

CURRICULUM VITAE

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Present Positions

Professor- Department of Psychology and Program in Biomedical Engineering, University of Nevada at Reno, Reno, NV.

Director- Program in Cognitive and Brain Sciences, University of Nevada, Reno

Affiliate Faculty Member- School of Public Health, University of Nevada, Reno

Faculty Member- Aerospace Lighting Institute

Owner/Manager - SeeAero Ltd., a vision and aviation consulting business.

Education

B.A. - 1982, Psychology, University of California, San Diego

Ph.D.- 1989, Biological Psychology, University of California, Santa Barbara

Research Experience

1998- Present Associate Professor, University of Nevada, Reno, Dept. of Psychology and the Biomedical Engineering Program

Human Factors in Aviation- Quantification of pilot performance skills related to visibility and to aircraft control accidental flight into poor visibility. Evaluation of the uses of flight simulators during training for general aviation pilots.

Vision, Attention and Physiological Stress in Aviation- Studies of perceptual processes in the aviation environment and under physiological stressors such as high altitude and G loads.

Development and Aging of Vision.-Electrophysiological assessment of color/luminance processing. The aging research has special emphasis on acquired vision losses and the effects of nutritional supplements.

Electrophysiological Assessment of Vision-VEP studies of parallel visual processing.

Comparative Color Vision- Studies of cone spectra and spectral sensitivity in various mammalian species, marine mammals, and sea turtles. (In collaboration with UCSD, Scripps Oceanographic Institute, HUBBS-Sea World, and WIDECASST).

Physiological Basis of Congenital and Acquired Color Vision Deficiencies- Studies examining pathology and genetics as causal factors in color vision variations.

1994-1998 Research Assistant Professor in the Dept. of Psychology, University of Washington, Seattle and the Dept. of Ophthalmology at Children's Hospital and Medical Center.

Development of vision.-Psychophysical investigations of color vision and electrophysiological assessment of color/luminance processing in infants (with Dr. D.Y. Teller's lab group).

Genetics of Color Vision- Human electrophysiology and psychophysics to determine phenotype genotype relationships and the genetic basis for color vision variation among normal and color deficient observers (with Drs. S. Deeb and A. Motulsky, Dept. of Medical Genetics and Dr. D.Y. Teller, Dept. of Psychology).

Clinical Assessment of Development of Vision- An appointment in the Dept. of Ophthalmology at Children's Hospital- Clinical visual assessment in children using electrophysiology and psychophysics (with Dr. A. Weiss, Dept. of Ophthalmology).

Plasticity and Evolution of Color Vision. Cortical and subcortical electrophysiology and behavior in a transgenic mouse model of primate color vision (with Drs. S. Deeb, G.H. Jacobs, and J. Olavarria, University of Washington and University of California, Santa Barbara).

Post-doctoral

1990-1994 Research Fellow with Anthony J. Adams and Eugene Switkes at the University of California, Berkeley

Human Electrophysiology- VEPs, ERGs, EOG

Psychophysics- Measurements of motion detection, chromatic/luminance processing, sensitivity, color vision.

Human Lens Densitometry -Measurement of individual variation in lens density.

Eye Movements- Measurements of optokinetic nystagmus for luminance/chromatic stimuli

Clinical Research- Electrophysiological investigations of diabetes, central serous choroidopathy, strabismus, anomalous trichromacy, dichromacy and monochromacy

1989-1990 Research Scientist with Gerald H. Jacobs at the University of California, Santa Barbara

Animal Behavior- Color discrimination, temporal sensitivity, spectral sensitivity

Animal Electrophysiology- Single unit recording, ERGs

Histology- radiolabeling with 2-deoxyglucose to locate chromatic cells in cortex and LGN

Human Electrophysiology- Flash and flicker ERGs for spectral sensitivity

Psychophysics- Color matching, spectral sensitivities, clinical color vision tests, temporal sensitivity, flicker thresholds.

Pre-doctoral

1983-1989 Research Assistant with Gerald H. Jacobs at the University of California, Santa Barbara

Animal Electrophysiology- Single unit recording, ERGs

Animal Behavior- Color discrimination, spectral sensitivities, temporal response

Histology- Selective staining of short wavelength cone mosaic

Psychophysics- Color vision, sensitivity, temporal response

Human Electrophysiology- Flicker ERG for spectral sensitivity

1982-1983 Laboratory Assistant with Donald I. A. MacLeod and Mary Hayhoe at the University of California, San Diego

Psychophysics- Spatial spread of adaptation

Teaching Experience

Undergraduate Courses

University of Nevada, Reno, 1998-present.

Physiological Psychology.

Experimental Psychology

Human electrophysiology lab

Numerous guest lectures.

University of Washington, 1996-1998.

Introduction to Physiological Psychology.

Undergraduate independent research in molecular genetics of color vision and in development of color vision.

Graduate Instruction

Physiological Psychology

Advanced Psychophysiology

Comparative Sensory Processing

Human Electrophysiology lab

Human Factors in Aviation

Numerous Special Topics course

Currently mentoring several graduate students at the University of Nevada, Reno

Mentored two graduate students in studies of visual processing at University of Washington.

Aerospace Lighting Institute-2003-present.

Teach annual short course on light, color, and vision to aerospace engineering consortium.

Aviation Instruction-Seattle & Reno.,1997-present.

Basic and instrument flight instruction and advanced ground instruction.

Martial Arts Instruction- High Sierra Jujitsu, Reno, 2003-present. Adult and Children's Jujitsu classes

Ski Instructor – Sky Tavern, NV, 2001-2007, qualified for level 9 (highest) instruction.

Readership- UC Berkeley, 1993.

