology Symposium on Vision and Shape from Shading, September 1988.

Commentator in a special session on Neural Networks at the annual meeting of the International Society for Ecological Psychology, Storrs, Connecticut, October 1988.

A neural network architecture for preattentive vision. Invited presentation at the Second Annual Neural Systems Symposium, Miami, Florida, February 1989.

Colloquium given at the Boston College Psychology Department, March 1989.

Colloquium given at the Boston University Computer Science Department, April 1989.

Colloquium given at the Worcester Polytechnic Institute Image Processing Seminar, October 1989.

Neural dynamics of motion perception: Direction fields, apertures, and resonant grouping. Invited presentation at the International Joint Conference on Neural Networks (IJCNN), Washington DC, January 1990.

Cortical dynamics of motion segmentation: Direction fields, apertures, and resonant grouping. Poster presented at annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, May 1990.

Five hours of tutorial lectures presented at Neural Networks: From Foundations to Applications, Wang Institute, Tyngsboro, Massachusetts, May 1990.

Cortical dynamics of motion segmentation: Direction fields, apertures, and resonant grouping. (with S. Grossberg.) Poster presented at conference on Automatic Target Recognition, Wang Institute, Tyngsboro, Massachusetts, May 1990.

Neural dynamics of motion segmentation. Invited presentation at Vision Interface 90, Halifax, Nova Scotia, May 1990.

Cortical dynamics of motion segmentation. Poster presented at the annual meeting of the Society for Neuroscience (SFN), St. Louis, Missouri, October 1990.

Perception of globally coherent motion (with J. Todd and F. Norman). Poster presented at the annual meeting of the Psychonomic Society, New Orleans, November 1990.

A neural architecture for motion segmentation. Invited presentation at the annual meeting of Neural Information Processing Systems (NIPS), November 1990.

Colloquium given at the Oregon Center for Advanced Technology and Education, Portland, Oregon, March 1991.

Colloquium given at the University of Oregon Computer Science Department, Eugene, Oregon, March 1991.

Colloquium given at the Boston University Center for Adaptive Systems, March 1991.

The perception of globally coherent motion (with J.T. Todd and J.F. Norman). Paper presented at the annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, May 1991.

Four hours of tutorial lectures presented at Neural Networks: From Foundations to Applications, Wang Institute, Tyngsboro, Massachusetts, May 1991.

A neural network architecture for visual motion segmentation. Invited presentation at Neural Networks for Vision and Image Processing, Wang Institute, Tyngsboro, Massachusetts, May 1991.

Preattentive texture segmentation and grouping by the Boundary Contour System (with D. Cruthirds, A. Gove, and S. Grossberg). Poster presented at Neural Networks for Vision and Image Processing, Wang Institute, Tyngsboro, Massachusetts, May 1991.

Neural dynamics of emergent visual segmentations: Neon color spreading and surface highlights. Invited presentation at Milanopoesia Arts Festival, Milan, October 1991.

Colloquium presentation at the Department of Psychology, University of Trieste, Italy, October 1991.

Colloquium presentation to the Triangle Area Neural Network Society (TANNS), Chapel Hill, North Carolina, April 1992.

Colloquium presentation to the University of North Carolina at Chapel Hill Computer Science Department, April 1992.

Four hours of tutorial lectures presented at Neural Networks Course: Introduction and Foundations, Wang Institute, Tyngsboro, Massachusetts, May 1992.

Contextual information for the perception of surface gloss on curved surfaces (with J.F. Norman and J.T. Todd). Poster presented at the annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, May 1992.

Neural dynamics of reset and binding of rapidly changing forms: Control of visual persistence and smearing (with G. Francis and S. Grossberg). Poster presented at the annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, May 1992.

Processing of synthetic aperture radar images by the Boundary Contour System and Feature Contour System (with D. Cruthirds, A. Gove, S. Grossberg, N. Nowak, and J. Williamson). Poster presented at the International Joint Conference on Neural Networks (IJCNN), Baltimore, June 1992.

