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The 21st Symposium of the International Colour Vision Society (ICVS) will take place at the Buskerud University College, Kongsberg, Norway, from Friday July 1st to Tuesday July 5th, 2011.

The meeting will encompass fundamental, applied, and clinical aspects of research into colour vision, ranging from the molecular to the cognitive. In addition to the keynote presentation, there will be topical symposia, along with individual contributions reflecting the diversity of interests of the members of the ICVS, who include physiologists, psychologists, physicists, engineers, geneticists, optometrists, ophthalmologists and other related professionals with interests in colour vision and colour-vision deficiencies.

Participants will have the opportunity to visit some of Kongsberg's most popular tourist attractions, including the Kongsberg Silver Mines, the Labro Museums, and Lågdalsmuseet. There's history to be enjoyed

as well as performing arts and entertainment. Kongsberg Jazz Festival begins the day after the symposium. For those who enjoy outdoor adventures, this is a once in a lifetime opportunity to visit the beautiful fjords in Western Norway and Jostedal Glacier, the largest glacier in Northern Europe.

The symposium proceedings will be published in Journal of the Optical Society of America A. There will also be a \$500 OSA Student Poster Award presented at the 2011 symposium. The membership renewal is now open at icvs.info (see page 3 for more details).

For more information, visit the website (home.hibu.no/~icvs2011/icvs2011/Home.html) or icvs homepage (icvs.info).



Contents

| | |
|--|---|
| 21 st Symposium of ICVS | 1 |
| Editorial | 2 |
| Junior Member Profile | 3 |
| Obituary | 6 |

| | |
|---|---|
| Verriest Medal | 2 |
| Membership Renewal | 3 |
| 2 nd International Symposium | 4 |

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2011 Verriest Medal Winner



The International Colour Vision Society (ICVS) is pleased to announce that the 2011 Verriest Medal will be awarded to Steven K. Shevell at the 21st Biennial ICVS Symposium to take place at Buskerud University College in Kongsberg, Norway (July 1-5, 2011). This award was established in 1991 in memory of the founding member of the Society, Dr. Guy Verriest, and honours outstanding contributions in the field of colour vision.

For over 35 years, Professor Shevell has contributed to the vision and particularly the color vision community in breaking new ground in research, training new researchers and providing service to the community. In his experimental work, he has carefully integrated theoretical and experimental approaches in studies of how early mechanisms and context influence colour perception. He has artfully exploited the technique of hue cancellation to study adaptive processes, spatio-temporal constraints, memory and binocular integration in colour perception. Professor Shevell is the Eliakim Hastings Moore Distinguished Service Professor in the Department of Psychology, Professor in the Section of Ophthalmology and Visual Science, Department of Surgery, and in the Committee on Computational Neuroscience, and, also, Chair of the Integrative Neuroscience Graduate Program at The University of Chicago, USA. Professor Shevell has served, over the years, on editorial boards of leading journals, study sections of leading granting agencies and on the boards of major research societies. He is currently a member of the Directors' Committee of the ICVS. His wise and equilibrated advice is sought after in our deliberations and personifies the voice of careful research, integrity and reason.

Editorial

Dingcai Cao, PhD and Andrew J. Zele, PhD d-cao@uchicago.edu andrew.zele@qut.edu.au

On behalf of the Board of Directors, we are pleased to announce that the ICVS membership has elected the following individuals to 4-year terms on the Board: Ken Knoblauch, Barry Lee, John Mollon, Sergio Nascimento, Qasim Zaidi. They join continuing Board members: John Barbur, Jay Neitz, Steven Shevell, Hannah Smithson, Jack Werner, Joel Pokorny, Steven Buck, Neil Parry, and Rigmor Baraas.

The Board thanks all of the candidates for their participation in the recent election. We are indeed fortunate to have so many highly qualified people eager to help the Society.

Membership Renewal Information

Neil Parry, PhD Treasurer



As 2010 draws to a close it is time for me to start asking you to renew your membership. This 2-year cycle, regular membership will be €140, and student and retired membership will be €30. Now we have a

reliable estimate of the cost of this coming year's proceedings, we can concentrate on our other main expenditure, which is the provision of student travel awards. The board are entirely in agreement that the support of students is of major benefit to the society and to colour vision research in general. It is with this in mind that the fees have been set at their present level.

As before, I am asking you to renew online. Virtually everyone did this last time and the Paypal system worked well. You'll find the renewal details on the website – just head for www.icvs.info and click through to 'Membership'. Don't forget that you need to be a current member of the society to present a paper at the meeting.

May I take this opportunity to wish you Season's Greetings. I hope you have a happy and successful 2011 and look forward to seeing you all in Kongsberg.

Junior Member Profile: Sarah Elliott, PhD



Sarah L. Elliott began her graduate career in Psychology at the University of Nevada, Reno working with Dr. Michael Webster. In 2005, she completed her M.A. with a thesis entitled *Blur Adaptation: Normalization or Repulsion?*, which explored the form of response change and therefore the perceptual consequences of blur adaptation. She completed her Ph.D. in Psychology at the University of California, Davis in the fall of 2009 with Dr. Jack Werner. Her Ph.D. dissertation was entitled *Optical and Neural Factors Contributing to Age-related Losses in*

Spatial Contrast Sensitivity.

