# VSAC 2012

## 1st Visual Science of Art Conference

1 - 2 September 2012
Alghero - Italy

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# Just a few words

On behalf of the VSAC organizing committee, welcome to Alghero for the Visual Science of Art conference (VSAC).

The Visual Science of Art Conference (VSAC) is the first edition of a worldwide academic conference aimed at studying scientific interactions between vision science and art.

In the last decade there has been a growing interest by scientists in studying interactions between art and vision. A strongly increasing number of publications (articles, books, special issues) and meetings (workshops, symposia) encouraged researchers, scholars and students to gather together in a unitary community that can cooperate, discuss and develop new scientific perspectives in this complex and intriguing new field.

A bridge between Vision Science and Art has already been constructed. Recent scientific discoveries have contributed to the understanding of Art, which incorporates knowledge generated by science. The VSAC 2012 is aimed at further stimulating and speeding up this construction to organize a Visual Science of Art community.

VSAC welcomes all kinds of works and approaches (from phenomenological to biological-computational) besides exploring the link between the science of perception and the visual arts. It also includes studies that might suggest new ideas and findings useful for the experimental foundation of a Visual Science of Art. Specifically, VSAC 2012 is aimed at a deeper understanding of vision, art, and their relationship based on the observation that both visual science and visual arts (i) explore visual perception through its main properties - color, spatial vision, shape, visual organization, depth and (nowadays) motion; (ii) analyze and create a large variety of phenomena that involve a range of objects, from the simplest possible to the most complex that involve integration across different sensory modalities; and (iii) answer different but related questions about how and why we see the way we do.

Thanks to all of you for the great and passionate participation from all over the world with 106 abstract submissions and 4 symposia that make this new meeting particularly exciting. This year, VSAC will be twinned with the European Conference on Visual Perception (ECVP).

We are also very honored to have as special guests, Jan Koenderink and Stephen Grossberg.
I am happy to thank the Rector of the University of Sassari and all the sponsors who have helped us to get the meeting underway.
Last but not least, I would like to thank my team. They have been just wonderful working hard to make things happen and also supporting with patience my anxieties for the responsibility of this new and important event.
We hope that you all enjoy VSAC and your stay in Alghero and in Sardinia.

**Baingio Pinna**
Art & Perception Lab
University of Sassari, Italy

## Organizer

Baingio Pinna

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## Local organising committee

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Claudia Satta

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Maria Teresa Sotgiu
Cristina Bodano
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### Scientific committee

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## Acknowledgments

Attilio Mastino, Rector of the University of Sassari
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*www.architettura.uniss.it/*

Fondazione del Banco di Sardegna
AIP (Associazione Italiana Psicologi)

## Exhibitors

| | |
|---|---|
| The MIT press | *http://mitpress.mit.edu/main/home/default.asp* |
| Kybervision | *http://www.kybervision.com/* |
| Pion Ltd | *http://www.pion.co.uk/* |
| Tobii | *http://www.tobii.com/* |
| Interactive Minds | *http://www.interactive-minds.com/* |
| Wiley-Blackwell | *http://eu.wiley.com/* |
| Springer | *http://www.springer.com* |
| SensoMotoric Instruments | *http://www.smivision.com/* |
| Oxford University Press | *http://global.oup.com/* |

# Plenary Speaker

**Jan Koenderink**

University of Leuven - Belgium

*"Experimental Phenomenology: Art & Science"*

Saturday 17:00-18:30

Jan Koenderink graduated in Physics and Mathematics in 1967 at Utrecht University. He has been associate professor in Experimental Psychology at the Universiteit Groningen. In 1974 he became lector, 1978 full professor Universiteit Utrecht where held a chair in the Department of Physics and Astronomy. At Utrecht he cofounded the Helmholtz Instituut in which multidisciplinary work in biology, medicine, physics and computer science is coordinated.
He presently is at Delft University of Technology. His main (scientific) interests are the psychology and philosophy of perception, computer vision and ecological physics, in all cases both theoretically (conceptually and mathematically) and empirically.
He has received an honorific degree (D.Sc.) in Medicine from the University of Leuven and is a member of the Royal Netherlands Academy of Arts and Sciences.

# From VSAC to ECVP Lecture

**Stephen Grossberg**

Boston University - USA

*"Cortical Dynamics of Visual Perception, Spatial Attention, and Conscious Recognition with Applications to Understanding Visual Art"*

From VSAC to ECVP Lecture: Sunday 12:15-13:15

Stephen Grossberg is Wang Professor of Cognitive and Neural Systems and Professor of Mathematics, Psychology, and Biomedical Engineering at Boston University. Grossberg is a major pioneer and current leader of theoretical research on how brains give rise to minds, and how technology can emulate biological intelligence. Grossberg has discovered design principles and neural architectures that clarify how the behavior of individuals, or machines, an adapt autonomously in real-time to unexpected environmental challenges. He is founding chairman of the Department of Cognitive and Neural Systems, founder and director of the Center for Adaptive Systems, and founding director of the NSF Center of Excellence for Learning in Education, Science.



# General information

## Venue

The conference takes place at **Carlos V Hotel**
Lungomare Valencia, 24, 07041 Alghero
It is a short walk from the city centre.
By Bus:
The AP Line bus stop is located in front of the Carlos V Hotel.
There are buses every 20 minutes.

## On Site Registration

You can register at the Conference Venue in the reception hall. Registration will be open from Saturday to Sunday 8:30 (am) to 18:00 (pm) and on Sunday from 8:30 (am) to 13:00 (pm).

## Coffee break and lunch

During the morning and afternoon breaks, coffee will be served.
The Hotel Carlos V has a restaurant that will be open for all the attendees. There is also a bar that will be open for all the attendees.
Prices, opening time and menus will be available at the reception desk.

There are many restaurants for dining out in the Old Town of Alghero. Reservations are not mandatory, but recommended for some restaurants. Prices listed in the menus include service and tax. Gratuity (tip) is not required. However, a small gratuity in the range of 5% is appreciated. Please find a selected list of restaurants in the bag.

## Public Exhibition "IllusoriaMente"

From the 2nd to the 6th of September, ECVP 2012 and VSAC 2012 are organizing a special exhibition called "IllusoriaMente" (in English both illusorily and the illusory mind) dedicated to the memory of the late Prof. Richard Gregory and Prof. Tom Troscianko and celebrating the ingenuity and creativity of ECVP and VSAC attenders in producing attractive scientific/artistic products ranging from visual illusions to all kinds of experimental tools/procedures to applications/implementations of theories, mechanisms and principles ruling the visual system.

The exhibition will be open to town residents, tourists, scholars, members of the University of Sassari, students and children all around Sardinia and will be advertised in newspapers and TVs. The exhibition will be hosted in the two sixteen-century Aragonese towers: the Esperò Reial (or Torre di Sulis) tower and the circular tower of la Polvorera (or Torre San Giovanni).

We plan to have new innovation at this year's ECVP: the "IllusoriaMente SHOW TIME" to be held on Monday evening (3rd September) in the CarlosV hotel from 19,00 to 21,00. There will be two awards and prizes for the best "Shows" – a Richard Gregory prize for the most amusing demonstration and a Tom Troscianko prize for the most outrageous exhibit. After "ShowTime", we intend to add the prizewinners' exhibits and several of the other striking demonstrations to the exhibits in the Sulis and San Giovanni towers that will then be on view to the general public throughout the rest of the meeting.

"IllusoriaMente" exhibition committee
Baingio Pinna, Bernd Linglebach, Nick Wade, Brian Rogers, Carol Laidler, Shelley James and Priscilla Heard.



## Important Phone Numbers

| | |
|---|---|
| International code for Italy | +39 |
| City (area) code of Alghero | 079 |
| (+39 (0)79 when calling from outside Italy) | |
| Emergency | 112 |
| Police | 113 |
| Fire | 115 |
| Ambulance (emergency) | 118 |

**Taxi service**

| | |
|---|---|
| Radio Taxi Consortium | +39 079 98 92 028 |
| Taxi Alghero Consortium | +39 079 97 39 795 |

Taxi stands
Via Vittorio Emanuele,1 (opposite Public Gardens)
Port - Scalo Tarantiello (outside the walls of the Old Town)
Sulis's Square
Airport Riviera del Corallo (in front of the arrivals lounge exit)

**Train service** www.fs-on-line.it
**Tourist Information** +39 079 979054
http://www.alghero-turismo.it

**Rent a bike**
This is a selected list of the city bike rentals in town.
Cicloexpress
Location: Porto di Alghero
Via Garibaldi / banchina Catardi - 07041 Alghero
T +39 079 986950 | M +39 329 2903650
Ecomania
Location: In town
Via S. Satta, 3/C - 07041 Alghero
F +39 079 985181 | M +39 320 0655434
Extreme
Location: On the Alghero Lido
Via Lido 22 c/o Camping La Mariposa - 07041 Alghero
F +39 079 930005 | M +39 328 9195168 – +39 345 6272537

# Instructions for presenters

## Talks

Talks can be no longer than 12 min and are followed by 3 min discussion (except for symposia). The time-limits will be strictly enforced by the session moderator. Please introduce yourself to the moderator 10 minutes before the session begins, at the latest.
Computers will be available in the auditorium (Windows-XP or Mac OS-X), but feel free to use your own laptop, especially if you intend to present video clips. You can setup and test your presentation from half an hour before the session begins.

## Posters

The posters will be exhibited at the second floor in the Terrazza Restaurant Emperador. Poster boards are 95 cm (37.4 inch) wide and 200 cm (78.7 inch) high. Place your poster at the poster board corresponding to your poster number. Material to attach your poster to the board will be available. Your poster presentation time depends on your poster number (see Poster program). On the day of your presentation, please put up your poster before 09:00 and remove it after the last session of the day. Posters still hanging after 19:00 will be removed and deposited at the Registration Desk.

## Plenary Lecture

The plenary lecture will be held in the Salon del Emperador at 17:00.