Cortical dynamics of feature binding and reset: Control of visual persistence (with G. Francis and S. Grossberg). Invited presentation at the International Joint Conference on Neural Networks (IJCNN), Washington, Baltimore, June 1992.

Cortical dynamics of feature binding and reset: Control of visual persistence (with G. Francis and S. Grossberg). Invited presentation to the FAA/CAIP Neural Network Workshop, New Brunswick, New Jersey, October 1992.

Colloquium presented at the Rutgers University Psychology Department, New Brunswick, New Jersey, October 1992.

Colloquium presented at the Psychology Department of the University of Newcastle, United Kingdom, December 1992.

Colloquium presented at the Psychology Department of York University, United Kingdom, December 1992.

The role of edges and line-ends in illusory contour formation (with G. Leshner), Poster presented at the annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, May 1993.

Computation of first order and second order motion by a model of magnocellular dynamics (with C.A.M. Nogueira and S. Grossberg), Poster presented at the annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, May 1993.

A neural model of visual search (with W.D. Ross and S. Grossberg), Poster presented at the annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, May 1993.

Emergent groupings and texture segregation (with D.R. Cruthirds and S. Grossberg), Poster presented at the annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, May 1993.

Neural dynamics of first and second order motion detection by transient mechanisms. Invited presentation to the World Congress on Neural Networks, Portland, Oregon, July 1993.

Perception of lightness on curved surfaces (with L. Arend). Presented to the International Conference on Perception and Action, Vancouver, August 1993.

Colloquium presented at the Universitat Hamburg, Fachbereich Informatik, November 1993.

A neural theory of attentive visual search: Interactions of boundary, surface, spatial, and object representations. Invited presentation to a topical meeting on "Naturalistic Approaches to Meaning" in Bielefeld, Germany, December 1993.

Shared mechanisms for hyperacuity and illusory contours (with G.W. Leshner). Presentation at annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, May 1994.

Global motion configuration can overrule local motion contrast (with J. Chey). Presentation at annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, May 1994.

Grouping effects in visual search (with W.D. Ross). Presentation at annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, May 1994.

Perceived texture segregation in chromatic element-arrangement patterns (with L. Pessoa and J. Beck). Presentation at annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, May 1994.

A link between brightness perception, illusory contours, and binocular corticogeniculate feedback (with A.N. Gove and S. Grossberg). Presentation at annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Sarasota, Florida, May 1994.

Categorical behavior without symbolic processing in brightness perception. Presentation at the Second Annual Symposium in Honor of Gaetano Kanizsa, Trieste, Italy, October 1994.

A multiscale network model of brightness perception. Invited lecture at the International School in Biocybernetics of Vision: Integrative Mechanisms and Cognitive Processes, Ischia, Italy, October 1994.

Recent results in emergent visual segmentation. Invited lecture at the International School in Biocybernetics of Vision: Integrative Mechanisms and Cognitive Processes, Ischia, Italy, October 1994.

Models of brightness perception. Colloquium presented at the Vision Sciences Laboratory, Department of Psychology, Harvard University, November 1994.

A neural model of illusory contour formation in V1 and V2 (with W.D. Ross and S. Grossberg). Presentation at annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Fort Lauderdale, Florida, May 1995.

Motion aftereffects due to interocular summation of adaptation to linear motion (with A. Grunewald). Presentation at annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Fort Lauderdale, Florida, May 1995.

Neural dynamics of motion processing and speed discrimination (with J. Chey and S. Grossberg). Presentation at annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Fort Lauderdale, Florida, May 1995.

The effect of short-range competition and long-range cooperation on contrast threshold for target detection (with S. Oddo). Presentation at annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Fort Lauderdale, Florida, May 1995.

The illuminant counts: Lightness constancy and surface curvature (with L. Arend and L. Pessoa). Presentation at annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Fort Lauderdale, Florida, May 1995.

Searching for the units of visual search. Colloquium presented at the Istituto de Neurofisiologia, CNR, Pisa, Italy, June 1995.

Neural mechanisms of brightness perception and visual search. Invited presentation to the World Congress on Neural Networks, Washington DC, July 1995.

