IS&T International Symposium on

Electronic Imaging

SCIENCE AND TECHNOLOGY

14–18 February 2016 • San Francisco, CA, USA

PROCEEDINGS

Human Vision and Electronic Imaging (HVEI) 2016

Editors: **Bernice E. Rogowitz,** Visual Perspectives (USA); **Thrasyvoulos N. Pappas,** Northwestern Univ. (USA); and **Huib de Ridder,** Technische Univ. Delft (the Netherlands)

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held February 14-18, 2016, at the Hilton San Francisco, Union Square in San Francisco, CA.

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Electronic Imaging 2016

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Human Vision and Electronic Imaging (HVEI) 2016

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Michael Webster, University of Nevada, Reno (USA)

Introduction

HVEI continues to provide a forum for multidisciplinary research at the intersection of human perception/cognition, imaging technology, and aesthetics. This year, Special Invited sessions expanded our base.

On Monday, Mark McCourt (North Dakota State University) and Lora Likova (Smith-Kettlewell Institute) organized a session on Multisensory Interactions, led off by a keynote presentation by John Foxe (University of Rochester) and Sophie Molholm (Albert Einstein) on the neurophysiology of multisensory integration. It was long believed that each of the senses commanded its own processing channel, and that interactions, if they occurred, were quite late in the processing pipeline. New evidence shows that inputs from vision, audition, and touch occur very early, and are not as closely tied to generating location as had previously been thought. Several of the papers explored visual-auditory and visual-tactile interactions. Others used blind observers to explore visual-auditory interactions, language processing, neurological differences in Braille reading and writing, and auditory vs. haptic surface graphs for data representation. The Monday Night Banquet speaker, Steve Palmer, brought a new angle to multi-sensory processing, bringing us on a journey through his research exploring emotion as a unifying concept that ties together the perception of music and color.

On Tuesday, John McCann (McCann Imaging) and Ale Rizzi (University of Milan) led the Special Session on Retinex at 50, which was co-sponsored with the Color Documents conference. The morning session reviewed the history and perceptual algorithms underlying color/spatial interactions. The Tuesday afternoon session examined Image Quality, examining models of visibility, temporal sensitivity, visual salience and semantics, applied to the judgment of visual quality in a variety of technologies.

Beau Watson's (NASA Ames) Wednesday keynote was hosted jointly with the Image Quality conference, and used a real-world problem of identifying naval targets to motivate a broad-reaching metric for evaluating imaging system performance, based on human detection and recognition. The Perceptual Image Analysis session explored computer vision and imaging processing methods in the service of modeling image feature analysis. The afternoon session was devoted to a Special Session organized by Michael Webster (University of Nevada) and David Peterzell (JFK University) on Individual Differences. Typically, psychophysical methodologies use each subject as his or her own control, normalizing out individual differences. This session harkened us back to early astronomical science, where each observer's individual judgment threshold was explicitly corrected for, and presented papers showing the role of individual differences in color naming, color categorization, face perception, and perceptual preferences. In the afternoon, Kjell Brunnstrom (Acreo) and Sebastian Arndt (TU Berlin) presented a Special Session on Psychophysiological Measures for Visual Quality, providing insight into advances in eye-tracking and electroencephalogram technologies to measure the impact of immersive and high dynamic range systems on emotion and quality of experience. The evening poster session featured eight presentations, exploring visual attention, aesthetic appeal, the visual and emotional effects of lens replacement surgery, color categorization, quality of experience, and a new portable device for measuring contrast sensitivity.

Thursday's Invited Special Session on Perceptual Coding for Visualization, organized by Ulrich Engelke (CSIRO) was launched with a Keynote Address by Colin Ware (University of New Hampshire) which examined how visualization could improve human analysis and reduce cognitive load in a high-performance computing environment. The session continued with papers on perceptual color scales, a semantic method for extracting visualization guidance, a new method for exploring complex brain network dynamics, and analyses of visual judgments underlying visualization tasks. The afternoon was devoted to Perception and Aesthetics in Emerging Media. Barry Sandrew (Augmented Vision Works) led us off with a Keynote address at the intersection of human perception/cognition and the movies, describing his inventions in bringing color to black-and-white movies and stereo to mono films, and discussing how visual and auditory transformations could heighten the viewers' emotional response. The special session papers ran a broad gamut, from a re-examination of cone distributions and peripheral color, to the implications of having a fourth cone pigment on visual judgments, to links between art and music perception, to the artistic impact of human color categorization and color adaptation.