## Business meeting

The business meeting will be held at 18:30 on Saturday in the Salon del Emperador. All participants are very welcome to attend. We will discuss the finances of this year's meeting as well as possible locations for future meetings in 2013 and 2014. Anyone interested in organising VSAC in the future can contact Baingio Pinna.



# Saturday 1st September

## Symposium

Measuring aesthetic impressions
(9:00 - 10:30, Salon del Emperador)

Contemporary approaches in empirical aesthetics
(11:30 - 13:00, Salon del Emperador)

Visual encoding of visual art: from features to aesthetics
(14:30 - 16:00, Salon del Emperador)

## Talks

Session 1 (9:00 - 10:30, Salon de la Infanta y Reina)
Session 2 (11:30 - 13:00, Salon de la Infanta y Reina)
Session 3 (14:30 - 16:00, Salon de la Infanta y Reina)

## Posters

10:30 - 11:30, Terrazza Restaurant Emperador

## Plenary Lecture

Jan Koenderink (17:00)

# SYMPOSIUM

## Measuring aesthetic impressions

Co-Chairs: M. Dorothee Augustin and Johan Wagemans
Salon del Emperador: 9:00 - 10:30

Measuring aesthetic impressions: Mission impossible or artful science
*M. Dorothee Augustin and Johan Wagemans*
Less unspeakable than said? Developing a verbal measure to assess aesthetic impressions of visual art
*M. Dorothee Augustin*
Measuring aesthetic impressions in an implicit way
*Claus-Christian Carbon*
See-volution: A large scale public investigation of aesthetic preferences
*Tim Holmes, Hayley Thair, Elina Nikolaidou, Alice Lowenhoff, Jade Jackson and Johannes Zanker*
Posturographic and subjective visual vertical tests conducted before and after visiting Richard Serra's Promenade, Monumenta 2008, at Grand Palais, Paris
*Zoi Kapoula*
Measuring aesthetic experience: A view from neuroaesthetics
*Marcos Nadal*

## Contemporary approaches in empirical aesthetics

Co-Chairs: Liliana Albertazzi and David Melcher
Salon del Emperador: 11:30 - 13:00

Art forms in nature and their colour
*Liliana Albertazzi*
Perception of emotion in abstract artworks
*David Melcher*
Fechner, Mondrian, and experimenting in aesthetics
*Chris McManus*



Human Color Preferences: An Ecological Approach
*Stephen Palmer and Karen Schloss*
Bringing art into the lab and science into the museum: A new way of doing empirical aesthetics?
*Johan Wagemans*

## Visual encoding of visual art: from features to aesthetics

Chair: Ming Meng
Salon del Emperador: 14:30 - 16:00

Mapping the range of pigment, luminance and lightness in vision and art.
*Alan Gilchrist*
Unnatural art, natural brain
*Patrick Cavanagh*
On the Sources of Visual Invariants in Artistic Composition
*Christopher Tyler*
Tracking perceptual learning in visual art students
*Alexander Schlegel, Sergey Fogelson, Prescott Alexander, Xueting Li, Zhengang Lu, Peter Tse and Ming Meng*
Representation and aesthetics of the human face in portraiture
*Pamela Pallett, Daniel Graham, Helmut Leder and Ming Meng*
Art appreciation: the interplay of perception, emotion and expertise
*Helmut Leder*

# TALKS

## Session 1

Chair: Robert Pepperell
Salon de la Infanta y Reina: 9:00 - 10:30

09:00 Think global, act local: Do local visual processing biases explain proficiency in observational drawing in non-autistic individuals?
*Rebecca Chamberlain, Chris McManus, Howard Riley, Qona Rankin and Nicola Brunswick*

09:15 Depicting visual perception in art and science
*Robert Pepperell*

09:30 The Mazzocchio in Perspective
*Kenneth Brecher*

09:45 A comparison of statistical regularities in images of regular text, calligraphy and aesthetic artworks
*Tamara Melmer, Michael Koch, Joachim Denzler and Christoph Redies*

10:00 Getting the shape right: drawings focus on proportion in the positive space
*Linda Carson, Matthew Millard, Nadine Quehl and James Danckert*

10:15 Nearly random naturalistic textures from photographs and paintings
*Jacques Ninio*

## Session 2

Chair: George Mather
Salon de la Infanta y Reina: 11:30 - 13:00

11:30 Photograph experience which deepens an understanding of an image - Development of the website with the photographs of the Nakagawa canal -
*Yota Shoji, Kiyofumi Motoyama and Shingo Sadakuni*

11:45 Imitation, inspiration and creation: Cognitive process of creative drawing by copying others' artworks
*Kentaro Ishibashi and Takeshi Okada*



12:00 On the association between abstract symmetry and valence
*Marco Bertamini, Alexis Makin and Anna Pecchinenda*

12:15 Image preference and visual statistics
*George Mather*

12:30 Accounting for Taste: Individual Differences in Preference for Harmony
*Stephen Palmer and William Griscom*

12:45 Occlusion Depiction in Australian Aboriginal Painting
*Barbara Gillam*

## Session 3

Chair: Johan Wagemans
Salon de la Infanta y Reina: 14:30 - 16:00

14:30 Ambiguity in art: Theories, definitions and empirical data
*Claudia Muth and Claus-Christian Carbon*

14:45 What makes an art expert? Emotion and evaluation in art appreciation
*David Welleditsch, Gernot Gerger and Helmut Leder*

15:00 Using playing time as an implicit measure of enjoyment
*Lee De-Wit, Tim Vandendriessche and Johan Wagemans*

15:15 Aesthetic evaluation of design objects at an implicit and explicit level between laypeople and experts
*Stefano Mastandrea*

15:30 The psychology of naive self-portraits: compositional biases when using the iPhone front camera
*Nicola Bruno and Marco Bertamini*

15:45 Koffka's Psychology of Art
*Branka Spehar and Gert van Tonder*

## POSTERS

Terrazza Restaurant Emperador: 10:30 - 11:30

1 Geometric texture aesthetics for digital cartography
*Zainab Almeraj, Craig Kaplan and Paul Asente*

2 Illusory Motion in three-dimensional applications
*Jessica Guinto*

3 Is rating the aesthetic value of a composition the same as rating its balance?
*Françoise Samuel and Dirk Kerzel*

4 Using computer arts to explore the look and feel of financial planning.
*Kenneth C. Scott-Brown, Santiago Martinez, Rosie Henderson, Dmitrijs Cernagovs, Hugh McLaughlin, Nicolas Tanda, Omid Ahmadidarani, Jason Turner and Robin Sloan*

5 Is Plato's banishment of the poets a release for mimetic art? An anamorphic interpretation for a philosophical puzzle.
*Gabriele Meloni*

6 Impact of alexithymia on aesthetic preference
*Francesca Baralla, Anna Maria Giannini and Emanuela Tizzani*

7 Visual and Motor Experience in Watching Ballet
*Frank Pollick and Seon Hee Jang*

8 Central Perspective Image Geometry for Object Depth Estimation
*Elodie Fourquet and William Cowan*

9 Wild Visions: an Artistic Investigation into Animal Vision
*Prue Sailer*

10 The sensitivity of aesthetic perception
*Stella Faerber and Claus Christian Carbon*

11 A painter's eye movements during creative painting
*Sawako Yokochi, Takeshi Okada and Kentaro Ishibashi*



12 Using eye-movements and verbalization to investigate spectatorship in Edouard Manet's painting (1882) 'A Bar at the Folies-Bergère.'
*Jason Kass, Beth Harland, John Gillett, Carl Mann, Simon Liversedge and Nick Donnelly*

13 What did Bernini get from Van Dyck's triple portrait of Charles I?
*Andrea Van Doorn, Jan Koenderink and Johan Wagemans*

14 Picasso's "distorted" figures
*Andrea Van Doorn, Jan Koenderink and Johan Wagemans*

15 The Hue of Shapes
*Liliana Albertazzi, Luisa Canal, Osvaldo Da Pos, Rocco Micciolo, Michela Malfatti and Massimo Vescovi*

16 Visualization of information of a Japanese onomatopoeia as infographics
*Kyo Suzuki, Yoshie Kiritani and Yoichi Tamagaki*

17 When do people aesthetically evaluate visual symmetry?
*Alexis Makin, Moon Wilton, Anna Pecchinenda and Marco Bertamini*

18 Magnitude and Preference Judgments of the Optimized Fraser-Wilcox illusion Type II Patterns
*Jasmina Stevanov, Branka Spehar and Akiyoshi Kitaoka*

19 E-motions
*Rossana Actis-Grosso and Daniele Zavagno*

20 Laws of coloration in vision and art
*Veronica Belli, Giulia Calaresu and Baingio Pinna*

Terrazza Restaurant Emperador: 16:00 - 17:00

21 The dynamics of fading and afterimages in contemporary art
*Rob van Lier and Arno Koning*

22 Listening to paintings
*Arno Koning and Rob Van Lier*

# Sunday 2nd September



## Symposium

M. Massironi and Arte Programmata e cinetica: visual research and art, art and visual research

(9:00 - 10:30, Salon del Emperador)

## Talks

Session 4 (9:00 - 10:30, Salon de la Infanta y Reina)

Session 5 (11:30 - 12:00, Salon de la Infanta y Reina)

Session 6 (11:30 - 13:30, Salon del Emperador)

## From VSAC to ECVP

Stephen Grossberg

*"Cortical Dynamics of Visual Perception, Spatial Attention, and Conscious Recognition with Applications to Understanding Visual Art"*

(12:15-13:15, Salon de la Infanta y Reina)





## SYMPOSIUM

### M. Massironi and Arte Programmata e cinetica: visual research and art, art and visual research

Chair: Ugo Savardi
Salon del Emperador: 9:00 - 10:30

Massironi and Arte Programmata: a brief review of research into perception
*Ugo Savardi*
Canaries from doodles and other visual exercises
*Daniele Zavagno*
The visual arts as on-field experimentation
*Rossana Actis Grosso and Daniele Zavagno*
Pictorial representation and the psychology of visual art
*Daniela Bressanelli and Enrico Giora*
Exploring the visual structure of reflections inside and outside a laboratory
*Ivana Bianchi*
Op Art and Perceptual Intuition
*Gert van Tonder*