Grouping effects in double target search (with W.D. Ross and N. Mejia-Monasterio). European Conference on Visual Perception, Tübingen, Germany, August 1995.

Brightness perception, illusory contours, and binocular corticogeniculate feedback. Colloquium presented at the Fakultät für Informatik, Universität Ulm, Germany, August, 1995.

A multiple scale neural system for boundary and surface representation of SAR data (with S. Grossberg and J. Williamson). Presentation at the IEEE Workshop on Neural Networks for Signal Processing (NNSP), Cambridge, Massachusetts, September 1995.

A cortical architecture for real and illusory contour processing in Areas V1 and V2 (with S. Grossberg and W.D. Ross). Presentation at the annual meeting of the Society for Neuroscience (SFN), San Diego, California, November 1995.

Recent results in early visual processing. Invited presentation at the International Workshop on Soft Computing in Industry, Muroran, Hokkaido, Japan, April 1996.

Cortical dynamics of grouping and segregation in areas V1 and V2 (with S. Grossberg and W.D. Ross). Presentation at the annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Fort Lauderdale, Florida, April 1996.

Visual search for a foreground object in continuous naturalistic displays: The importance of shadows and occlusion (with R.K. Cunningham and J. Beck). Presentation at the annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Fort Lauderdale, Florida, April 1996.

Neural dynamics of directional grouping: From aperture ambiguity to plaid coherence (with J. Chey and S. Grossberg). Presentation at the annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Fort Lauderdale, Florida, April 1996.

Luminance and brightness effects in chromatic element-arrangement texture segregation (with S. Oddo and J. Beck). Presentation at the annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Fort Lauderdale, Florida, April 1996.

Mental representations in navigation. Discussant for session on Human Wayfinding at the Third Annual CBR Workshop, Cambridge Basic Research, Cambridge, Massachusetts, June 1996.

Discussant for session on Lightness and Shading at the Fifth Hans-Lukas Teuber Symposium, MIT, Cambridge, Massachusetts, October 1996.

Neural circuits for perceptual grouping. Colloquium presented to the Ohio State University Psychology Department, March 1997.

Visual search. Invited presentation to the International Conference on Vision, Recognition, and Action: Neural Models of Mind and Machine, Boston University, May 1997.

Perceptual grouping. Invited presentation to Cambridge Basic Research, Cambridge, Massachusetts, July 1997.

Neural circuits for perceptual grouping. Colloquium presented to the Indiana University Psychology Department, Bloomington, October 1997.

Neural circuits for perceptual grouping. Colloquium presented to the Brown University special interest group in Neural Networks and Vision, January 1998.

How does cortical area MST use optic flow to navigate? (with C. Pack and S. Grossberg). Presentation at the annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Fort Lauderdale, Florida, April 1998.

Disparity and occlusion cues facilitate multi-element visual tracking (with L. Viswanathan). Presentation at the annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Fort Lauderdale, Florida, April 1998.

Models of biological vision. Tutorial presentation to the Second International Conference on Cognitive and Neural Systems, Boston University, May 1998.

Neural models of the visual system. Colloquium presented to the Laboratorio de Investigaciones Visuales del CONICET, University of Buenos Aires, Argentina, August 1998.

Visual search in photo-realistic scenes (with R.K. Cunningham and J. Beck). Poster presented at the 1998 European Conference on Visual Perception, Oxford, England, August 1998.

Neural circuits for perceptual grouping: Invited presentation to the Boston University Psychology Department's Program in Brain, Behavior, and Cognition, January 1999.

Cortical computation for attentive visual navigation: heading, Time-to-contact, and pursuit eye movements. Invited presentation to the Third International Conference on Cognitive and Neural Systems, Boston University, May 1999.

Cognitive neuroscience for fun and profit. Invited presentation to a topical meeting of imagery analysts sponsored by the National Imagery and Mapping Agency, Bedford, Massachusetts, June 1999.

Neural circuits for perceptual grouping. Presentation to the European Conference on Visual Perception, Trieste, Italy, August 1999.