Graded and consulted for senior research theses requirement of optometry students.

Teaching Assistant- UC- Santa Barbara, 1984-1989.

Grants, Fellowships, Contracts, and Awards

Aerospace Lighting Institute- Individual Appreciation Award – (2007)

Marquis Who's Who in America- Listing (2007)

Marquis Who's Who in Science and Engineering- Listing (2008)

Marquis Who's Who in the World- Listing (2008)

Federal Aviation Administration- (contract) Development of Ground Observer Requirements for the Operation of Unmanned Aerial Vehicles. 2006-2009.

Federal Aviation Administration Human Factors (Principal Investigator) Helicopter Pilot Performance: VFR into IMC. 2005-2006.

NASA/Ames Human Factors (Principal Investigator) Validation of NASA/FAA WEB-based training tool. 2005-2006.

National Marine Fisheries Institute- (consultant/co-investigator) Spectral Sensitivity in Sea Turtles Phase III. Circadian Effects 2005-2006.

Sanford Center for Aging, Pilot Research Grant (Co-principal Investigator) Adaptation and aging in the human visual system. 2005-2006

Federal Aviation Administration AAR-100 (Principal Investigator) Visibility in the Flight Environment. 2003-2006.

National Marine Fisheries Institute- (consultant/co-investigator) Spectral Sensitivity in Sea Turtles. 2001-2004.

Federal Aviation Administration AAR-100 (consultant/co-investigator) The Use of Flight Training Devices in General Aviation Phase II. 2002-2003.

NASA Joint Research Grant (Principal Investigator) Allocation of Attentional Resources in the Cockpit Environment, 2002-2005.

NIH/NIA RO3 (Principal Investigator) Assessment of Chromatic Pathways in Aging, 2001.

Sanford Center for Aging Seed Grant (Principal Investigator) University of Nevada, Reno, Maturation and Aging of the Visual Pathways, 2000-2001.

Junior Faculty Research Award (Principal Investigator) University of Nevada, Reno, Development of Optical Imaging in Live Retina, 2000-2001.

Royalty Research Fund Grant (Principal Investigator) University of Washington, Cortical recording in a transgenic mouse model of color vision, 1997. (With Jaime Olivarria)

NIH/NEI RO1 (Co-Investigator), Color Vision: Molecular and Physiological Studies, 1994-1999

NIH Public Health Service Research Fellowship (Individual), Electrophysiology of Human Chromatic Processing, 1992-1994

NIH Post-Doctoral Training Fellowship, UCB, 1990-1992

International Research Group on Color Vision Deficiencies Travel Fellowship, 1993

Optical Society/American Academy of Optometry Travel Fellowship, 1992

International Research Group on Color Vision Deficiencies Travel Fellowship, 1991

Presidents Fellowship, UCSB

Honors Program, UCSD, 1982

Professional Affiliations

Aerospace Lighting Institute
Aerospace Medical Association
American Association for the Advancement of Science
American Physical Society
Association for Research in Vision and Ophthalmology
Human Factors and Ergonomics Society
International Colour Association
International Research Group on Color Vision Deficiencies
International Society for the Clinical Electrophysiology of Vision
Intersociety Color Council
National Association of Flight Instructors
Optical Society of America
Society for Neurosciences
Vision Sciences Society

Other Professional Activities

Council Member, Nevada Chapter of the Society for Neuroscience, 2008-present.
Member of the Editorial Board for Visual Neuroscience, 2000-2007
Consultant for legal proceedings as an expert witness regarding vision in aviation.
Consultant for the Federal Aviation Administration for aviation safety.
Member of the Teaching Faculty for the Aerospace Lighting Institute.
Guest Editor for special issue on color vision for Visual Neuroscience 2004 (21) 3
Owner of SeeAero Ltd., a vision and aviation consulting business.

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Peer Reviewer

Aviation Space and Environmental Medicine
Color Research and Application
Clinical Neurophysiology
Developmental Science
Documenta Ophthalmologica
Experimental Aging Research
Investigative Ophthalmology and Visual Science
Journal of Experimental Biology
Journal of Glaucoma
Journal of Neuroscience Methods
The Journal of the Optical Society of America
Journal of Vision
Neurotoxicology
Ophthalmic and Physiological Optics
Optometry and Vision Science
PloS One
Vision Research
Visual Neuroscience
Wellcome Trust

Invited Talks

Sensitivity to temporally modulated visual stimuli: A comparison of behavior and electrophysiology.

8/89, University of Washington, Seattle, WA.

The spatio-chromatic VEP: Some properties and applications. 3/93, University of Texas, Austin, TX.

Behavioral and electrophysiological methods for assessment of photopigments and color vision. 9/29/93,

University of Washington Medical School, Division of Medical Genetics, Seattle, WA.

Properties and applications of the spatio-chromatic VEP. 11/17/93, University of Auckland, School of Medicine.

Investigations of isolated cone and color mechanisms. 7/94, Univ. of Washington, Seattle WA.

Electrophysiological investigations of visual pathways. 10/94, Univ. of Louisville, Louisville, KY.

Electrophysiology of color mechanisms. 3/95, Australian National University, Canberra, Australia.

Longitudinal development of the chromatic VEP in human infants. 8/96, Univ. of Chicago, Chicago, IL.

The development of parallel visual pathways: VEP studies. 4/98 Univ. of Nevada, Reno, NV.

Developmental and clinical studies of parallel visual pathways. 5/98 Univ. of California, Berkeley, CA.

VEP Studies of the development of visual pathways. 1/99 Medical College of Wisconsin, Milwaukee, WI

Sight for flight: Vision and lighting for the pilot. 2/00 Aerospace Lighting Institute, Annual Meeting, L.A.