As always, each day at HVEI ended with a dynamic discussion session, where the audience of engineers and imaging scientists, psychophysicists, cognitive neuroscientists, artists, and theoreticians gathered to look at the day's presentations from many different perspectives. In an atmosphere of charged curiosity, complicated relationships were unraveled and new ideas were hatched.

Thanks to Suzanne Grinnan and IS&T for providing the foundation for HVEI, and to our sponsor, Qualcomm for supporting the banquet and discussion sessions, which are so important to the liveliness of our community.

We also want to thank Judith Redi (T.U. Delft) for chairing the Best Student Paper Award committee, and the IS&T for recognizing Bernice Rogowitz as the 2015 IS&T Honorary Member.

Looking forward to HVEI 2017!

Your chairs,
Bernice E. Rogowitz (Visual Perspectives)
Thrasos Pappas (Northwestern University)
Huib de Ridder (T.U. Delft)

Human Vision and Electronic Imaging (HVEI) 2016

Monday, February 15, 2016

Welcome and Keynote Session 1:
The Neuroscience of Multisensory Processing
Session Chairs: Bernice Rogowitz, Visual Perspectives (USA); Thrasyvoulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands)
8:50 – 9:50 am
Continental Ballroom 4
HVEI Conference Welcome

HVEI-091

Towards a rudimentary neural model of multisensory integration in human neocortex, *John Foxe[1] and Sophie Molholm[2]; [1]University of Rochester Medical Center and [2]Albert Einstein College of Medicine (USA)*

Multisensory Interactions

Session Chairs: Mark McCourt, North Dakota State University (USA) and Lora Likova, Smith-Kettlewell Eye Research Instituite (USA)

9:50 – 10:20 am
Continental Ballroom 4

10:20 – 10:50 am   Coffee Break

Multisensory Interactions (continued)

Session Chairs: Mark McCourt, North Dakota State University (USA) and Lora Likova, Smith-Kettlewell Eye Research Instituite (USA)

10:50 – 12:30 am
Continental Ballroom 4

10:50   HVEI-093
Psychophysical investigations into Ramachandran's mirror and visual feedback for phantom limb pain: Video-based variants for unilateral and bilateral amputees, and temporal dynamics of paresthesias (Invited), *David H. Peterzell, John F. Kennedy University (USA)*

11:10   HVEI-094
Superior verbal abilities in congenital blindness (Invited), *Valeria Occelli[1], Simon Lacey[1], Careese Stephens[1,2] and Krish Sathian[1,2]; [1]Emory University and [2]Atlanta VAMC (USA)*

11:30   HVEI-095
The Cortical Network for Braille Writing in the Blind (Invited), *Lora T. Likova, Christopher W. Tyler, Laura Caciamani, Kristyo Mineff, and Spero Nicholas, Smith-Kettlewell Eye Research Institute (USA)*

11:50   HVEI-096
Blind individuals represent the auditory space in egocentric rather than allocentric reference frame (Invited), *Tiziana Vercillo[1] and Monica Gori[2]; [1]University of Nevada, Reno (USA) and [2]U-VIP Unit for Visually Impaired People, Fondazione Istituto Italiano di Tecnologia (Italy)*

12:10   HVEI-097
Individual differences in multisensory integration and timing (Invited), *Elliot D. Freeman and Alberta Ipser, City University London (United Kingdom)*

12:30 – 2:00 pm   Lunch Break

EI 2016 Opening Plenary and Symposium Awards
Session Chair: Choon-Woo Kim (Inha University)
2:00 – 3:00 PM
Continental Ballroom 5