## TALKS

### Session 4

Chair: Slobodan Markovic
Salon de la Infanta y Reina: 9:00 - 10:30

09:00 Automatic Analysis of Emotions Conveyed by Abstract Painting
*Victoria Yanulevskaya, Elia Bruni, Jasper R.R. Uijlings, Andreza Sartori, Elisa Zamboni, Francesca Bacci, David Melcher and Nicu Sebe*

09:15 Fractals, scale-invariance and visual preference
*Branka Spehar and Richard Taylor*

09:30 Kafka's Castle: Vision and Imagination in Visual Art and Literature
*Emily Troscianko*

09:45 Aspects of experience of beauty
*Slobodan Markovic*
10:00 Goodness-of-fit of oriented elements within a rectangular frame
*Stefano Guidi and Stephen E Palmer*
10:15 Mirror Reversal of Artworks
*Michael Forster and Helmut Leder*

## Session 5

Chair: Christopher Tyler
Salon de la Infanta y Reina: 11:00 - 12:00

11:00 Assessment Depth Cue Dynamics
*Christopher Tyler and Spero Nicholas*
11:15 Art and the brain: the view from dementia
*Cosima Gretton*
11:30 A perspective view of Leonardo Da Vinci's Last Supper
*George Sperling*
11:45 Eye-conographs
*Nicholas Wade*
12:00 Climate, illumination statistics, and the style of painting
*Isamu Motoyoshi*

## Session 6

Chair: Stephen Palmer
Salon del Emperador: 11:00 - 13:30

11:00 There are images neither in the mind nor in the world, only pictures
*Riccardo Manzotti*
11:15 Sensitivity to the Fine Scale of Artistic Style
*Holly Gerhard and Matthias Bethge*
11:30 Motion in Art - Art in Motion
*Johannes M Zanker*
11:45 Depiction of material properties in paintings
*Bilge Sayim and Patrick Cavanagh*



12:00 Eastern and Western Perspectives in Traditional Visual Arts
*Yan Bao*
12:15 Historical forerunners of contemporary perspectives in the field of neuroaesthetics
*Enrico Giora*
12:30 Neuroaesthetics of ambiguous art: viewing Arcimboldo's artworks.
*Maddalena Boccia, Federico Nemmi, Emanuela Tizzani, Cecilia Guariglia, Fabio Ferlazzo, Gaspare Galati and Anna Maria Giannini*
12:45 Chinese calligraphy: strokes in motion
*Jérôme Pelletier and Yolaine Escande*
13:00 Ansel Adams Zone System: Techniques for rendering HDR scenes on LDR film media
*John McCann and Alessandro Rizzi*

# VSAC 2012

## 1st Visual Science of Art Conference

## ABSTRACTS

# Saturday 1st September

## SYMPOSIUM: Measuring aesthetic impressions

### Measuring aesthetic impressions: Mission impossible or artful science

**M. Dorothee Augustin and Johan Wagemans**

Although its roots go back to the founding fathers of experimental psychology (e.g., Fechner), empirical aesthetics can still be considered a relatively young science. This entails great possibilities and scientific freedom but also a need for truly fundamental research, especially regarding methodological issues. In our view, one of the most important questions is how to validly and reliably measure aesthetic impressions. Standardised measures are rare, and many aspects that make aesthetics such a fascinating field of study, such as the complexity of aesthetic experiences or the variety of aesthetic materials, make the search for adequate measures far from trivial. The speakers of this symposium illuminate the issue of measuring aesthetic impressions from a variety of different angles, including different materials (visual art, music, design) and different methodological approaches (verbal measures, eye-movement recordings, brain correlates, posturography). An appropriate choice from these possibilities certainly requires an artful approach. What problems do researchers encounter when trying to measure aesthetic impressions, which possibilities do different measures offer, and what could be promising lines for further development? The symposium aims to gather state-of-the-art methodological knowledge in aesthetics and to launch new ideas for a field that offers serious scientific challenges but also great pleasure.



### Less unspeakable than said? Developing a verbal measure to assess aesthetic impressions of visual art

**M. Dorothee Augustin**

A difficulty for research on aesthetic impressions of visual art does not only lie in the lack of standardized measures, but also in an uncertainty of what to measure at all. Developing a questionnaire to assess aesthetic impressions of visual art seems promising, because verbal measures are relatively easy to apply and yield important insights about what characterizes aesthetic experiences for the viewer. My colleagues and I conducted a series of five studies that focused on the following questions: How do people describe their aesthetic impressions of visual art, which general dimensions of experience does this word usage point to, and which items may be most suitable to assess each of these dimensions? Starting from free naming of words the studies included ratings of artworks in a museum as well as online ratings, in different samples and with a variety of artistic materials. Overall, four dimensions seem to be of particular importance for aesthetic experiences of visual art: (in)comprehensibility, originality, emotiveness and pleasingness, but their exact weight and meaning can vary between different artworks and participant samples. I will describe the project in detail and discuss what differences among materials and samples may mean for the assessment of aesthetic impressions.

### Measuring aesthetic impressions in an implicit way

**Claus-Christian Carbon**

Measurement of aesthetic impressions is typically realized using explicit methods, e.g. by asking people for their feelings or thoughts or by explicitly trying to get notion of their understanding of artworks. Explicit measures, as compared to implicit ones, do definitely have the advantage that they allow capturing highly complex cognitive processes like multidimensional emotional reactions or fine-graded levels of understanding. These measures, however, are also prone

to cognitive penetration, which is particularly problematic concerning the domain of art where effects of social desirability may very probably occur. Consequently, there is clear need for less penetrable measures working on an implicit way that can at the same time test more complex hypotheses. The present paper discusses several implicit measures, for instance obtained a) by similarity tasks in which aesthetic material varies on several aesthetically relevant dimensions and participants have to rate or arrange material according to psychological similarity [Augustin et al, 2008, Acta Psychologica, 128(1), 127-138; Imhof et al, 2010, Perception, 39(S), 103-103], and b) by multidimensional association tasks (md-IAT) [Gattol et al, 2011, PLoS ONE, 6(1), e15849] that extend the IAT towards a multidimensional perspective enabling complex implicit profiles of artworks to be tested.

**See-volution: A large scale public investigation of aesthetic preferences**

**Tim Holmes, Hayley Thair, Elina Nikolaidou, Alice Lowenhoff, Jade Jackson and Johannes Zanker**

Objectively measuring aesthetic preference is notoriously difficult due to the vast individual differences in the aesthetic experience. Eye-movements offer a potential source for such a measure, and there is evidence to support a correlation between patterns of eye-movements and aesthetic preference (Holmes & Zanker, i-Perception, 2012). Here we use those eye-movements as the fitness measure in a Gaze Driven Evolutionary Algorithm (GDEA) (Holmes & Zanker, Proceedings of GECCO, 2008, 1531-1538) to explore individual preferences in a complex design space. During a 3 month installation at the London Science Museum, 1400 participants were invited to look at initially random images of cartoon dinosaurs. 16 dinosaurs were presented 4 at a time for between 2500ms and 5000ms for each of 10 generations, resulting in a converged design space for each participant. Strength of preference for each dinosaur was checked using an explicit 2-alternate forced choice paradigm, and correlated positively with the screen presentation times used in the evolutionary algorithm. Age and gender related effects in both colour and shape were also identified. Future directions and potential applications for the methodology in experiment aesthetics, assistive technology and developmental psychology will be discussed. Funded by British Academy Small Grant - SG111199.



**Posturographic and subjective visual vertical tests conducted before and after visiting Richard Serra's Promenade, Monumenta 2008, at Grand Palais, Paris**

**Zoi Kapoula**

Body sway while maintaining upright quiet stance reflects an active process of balance based on integration of visual, vestibular gravity, somatosensory and proprioceptive inputs. Serra's exhibition can be conceived as a study in the vertical and longitudinal as it showcased 5 steel, towering rectangular solids all of which were slightly inclined (1.69¬∞); measuring 17mx4mx0.33m, and weighing 75 tons each. With a posturography device we measured body sway of 23 visitors (26.1¬±6.1 years-old) before and after promenade around the sculptures. Facing the sculptures produced an immediate but subtle effect: the power spectrum of lateral body sway decreased relative to a baseline condition (wavelet analysis, Px dropped from 63¬±6.5 mm2x106 to 61¬±5.9, $p<0.004$). Immediately following the promenade, lateral body sway sensu stricto did itself decrease (SDx from 3.5¬±2.5 mm to 2.5¬±1.7, $p<0.003$). Fourteen additional visitors (29.5¬±9 years) were asked to adjust a luminous line in complete darkness in accordance with what they consider to be earth vertical. Promenade through Serra's sculptures reduced the error on the vertical test from 1.1¬±0.6 to 0.8¬±0.5¬∞, $p=0.01$. We attribute both these effects to exhibition's sculpted environment acting as physiologic 'training ground' improving the sense of visual perspective, equilibrium and gravity.

**Measuring aesthetic experience: A view from neuroaesthetics**

**Marcos Nadal**

Our knowledge of the neural processes underlying aesthetic experience has grown considerably in the last decade. Neuropsychological and neuroimaging studies have measured the impact of brain injuries and degenerative diseases on aesthetic production and appreciation, and neural activity in diverse brain regions during aesthetic experiences. The limited coincidence among the results of the different studies, however, suggests that they might not have been measuring the same phenomenon. From a neurobiological perspective, aesthetic experience cannot be considered a single response. Rather, it is the result of several responses in different brain regions, related with the processing of diverse sensory, conceptual and contextual aspects. Unless neuroimaging and neuropsychological studies are explicitly designed to measure some of these component processes specifically, researchers cannot be sure what exactly was measured in their study. In this contribution I will suggest strategies to help us increase measurement precision in neuropsychological and neuroimaging studies of aesthetic experience.