Physiological stress and cockpit vision: Effects of hypoxia and G-forces, 2/01 Aerospace Lighting Institute, Annual Meeting, L.A., CA.

The development and maturation of chromatic processing: Visual evoked potential studies. 10/01 OSA/UC Irvine Color Vision Workshop, Irvine, CA.

Human Visual Factors in Aviation 2/02 Aerospace Lighting Institute, Annual Meeting, L.A., CA.

Light, Color, and Vision. 8/02 Federal Aviation Administration: Human Factors Seminar, Washington DC

Vision and Aviation Safety. 9/02 Piper Malibu/Mirage Airplane Owner's Association. Tucson, AZ.

Visual Capability of Sea Turtles (Electrophysiology). 1/03 Meeting of the Turtle-Pelagic Fish Sensory Biology Working Group, Honolulu, HI.

Some Factors Affecting Visibility of Aircraft 2/04 Aerospace Lighting Institute, Advanced Seminars, L.A.

Visibility in the Aviation Environment. Annual Sponsor's Symposium, Federal Aviation Administration, Washington D.C.

Aging of Visual Pathways. 9/04 Sanford Center for Aging "Living the Legacy" meeting, Reno NV.

Improving Aircraft Detection. 2/05 Aerospace Lighting Institute, Advanced Seminars, L.A.

Aviation Vision: Facts and Myths. 7/05 Experimental Aircraft Association's Airventure 2005, Oshkosh, WI.

Studies of Human and Animal Vision: What you can do with a degree in Physiological Psychology, 11/06 Davidson Academy and Roy Gomm Elementary School, Reno NV.

Visibility in the Aviation Environment: New Findings 6/06 Sponsor's meeting, Federal Aviation Administration, Washington, D.C.

Helicopter Pilot Performance: VFR into IMC 6/06 Sponsor's meeting, Federal Aviation Administration, Washington, D.C.

Aviation Vision: Facts and Myths. 7/06 Experimental Aircraft Association's Airventure 2006, Oshkosh, WI.

Applications of Human Electrophysiology for Objective Assessment of Visual Function. 9/06, Envision 06' International Vision Rehabilitation and Vision Research Conference.

Spectral and temporal sensitivity of adult and hatchling leatherback sea turtles. 9/06, Wachapreague, VA, Meeting of the Turtle-Pelagic Fish Sensory Biology Working Group

Spectral and temporal sensitivity of adult and hatchling leatherback sea turtles: Consequences for color vision. (1/07) Summer Colour Conference. National Vision Research Institute of Australia.

University of Melbourne, Australia.

Radiance, Luminance, Brightness, and Saliency: What they are and why it matters. (2/07) Aerospace Lighting Institute, Advanced Seminar, Los Angeles, CA.

Visual Human Factors in Aviation. (2/07) Regional Human Factors Regional Conference, California State University, Long Beach, CA.

Visual Focus: Factors for Pilots (2/08) Aerospace Lightning Institute Advanced Seminar, Los Angeles, CA.

Helicopter Pilot Performance: Inadvertent Flight into Instrument Meteorological Conditions (IMC), Helicopter Association International Annual Exposition (2/08). Houston, TX.

Advances in Retinal Imaging: Adaptive Optics (5/08) Northern Nevada Optometric Association, Reno, NV.

Lighting and Vision Related Issues for Pilots (7/08) Cessna 180/185 Owners Club annual fly-in, Johnson Creek, ID.

Seeing and Being Seen: Vision and the Aviation Environment (11/11-11/13/08) Idaho Division of Aeronautics, FAA Safe Pilot Seminars, Lewiston, ID, Coeur D'Alene, ID, and Sandpoint, ID.

UAS Ground Observer Performance: Preliminary Results (12/08) TAAC- UAS conference-Santa Ana Pueblo, New Mexico.

Unmanned Aerial Vehicles: Special Lighting Requirements (2/09) Aerospace Lightning Institute, Advanced Seminar, Los Angeles, CA.

Other Skills, Certificates

Pilot - Commercial, Instrument, Land, Sea

Certified Instrument Flight Instructor

Certified Advanced Aviation Ground Instructor

Certified ocean diver SCUBA-(NAUI)