Illuminating a bright future for medicine, *Audrey K. Bowden, Stanford University (USA)*

3:00 – 3:30 pm   Coffee Break

Multisensory Interactions (continued)

Session Chairs: Mark McCourt, North Dakota State University (USA) and Lora Likova, Smith-Kettlewell Eye Research Instituite (USA)

3:30 – 4:30 pm
Continental Ballroom 4

3:30   HVEI-098
Beyond the predominance of the visual empire: A functional model on haptics & more (Invited), *Claus-Christian Carbon, University of Bamberg (Germany)*

3:50   HVEI-099
Visual-tactile integration during active touch (Invited), *Cintia Martins and Qi Wang, Columbia University (USA)*

HVEI Monday Author Discussion Session
Moderators: Bernice Rogowitz, Visual Perspectives (USA); Thrasyvoulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands)
4:30 – 5:30 pm
Continental Ballroom 4

5:00 – 6:00 pm   EI 2016 Symposium Reception

HVEI Banquet
Conference Chairs: Bernice Rogowitz, Visual Perspectives (USA); Thrasyvoulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands)
7:30 – 10:30 pm
TBA at Registration

HVEI-101

Bach to the blues: Color, music, emotion, and synesthesia, *Stephen Palmer, University of California (USA)*

Tuesday, February 16, 2016

COLOR/HVEI: RETINEX at 50: History `Joint Session`

Session Chair: Marcelo Bertalmio, Universitat Pompeu Fabra (Spain)

8:50 – 10:10 am
Continental Ballroom 4

This session is jointly sponsored by: Color Imaging XXI: Displaying, Processing, Hardcopy, and Applications, and Human Vision and Electronic Imaging (HVEI) 2016.

8:50 RETINEX-017
Retinexes algorithms: Many spatial processes used to solve many different problems (Invited), *John McCann, McCann Imaging (USA)*

9:30 RETINEX-018
Designator Retinex, Milano Retinex and the locality issue (Invited), *Alessandro Rizzi, Università degli Studi di Milano (Italy)*

10:10 – 10:50 am Coffee Break

COLOR/HVEI: RETINEX at 50: Spatial Algorithms `Joint Session`

Session Chair: John McCann, McCann Imaging (USA)

10:50 am – 12:30 pm
Continental Ballroom 4

This session is jointly sponsored by: Color Imaging XXI: Displaying, Processing, Hardcopy, and Applications, and Human Vision and Electronic Imaging (HVEI) 2016.

10:50 RETINEX-019
The oriented difference of Gaussians model of brightness perception (Invited), *Mark McCourt and Barbara Blakeslee, North Dakota State University (USA)*

11:10 RETINEX-020
A center-surround framework for spatial image processing, *Vassilios Vonikakis, Advanced Digital Sciences Center (ADSC) (Singapore)*

11:30 RETINEX-021
Retinex-like computations in human lightness perception and their possible realization in visual cortex (Invited), *Michael Rudd, University of Washington (USA)*

11:50 RETINEX-022
The role of lightness perception in determining the perceived contrast of real world scenes (Invited), *David Kane and Marcelo Bertalmio, Universitat Pompeu Fabra (Spain)*

12:10 RETINEX-023
Processing astro photographs using Retinex based methods (Invited), *Daniele Marini, Alessandro Rizzi, and Cristian Bonanomi, Università degli Studi di Milano (Italy)*

12:30 – 2:00 pm Lunch Break

EI 2016 Tuesday Plenary and Symposium Awards
Session Chair: Nitin Sampat (Rochester Institute of Technology)
2:00 – 3:00 PM
Continental Ballroom 5

Pushing computational photography deeper into imaging system design, *Ren Ng, University of California, Berkeley (USA)*

3:00 – 3:30 pm Coffee Break

Image Quality from Threshold to Experience

Session Chairs: Thrasyvoulos Pappas, Northwestern University (USA) and Huib de Ridder, Delft University of Technology (Netherlands)