Visual search and object identification in time-varying imagery. Invited presentation at the Neuroscience Colloquium of the Neuroscience Institute, La Jolla, California, September 1999.

Neural dynamics of motion integration and segmentation within and across apertures (with S. Grossberg and L. Viswanathan). Presentation at the annual meeting of the Association for Research in Vision and Ophthalmology (ARVO), Fort Lauderdale, Florida, April 2000.

Perceptual learning, surface color, cortical feedback, and the McCollough effect. Invited presentation to the Fourth International Conference on Cognitive and Neural Systems, Boston University, May 2000.

The perception of glossy surfaces (with J.T. Todd and J.F. Norman). Presented at Electronic Imaging 2001, SPIE Symposium, San Jose, California, January 2001.

Biologically inspired approaches to automated feature extraction and target recognition. Invited presentation to the 4th NURI Symposium of the National Imagery and Mapping Agency, Reston, Virginia, July, 2001.

L'effetto delle aree di alta luminosità [highlights] sulla percezione della lucentezza [gloss]. In Italian, "The effect of highlights on the perception of gloss," Presented at the Associazione Italiana di Psicologia Congresso Nazionale Della Sezione Di Psicologia Sperimentale; Alghero, Italy, September 2001.

Highlights and gloss perception. Colloquium presented to the Department of Psychology, University of Padova, Italy, October 2001.

The units of vision. The Ninth Annual Kanizsa Lecture, Trieste, Italy, October 2001.

Visual segmentation and search. Presentation to the Inaugural Meeting of the Cognitive and Neural Systems Technology Laboratory, Boston University, June 2002.

Neural models of visual search, motions segmentation and perceptual learning. Presentation to the Office of Naval Research, Washington DC, June 2002.

Recent progress in biologically inspired approaches to automated feature extraction and target recognition. Invited presentation to the 5th NURI Symposium of the National Imagery and Mapping Agency, Reston, Virginia, July 2002.

"The units of form vision." Plenary lecture, International Conference on Theoretical Neurobiology, New Delhi, India. February 24, 2003.

"Networks for visual form perception." Invited lecture, Department of Computer Science, Indian Institute of Technology, Delhi, February 27, 2003.

"Visual perception in the 21st century." Invited lecture, Department of Mathematics, Delhi University, February 28, 2003.

"Cortical dynamics of motion integration and segmentation within and across apertures." Invited lecture, Department of Brain and Cognitive Sciences, MIT, May 2, 2003.

Networks for visual form perception. Invited lecture, ATR Computational Neuroscience Laboratories, Kyoto, Japan, August 1, 2003.

Neural models of form perception. Invited lecture, NTT Communication Science Laboratories, Kanagawa Japan, August 4, 2003.

The units of form vision. Invited lecture, Riken Institute, Saitama, Japan, August 5, 2003.

A model of early vision. Invited lecture, Department of Psychology, University of Tokyo, August 6, 2003.

Jake Beck's impact at CNS. Presentation at the Jacob Beck Memorial Tribute, Boston University, September 12, 2003.

Measurement, dynamics, and mode switching. Invited presentation at Symmetry and Duality: Principles for an Ecological Psychology -- A Festschrift in Honor of Robert E. Shaw. University of Connecticut, Storrs, June 10-12, 2004.

Contextual interactions in motion processing. Invited presentation to the Smith-Kettlewell Eye Research Institute, San Francisco, October 1, 2004.

A neural model of color vision, with applications to image processing and classification. Invited presentation to the National Geospatial Intelligence Agency's Neuroscience Enabled Geospatial Intelligence Initiative Workshop, Reston, Virginia, April 1, 2005.

Biologically inspired approaches to automated feature extraction and target recognition. Invited presentation to the National Geospatial Intelligence Agency's Academic Research Program Symposium, Washington, DC, September 21, 2005.

A glottal positioning system for navigating oceans of hyperbole, controversy, and rediscovery in vision science. Presented at the Anniversary Conference Celebrating Steve Grossberg@65 and CNS@15, Department of Cognitive and Neural Systems, Boston University, September 16, 2005.