Percussionist- jazz, rock, taiko

Shodan (black belt) in Hapkido

Shodan (black belt) in Jujitsu

Automobile and general mechanic

Publications

Papers

- Jacobs G.H., Neitz J. & Crognale M. A.(1984) Spectral sensitivity of ground squirrel cones measured with ERG flicker photometry. *J. Comp. Physiol. A. Sens. Neural. Behav. Physiol.* 156:503-509.
- Jacobs G.H., Neitz J. & Crognale M.A. (1987) Color vision polymorphism and its photopigment basis in a callitrichid monkey (*Saguinus fuscicollis*). *Vision Res.* 27:2089-2100.
- Jacobs G.H., Crognale M.A. & Fenwick J. (1987) Cone pigment of the Great Horned Owl. *The Condor.* 89:434-436.
- Crognale M.A. & Jacobs G.H. (1988) Temporal response properties of the short wavelength cone mechanism: Comparison of receptor and postreceptor signals in the ground squirrel. *Vision Res.* 28:1077-1082.
- MacLeod D.I.A., Chen B. & Crognale M.A. (1989) Spatial organization of sensitivity regulation in rod vision. *Vision Res.* 29:965-978.
- Crognale M.A., Jacobs G.H. & Neitz J. (1991) Flicker photometric ERG measurements of short wavelength sensitive cones In: Drum, B., Moreland, J.D. and Serra, A. (eds.), *Color Vision Deficiencies X, Doc. Ophthalmol. Proc. Ser. 54:* 341-346 Kluver Acad. Publ., Dordrecht.
- Jacobs G.H., Neitz J., Crognale M.A. & Brammer G. L. (1991) Spectral sensitivity of vervet monkeys (*cercopithecus aethiops sabaues*) and the issue of catarrhine trichromacy. *Am. J. Primatology* 23, 185-195.
- Crognale M.A. & Jacobs G.H. (1991) Behavioral and electrophysiological sensitivity to temporally modulated visual stimuli in the ground squirrel. *Visual Neurosci.* 6, 593-606.
- Jacobs G.H., Fenwick J.A., Crognale M.A. & Deegan II J.F. (1992) The all-cone retina of the garter snake: Spectral mechanisms and photopigments. *J. Comp. Physiol. A. Sens. Neural. Behav. Physiol.* 170, 701-707.
- Jacobs G.H., Deegan II J.F, Crognale M.A. & Fenwick J. (1993) Photopigments of dogs and foxes and their implications for canid vision. *Visual. Neurosci.* 10, 173-180.
- Crognale M.A. Rabin J., Switkes E. & Adams A.J. (1993) Selective loss of S pathway sensitivity in central serous choroidopathy revealed by spatio-chromatic visual evoked cortical potentials (VECP). *Color Vision Deficiencies XI, Doc. Ophthalmol. Proc. Ser.* ,229-239. (Also presented at the Third Canadian University Seminar in Optometry held in Montreal, April 1992.)

12. Crognale M.A., Switkes E., Rabin J., Schneck M.E., Hægerström-Portnoy G. & Adams A.J. (1993) Application of the spatio-chromatic visual evoked potential to detection of congenital and acquired color deficiencies *J. Opt. Soc. Am.* 10, 8, 1818-1825.
13. Jacobs G.H, Deegan J.F.II, Neitz J., Crognale M.A. & Neitz M. (1993) Photopigments and color vision in the nocturnal monkey, *Aotus*. *Vision. Res.* 33, 13, 1773-1783.
14. Rabin J., Switkes E., Crognale M.A., Schneck M.E. & Adams A.J. (1994) Visual evoked potentials in three-dimensional color space: Correlates of spatio-chromatic processing. *Vis. Res.* 34, 2657-2671.
15. Crognale M.A., Switkes E., Rabin J., Schneck M.E. Hægerström-Portnoy G. & Adams A.J. (1995) Objective assessment of short wavelength sensitive (SWS) mechanisms with the spatio-chromatic VEP: S-cone monochromacy and transient tritanopia. In: *Color Vision Deficiencies XII, Doc. Ophthalmol. Proc. Ser.* 57, Kluver Acad. Publ., Dordrecht, pp-407-413.
16. Crognale M.A. & Schor C.M. (1996) Contribution of chromatic mechanisms to the production of optokinetic nystagmus (OKN) in normals and strabismic. *Vis. Res.* 36, 11, 1687-1698.
17. Switkes E., Crognale M.A., Rabin J., Schneck, M.E. & Adams, A.J. (1996) Reply to 'Specificity and selectivity of chromatic visual evoked potentials' *Vis. Res.* 36, 3403-3405.
18. Schneck M.E., Lee E., Fortune B.F., Switkes E., Crognale M.A. & Adams A.J. (1997) Spatio-chromatic VEPs in recovered optic neuritis and multiple sclerosis. In: *Color Vision Deficiencies XIII, Doc. Ophthalmol. Proc. Ser.* 59, Kluver Acad. Publ., Dordrecht, pp-179-185.
19. Schneck M.E., Fortune B., Switkes E., Crognale M.A. & Adams A.J. (1997) Acute effects on blood glucose on chromatic VEP's in diabetic and normal individuals. *Invest. Ophthalm. Vis. Sci.* 38, 800-810.
20. Crognale M.A., Adams A.J. & Switkes E. (1997) Temporal response characteristics of the spatio-chromatic VEP: Non-linearities and departures from psychophysics *J. Opt. Soc. Am. A.*, 14, 2595-2607.
21. Crognale M.A., Kelly J.P., Chang S., Weiss A.H. & Teller D.Y. (1997) Development of pattern visual evoked potentials: Longitudinal measurements in human infants. *Optom. Vis. Sci.*, 10, 808-815.
22. Shaaban S.A., Crognale M.A., Calderone J.B., Jacobs G.H. & Deeb S.S. (1998) Expression of a functional human photopigment in the mouse retina. *Invest. Ophthalm. Vis. Sci.* 39, 1036-1043.
23. Crognale M.A., Kelly J.P., Weiss A. & Teller D.Y. (1998) Development of the spatio-chromatic visual evoked potential (VEP): A longitudinal study. *Vis. Res.* 38, 3283-3292.
24. Crognale M.A., Teller D.Y., Motulsky A. & Deeb S.S. (1998) Severity of color vision defects: Electroretinographic (ERG), molecular and behavioral studies. *Vis. Res.* 38, 3377-3385.
25. Crognale M.A., Levenson D.H., Ponganis P.J., Deegan J.F. II & Jacobs G.H (1998) Measurements of cone photopigment in the harbour seal (*Phoca vitulina*) and implications for colour vision. *Can. J. Zool.* 76, 2114-2118.
26. Crognale M.A., Teller D.Y., Yamaguchi, T., Motulsky A. & Deeb S.S. (1999) Analysis of red/green color discrimination in subjects with a single X-linked photopigment gene. *Vis. Res.* 39, 707-719.
27. Switkes E. & Crognale M.A. (1999) Comparison of color and luminance contrast: Apples vs. oranges? *Vis. Res.* 39, 1823-1831.
28. Crognale M.A. (1999) Is what you see what you get? *Aviation Safety*, 8, 15-19.
29. Varadharajan S., Lakshminarayanan V. & Crognale M.A. (2000) Wavelet analysis of maturation of chromatic VEP. *Proceedings of Vision Science & Its Applications Topical Optical Society Meeting.*
30. Varadharajan S., Lakshminarayanan V., Fitzgerald K, & Crognale M.A. (2000) Wavelet applications in electrophysiology. *Trends in Optics and Photonics Series: Vision Science and its Applications*, Vol. 35, Ed. V. Lakshminarayanan, OSA, Washington DC.
31. Madrid M. & Crognale M.A. (2000) Long-term maturation of visual pathways. *Visual Neurosci.* 17, 831-837.
32. Crognale M.A. & Knight R.A. (2000) The effects of color of cockpit lighting on vision. *Proceedings of the 38th Annual SAFE Association Symposium.*
33. Crognale M.A., Nolan J.B., Webster M.A., Neitz, M. & Neitz J. (2001) Color vision and genetics in a case of cone dysfunction syndrome. *Color Research & Application* 26, S284-S287..