3:30 – 6:10 pm
Continental Ballroom 4

3:30 HVEI-102
The pyramid of visibility, *Andrew B. Watson and Albert J. Ahumada, NASA Ames Research Ctr. (USA)*

3:50 HVEI-103
Perceptual image quality assessment using a normalized Laplacian pyramid, *Valero Laparra[1,2], Johannes Ballé[2,3], Alexander Berardino[2], and Eero Simoncelli[2,3]; [1]Universitat de Valencia (Spain), [2]New York University (USA), and [3]Howard Hughes Medical Institute (USA)*

4:10 HVEI-104
A method for rapid measurement of contrast sensitivity on mobile touch-screens, *Jeffrey B. Mulligan, NASA Ames Research Ctr. (USA)*

4:30 HVEI-105
Subjective analysis and objective characterization of adaptive bitrate videos, *Jacob Søgaard[1], Samira Tavakoli[2], Kjell Brunnström[3,4], and Narciso Garcia[2]; [1]Technical University of Denmark (Denmark), [2]Universidad Politécnica de Madrid (Spain), [3]Acreo Swedish ICT, and [4]Mid Sweden University (Sweden)*

4:50 HVEI-106
Assessing visibility of individual transmission errors in networked video, *Jari Korhonen and Claire Mantel, Technical University of Denmark (Denmark)*

5:10 HVEI-107
HEVC saliency map computation, *Marwa Ammar[1], Mihai Mitrea[1], Ismail Boujelben[1], and Patrick Le Callet[2]; [1]Télécom Sud Paris and [2]Polytech Nantes/Université de Nantes (France)*

5:30 HVEI-108
Perceptual flicker visibility prediction model, *Lark Kwon Choi and Alan C. Bovik, The University of Texas at Austin (USA)*

5:50 HVEI-109
Does visual quality depend on semantics? A study on the relationship between impairment annoyance and image semantics at early attentive stages, *Ernestasia Siahaan, Alan Hanjalic, and Judith Redi, Technische Universiteit Delft (Netherlands)*

EI 2016 Symposium Demonstration Session and Exhibit Hall Happy Hour
5:30 – 7:00 PM
Continental Ballroom Foyer

HVEI Tuesday Author Discussion Session
Moderators: Bernice Rogowitz, Visual Perspectives (USA); Thrasyvoulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands)
6:10 – 7:10 pm
Continental Ballroom 4

Wednesday, February 17, 2016

IQSP/HVEI: Keynote: Perception and Quality Joint Session

Session Chair: Chaker Larabi, Université de Poitiers (France)

8:50 – 9:40 am
Continental Ballroom 4

This session is jointly sponsored by: Image Quality and System Performance XIII, and Human Vision and Electronic Imaging (HVEI) 2016.

8:50   IQSP-029
Up Periscope! Designing a new perceptual metric for imaging system performance, *Andrew Watson, NASA Ames Research Center (USA)*

Perceptual Image Analysis

Session Chair: Bernice Rogowitz, Visual Perspectives (USA)

9:40 – 10:20 am
Continental Ballroom 4

9:40   HVEI-110
Hierarchical Manifold Sensing with foveation and adaptive partitioning of the dataset (JIST-first), *Irina Burciu, Thomas Martinetz, and Erhardt Barth, University of Lübeck (Germany)*

10:00   HVEI-111
Comparing object recognition from binary and bipolar edge features, *Jae-Hyun Jung[1], Tian Pu[1,2], and Eli Peli[1]; [1]Schepens Eye Research Institute/ Mass. Eye and Ear, Harvard Medical School (USA) and [2]University of Electronic Science and Technology of China (China)*

10:20 – 10:50 am   Coffee Break

Individual Differences in Perceptual Judgments

Session Chairs: Michael Webster, University of Nevada, Reno (USA) and David Peterzell, John F. Kennedy University (USA)

10:50 am – 12:40 pm
Continental Ballroom 4

10:50   HVEI-112
Discovering sensory processes using individual differences: A review and factor analytic manifesto (Invited), *David H. Peterzell, John F. Kennedy University (USA)*