Bridging brain function with science education in schools. Invited presentation to the Learning and the Brain Conference, Cambridge, MA, April 30, 2006.

Visual form and motion interactions during coherent motion perception. Invited presentation to the New York University Center for Neural Science, April, 2006.

Functional Interactions between "What" and "Where" cortical streams. Invited presentation to the Tenth International Conference on Cognitive and Neural Systems, Boston University, May 20, 2006.

Biologically inspired approaches to automated feature extraction and target recognition. Invited presentation to the National Geospatial Intelligence Agency's Academic Research Program Symposium, Washington, DC, September 14, 2006.

Emerging paradigms in laminar cortical computing. Invited presentation to the DARPA Electronic Cortex Workshop, Washington, DC, August 1, 2007.

Interactions between "What" and "Where" cortical streams for visual motion processing and recognition with scanning eye movements. Invited lecture to the International Joint Conference on Neural Networks, Orlando, FL, August 14, 2007.

How surface-based attentional shrouds regulate scanning eye movements and view-invariant object category learning. Presentation to the European Conference on Visual Perception, Arezzo, Italy, August 28, 2007.

Visions of your brain. Presentation to the annual meeting of the Society for Advancement of Chicanos and Native Americans in Science, Kansas City, MO, October 11, 2007.

The units of vision. Invited presentation to the National Science Foundation Workshop on Educational Neuroscience, Washington, DC, December 6, 2007.

Spatial cognition in the Center of Excellence for Learning in Education, Science, and Technology. Invited presentation to the NSF-sponsored Spatial Cognition Workshop, Freiburg, Germany, September 13-15, 2008.

Cortical dynamics of visual learning and perception. Invited presentation to the NSF Science of Learning Center meeting, Washington, DC. October 16-17, 2008.

Neural dynamics of surface perception: Multiple-scale filtering, grouping, and completion of boundary webs and featural filling-in. Invited presentation to the AFOSR-sponsored Surface Representation Workshop, San Francisco, October 30-31, 2008.

Visions of motion. Invited presentation to the Consciousness Seminar, Boston University, February 2, 2009.

A neural model of visually-guided navigation in a cluttered world. Invited presentation to the European Conference on Visual Perception (ECPV) 2009 Satellite Symposium, Models of vision and decision-making: from features to behaviour and perceptual robotics. Regensburg, Germany, August 24, 2009.

Neural dynamics of perceptual 3-D surface formation: Multi-scale boundary webs and featural filling-in. Invited presentation to the International conference of sub-Riemannian geometry and vision. Bologna, Italy, September 5, 2009.

Interactions between “what” and “where” cortical streams for object recognition with scanning eye movements. Invited presentation to the Department of Psychology, University of Parma, Italy, October 6, 2009.

Object recognition with active eye movements. Invited presentation to the Department of Psychology, University of Trieste, Italy, October 13, 2009.

The edges of perception. Invited presentation to the Center for the Ecological Study of Perception and Action (CESPA), University of Connecticut at Storrs, November 13, 2009.

Mechanisms of visually guided navigation. Presentation to the National Science Foundation (NSF) meeting of principal investigators of Science of Learning Centers. Washington, DC, November 16, 2009.

Neural designs for nanochip applications. Invited presentation to the International Conference on Cognitive and Neural Systems, Boston University, May 22, 2010.

The unexpected units of vision. Invited presentation at Los Alamos National Laboratory, Los Alamos, New Mexico, July 1, 2010.

Neural modeling and applications in the CELEST center. Invited presentation at the Air Force Research Laboratory, Rome, NY, September 14, 2011.

Neural designs for nanochip applications. Invited presentation to the National Conference of the Society for the Advancement of Chicanos and Native Americans in Science. Anaheim, CA, September 30, 2010.

A neural model of visually-guided steering, obstacle avoidance, and route selection. Colloquium presentation at the Department of Psychology, University of Indiana, Bloomington, IN, October 18, 2010.