## SYMPOSIUM: Contemporary approaches in empirical aesthetics

**Art forms in nature and their colour**

**Liliana Albertazzi**

The association between shapes and colours has been explored both in the artistic domain, and more recently in the experimental domain. In a recent study, conducted at CIMeC, we tested whether the general population exhibits naturally-biased associations between two different dimensions (geometrical shape and colour) of the same modality. Results show that the choices of colour for each shape were not random and that the main aspect determining these relationships are the 'warmth' and degree of 'natural lightness'



of hues. Also the morphological characteristics of natural shapes have received close interest in aesthetic studies, for example those on Art Nouveau. We present here a second study on the naturally biased association between perceptual biological shapes and characteristics of colours . The results show a significant discrimination between two basic shape characteristics--roundedness as opposed to elongation: the round shapes as naturally matched by reddish warm colours and the elongated shapes are matched by cold bluish colour.

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**Perception of emotion in abstract artworks**

**David Melcher**

I will discuss an approach to studying the perception of emotion in artworks that combines an art historical and cognitive neuroscience approach. From the perspective of art history, many artists and critics have made specific, testable claims about the expression of specific emotions in particular works. For cognitive neuroscience, any theory that attempts to account for human perception of emotion must go beyond the study of facial emotions to include all emotional stimuli, such

as visual art and music. In collaboration with colleagues at the Museo di arte Moderna e Contemporanea di Trento e Rovereto (MART) and the Center for Mind/Brain Sciences (CIMeC), we have used converging methods including computational vision, experimental psychology, eye-tracking and neuroimaging to characterize the emotional response of a large group of observers to a several hundred abstract paintings. We believe that this methodology offers a promising approach to study the role of emotions in aesthetic experience.

**Fechner, Mondrian, and experimenting in aesthetics**

**Chris McManus**

Fechner, the founding father of experimental aesthetics, described three methods for researching on aesthetics -- the Method of Choice, the Method of Production and the Method of Use. Most modern research uses the Method of Choice, the Method of Production is sometimes used, and the Method of Use is rare. In this paper I will describe some issues and problems of using the Method of Choice, mainly in the aesthetics of rectangles, Fechner's own topic. I will then describe some results using the Method of Production, firstly in photography, where the technique works well, and I will then describe some work exploring the paintings of Mondrian, where a number of methodological problems become apparent, which I will explore.

**Human Color Preferences: An Ecological Approach**

**Stephen Palmer and Karen Schloss**

Color preference is an important aspect of human behavior, but little is known about why people like the colors they do. Recent results from the Berkeley Color Project (BCP) provide an answer. I will report measurements of preferences among 37 colors and the fit of several models to these data, including ones based on physiology (cone-contrasts), phenomenology (color-appearances and color-emotion associations), and ecological preferences (Palmer & Schloss's ecological valence theory (EVT), which is based on the statistics of



people's emotional reactions to colored objects. The EVT postulates that color serves an evolutionary 'steering' function, analogous to taste preferences, biasing organisms to approach advantageous objects and avoid disadvantageous ones. It predicts that people will tend to like colors to the extent that they like the objects that are characteristically that color, averaged over all such objects. A quantitative formulation of the EVT predicts 80% of the variance in average preference ratings, much more variance than any of the other models. I will also describe how hue preferences for single colors differ as a function of object-type, gender, expertise, culture, social institutions, and perceptual experience, and how many of these effects might be explained by the EVT.

**Bringing art into the lab and science into the museum: A new way of doing empirical aesthetics?**

**Johan Wagemans**

After reviewing some general characteristics of experimental aesthetics, I describe and discuss the Parallellepipeda project, a cross-over project between artists and scientists in Leuven. In particular, I sketch how it started and how it was developed further, with close interactions between the participating artists and scientists. A few examples of specific research projects are mentioned to illustrate the kind of research questions we address and the methodological approach we have taken. We often found an effect of providing participants with additional information, a difference between novice and expert participants, and a shift with increasing experience with an artwork, in the direction of tolerating more complexity and acquiring more order from it. These findings suggest that an artwork becomes a stronger Gestalt by establishing more connections between parts of an artwork and more associations to the artwork, which is then more easily mastered by the viewer and leads to increased appreciation. In the final part of the talk, I extract some general lessons from the project regarding a possible new way of doing empirical aesthetics

research, which is able to solve some of the problems of traditional experimental aesthetics (e.g., trade-off between experimental control and ecological validity).

## SYMPOSIUM: Visual encoding of visual art: from features to aesthetics

### Mapping the range of pigment, luminance and lightness in vision and art.

**Alan Gilchrist**

The high dynamic range of most natural images, due to variations in both reflectance and illumination level, poses a challenge both for the visual system and for the artist. The visual system must assign a range of reflectances no greater than about 30:1 (from 90% to 3%) to a range of image luminances that often far exceeds 1000:1. The painter must represent that large range of intensities using the same (30:1) low range of reflectances, even after Van Eyck extended that range by shifting from tempera to oil. While the visual system organizes these high range images into regions of high and low illumination, each comprising a limited range (< 30:1) the artist must compress the high range image into the limited range of pigment. When the painting is viewed, the observer's visual system then expands the compressed range. We measured this range mapping in paintings and abstract laboratory patterns, both low-range and very high range (>5000:1), finding a tendency to normalize the perceived range to the white-to-black range. We demonstrated that use of a 3D canvas (Patrick Hughes-type reverspective) can extend the range by exploiting directional illumination on the canvas, producing a genuine perception of light-emitting self-luminosity.

### Unnatural art, natural brain

**Patrick Cavanagh**

Artists represent the world quite realistically using a naive physics for the properties of light, shadow, and materials. In many cases, this unnatural representation appears to be correct, supporting an appropriate perception of the scene. We do not notice that this naïve physics deviates significantly from natural physics. These deviations reveal the properties of the internal physics and the visual processes that realize them. Importantly, paintings explore this naive physics in ways that that photographs and real scenes cannot. We will look at the depiction of material properties and high contrast rendering to see examples of the discoveries about the brain that are found in works of art.





### On the Sources of Visual Invariants in Artistic Composition

**Christopher Tyler**

Composition in painting derives from a wide array of influences. Here, the focus is on the visual invariants that govern the 2D layout within the available frame, and the question of which brain structures may be involved in the process. One well-known compositional formalism is the visual pyramid, which has been known as a key principle of compositional geometry since the time of Leonardo and Raphael. Originally centered in the frame, in later centuries the compositional pyramid could be shifted laterally to introduce asymmetries. What is less recognized is that the pyramid is not just a geometrical format, but typically peaks at the eye of a figure in the role of an observer of the action below. The same principle is found in portraits, in which one eye is usually close to the center line, while the body forms a pyramid expressing a variety of facets of the sitter's life. This 'center of consciousness' of the observing eye in the structure of many representational paintings takes the geometric concept to a new level of perceptual/inferential analysis. In terms of brain structures involved in guiding these compositional choices, the lateral occipital complex (LOC) plays a key role in encoding the long-range structure, balance and symmetry aspects of these compositional principles, but the concept of the observing eye implies a novel projection of the mirror

neuron system to the inverse concept of 'being mirrored' by an external focus of observation, which evidently plays a key role in many forms of artistic representation. References Tyler, C.W. (2007) Some principles of spatial organization in art. Spatial Vision, 20, 509-530. Chen, C.C., Kao, C., Tyler, C.W. (2006) Face configuration processing in the human brain: the role of symmetry. Cereb Cortex, 7, 1423-32. Tyler, C.W. (1998) Painters centre one eye in portraits. Nature 392, 877-878.

**Tracking perceptual learning in visual art students**

**Alexander Schlegel, Sergey Fogelson, Prescott Alexander, Xueting Li, Zhengang Lu, Peter Tse and Ming Meng**

Visual artists' expertise comes in part from their ability to translate their rich and precise perception of the world into controlled actions such as drawing and painting. Graham & Meng [2011, VSS] and Perdreau & Cavanagh [2011, Frontiers in Human Neuroscience, 5] have found conflicting evidence regarding the ability of professional artists to 'see through' visual illusions that arise during mid-level visual processing. Even if visual artists cannot circumvent these processes, their ability to perceive and represent their environment is clearly exceptional. How might acquiring these abilities be reflected in the plasticity of adult brains? We investigated the effects of visual art training on behavior as well as the structure and function of the human brain by tracking undergraduate college students as they took an intensive course in painting or drawing, as well as control group students taking either organic chemistry or engineering problem-solving courses. We collected monthly high-resolution structural and DTI scans as well as functional scans while subjects a) made judgments about Craik-O'Brien-Cornsweet and Müller-Lyer illusions and b) created gesture drawings from observation of human figures. Our findings shed light on the neural plasticity that allows visual artists to develop their skillful observation and manipulation of their environment.



**Representation and aesthetics of the human face in portraiture**

**Pamela Pallett, Daniel Graham, Helmut Leder and Ming Meng**

Egyptian Queen Nefertiti is renowned for her elegant beauty, but do her portraits and busts reflect her real face? Here we examine how representations of the face in portraiture relate to human visual encoding of natural faces, and how the aesthetics of portraits relates to preferences for natural faces. In Experiment 1, participants made paired comparisons of attractiveness between different levels of composite-averaged portraits. We report that, as with natural frontal faces, portraits show norm-based coding properties with respect to preference: averaged portraits become more attractive as the number of contributing faces increases. In Experiment 2, we assessed the role of facial feature arrangement in this averageness effect. Participants compared the attractiveness of portraits with identical facial features but different eye-mouth or interocular distances. We again find that the average facial feature arrangement is preferred. However, we also find that the structure of the average portrait feature arrangement is significantly different from that of natural faces. Our results suggest a common norm-based encoding for portraits and photographs, even though portraits on average may not be faithful representations of the natural face and humans may appreciate a different form of aesthetics for portraits compared to natural faces.