11:10   HVEI-113
Individual differences in perceptual (Invited), *Stephen E. Palmer[1], Karen B. Schloss[2], and William S. Griscom[3]; [1]University of California, Berkeley, [2]Brown University, and [3]Microsoft Corporation (USA)*

11:40   HVEI-114
Individual differences in color naming (Invited), *Delwin T. Lindsey and Angela M. Brown, Ohio State University (USA)*

12:00   HVEI-115
Using individual differences to better determine normative responses from crowdsourced transcription tasks: An application to the R. E. MacLaury Color Categorization Archive (Invited), *Kimberly A. Jameson, Prutha S. Deshpande, Sean Tauber, Stephanie M. Chang, Nathanial Benjamin, Yang Jiao, and Sergio Gago, University of California, Irvine (USA)*

12:20   HVEI-116
Individual differences in lifetime face exposure predict behavioral and neural responses to faces (Invited), *Benjamin Balas and Corey Grant, North Dakota State University (USA)*

12:40 – 2:00 pm   Lunch Break

EI 2016 Wednesday Plenary and Symposium Awards
Session Chair: Choon-Woo Kim (Inha University)
2:00 – 3:00 PM
Continental Ballroom 5

Intel® RealSense Technology: Adding human-like sensing and interactions to computing devices, *Achin Bhowmik, Intel Corporation (USA)*

3:00 – 3:20 pm   Coffee Break

Human Vision and Electronic Imaging (HVEI) 2016 Interactive Papers Oral Previews

Session Chair: Jeffrey Mulligan, NASA Ames Research Ctr. (USA)

3:20 – 3:30 pm
Continental Ballroom 4

In this session interactive poster authors will each provide a brief oral preview of their poster presentation, which will be presented fully in the Human Vision and Electronic Imaging (HVEI) 2016 Interactive Papers Session at 5:30 pm on Wednesday.

3:20   HVEI-117
Role of spatio-temporal distortions in the visual periphery in disrupting natural attention deployment, *Yashas Rai, Marcus Barkowsky, and Patrick Le Callet, University of Nantes (France)*

3:21   HVEI-118
Reducing inattentional blindness using subliminal cueing in visual performance tasks, *Deepti Pappusetty and Hari Kalva, Florida Atlantic University (USA)*

3:22   HVEI-119
Evaluation of aesthetic appeal with regard of user's knowledge, *Pierre Lebreton[1], Alexander Raake[1], and Marcus Barkowsky[2]; [1]Technische Universität Ilmenau (Germany) and [2]Université de Nantes (France)*

3:23   HVEI-120
Visually-based sensations: From perception to the 'wow factor', *Floris van Nes, Eindhoven University of Technology (Netherlands)*

3:24   HVEI-121
Image segmentation using fuzzy spatial-taxon cut: comparison of two different stage one perception based input models of color (Bayesian classifier and fuzzy constraint), *Lauren Barghout, University of California, Berkeley (USA)*

3:25   HVEI-122

Positive and negative polarity contrast sensitivity measuring app, *Alex Hwang and Eli Peli; Schepens Eye Research Institute, Massachusetts Eye and Ear, Harvard University (USA)*

3:26   HVEI-123

Are lab-based audiovisual quality tests reflecting what users experience at home?, *Miguel Rios Quintero[1] and Alexander Raake[1,2]; [1]Technical Universität Berlin and [2]Technische Universität Ilmenau (Germany)*

3:27   HVEI-124

Image quality of experience: A subjective test targeting the consumer's experience, *Michele A. Saad[1], Margaret H. Pinson[2], David G. Nicholas[1], Niels Van Kets[3], Glenn Van Wallendael[3], Ramesh V. Jaladi[1], and Philip J. Corriveau[1]; [1]Intel Corporation (USA), [2]NTIA's Institute for Telecommunication Sciences (USA), and [3]Ghent University-iMinds (Belgium)*