34. Crognale M.A, Page J.P. & Fuhrel A. (2001) Aging of the chromatic onset visual evoked potential. *Optom. Vis. Sci.* 78, 442-446.
35. Crognale M.A. (2002) Review of “Fundamentals of Sensation and Perception, 3rd Ed. by Michael W. Levine. (invited review) *Optometry and Vision Science* 79, 84.
36. Crognale M. A. (2002). Development, maturation, and aging of chromatic visual pathways: VEP results. *Journal of Vision*, 2(6), 438-450, <http://journalofvision.org/2/6/2/>, DOI 10.1167/2.6.2
37. Maciokas J.B. & Crognale M.A. (2003) Cognitive and attentional changes with age: Evidence from attentional blink deficits. *Experimental Aging Research* 29, 137-153.
38. Kelly J.P., Crognale M. A. & Weiss A.H. (2003) ERGs, cone-isolating VEPs and analytical techniques in children with cone dysfunction syndromes. *Doc. Ophthalmol.* 106, 289-384 .
39. Nolan J.B., Crognale M.A. & Webster M.A. (2003) Colour naming, colour categories, and central colour-coding in a case of x-linked incomplete achromatopsia. In: *Normal & Defective Colour Vision*. J.D. Mollon, J Pokorny, & K. Knoblauch Eds. Oxford University Press, Oxford. 370-377.
40. Gerth C, Delahunt P.B., Crognale M.A. & Werner J.S. (2003) Topography of the chromatic pattern-onset VEP. *Journal of Vision* <http://journalofvision.org/3/2/5/>.
41. Wiggins, M.E. & Crognale M.A. (2003) How Training Devices Are Actually Being Used By General Aviation Flight Training Organizations. Annual Report to the Federal Aviation Administration, Human Factors Division, AAR-100.
42. Mizokami, Y., Werner J.S., Crognale M.A. & Webster M.A. (2003) Unique hue and spectral bandwidth. Proceedings of the Annual meeting for the AIC, International Colour Association.
43. Levenson D.H., Eckert S.A. Crognale M.A., (2004) The Sensory Biology of Sea Turtles: What can they see, and how can this help them avoid fishing gear?: Part 2 – Leatherbacks. Sensory Biology (AB133-F-03-SE-1154) Project Report.
44. Crognale M.A., Fry M., Highsmith J., Heagerstrom-Portnoy G., Neitz M., Neitz J. & Webster M.A. (2004) Characterization of a novel form of X-linked incomplete achromatopsia. *Visual Neuroscience* 21, 197-203.
45. Levenson D.H., Eckert S., Crognale M.A., Deegan J.F.II, & Jacobs G.H. (2004) Photopic spectral sensitivity of green and loggerhead sea turtles. *Copeia*, 4, 908-914.
46. Page J.W. & Crognale M.A. (2005) Differential aging of chromatic and achromatic visual pathways: behavior and electrophysiology. *Vision Res.* 45, 1481-1489.
47. Page J.W., Findley J. & Crognale M.A. (2005) An electrophysiological analysis of the effects of Ginkgo biloba on visual processing in older healthy adults. *J Gerontol A Biol Sci Med Sci.* 60(10):1246-51.
48. Parson S., Beringer D., Knecht W., Crognale M.A., Wiegmann D., Beard B.L., Geven, C., Craig P., Fiduccia P., Trescott M., McMahon A., Sharp R., Werner A., Mowery J., Stoodley H., Cole L., Galbraith R., Lenz M., Adams R., Krebs W.K. (2006) General Aviation Pilot’s guide to preflight weather planning, weather self-briefings, and weather decision making. *Federal Aviation Administration*.
49. Levenson D.H., Ponganis P.J., Crognale M.A., Deegan, J.F.II, Dizon, A. Jacobs G.H. (2006) Visual pigments of marine carnivores: Pinnipeds, polar bear, and sea otter. *J Comp Physiol A Neuroethol Sens Neural Behav Physiol.* 192(8):833-43.
50. Mizokami Y, Werner J.S., Crognale M.A., Webster M.A. Non-linearities in color coding: compensating color appearance for the eye’s spectral sensitivity. (2006) *Journal of Vision* 6(9), 996-1007, <http://journalofvision.org/6/9/12/>, doi:10.1167/6.9.12.
51. Levenson D.H., Eckert, S.A., Crognale M.A., Deegan J., Jaobs G.H. (2006) Electroretinographic and genetic examination of sea turtle visual pigments. In: Sea Turtle and Pelagic Fish Sensory Biology: Developing Techniques to Reduce Sea Turtle Bycatch in Longline Fisheries, *NOAA Technical Memorandum NMFS-PIFSC-7*.
52. Crognale M.A., Eckert S.A. (2007) Spectral and Temporal Sensitivity of Adult and hatchling leatherback seas turtles. In: 2006 Sea Turtle and Pelagic Fish Sensory Biology: Workshop, *NOAA Technical Memorandum NMFS-PIFSC-12*.