**Art appreciation: the interplay of perception, emotion and expertise**

**Helmut Leder**

Art is a unique feature of human experience and several approaches aim to understand what the psychological aspects of this uniqueness are. Art appreciation involves the complex interplay among stimuli, perceiver and contexts, which have been discussed as eliciting a special combination of aesthetic

judgments and aesthetic emotions. Based on our model of aesthetic appreciation (Leder et al., 2004), we conducted studies to understand the nature of stylistic processing (Augustin et al., 2008), the dependence of art appreciation of the class of artworks (Belke et al. 2010) as well as the complex interplay of the variables involved between these factors. Regarding the more complex interplay, we conducted a study in which we measured differences in preferences for classical, abstract, and modern artworks (Leder et al., 2011) and using structural equation modeling assessed the contribution of emotion, arousal, and comprehension and expertise as determining factors of art appreciation. The implications of these studies are discussed in respect to underlying theoretical foundations in particular regarding the interplay of perception, emotion and knowledge.

## TALKS: Session 1

### Think global, act local: Do local visual processing biases explain proficiency in observational drawing in non-autistic individuals?

**Rebecca Chamberlain, Chris McManus, Howard Riley, Qona Rankin and Nicola Brunswick**

Exceptional graphical abilities in autistic savants have been explained by enhanced local visual processing, coupled with an intact global advantage effect under voluntary selective attention (Plaisted, Swettenham & Rees, 1999, Journal of Child Psychology & Psychiatry, 40, 733-742). Furthermore, it has been suggested that non-autistic children who are precocious at drawing exhibit the same local processing hallmarks as their autistic savant peers (Drake, Redash, Coleman, Haimson & Winner, 2010, Journal of Autism and Developmental Disorders, 40, 762-773). Similar effects have been seen in artistic adults whose drawing experience was correlated with reduced holistic processing in face perception tasks (Zhou, Cheng, Zang & Wong, 2011). In an initial study performance on the embedded figures task (EFT), a measure of local visual processing, independently predicted both self-perceived and objectively assessed drawing ability. This finding was examined in a study that probed both local and global visual processing in art students and controls using Navon shape stimuli, the Block Design Task (Shah & Frith, 1993, Journal of Child Psychology & Psychiatry, 34, 1351-1364) and the attention to detail subscale of the Autism Spectrum Quotient (AQ). The results are discussed with reference to perceptual enhancement theories of observational drawing ability.



### Depicting visual perception in art and science

**Robert Pepperell**

This paper will discuss my attempts to depict visual perception in painting and drawing. Depicting visual perception means trying to capture natural scenes as they are actually perceived rather than as they might appear in, say, a photograph or computer generated rendering. As I will show, there are a number of fundamental features of visual experience that conventional imaging technology does not record. The most important of these are the differentiation between central and peripheral vision and the relative indeterminacy of objects in the periphery, deformations of objects in space relative to viewing position, and the presence of the viewer's own body in the field of view. Once these features are accommodated into the depiction, I argue, we arrive at image that is much closer to actual visual experience than images that conform to linear perspective and omit the appearance of the viewer's own body in the periphery of the visual field. The paper will consider the implications of this approach for the scientific study of perception, how it links to some recent neuroscientific research, and how artists and scientists might benefit from further developing the methods outlined here.

### The Mazzocchio in Perspective

**Kenneth Brecher**

The mazzocchio was a part of 15th century Italian headgear. It was also a kind of final exam problem for students of

perspective. In this presentation, we review its history; show 3D models made by hand in wood and using stereolithography in plastic; and discuss a previously unreported visual effect. When viewing a wooden checkerboard mazzocchio - either monocularly or binocularly - that we have fabricated consisting of 16 alternating dark and light segments circumscribing its overall toroidal shape, the outer sides of the individual segments appear to bow inward. This concave inward 'mazzocchio effect' appears to be strongest when viewing a model containing 15 - 20 segments. With too few segments the edges appear flat as they indeed are; and with too many segments, the outer edges appear to take on the convex outward shape of a circle. What causes this 'mazzocchio effect' is not clear. The well known Wundt and Hering illusions that are made from straight lines only (but with intersections) also elicit the percept of curvature. However in the case of the checkerboard mazzocchio, there are no intersecting lines. This research is part of Project LITE which is supported by NSF Grant # DUE - 0715975.

**A comparison of statistical regularities in images of regular text, calligraphy and aesthetic artworks**

**Tamara Melmer, Michael Koch, Joachim Denzler and Christoph Redies**

The statistical properties of natural scenes and visual artworks share scale-invariant properties in the Fourier domain. In particular, their radially averaged (1d) Fourier power falls off linearly with a slope of about -2 in log-log plots [Redies et al., 2007, Spatial Vision 21(1-2), 137-148]. In the present study, we asked whether this property can also be found in other categories of man-made images, such as regular text and text with artistic claim (calligraphy). Our results show that the 1d Fourier spectrum of regular text can be roughly divided into two segments. With 8 lines of text per image, the slope of the lower-frequency segment (2-40 cycles/image) is about -1 while that of the higher-frequency segment (40-512 cycles/image) is about -3. The ratio of the two slopes is about 0.3-0.4. This ratio increases with rising artistic claim. It is about 0.5-0.6 for calligraphy and reaches values of about 1 (straight line) or higher for aesthetic artworks. Results were similar for examples from three cultures (Western, Arabic and East Asian). In conclusion, our findings imply that images of artworks and artistic writing contain more global structure (low frequencies) relative to fine detail (high frequencies) than images of regular text.



**Getting the shape right: drawings focus on proportion in the positive space**

**Linda Carson, Matthew Millard, Nadine Quehl and James Danckert**

Artists who teach drawing share a conviction that accuracy can be improved by paying careful attention to the spaces between objects ('negative space'). In a geometric analysis of 34 drawings of a complex still life, we applied objective measures of local and global drawing accuracy that were consistent with the expertise of the participants. When we compared each participant's accuracy in drawing shapes in the positive space (figure) and negative space (ground) we found that people made similar errors of orientation, position and scale in both. As drawing teachers would predict, though, participants made significantly larger errors of proportionality in the negative than in the positive space. That is, people did much worse at 'getting the shapes right' in the ground than in the figure, despite the fact that there were no figure/ground differences in orienting, positioning or scaling those shapes. Even expert participants, who were more accurate than novices on every dimension of error, made larger errors of proportionality in negative than in positive space. We discuss the implications for drawing education and how these error measures can be used to probe for similar differences in visual perception.

**Nearly random naturalistic textures from photographs and paintings**

**Jacques Ninio**

In previous work (Ninio, 2007 Spatial Vision 20 561-577) I showed how to design camouflaging textures having as in real life edges at all orientations. These textures were suitable for covering curved surfaces without visible join. The starting material could be photographs of a collection of similar objects (for instance, barks or sea-shells, or natural heaps of objects such as leaves or seaweed). The starting textures could also be produced manually by mixing, according to various protocols, modeling pastes of various shades of gray. The initial textures were then transformed by cut and paste procedures to generate suitable final textures. When symmetry is introduced in these textures, meaningful scenes emerge vividly, whatever the position of the symmetry axis. The work has now been extended by using new photographic material, and also reproductions of paintings from Tiepolo, Gauguin, Kokoshka, Klimmt, Ligabue and others. Areas in the paintings in which patches of different colors converge were extracted and assembled into abstract textures. Occasionally, these abstract textures provided, even without symmetry, a sense of pictorial realism. It could be due to the presence of a good balance between filled and empty spaces, that was present in the paintings, and absent in the author's initial textures.

## TALKS: Session 2

**Photograph experience which deepens an understanding of an image - Development of the website with the photographs of the Nakagawa canal**

**Yota Shoji, Kiyofumi Motoyama and Shingo Sadakuni**

It is said today that we are overflowed by the photographic image, with 140 billion photographs existing now on Facebook alone. While a photograph is a familiar method of expression, often it remains in the subject of seeing somehow. Recently, we explored this conception, conducting a workshop with already taken photographs at the Nakagawa canal, an industrial heritage site of Nagoya, Japan. In this program, participants experienced the photograph over several hours by looking intensely and arranging them into multiple stages, considered the diversity of the printed works and the significance of their differences. In this presentation, we discuss a website, based on the previous workshop, to experience photographs more aesthetically, and provide an interactive analogical experience based on visual perception. Photographs are divided into parts, with a user able to slide to a next photograph which has a similar characteristic--based on the elements of composition, color, focus and blurring--by clicking any point. We produced the interface with knowledge of information design, and referring to the cognitive characteristics of web interaction, allowing the possibility of tracing the evidence of others. The ultimate goal of this study is to consider the meaning of photograph literacy and its acquisition.



**Imitation, inspiration and creation: Cognitive process of creative drawing by copying others' artworks**

**Kentaro Ishibashi and Takeshi Okada**

Through three experiments, this study investigates the effect on people's creative drawing of their interaction with artworks by others. In experiment 1, we discover that through copying unfamiliar abstract drawings, the participants produced creative drawings that were different from the model drawings. An analysis of the process shows that their realistic constraints became relaxed and new perspectives were formed through the imitation of others' artwork. During this process, they changed their internal representations of drawing and generated new signs (symbols). Thus, their drawings became more creative after imitation. We conducted two further experiments to clarify the effect of the style of the model artworks and the type of interaction with the artworks. In Experiment 2, we manipulated the familiarity with the model artwork that people

copied. The results show that an unfamiliar style of artworks facilitates creativity in drawing, while familiar styles of artwork suppress it. In Experiment 3, we manipulated the type of interaction with the artworks. The results show that viewing and copying an unfamiliar style of artwork facilitates creativity in drawing, while just thinking about alternative ways of drawing does not.

**On the association between abstract symmetry and valence**

**Marco Bertamini, Alexis Makin and Anna Pecchinenda**

Many authors have suggested that symmetry and beauty are linked, but how fast and automatic is the human response to abstract symmetry? We used the IAT (Implicit Association Test) to measure the valence of visual regularities in the absence of overt judgments. Participants classified dot patterns as random or having a reflection, and words as positive or negative. When the same response was used to report reflection and positive words, responses were faster than when the same response was used for reflection and negative words. In addition there was an implicit preference for rotation over random and for reflection over rotation and over translation (Makin et al. 2012 Emotion, online first). In another set of studies we used the priming paradigm, in which a brief presentation of an abstract pattern was followed by a word with positive or negative valence. Passive presentation of regular patterns did not lead to significant congruency effect (affective priming), but the priming emerged when participants had to report on the characteristics of the prime. Taking these results together, response competition shows an automatic association between symmetry and positive valence as long as classification of the visual regularity is part of the task.