Psychophysiological Measures for Visual Quality

Session Chairs: Kjell Brunnstrom, Acreo Swedish ICT AB (Sweden) and Sebastian Arndt, Technische Universität Berlin (Germany)

3:30 – 5:10 pm
Continental Ballroom 4

3:30   HVEI-125

Review on using physiology in quality of experience (Invited), *Sebastian Arndt[1], Kjell Brunnström[2,3], Eva Cheng[4], Ulrich Engelke[5], Sebastian Möller[1], and Jan-Niklas Antons[1]; [1]Technische Universität Berlin (Germany), [2]Acreo (Sweden), [3]Mid Sweden University (Sweden), [4]Royal Melbourne Institute of Technology (RMIT) (Australia), and [5]Commonwealth Scientific and Industrial Research Organisation (CSIRO) (Australia)*

3:50   HVEI-126

Physiological capture of augmented viewing states: Objective impact measures of high-dynamic range and wide-color gamut viewing experiences (Invited), *Dan Darcy, Evan Gitterman, Alex Brandmeyer, Scott Daly, and Poppy Crum, Dolby Laboratories, Inc. (USA)*

4:10   HVEI-127

Using eye tracking metrics and visual saliency maps to assess image utility (Invited), *Laura E. Matzen, Michael J. Haass, Jonathan Tran, and Laura A. McNamara, Sandia National Laboratories (USA)*

4:30   HVEI-128

Towards prediction of sense of presence in immersive audiovisual communications (Invited), *Anne-Flore Perrin, Martin Řeřábek, and Touradj Ebrahimi, École Polytechnique Fédérale de Lausanne (EPFL) (Switzerland)*

4:50   HVEI-129

Emotion recognition by physiological signals (Invited), *Naeem Ramzan[1], Sebastian Palke[2], Thomas Cuntz[2], Ryan Gibson[2], and Abbes Amira[1], [1]University of West of Scotland (United Kingdom) and [2]H.T.W.K. Leipzig, Germany*

HVEI Wednesday Author Discussion Session
Moderators: Bernice Rogowitz, Visual Perspectives (USA); Thrasyvoulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands)
5:10 – 5:40 pm
Continental Ballroom 4

EI 2016 Symposium Interactive Papers Session
5:30 – 7:00 PM
Continental Ballroom 6

Human Vision and Electronic Imaging (HVEI) 2016 Interactive Papers Session

5:30 – 7:00 pm
Continental Ballroom 6

The HVEI interactive papers will be presented in the EI 2016 Symposium Interactive Papers Session.

Thursday, February 18, 2016

Keynote Session II: Visual Cognition
Session Chairs: Bernice Rogowitz, Visual Perspectives (USA); Thrasyvoulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands)
8:50 – 9:40 am
Continental Ballroom 4

8:50   HVEI-130

Optimizing for visual cognition in high performance scientific computing, *Colin Ware[1], David Rogers[2], Mark Petersen[2], James Ahrens[2], and Erol Aygar[1]; [1]University of New Hampshire (USA) and [2]Los Alamos National Laboratory (USA)*

Perceptual Coding for Visualization

Session Chair: Ulrich Engelke, CSIRO (Australia)

9:40 – 10:30 am
Continental Ballroom 4

9:40   HVEI-131

From vision science to data science: Applying perception to problems in big data (Invited), *Remco Chang, Fumeng Yang, and Marianne Procopio, Tufts University (USA)*

10:10   HVEI-132

A grounded theory study on the language of data visualization principles and guidelines, *Eser Kandogan[1] and Hanseung Lee[2]; [1]IBM Research and [2]Google (USA)*

10:30 – 11:00 am   Coffee Break

Perceptual Coding for Visualization (continued)

Session Chair: Ulrich Engelke, CSIRO (Australia)

11:00 am – 12:20 pm
Continental Ballroom 4

11:00   HVEI-133

Why we use bad color maps and what you can do about it (Invited), *Kenneth Moreland, Sandia National Laboratories (USA)*