53. Harms C.A., Eckert S.A., Kubis S.A., Campbell M., Levenson, D.H. & Crognale M.A. (2007) Field anaesthesia of leatherback sea turtles (*Dermodochelys coriacea*). *The Veterinary Record*, 161, 15-.
54. Crognale M.A., Eckert S.A., Levenson D.H., & Harms C.A. (2008) Spectral; and temporal visual sensitivity of adult and hatchling leatherback sea turtles. *Endangered Species Research* 5, 249-256.
55. Highsmith, J & Crognale M.A. (2009) Changes in Chromatic Pattern Onset VEP with Full Body Inversion *Doc. Ophthalmol.* (in press).
56. Crognale M.A., Webster M.A. & Fong A. (2009) Application of digital micromirror devices to vision science: shaping the spectrum of stimuli. *SPIE Proceedings Ser.* (in press).
57. Mizokami, Y. & Crognale M.A. Sparse Coding for aerial images. (submitted)
58. Page J.W., Duhamel, P. & Crognale M.A. Evidence for visualization at early visual cortex. (submitted).
59. Crognale M.A. Prior viewing of a binocular collimator improves detection under conditions of empty field myopia. (submitted).

Presentations/Abstracts

1. MacLeod D.I.A., Chen B. & Crognale M.A. (1984) Local adaptation vs. neural pools in rod vision. *Invest. Ophthalmol. Visual Sci.* (Suppl) 25.
2. Neitz J., Jacobs G.H. & Crognale M.A. (1985) Polymorphism of color vision in a callitrichid monkey. *Invest. Ophthalmol. Visual Sci.* (Suppl) 26.
3. Crognale M. A. & Jacobs G.H. (1986) Temporal response properties of the short wavelength mechanism in the ground squirrel. *Invest. Ophthalmol. Visual Sci.* (Suppl) 27.
4. Crognale M. A. & Jacobs G.H. (1989) Temporal response properties of color opponent ganglion cells in the ground squirrel. *Invest. Ophthalmol. Visual Sci.* (Suppl) 30.
5. Crognale M. A. & Jacobs G.H. (1989) Temporal aliasing in optic nerve fibers. *1989 Annual meeting of the Society for Neurosciences.*
6. Crognale M.A., Switkes E., Rabin R., Hægerström-Portnoy G. & Adams, A.J. (1992) Assessment of color vision anomalies with the VEP. In *Non-invasive Assessment of the Visual System Technical Digest, 1992* (Optical Society of America, Washington D.C.) 1, pp 43-46.
7. Rabin J., Schneck M.E., Crognale, M.A., Switkes E. & Adams A.J. (1992) Threshold and supra-threshold tests of S-cone vision in diabetes and eye disease. *Invest. Ophthalmol. Visual Sci.* (Suppl) 33.
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31. Varadharajan S., Crognale M. & Lakshminarayanan V. (1999) Wavelet analysis of the maturation of the spatio-chromatic VEP. *Annual meeting for the Optical Society of America, Santa Clara*.
32. Crognale M.A. (2000) Sight for flight: Night lighting in the cockpit. *Invited talk for the Proceedings of the Annual Meeting for the Aerospace Lighting Institute, Los Angeles, CA*.
33. Crognale M.A. (2000) Development and maturation of the major visual pathways: VEP measures. *XXXVIII Symposium of the International Society for Clinical Electrophysiology of Vision*. Sydney Australia.
34. Varadharajan S., Lakshminarayanan V. & Crognale M.A. (2000) Wavelet analysis of maturation of chromatic VEP. *Annual Vision Science & Its Applications Topical Meeting of the Optical Society*.
35. Kelly J.P., Crognale, M.A., & Weiss A.H. (2000) Evaluation of rod monochromatisms and cone dystrophy in children by chromatic VEP's. *Invest. Ophthalm. Vis. Sci.* (suppl.) 41.
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38. Crognale M.A. & Knight R. (2000) Light, Sight, & Flight: Vision and colored cockpit lighting. *SAFE Association Annual Symposium.* Reno, Nevada.
39. Crognale M.A. (2001) Physiological stress and cockpit vision: Effects of hypoxia and G-forces. *Invited talk for the Proceedings of the Annual Meeting for the Aerospace Lighting Institute, Los Angeles, CA*
40. Findley J., Maciokas J. & Crognale M (2001) Effects of Gingko Biloba on Visual Evoked and Event Related Potentials (VEP/ERP) in older adults. *Annual meeting of the Rocky Mountain Psychology Association,* Reno, Nevada.
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44. Page J.P., & Crognale M.A. (2001) Development and aging of chromatic visual pathways. *IX Biennial Western Eye Research Conference,* Lake Tahoe, CA.
45. Crognale M.A. (2001) Development, Maturation, and Aging of Chromatic Visual Pathways: VEP Results. *Optical Society of America/UC Irvine Color Vision Workshop.*
46. Crognale M.A., Gerth C. & Werner J.S. (2002) Multifocal chromatic pattern-onset VEPs, *Annual meeting for the Vision Sciences Society,* Sarasota, Florida.
47. Maciokas J.B., Svec L. & Crognale M.A. (2002) Attentional changes with age: Evidence from the attentional blink deficits. *Annual meeting for the Vision Sciences Society,* Sarasota, Florida.
48. Delahunt P., Gerth C., Crognale M.A. & Werner J. (2002) Topography of the chromatic pattern-onset VEP. *Annual European Conference on Visual Perception,* Glasgow.
49. Crognale M.A. (2002) Visual Factors in Aviation *Invited talk for the Proceedings of the Annual Meeting for the Aerospace Lighting Institute, Los Angeles, CA*
50. Mizokami Y., Werner J.S., Crognale, M.A. & Webster M.A. (2002) Color Appearance and Spectral Bandwidth. *Optical Society of America, Fall Vision Meeting,* San Francisco.
51. Page J.P. & Crognale M.A. (2003) Behavioral and Electrophysiological measures of aging in visual pathways. *2003 Annual meeting for the Vision Sciences Society,* Sarasota, Florida.