**Image preference and visual statistics**

**George Mather**

Images of natural scenes have been found to display regular visual statistics, conventionally measured in terms of the slope of the rotationally averaged Fourier amplitude spectrum. The visual system may have evolved to take advantage of these regularities during processing. Recent studies indicate that paintings display similar statistical regularities to natural scenes, leading to the suggestion that artists adjust the visual statistics of their work to match those which are most prevalent in natural scenes. As a test of this idea, the statistical properties of fourteen paintings by well-known artists were compared to those of corresponding photographic images depicting the same scenes. The statistics of the artworks were found to gravitate towards the most prevalent values found in natural images. To test whether observers actually prefer images displaying the most prevalent statistics, photographs of natural scenes were manipulated digitally to create versions with different statistics, and observers made forced choice preference judgements between pairs of images displaying different statistics. As predicted, results showed that images displaying the most prevalent statistical values were preferred over those displaying more extreme values. Data are therefore consistent with the proposal that image preferences are influenced by natural visual statistics.



**Accounting for Taste: Individual Differences in Preference for Harmony**

**Stephen Palmer and William Griscom**

Although empirical research into aesthetics has had some success in explaining the average preferences of groups of observers, relatively little is known about individual differences. In this study we highlight one prominent dimension of aesthetic response -- preference for harmonious stimuli -- and look at how it varies in four domains (color, shape, spatial location, and music) across individuals with different levels of training in art and music. We found that individual preference for harmony is strongly correlated across all four dimensions tested, and decreases consistently with level of training in relevant domains. We modeled these results using confirmatory factor analysis and found that cross-

domain preference-for-harmony is well-represented as a single unified factor, with effects separate from those of training and common personality measures.

**Occlusion Depiction in Australian Aboriginal Painting**

**Barbara Gillam**

Successfully depicting the occlusion of a far surface by a nearer surface is an issue in two-dimensional paintings. Yet although artists' use of linear perspective has received a great deal of attention from psychologists interested in art, their depiction of occlusion and its uses for aesthetic purposes have received almost none. It is also rarely acknowledged that depicted occlusions are common in abstract and other non-representational forms of art. Since the 1970s Australian Aboriginal art has been recognized as more than a folk art with central desert paintings in particular having major success in international exhibitions as a striking form of modern art. Yet discussion is almost entirely restricted to the stories underlying the paintings; not the visual basis of their impact. Here I'll show the sophisticated depiction of occlusion by Aboriginal painters of non-realistic scenes and discuss the way it is used to represent aspects of their stories and to create highly original aesthetic effects and symbolic meaning. In doing so I'll refer to aspects of the psychology of figure-ground, occlusion perception and subjective contours. The two major forms I shall demonstrate and discuss are the bark paintings of eastern Arnhem Land and the paintings of the central desert.

## TALKS: Session 3

**Ambiguity in art: Theories, definitions and empirical data**

**Claudia Muth and Claus-Christian Carbon**

Jakesch and Leder [2009, The Quarterly Journal of Experimental Psychology, 62(11), 2105-2112] underline ambiguity as a characteristic of modern artworks. What does ambiguity actually mean and what are its specifics in modern art? We enlarge Zeki's (2004) definition by proposing different



categories of ambiguity in modern art. Experimental data suggests that perceptual insights affect aesthetic appreciation which is in line with theoretical accounts claiming elaboration to be rewarding by itself [Ramachandran and Hirstein, 1999, Journal of Consciousness Studies, 6(6-7), 15-51] or the reduction of prediction errors to induce pleasure [Van de Cruys and Wagemans, 2011, i-Perception, 2(9), 1035-1062]. While experiential reports of 20 subjects elaborating 16 artworks describe possible levels of insights and ambiguity, they reveal dynamics of elaboration aside progressive mastering: Participants not only described dissolutions of ambiguity, but also the detection of contradictory elements; sometimes even associated with pleasure. Our presentation connects these findings to a broad view and critically reflects on theories like Cupchik's [1995, Poetics, 23(1-2), 177-188] distinction of reactive versus reflective aesthetic processing, Reber et al.'s [2004, Personality and Social Psychology Review, 8(4), 364-382] processing-fluency approach and Van de Cruys and Wagemans' [2011, i-Perception, 2(9), 1035-1062] recent idea of reward by reduction of uncertainty.

**What makes an art expert? Emotion and evaluation in art appreciation**

**David Welleditsch, Gernot Gerger and Helmut Leder**

Why do some people like artworks of negative, or even disgusting and provoking, content? Art expertise is assumed to play an important role by changing the interplay of cognitive and emotional factors. We employed artworks with negative and positive valence and studied how expertise affects aesthetic and/or emotional responses inferred by self-reports and facial EMG. Clearly, emotionally negative art was perceived as negative and positive art as positive within all expertise groups. However, experts liked negative art more, their valence ratings were less extreme and their aesthetic judgments particularly for negative artworks were not highly correlated with their emotional responses. Moreover, experts

generally had stronger positive emotions. As a control, emotional responses to IAPS revealed no differences according to expertise. The study shows that experts base their aesthetic evaluations of art on factors beyond emotional reactions; they can discard the immediacy of emotions.

**Using playing time as an implicit measure of enjoyment**

**Lee De-Wit, Tim Vandendriessche and Johan Wagemans**

Psychology could be described as the (often creative) art of turning subjective experiences into quantifiable measures. Research in art perception and appreciation will require, at its foundation, ways of operationalizing and measuring the pleasure and enjoyment people take in interacting with a piece of art. A potentially useful and ecologically valid way of measuring pleasure or enjoyment could rely simply on the amount of time one spends looking at or interacting with a piece of art. In this talk I want to discuss the possibility of using the amount of time people engage with something as a way of assessing how enjoyable they find it. I will discuss empirical data we have collected in the context of playing simple computer games where we can easily manipulate the aesthetics of the computer display to assess the validity of 'playing time' as a useful operalization of enjoyment or pleasure.

**Aesthetic evaluation of design objects at an implicit and explicit level between laypeople and experts**

**Stefano Mastandrea**

Can the preference for industrial design objects be also achieved automatically? The aim of this study is to verify if different levels of expertise on industrial design (laypeople vs. design students) can orient the preference towards different styles of design objects (classic objects vs. modern objects), at an implicit and explicit level. Implicit and explicit preferences are often mediated by assessor features. The Implicit Association Test (IAT; Greenwald, McGhee & Schwartz, 1998) was used to assess the automaticity of the evaluation.



Participants (44 laypeople and 40 design students) performed a categorization task of pictures (5 classic and 5 modern chairs) and words (5 positive and 5 negative aesthetic words). Reaction times were registered. The explicit evaluation of the stimuli was assess through a 7 points Likert scale for the adjectives beautiful, typical, familiar, complex and interesting. In both measurements, implicit and explicit preferences for classic and modern objects were moderate by expertise: experts were more aesthetically oriented towards modern objects while laypeople towards classical ones. According to the model of Processing Fluency (Reber, Schwarz e Winkielman, 2004) the more one is fluent in the processing of an object, the more positive the aesthetic evaluation will be.

**The psychology of naive self-portraits: compositional biases when using the iPhone front camera**

**Nicola Bruno and Marco Bertamini**

Studies of portraiture have revealed consistent biases in artist's compositional choices. However, the origin of these biases remains controversial, and we do not know whether similar biases would be observed when non-experts compose a portrait. We present data on the production of self-portraits by naive photographers which used the iPhone front camera to control the composition of the picture. Results documented systematic biases regarding the subject's location within the picture and his or her pose relative to the viewpoint. The mirror-reversal of the front camera display, in conjunction with variations of the camera position in portrait and landscape picture orientations, allowed us to distinguish between alternative accounts for these biases. We discuss these findings in relation to earlier studies of portraits and self-portraits by professional painters and photographers.

**Koffka's Psychology of Art**

**Branka Spehar and Gert van Tonder**

At the Bryn Mawr Symposium on Art in 1940, Koffka presented what has by now become an obscure and largely unknown aesthetic theory. Koffka's general stance is consistent with the Gestalt school's emphasis on the 'projective' or 'expressive', in contrast to the more prevalent purely sensory views of perception. Koffka realized the importance of perceptual qualities in aesthetics and discusses the role of primary, secondary and tertiary perceptual qualities in perception and aesthetic experience. A particular importance is given to the so-called physiognomic and expressive qualities of the phenomenal objects, including art. Some of these notions were later re-incarnated in Gibson's theory of affordances, but stripped of most of the characteristic Gestalt qualities. With this review, we hope to revive an awareness of Koffka's aesthetic theory, as a potential candidate to guide the scientific analysis of art toward deeper understanding of our aesthetic experience.



## POSTERS 1

**Geometric texture aesthetics for digital cartography**

**Zainab Almeraj, Craig Kaplan and Paul Asente**

The creation of attractive 2D textures has long been of interest to researchers in art and design, and, more recently, to computer scientists. Automatic pattern synthesis by example has proven successful at mimicking the appearance of expressively drawn arrangements of primitives. A movement targeting vector patterns has brought us a variety of new synthesis algorithms [Passos et al.]. For comparison, they show their results along side previous examples. But how can we judge which algorithm produces the best results? Vision research has provided some ideas, but their research focuses more on understanding underlying perceptual processes. The synthesis field needs better standards for evaluating new algorithms. Recent research in computer graphics advocates for better depictions of 2D patterns and ways to effectively generate them without knowing the low-level perceptual processes involved. This ties the success of computer-generated arrangements to effective criteria for measuring their aesthetics and visual similarity. One important application area is digital cartography. A cartographer must fill large predefined spaces on maps with various lithological primitives, often using synthesis methods to save time and effort. The ques- tion naturally arises of whether these arrangements are successful. We investigate what makes arrangement 'successful', and methods for effectively evaluating new synthesis algorithms. [V. Alves dos Passos, M. Walter, and M.C. Sousa, 2010, 18th Pacific Conference on Computer Graphics and Applications, September, 109-116].