11:20   HVEI-134

SwordPlots: Exploring neuron behavior within dynamic communities of brain networks (JIST-first), *Chihua Ma[1], Angus Forbes[1], Daniel Llano[2], Tanya Berger-Wolf[1], and Robert Kenyon[1]; [1]University of Illinois at Chicago and [2]University of Illinois at Urbana-Champaign (USA)*

11:40   HVEI-135

Color visualization of the phase of complex signals, *Alfredo Restrepo and Jorge L. Mayorga, Universidad de los Andes (Colombia)*

12:00   HVEI-136

Visual performance in multidimensional data characterisation with scatterplots and parallel coordinates (Invited), *Ulrich Engelke, Jenny Vuong, and Julian Heinrich, CSIRO (Australia)*

12:20 – 1:50 pm   Lunch Break

Keynote Session III: Perception and Aesthetics in Emerging Media
Session Chairs: Bernice Rogowitz, Visual Perspectives (USA); Thrasy-voulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands)
1:50 – 2:40 pm
Continental Ballroom 4
1:50   HVEI-137
Lessons learned from the colorization and 3D conversion of feature films and how they can be applied to the emerging mediums of virtual and augmented reality: A creative, consumer and neuroscience perspective, *Barry Sandrew, Augmented Vision Works (USA)*

Art, Aesthetics, and Perception

Session Chairs: Mónica López-González, La Petite Noiseuse Productions (USA) and Elena Fedorovskaya, Rochester Institute of Technology (USA)

2:40 – 3:40 pm
Continental Ballroom 4

2:40   HVEI-138

Peripheral color vision and motion processing, *Christopher Tyler[1,2], Smith-Kettlewell Eye Research Institute (USA))*

3:00   HVEI-139

Experiencing the interestingness concept within and between pictures, *Christel Chamaret, Claire-Hélène Demarty, Vincent Demoulin, and Gwenaëlle Marquant, Technicolor (France)*

3:20   HVEI-140

Enhancing visualization with expressive motion, *Matthew Lockyer[1], Lyn Bartram[1], Thecla Schiphorst[1], and Karen Studd[2]; [1]Simon Fraser University (Canada) and [2]GMU School of Dance (USA)*

3:40 – 4:00 pm   Coffee Break

Art, Aesthetics and Perception (continued)

Session Chairs: Mónica López-González, La Petite Noiseuse Productions (USA) and Elena Fedorovskaya, Rochester Institute of Technology (USA)

4:00 – 6:00 pm
Continental Ballroom 4

4:00   HVEI-141

Color systems are categories that carry meaning in visualizations: A conceptual metaphor theory approach (Invited), *Jack Ox[1,2]; [1]University of Texas, Dallas and [2]University of New Mexico (USA)*

4:20   HVEI-142

Towards a computational account of art cognition: Unifying perception, visual art, and music through Bayesian inference (Invited), *Jorge Menendez, University College London (United Kingdom)*

4:40   HVEI-143

Minds in the spotlight: Using live performance art to uncover creative thinking processes (Invited), *Mónica López-González, La Petite Noiseuse Productions (USA)*

5:00   HVEI-144

Swapping swatches: Adapting to and from an artist's palette (Invited), *Katherine E.M. Tregillus and Michael A. Webster, University of Nevada Reno (USA)*

5:20   HVEI-145

Art, interpersonal comparisons of color experience, and potential tetrachromacy (Invited), *Kimberly Jameson[1], Alissa D. Winkler[2] and Keith Goldfarb[3], and Vladimir Bochko[3]; [1]University of California, Irvine (USA), [2]University of Nevada, Reno (USA), and [3]Blackthorn Media LLC (USA)*

5:40   HVEI-146

Painting like old masters, creative algorithms for 2.5D reproduction (Invited), *Carinna Parraman, University of the West of England (United Kingdom)*

HVEI Thursday Author Discussion and Reception

Hosts: Bernice Rogowitz, Visual Perspectives (USA); Thrasyvoulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands)

6:00 – 7:00 pm
Continental Ballroom 4