52. Fry M., Highsmith J. & Crognale M.A. (2003) A Study of the Phenotypic Differences Manifested in Blue-Cone Monochromacy. *2003 Annual meeting for the Vision Sciences Society,* Sarasota, Florida.
53. Levenson D.H., Crognale M.A. & Eckert S. (2003) Visual capability of sea turtles (electrophysiology). *Meeting of the Turtle-Palagic Fish Sensory Biology Working Group* (invited talk) January 2003, Honolulu, HI.
54. Mizokami Y., Werner J.S., Crognale, M.A. & Webster M.A. (2003) Unique hue and spectral bandwidth. *2003 Annual AIC meeting.* Bangkok, Thailand.
55. Crognale M.A., Fry M., Highsmith J., Heagerstrom-Portnoy G., Neitz M., Neitz J. & Webster M.A. (2003) Characterization of a novel form of incomplete blue-cone monochromacy. *17th Symposium of the International Color Vision Society.* Seattle, WA.
56. Wiggins M. & Crognale M.A. (2003) Use of Training devices in general aviation training programs. *FAA Human Factors (AAR-100) Year 2003 Program Review,* Reno NV.
57. Mizokami Y., Werner J.S., Crognale, M.A. & Webster M.A. (2003) Constant hue loci across spectral bandwidth. *Optical Society of America, Fall Vision Meeting, Tucson. Journal of Vision, 3(12), 61a,* <http://journalofvision.org/3/12/61/>, doi:10.1167/3.12.61
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59. Duhamel P., Crognale M.A & Publicover N. (2004) Physiological Assessment of Pain, *Annual meeting for the American Pain Society*, Vancouver, Canada.
60. Highsmith J. & Crognale M.A. (2004) Contrast response and components of the achromatic onset visual evoked potential. 2004 *Annual meeting for the Vision Sciences Society*, Sarasota, Florida.
61. Mizokami Y. & Crognale M.A. (2004) Sparse coding of images in the aviation environment. *Optical Society Fall Vision Meeting*, Rochester, NY.
62. Highsmith J. & Crognale M.A. (2004) Chromatic Visual evoked potentials during full-body inversion. *Annual meeting for the International Society for Clinical Electrophysiology of Vision*, San Juan, Puerto Rico.
63. Crognale M.A. (2004) Visibility in the Aviation Environment. *Annual Sponsor's Symposium, Federal Aviation Administration*, Washington D.C.
64. Crognale M.A. (2004) Aging of Visual Pathways. Sanford Center for Aging "Living the Legacy" meeting, Reno NV.
65. Harms C.A., Eckert S.A., Kubis S.A., Campbell M., Levenson D.H. & Crognale M.A. (2005) Field Anesthesia of Leatherback Sea Turtles (*Dermochelys coriacea*) *25th Annual Symposium on Sea Turtle Conservation and Biology*, Savannah, GA.
66. Levenson D.H., Eckert S.A. Crognale M.A., Duhamel P., Kubis S.A. and Harms C.A. (2005) Night-time spectral sensitivity of adult female leatherback sea turtles. *25th Annual Symposium on Sea Turtle Conservation and Biology*, Savannah, GA.
67. Mizokami Y. & Crognale M.A. (2005) Detection of dual flashing lights. *Annual meeting for the Vision Sciences Society*, Sarasota, FL.
68. Svec L., Elliot S., Highsmith J., Brunstetter T., Crognale M.A. (2005) The Effect of Spectrally Selective Filters on Perception. *Annual meeting for the Vision Sciences Society*, Sarasota, FL.
69. Crognale M.A (2005) Aviation Vision: Facts and Myths, *Experimental Aircraft Association's Airventure 2005*, Oshkosh, WI.
70. Mizokami Y. & Crognale M.A. (2005) Detection model predictions for aircraft targets on natural backgrounds. *European Conference on Visual Perception*.
71. Mizokami Y. & Crognale M.A. (2005) Color contrast adaptation on visual evoked potentials *Annual Fall Vision Meeting for the Optical Society of America*.
72. Highsmith J. & Crognale M.A. (2005) Effects of attention on the chromatic pattern on-set VEP. *Annual Fall Vision Meeting for the Optical Society of America*.
73. Elliot S., Highsmith J., Crognale S. D., Crognale M.A. (2005) Physiological correlates for the watercolor effect. *Annual Fall Vision Meeting for the Optical Society of America*.
74. Webster M.A., Mizokami Y., Werner J.S. & Crognale M.A. (2005) Hue constancy across changes in spectral purity - a functional theory of the Abney Effect. *Annual Fall Vision Meeting for the Optical Society of America*.
75. Levenson D.H., Ponganis P.J., Crognale, M.A., Deegan, J.F.II, Dizon, A.& Jacobs, G.H. (2005) Genetic and electroretinographic examination of pinniped visual pigments. *16th Biennial Conference on the Biology of Marine Mammals Society for Marine Mammalogy*, San Diego CA.
76. Highsmith J., Stoebling D., Gulla P., & Crognale M.A. (2006) Does attention modulate chromatic VEP responses? *Annual meeting for the Vision Sciences Society*, Sarasota, FL.
77. Webster M.A., Mizokami Y., Werner J.S. , Crognale M.A.(2006) Nonlinearities in color appearance - compensating for the eye's spectral sensitivity. *Annual meeting for the Vision Sciences Society*, Sarasota, FL
78. Crognale M.A. (2006) Aviation Vision: Facts and Myths, *Experimental Aircraft Association's Airventure 2006*, Oshkosh, WI.
79. Crognale M.A. (2006) Applications of Human Electrophysiology for Objective Assessment of Visual Function. *Envision 06' International Vision Rehabilitation and Vision Research Conference*, Kansas City, KS, (invited).
80. Mizokami Y., Werner J.S., Crognale, M.A. & Webster M.A. (2006) A functional account of nonlinearities in color appearance. *Fourth Asian Conference on Vision*, Matsue, Japan.