Sarah has published five papers, three of which examine optical and neural factors involved in age-related spatial sensitivity decline, and two of which utilize adaptive optics to evaluate the role of high-order aberrations on spatial vision performance. She is currently studying perceived color and its relation to perceptual organization as a Postdoctoral Scholar in the Institute for Mind and Biology at the University of Chicago.

Selected Publications:

Elliott, S.L., & Werner, J.S. (2010). Age-related changes in contrast gain related to the M and P pathways. *Journal of Vision*, 10(4):4, 1-15. <http://www.journalofvision.org/content/10/4/4.full>

Elliott, S.L., Choi, S.S., Doble, N., Hardy, J.L., Evans, J.W. & Werner, J.S. (2009) Role of high-order aberrations in senescent changes in spatial vision. *Journal of Vision*, 9(2), 1-16. <http://journalofvision.org/9/2/24/>

Elliott, S.L., Hardy, J.L., Webster, M.A., Werner, J.S. (2007). Aging and Blur Adaptation. *Journal of Vision*, 7(6), 1-9. <http://journalofvision.org/7/6/8/>

2nd International Symposium on Vision and Visual Dysfunction

Belém, State of Pará, Brazil

The 2nd International Symposium on Vision and Visual Dysfunction took place in Federal University of Pará, Belém, Brazil, from September 23 to September 26, 2010. The symposium included 22 conferences given by outstanding scientists, 15 guests from around the world and 7 Brazilian professors. The symposium was held to celebrate the retirement of Drs. Barry Lee and Dora Selma Fix Ventura. Detailed information of the conference can be found on the following website: <http://www.eaevdv.ufpa.br/eaevdv/>.

Invited speakers:

Adriana Berezovsky

Departamento de Oftalmologia, Universidade Federal de São Paulo
"Clinical electroretinography"

Dingcai Cao

Sections of Surgical Research & Ophthalmology and Visual Science, Department of Surgery, The University of Chicago
"Mesopic vision: A review"

Valerio Carelli

Dipartimento di Scienze Neurologiche, Università di Bologna
"Vision losses in mitochondrial diseases"

Elisa M. Colombo

Departamento de Luminotecnia, Luz y Visión, Facultad de Ciencias Exactas y Tecnología, Universidad Nacional de Tucumán
"Ambient illumination effects on visual performance"

Manoel da Silva Filho

Instituto de Ciências Biológicas, Universidade Federal do Pará
"The morphology and firing pattern of layer I neurons in the primary visual cortex of the rat"

Luiz Carlos de Lima Silveira

Núcleo de Medicina Tropical, Universidade Federal do Pará
"Diurnal and nocturnal primate vision – a study of New World monkeys"

José Luiz Martins do Nascimento

Instituto de Ciências Biológicas, Universidade Federal do Pará
"Retinal neurochemistry"

Barbara LaVerne Finlay

Department of Psychology, Cornell University
"General and niche-specific factors in visual system evolution: an evo-devo approach"

Ulrike Grünert

Save Sight Institute, University of Sydney, Sydney Eye Hospital Campus

“Outer retina – structure and function”

Russell D. Hamer

Instituto de Psicologia, Universidade de São Paulo

“Evoked potential measurement of human vernier hyperacuity: a review”

Jan Kremers

Department of Ophthalmology, University Hospital Erlangen, University of Erlangen-Nürnberg

“Non-invasive electrophysiological assessment of the physiology of retino-geniculate pathways”

Barry Buchanan Lee

Graduate Center for Vision Research, College of Optometry, State University of New York

“Peculiarities of the parvocellular pathway”

Paul Ronald Martin

Save Sight Institute, University of Sydney, Sydney Eye Hospital Campus

“Who needs cellulas parvocellularis?”

Jay Neitz

Department of Ophthalmology, University of Washington Medical School

“What genetics can tell us about the neural circuitry for color vision”.

Maureen Neitz

Department of Ophthalmology, University of Washington Medical School

“Gene therapy for red–green color blindness in New World monkeys”

Joel Pokorny

Department of Ophthalmology & Visual Science, Visual Science Laboratories, The University of Chicago

“Steady and pulsed pedestals: the how and why of postreceptoral pathway separation”

Solange Rios Salomão

Departamento de Oftalmologia, Universidade Federal de São Paulo

“Assessing grating acuity in pre-verbal and non-verbal patients”

Hao Sun

Department of Optometry & Visual Science, Buskerud University College

“Rod inputs to ganglion cells estimated with a novel technique”

Arne Valberg

Department of Biophysics and Medical Technology, Norwegian University of Science and Technology

“Prepotentials revisited”

Dora Selma Fix Ventura

Instituto de Psicologia, Universidade de São Paulo

“Psychophysical and electrophysiological studies on acquired human visual dysfunction: a review of Brazilian work”