Biologically-inspired flow field computation for sensing and control of ground vehicles. Presentation to the review meeting of principal investigators of the Office of Naval Research program in Computational Neuroscience, Vision and Acoustic Systems, Washington, DC, June 27, 2011.

The Center of Excellence for Learning in Education, Science, and Technology (CELEST). Invited presentation to the Australian Science of Learning Meeting, Brisbane, Australia, July 20, 2011.

Modeling visual attention in the brain’s What and Where streams. Invited presentation to the Symposium on Attention and Learning, Brisbane, Australia, July 21, 2011.

Neural dynamics of object-based multifocal visual spatial attention and priming using transient Where and sustained What stream inputs. Invited presentation to the Companion Technology for

Cognitive Technical Systems colloquium series, University of Ulm, Germany, September 12, 2011.

Brain inspired computing and robotics. Invited presentation to the Neuromorphic Workshop sponsored by the Human Brain Project, Heidelberg, Germany, September 13, 2011.

What can neuroscience and robotics teach one another? Invited presentation to the Kraznow Institute, George Mason University, September 19, 2011.

Unmanned Systems and robots: The computational neuroscience of learning. Invited presentation to the National Conference of the Society for the Advancement of Chicanos and Native Americans in Science. Anaheim, CA, September 30, 2010.

What the robot's eye should tell the robot's brain. Invited presentation at Hewlett-Packard (HP Labs), Palo Alto, California, October 27, 2011.

What can neuroscience and robotics teach one another? Plenary presentation to the annual meeting of the Biologically Inspired Cognitive Architectures Society, November 5, 2011, Washington, DC, San Jose, California, October 28, 2011.

The shroud of visual attention. Invited presentation at Hewlett-Packard, Inc. (HP Labs, Palo Alto), Feb 15, 2012.

Man vs. machine: The ultimate smackdown. Wellesley High School, Wellesley, Massachusetts, Seminar Day, May 2012.

Biologically-Inspired Flow Field Computation for Sensing and Control of Ground Vehicles, with N. Andrew Browning and Florian Raudies. Annual review for principal investigators of Office of Naval Research's Computational Neuroscience and Vision programs. Arlington, VA, June 15, 2012.

Visual depth perception from motion through texture accretion and deletion: A neural model of figure-ground segregation and occlusion. Presentation at the annual program review of the Air Force Office of Scientific Research: Computational and Machine Intelligence Program. Washington, DC, Jan 29, 2013.

Biologically-inspired visual flow field computation for steering and route selection. Invited presentation, Brown University Department of Cognitive and Linguistic Sciences, March 6, 2013.

Biologically-inspired visual flow field computation for steering and route selection. Northeastern University Engineering Workshop, April 5, 2013.

A model of depth ordering from motion occlusion and disocclusion in textured scenes. Presented by Harald Ruda. Annual meeting Computational and Mathematical Models in Vision (MODVIS) May, 2013.

Biologically-Inspired Flow Field Computation for Sensing and Control of Ground Vehicles, with Arash Yazdanbakhsh. Annual review for principal investigators of Office of Naval Research's Computational Neuroscience and Vision programs. Arlington, VA, June 17, 2013.

Visual depth perception from motion through texture accretion and deletion: A neural model of figure-ground segregation and occlusion. Presentation at the annual program review of the Air Force Office of Scientific Research: Computational and Machine Intelligence Program. Washington, DC, December 9, 2013.

Beneath the shroud of visual attention. Invited presentation to Department of Psychology, Northeastern University, March 27, 2014.

The role of border-ownership in detecting kinetic occlusion. Presented by Oliver Layton and with Arash Yazdanbakhsh. Annual meeting Computational and Mathematical Models in Vision (MODVIS) May, 2014.

Biologically-Inspired Flow Field Computation for Sensing and Control of Ground Vehicles, with Arash Yazdanbakhsh. Annual review for principal investigators of Office of Naval Research's Computational Neuroscience and Vision programs. Arlington, VA, June 17, 2014.

Lifting the shroud of visual attention. Invited presentation to Cognitive Science Department, Rensselaer Polytechnic Institute, February 25, 2015.