**Illusory Motion in three-dimensional applications**

**Jessica Guinto**

Illusory motion can be generated in static images by repeating asymmetric patterns of contrasting colours. While many

have studied this phenomena, creating more complex images and stronger effects along the way, an understanding of its underlying perceptual mechanisms remains incomplete. This research employed a qualitative, heuristic method to broaden our understanding of the effect. Goal-oriented, the intention was to develop three-dimensional illusory motion which could be used for architectural and artistic applications. This method through its novelty, introduced variables and contexts yet to be examined regarding the effect, shedding new light on its perceptual underpinnings. Forms and techniques were developed using biological computation, 3d virtual modelling and physical prototypes to determine how the effect could be executed and exploit three-dimensional form. This research provides the first known examples of three-dimensional anomalous motion illusions, the results of which will be discussed in further detail along with new insight gained. This novel illusionary motion context offers interesting opportunities in design, but with distinct constraints differing it from two-dimensional illusionary motion images.

**Is rating the aesthetic value of a composition the same as rating its balance?**

**Françoise Samuel and Dirk Kerzel**

In the literature on aesthetics, a widespread claim is that balance contributes to the aesthetic value of art compositions. In some studies, the definition of balance seems to be equivalent to equilibrium in the physical sense: dark areas are like weights that compensate each other in comparison to a central pivot point. Recent studies challenged this claim because no preference was observed for compositions which are equilibrated. We investigated whether it was the observers' failure to perceive equilibrium which led to the lack of aesthetic appreciation of equilibrium. We also wanted to elucidate whether observers considered 'balance' a synonym of 'harmony' or 'equilibrium'. In two experiments with symmetric stimuli, asymmetric but equilibrated stimuli, and



unequilibrated stimuli, all made up of two or three rectangles, we explored the relationship between aesthetic ratings, balance ratings, and weight ratings. We found that some stimulus characteristics influenced the three ratings differentially. The equilibrium state of the compositions played only a small role in the aesthetics ratings, though the equilibrium state was correctly perceived when weight was rated. The pattern of responses in the aesthetics ratings suggests that increases in aesthetic value that had been attributed to equilibrium are in fact attributable to approximate symmetry.

**Using computer arts to explore the look and feel of financial planning.**

**Kenneth C. Scott-Brown, Santiago Martinez, Rosie Henderson, Dmitrijs Cernagovs, Hugh McLaughlin, Nicolas Tanda, Omid Ahmadidarani, Jason Turner and Robin Sloan**

Can artistic principles address psychological problems? Does it look expensive? Does it feel cheap? Does it look like a good investment? These are some of the economic decisions that face people in day-to-day financial planning. The current global credit crunch is evidence of a yawning disconnect between the language and mechanisms of banking and budgeting and the reality of the economic decisions people make from minute to minute, from day to day and over the longer term. We propose a set of artistic and interactive principles that can be used to establish a new paradigm for interaction with economic data to enable interaction, experimentation and ownership of financial decision. The principles involve artistic representation of abstract concepts using art, animation and multi-touch interactivity. Using a large multi-touch interface (Microsoft Surface TM) and simple gesture-scalable graphical icon techniques, we have developed an interactive savings planner that allows users to scale financial allocations using gestures and to rapidly visualise the development of future outcomes using an animated fast-forward time wheel. This technique offers the potential for

touch screen interfaces to exploit embodied cognition and computer arts to engage user groups that may traditionally be excluded from financial awareness and planning tools.

**Is Plato's banishment of the poets a release for mimetic art? An anamorphic interpretation for a philosophical puzzle.**

**Gabriele Meloni**

In this paper I want to address Plato's notorious attitude toward poetry. Such a topic looks prima facie a dilemma. On the one hand he expresses hard criticism against poetry and he even banishes the poets from the ideal state he envisages in the Republic. On the other hand he constantly prizes Homer as well as many other bards. The outcome of that is a bizarre, incoherent picture. My aim is to offer a new, anamorphic interpretation of this puzzle, in order to reconstruct a consistent (and positive) picture of Plato's attitude on Art. Starting from the totally different role poets had in archaic Greece, I will draw a comparison with anamorphic painting in order to show that by adopting a different perspective it will be clear that Plato's criticisms do not regard poetry qua art, but they are rather a justified concern about the pursuit of truth through poetry. Indeed, as it widely sustained, poetry was the main source of teaching, moral value, and knowledge in the ancient Greek society. In conclusion, the present work allows solving the vexata quaestio of Plato on art by proposing an original theory based both on vision science and philosophy.

**Impact of alexithymia on aesthetic preference**

**Francesca Baralla, Anna Maria Giannini and Emanuela Tizzani**

Aim of this work is to explore the impact of alexithymia on art appreciation, and to examine the influence of emotion regulation on art judgement (Leder et al., 2004, British Journal of Psychology, 95, 489-508). While observing a painting, the viewer's cognitive structure contains several information and is the repository of personal traits, motivations and emotional dispositions. The study of how personal traits influence



work of art appreciation, and especially the study of the way emotion regulation impacts on art judgement, aims at improving the comprehension of aesthetic experience costruct. In this study 100 adults, divided into two groups hight and low alexithymia scores (evaluated by SAR - Baiocco, Giannini, Laghi, 2005, SAR - Scala Alessitimica Romana, Trento, Erickson), observed 20 paintings and then were asked to give an evalutative judgement on three dimentions: cognitive, emotional, and aesthetic ones. As espected, the two groups had significant differences in their aesthetic preferences. While subjects without affective regulation disorders preferred excitation-related pictures, subjects with hight alexithymia scores appreciated painting with emotions of pleasure-inhibition. These results allow to evaluate the impact of traits personality on aesthetic preference, and suggest to include also emotional regulation in a comprehensive model of aesthetic experience.

**Visual and Motor Experience in Watching Ballet**

**Frank Pollick and Seon Hee Jang**

We were interested in how visual and motor experience influence brain response to watching ballet [Jang and Pollick, 2011, Dance Research, 29, 352-377]. To examine this question we used fMRI to measure the brain activity of 14 ballet dancers, 12 novices and 10 experienced viewers of ballet. Participants either passively viewed or imagined themselves duplicating a ballet posture or a ballet movement. Movements were 2-second clips of ballet where the dancer was represented as points of light at major joints. These point-light displays were created from capturing the motion of a skilled ballet dancer. Brain data were analysed using a random effects ANOVA with a design of Experience (dancer, novice, experienced viewer) X Display (static, moving) X Task (observe, imagine). Results showed different patterns of activation in motor and somatosensory cortex for dancers, different patterns of activation in temporal pole and

orbitofrontal cortex for experienced viewers, and different patterns of activation in both dancers and experienced viewers in the temporo-parietal junction and retrosplenial cortex. These results are consistent with a view that while both dancers and experienced viewers share enhanced early perceptual representations of dance they differ in higher level representations that are more embodied in the dancer.

**Central Perspective Image Geometry for Object Depth Estimation**

**Elodie Fourquet and William Cowan**

Recently there has been speculation (e.g. [Melshner and Cavanaugh 2011, in: Art and the senses, F Bacci and D Melcher, Oxford, Oxford University Press]) that the human visual system possesses no inherent 3D representation of the visual environment, only a variety of 2D representations, on the basis of which it is easy to compute answers to the 3D questions that arise during image interpretation, motion planning, and so on. If true, this idea sheds light on the decision of so many realist artists to work in 2D despite their subject matter being 3D. Given the uncompromising nature of artists, we are correctly reluctant to attribute the decision to expedience. Artists creating realistic paintings with 3D content compose their images using construction lines drawn directly onto the 2D canvas, in effect performing perspective calculations using 2D constructive geometry. Renaissance artists, who considered themselves both visual scientists and geometers, invented the constructions, which allow artists simultaneously to compose in 2D and to arrange in 3D. Viewers easily perceive the 3D positions objects in their paintings, supporting Melshner and Cavanaugh's suggestion. We recently constructed a test framework to explore composition and arrangement using artistic constructions based on a tiled floor. Ongoing experiments show that the tiled floor, which is common in Renaissance art, when combined with vertical gravity, gives precise estimates of object position in depth.



**Wild Visions: an Artistic Investigation into Animal Vision**

**Prue Sailer**

The research informing this presentation comes from the perspective of an artist investigating and interpreting the capabilities of animal vision. While visual art traditionally represents the world from a human perspective, the approach for this project has been reversed to illustrate the varied views of the world through the eyes of selected animal species. The resulting artworks are inspired by existing scientific research that explores the visual world of animals. The focus of this paper is the visual capabilities of both the Tawny Frogmouth and Rainbow Trout, with visual interpretations of the way they see their habitats. The methodology consists of two integrated approaches. The first involves the collection of scientific data through literature searches, along with field studies in which the selected species are observed, drawn and photographed. The second consists of studio-based research, through which the scientific and visual data are processed into a series of interpretive paintings. This study provides a means by which the important and fascinating research carried out by vision scientists can be delivered to a wider audience, through visual art. Subsequent studies can be applied to a wider range of species and continue to present artistic interpretations of new findings in animal vision research.

**The sensitivity of aesthetic perception**

**Stella Faerber and Claus Christian Carbon**

The assessment of aesthetic appreciation was shown to be highly reliable in many different research fields. Ratings of facial attractiveness, for instance, have high consistency between raters indicating a general and highly developed cognitive mechanism. This mechanism, however, is not yet well understood, although many variables have been discussed to impact aesthetic processing (e.g., typicality or symmetry). Within the present study we implemented aesthetic appreciation through the variable liking along with

the important moderator variable typicality questioning their sensitivity for subtle changes of the stimulus material. We tested both variables for 3D-chair-models systematically varying on two important aesthetic dimensions, proportion and colour saturation. To improve the validity of testing we used a test-adaptation-test design and calculated the sensitivity of both variables from a static (test only) as well a dynamic (test-retest) perspective. We showed that typicality was solely prone to changes in proportion while liking ratings were influenced by aspects of proportion as well as colour saturation pointing to a more complex and integrative processing mechanism. Results give first indications that the evaluative processing of liking is a highly sensitive process, which is trained everyday throughout life, which might be the reason why it works so quickly and reliably.