Trichur Vidyasagar

Department of Optometry & Vision Sciences, University of Melbourne

“Parallel bottom-up pathways and serial top-down processes in primate vision”

Qasim Zaidi

Graduate Center for Vision Research, College of Optometry, State University of New York (SUNY)

“Cortical decoding of color”

Obituary Leo M. Hurvich (1910-2009)

Leo M. Hurvich, a renowned figure in the field of human color vision, died on April 25, 2009, at age 98, in New York City. His research brought to the mainstream a theoretical framework for understanding human color perception in terms of underlying opponent-color mechanisms. When most psychologists and virtually all physiologists and physicists had sought principally to explain how physically different lights match in color, or how neural responses from photoreceptors combine to give the threshold of visually perceptible differences, Hurvich, together with his lifelong collaborator and wife, Dorothea Jameson, focused on understanding the appearance of hue, saturation, and brightness. The influence of their work has been profound and enduring. Their 1957 paper in *Psychological Review* (Hurvich & Jameson, “An Opponent-Process Theory of Color Vision”) has been referenced in 49 of the last 50 years and continues to be cited often.

Hurvich was born on September 11, 1910, near Boston. His undergraduate and graduate degrees were taken at Harvard (his doctorate in 1936), where he stayed until 1947. He and Jameson then joined the Color Technology Division of Eastman Kodak; 10 years later he moved to New York University as chair of undergraduate psychology. In 1962, he joined the Psychology Department at the University of Pennsylvania. He retired from Penn in 1979 but maintained an authoritative presence in the field, propelled in part by his book *Color Vision* (Sinauer Associates), published the next year. He was a fellow of the American Psychological Association, the New York Academy of Sciences, and the Optical Society of America and a member of the Society of Experimental Psychologists and the National Academy of Sciences.

Hurvich was the proponent of opponent-colors theory in his generation. The theory, first proposed by Ewald Hering in the 1870s, holds that red and green are represented with opposite signs (+ and -) along a single bipolar continuum with a neutral (zero) point for any color that appears neither reddish nor greenish. Similarly, yellow and blue are along a second bipolar dimension. Most physiologists in the early 1950s dismissed opponent-colors theory as implausible because neural responses were thought to vary only in magnitude, not sign, so a single neural response could not represent two qualitatively different percepts -- red and green -- according to the sign of the response. Hurvich, with Jameson, published landmark papers in the mid-1950s that quantified the redness, greenness, yellowness, and blueness of any light in the spectrum, and they used these measurements to demonstrate the versatility of opponent-colors theory for explaining perceived hue, saturation, and brightness under a wide variety of viewing conditions. The significance of these papers slowly gained widespread recognition after physiological evidence appeared for bipolar, chromatically opponent neural coding within fish retina in 1958 and in monkey lateral geniculate nucleus in 1960.

Hurvich, again with Jameson, later revealed the power of opponent-colors theory by explaining changes in color appearance following adaptation to chromatic lights. The

emphasis on the importance of viewing conditions was a characteristic feature of their science. These studies strengthened support for the theory as a model of post-receptoral neural representation.

Though subcortical physiological recordings 50 years ago fueled interest in opponent-colors theory, the underlying neural representations for the opponent-colors percepts, red-green and yellow-blue, have yet to be discovered in the visual system and almost surely are not at the subcortical level. Bipolar chromatically opponent coding is now a firmly established, foundational property of neural responses within the visual pathways of most vertebrates (primates in particular), but an open question is how the subcortical responses determine the colors we see. The search for neural representations in accord with opponent-colors percepts remains an active area of study.

Opponent-colors theory often was wrongly viewed as incompatible with the idea that color matches are determined by the responses of exactly three types of retinal receptors. In truth, however, the four hue percepts of opponent-colors theory (red, green, yellow, and blue) are compatible with various photoreceptor models, as was known at least since the 1920s and was explicitly restated by Hurvich and Jameson in the 1950s. Modern opponent-colors theory incorporates full contemporary knowledge of the three types of cone photoreceptors

Hurvich read widely in an era when a literate scientist was faced with critically important papers available only in foreign languages. He knew well the German literature from the latter 19th and early 20th centuries, as well as French, British, and American contributions. His 1964 translation from German of Hering's *Outlines of a Theory of the Light Sense* (Harvard University Press), done with Jameson, brought the full depth of Hering's theories to a broad audience of English-speaking scientists.

Hurvich was kind and generous to individuals. He could be less patient in public and was capable of responding to a presentation with an irascible gloss. One sensed that he understood the limits of his style when he would deliberately defer to Jameson so that she could restate the point in a tone of sweet reason. Outside of his science, he was interested in everything and was a fascinating interlocutor. His style was one of remarkably embedded digressions. He could insert four opening parentheses into a conversation and then systematically close each one, returning always to the next embedded level.

Hurvich lived a long and rich life, including more than 50 years in a scientific and personal partnership with Dorothea Jameson that blended independence and mutual support most wonderfully, enriching the lives of many in their circle of family, friends, and colleagues.

*Steven K. Shevell, University of Chicago
David H. Krantz, Columbia University*

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