81. Crognale M.A., Levenson D.H., Harms C.A., Tuttle A., & Eckert S.A. (2006) Spectral and temporal sensitivity of adult and hatchling leatherback sea turtles. *Meeting of the Turtle-Palagic Fish Sensory Biology Working Group*, National Marine Fisheries Association, Wachapreague, VA
82. Crognale, M.A. (2006) Visibility in the Aviation Environment. *Annual Sponsor's Symposium, Federal Aviation Administration*, Washington D.C.
83. Crognale, M.A. (2006) Helicopter Pilot Performance: VFR into IMC. *Annual Sponsor's Symposium, Federal Aviation Administration*, Washington D.C.
84. Clapham E. S., McDermott K. & Crognale, M. A. (2006) P300 In Response To Emotional Face Stimuli. *Annual Meeting for the Society of Neurosciences*, Atlanta, GA.
85. Crognale M.A., Levenson D.H., Harms C.A., & Eckert S.A. (2007) Spectral and temporal sensitivity of adult and hatchling leatherback sea turtles. *Annual Meeting of Association for Research in Vision and Ophthalmology*, Ft. Lauderdale, FL.
86. Highsmith, J, Santiago, Z. and Crognale, M.A. (2007) Chromatic Pattern-Onset VEPs are robust to inattention. *Annual meeting for the Vision Sciences Society*, Sarasota, FL
87. Crognale M. (2007) Radiance, Luminance, Brightness, and Saliency: What they are and why it matters. *Aerospace Lightning Institute Advanced Seminar*, Los Angeles, CA. (invited)
88. Crognale M.A., Levenson D.H., Harms C.A., & Eckert S.A. (2007) Spectral and temporal sensitivity of adult and hatchling leatherback sea turtles: Consequences for color vision. *Summer Colour Conference. National Vision Research Institute of Australia*. University of Melbourne, Australia (invited).
89. Crognale M. Visual Human Factors in Aviation. (2007) *Regional Human Factors Regional Conference*, California State University, Long Beach (invited)
90. Crognale M.A. Aviation Vision: Safety Strategies. (2007) *Sun n' Fun Fly-in Safety and Technical Forums*, Lakeland, FL. (invited).
91. Crognale M.A., Eckert S.A., Levenson D.H., & Harms C.A. (2007) Visual capacities in adult and hatchling leatherback sea turtles. *Thirtieth European Conference on Visual Perception (ECVP) Arezzo, Italy, Perception, 36*, suppl., 190
92. Crognale M.A. (2008) Visual focus: factors for pilots *Aerospace Lightning Institute Advanced Seminar*, Los Angeles, CA. (invited)
93. Crognale M.A. (2008) How well do helicopter pilots transition from VMC to IMC?. *Helicopter Association International 2008 Annual Exposition*, Houston, TX (invited).
94. Highsmith J., Duncan C.S., O'Neil S.F., Roth E. & Crognale M.A. (2008) Effects of selective attention on the chromatic VEP: Task-relevant stimuli. *Annual meeting for the Vision Sciences Society*, Naples, FL
95. Crognale M.A. & Krebs W.K. (2008) Helicopter Pilot Performance: Inadvertent Flight into Instrument Meteorological Conditions, *Annual meeting for the Human Factors and Ergonomics Society*, New York, NY. (invited)
96. Crognale M.A. & Highsmith J. (2008) Attentional shifts have little effect on the waveform of the chromatic onset VEP, *Annual meeting for the International Society for the Clinical Electrophysiology of Vision (ISCEV)*, Morgantown, WV.
97. Crognale M.A. (2008) Seeing and being seen: Vision in the aviation environment *Idaho Division of Aeronautics, FAA Safe Pilot Seminars*, Lewiston, ID, Coeur D'Alene, ID, and Sandpoint, ID (invited)
98. Crognale M.A. (2008) UAS ground observer performance: preliminary results. *Annual Technical Analysis and Applications Center (TAAC) Conference*, Santa Ana Pueblo, NM. (invited)
99. Crognale M.A., Webster M.A. & Fong A. (2009) Application of digital micromirror devices to vision science: shaping the spectrum of stimuli. *SPIE Photonics West*, San Jose, CA.
100. Duncan C.S., Roth E., Mizokami Y. & Crognale M.A. Contrast adaptation reveals higher order color processing in the visual evoked potential. *Annual meeting for the Vision Sciences Society*, Naples, FL (accepted).

101 O'Neil S.F., McDermott K. Mizokami Y. Werner J.S., Crognale M.A. & Webster M.A. Individual differences in the Abney effect. *Annual meeting for the Vision Sciences Society*, Naples, FL (accepted).