Biologically-Inspired Flow Field Computation for Sensing and Control of Ground Vehicles, with Arash Yazdanbakhsh. Annual review for principal investigators of Office of Naval Research's Computational Neuroscience and Vision programs. Arlington, VA, June 18, 2015.

Biologically-inspired flow field computation for sensing. Invited presentation for OAK Sentient kickoff workshop, Herndon, VA, September 29, 2105.

Biologically-inspired flow field computation for sensing in video. Invited presentation for OAK Sentient review workshop, Herndon, VA, February 2, 2106.

Biologically-inspired flow field computation for sensing in video. Invited presentation for Deep Learning Workshop in Beavercreek, Ohio, February 26, 2016.

Optic flow for detecting depth discontinuities: Neural models and machine algorithms. Invited presentation to Center for Imaging Science, Rochester Institute of Technology, April 28, 2016.

Biologically-Inspired Flow Field Computation for Sensing and Control of Ground Vehicles, with Arash Yazdanbakhsh. Annual review for principal investigators of Office of Naval Research's Computational Neuroscience and Vision programs. University of Massachusetts, Amherst, June 13, 2016.

A neurally-inspired algorithm for detecting ordinal depth from motion signals in video streams (Invited), with Gennady Livitz and Harald Ruda, annual meeting of *Human Vision and Electronic Imaging*, HVEI-138, San Francisco, January, 2017.

Ordinal depth from motion: A model of human perception. Invited presentation at the New England College of Optometry, Boston, MA, October 17, 2017.

Ordinal depth from motion: A model of human perception and a neurally-inspired algorithm for video streams. Invited presentation at Neurala, Inc., Boston, MA, November 3, 2017

DISSERTATIONS SUPERVISED, FIRST READER OR CO-FIRST READER (Graduation Year)

Andrew Worth (1993) Neural networks for automatic segmentation of magnetic resonance brain images

Alan Gove (1994) A neural network model of visual segmentation: Illusory contour formation, brightness induction, and grouping of scenic elements

Gregory Leshner (1994) Neural networks for vision and pattern recognition: Boundary completion, spatial mapping, and multidimensional data fusion

Carlos Nogueira (1994) A neural network model of visual motion perception

Gregory Francis (1994) Cortical models of visual perception: Dynamics of form and motion segmentation

Alexander Grunewald (1995) Temporal dynamics of visual perception

Luiz Pessoa (1996) Studies of human vision: A neural network model of brightness perception and experiments on chromatic textures

James Williamson (1996) Neural network for dynamic binding with graph representation; Form, linking, and depth-from-occlusion

Jonathan Chey (1996) Neural dynamics of visual speed discrimination and motor perception

Lars Lidén (1999) The integration and segmentation of visual motion signals: experiments and a computational model of cortical mechanisms

Seungwoo Hwang (2002) Neural network model of thalamocortical dynamics, adaptive boundary-surface alignment, and the McCollough effect

Julia Berzhanskaya (2005) Contextual interactions in cortical motion and surface perception: Neural models and psychophysical experiments

Levin Kuhlmann (2007) A neural model of 3D shape-from-texture: Multiple-scale filtering, boundary grouping, and surface filling-in

David Elder (2007) A neural model of visually-guided steering, obstacle avoidance, and route selection

Arash Fazl (2008) View-invariant object category learning, recognition, and search: How spatial and object attention are coordinated using surface-based attentional shrouds

Andrew Browning (2009) A neural model of visually-guided navigation and object tracking in a cluttered world: Computing ego and object motion in a model of the primate magnocellular pathway

Gennady Livitz (2010) A neural model of chromatic induction in uniform and textured images and psychophysical detection of non-opponent chromatic qualia

- Timothy Barnes (2012) Visual depth perception from texture accretion and deletion: A neural model of figure-ground segregation and occlusion
- Harald Ruda (2012) Estimation of the parameters of a boundary contour system using psychophysical hyperacuity experiments
- Oliver Layton (2013) Neural models of inter-cortical networks in the primate visual system for navigation, attention, path perception, and static and kinetic figure-ground perception