**A painter's eye movements during creative painting**

**Sawako Yokochi, Takeshi Okada and Kentaro Ishibashi**

How does a painter move his eyes during creative painting? Though there have been studies on painters' eye movements while sketching real objects (e.g., Miall & Tchalenko, 2001; Tchalenko & Miall, 2009), eye movements during creative painting have not been well studied. We conducted an experiment with a painter who had been painting imaginary abstract pictures for more than thirty years. We asked him to paint his style of pictures wearing a head-free eye tracker (NAC EMR-9) in two conditions: 1) Painting-Objects condition, in which he was required to paint his own imaginary pictures by transforming external objects in photographs to function as motifs; and 2) Painting-No-Object condition, in which he was required to paint his internal images without using any photographs. The results show that from the beginning of the painting process, he often observed not only the area he was painting at that moment, but also the area that he was not painting. As the painting progressed, he often viewed his painting with his eyes half-closed so that he could check the balance of colours and shapes. There were some differences between the two conditions with respect to the order of the areas of eye fixation.



**Using eye-movements and verbalization to investigate spectatorship in Edouard Manet's painting (1882) 'A Bar at the Folies-Bergère.'**

**Jason Kass, Beth Harland, John Gillett, Carl Mann, Simon Liversedge and Nick Donnelly**

'A Bar at the Folies-Bergère' is an image that intentionally engages with the notion of spectatorship in art, by articulating a complex and geometrically impossible relationship between objects and reflections, subtleties which take time to become apparent. The painting unsettles the conventional relationship between picture and spectator and represents a radical moment in the development of pictorial modes of address. Issues of pictorial address have been extensively theorized (see, e.g.: Fried, 1980, 'Absorption and theatricality: painting and beholder in the age of Diderot', University of California Press) and remain relevant for artists today. To explore cognitive processing generally during inspection of the picture, and to investigate whether we might gain insight into psychological processes associated with spectatorship, we recorded eye movements and verbal responses from experts and novices as they responded to questions directing them towards a specific mode of spectatorship. A systematic relationship between eye movements and utterances emerged suggesting a tightly coupled referential relationship. Particular patterns of saccades over specific elements of the scene suggest observers did engage in particular patterns of spectatorship, though this occurred differentially across novices and art experts.

**What did Bernini get from Van Dyck's triple portrait of Charles I?**

**Andrea Van Doorn, Jan Koenderink and Johan Wagemans**

In 1636 Charles I dispatched a painting by van Dyck to Bernini at Rome. The painting showed the King's countenance, as seen

from three (very) different angles. The painting was meant as the data needed by Bernini to sculpt a bust of the King in his absence. The bust was delivered in 1638. Although the original of the bust was lost in a fire, contemporary pictures and copies exist. Thus, it is possible to compare van Dyck's painting to a copy of Bernini's sculpture. We are especially interested in the three dimensional shape impressions observers of the painting are able to extract from it visually. What was the quality and extent of Bernini's 'ground truth'? In order to approach the question we measured pictorial reliefs on a reproduction of the painting for a number of observers, using different methods. We present results, and discuss the quality of Bernini's ground truth.

**Picasso's 'distorted' figures**

**Andrea Van Doorn, Jan Koenderink and Johan Wagemans**

In the 1940's Picasso produced a number of remarkable drawings, mostly of female nudes, that combine a number of sometimes very different views in a single pattern. There is obviously no way to analyze such drawings as conventional perspectives of some scene. Yet observers have no trouble to come up with pictorial reliefs in immediate visual awareness. We study empirically obtained reliefs for a number of observers. These have necessarily idiosyncratic features, so much of the interest is in inter-observer comparisons. We find that observers agree only somewhat on the global level, though they tend to agree remarkably well on the level of 'natural' body parts. Here 'natural' has to be understood in terms of Picasso's graphically suggested partitions. The main differences between observers can be described as idiosyncratic 'mental movements' of such parts.

**The Hue of Shapes**

**Liliana Albertazzi, Luisa Canal, Osvaldo Da Pos, Rocco Micciolo, Michela Malfatti and Massimo Vescovi**

The association between particular shapes and colours has been explored in the artistic domain. As it is well known, Kandinsky [1947, Point and line to plane. New York, Solomon R. Guggenheim Foundation], conducting a survey among the Bauhaus members, found a relation between yellow and triangle, red end square, and blue and circle. In our study [Albertazzi et al., 2012, Journal of Experimental Psychology: Human Perception and Performance, in press] we tested whether people from the general population, which usually is mostly non synaesthetic, exhibit naturally-biased associations between shape and colour [Spector and Maurer, 2011, Journal of Experimental Psychology: Human Perception and Performance, 37(2), 484-495]. Results show that the choices of colour for each shape were not random, i.e., participants systematically established an association between shapes and colours. Correspondence analysis suggested that two main aspects determine these relationship, namely the 'warmth' and degree of 'natural lightness' of hues [Da Pos & Valenti, Proceedings of the AIC 2007 M. Meeting Color Science for Industry, Hangzhou, 41-44; Spillmann, Proceedings of the 5th AIC Congress, Montecarlo, 1-6]. As a by-product of the analysis Kandinsky's hypothesis could be tested without the constraint of a one-to-one association.



**Visualization of information of a Japanese onomatopoeia as infographics**

**Kyo Suzuki, Yoshie Kiritani and Yoichi Tamagaki**

Onomatopoeias express concretely and briefly sounds and appearance, which have a concise impact and descriptive power (Tajima, 2006). Japanese has many onomatopoeias, so that this is a feature of the language in comparison with Western languages (Ishibashi, 2007; Yoshimura, 2007). For instance, Japanese uses onomatopoeias to communicate nuances of action or motion. It can be possible, because Japanese users have a common ground of understanding of onomatopoeias. The present study expresses the meaning of onomatopoeia in real motions and visualizes the common ground of understanding. The target onomatopoeia is 'Pyon'

which usually expresses bound, hopping, or jump in Japanese. Kiritani et al. (2012, ECVP) reveals the concrete style of motion of 'Pyon'. The present study visualizes the physical data as infographics that will be an artifact to shape an abstract concept of the onomatopoeia. Moreover, it will contribute to a visualization of information for communication design.

**When do people aesthetically evaluate visual symmetry?**

**Alexis Makin, Moon Wilton, Anna Pecchinenda and Marco Bertamini**

Philosophers and artists have long been believed that symmetry and beauty are fundamentally related. We tested whether symmetry is automatically evaluated, or whether positive emotional reactions to symmetry are confined to conditions of deliberate aesthetic contemplation. In our affective priming experiments, we presented symmetrical or random patterns, then a positive or negative word. Participants had to categorize the words as quickly as possible. We found that symmetrical pattern facilitated responding to the positive words and vice versa. However, this priming effect only manifested when participants overtly attended to regular-random dimension. Comparable results were obtained from more behavioural experiments using the implicit association test. Finally, in another series of experiments, we recorded electrical activity in the Zygomaticus Major (ZM, the muscle responsible for smiling), while people viewed and classified symmetrical or random patterns. Symmetrical patterns produced greater ZM activity, even though people were not required to evaluate the images. In summary, multiple behavioural and elecrophysiological experiments provide a clear answer to the original research question: symmetry is emotionally evaluated whenever people overtly attend to it and label it, but not when attention is directed to some other attribute of the stimulus.



**Magnitude and Preference Judgments of the Optimized Fraser-Wilcox illusion Type II Patterns**

**Jasmina Stevanov, Branka Spehar and Akiyoshi Kitaoka**

Optimized Fraser-Wilcox illusion type II (Fraser&Wilcox, 1979, Nature, 281, 565 - 566; Kitaoka, 2007, DemoNight, VSS2007) belong to the category of motion illusions observed in stationary images. Using method of adjustment it was demonstrated that changes in contour (circle, square) but not in area defined by contour (radial, elliptical, parabolic arrangement of the patches) affected illusion strength (Stevanov et al., 2011, Perception 40 ECVP Abstract Supplement, page 200). The present study employed Paired comparison procedure (Spehar et al., 2003, Computers & graphics, 27, 813-820) to establish relative preference and perceived illusion magnitude in relationship to other images in the set. Images were shown one at a time and observers compared each new image to the immediately preceding image. In each set of images one image is paired with every other image, but all images are presented with equal frequency and in all possible combinations. The resulting overall relative frequency with which each image is chosen is a good indicator of its preference/illusion magnitude in relationship to other images in the set. Results showed that average proportions by which images were chosen are similar in preference and magnitude conditions implying that preference decreased with decrease in illusion magnitude.

**E-motions**

**Rossana Actis-Grosso and Daniele Zavagno**

A growing body of evidence shows that motion is one of the core components of emotion. At a perceptual level, it has been demonstrated that biological motion is sufficient for the perception of motion [Clarke et al., 2005, 34, 1171-1180] and that some patterns of motion could increase perceived intensity and arousal related to emotional faces [Chafi et al., 2012, 3(1), 82-89]. The question arises whether some emotions are more

motion-related than others, i.e. they imply the encoding of motion. We think that a first answer to this question could be found in the visual arts, where the representation of motion is often achieved by portraying unstable poses. Focusing on facial expressions, we hypothesize that some emotions (i.e. E-motions), such as anger and fear, incorporate a sense of dynamicity because their expression is unstable, whereas the expression of static emotions can last and even represent a constant facial feature. Our hypothesis implies that E-motions are used to enhance the representation of motion in static artworks: if this is true, then it should be possible to classify emotions based on the dynamicity conveyed by- and attributed to- the paintings where they are portrayed, as we are actually testing.

**Laws of coloration in vision and art**

**Veronica Belli, Giulia Calaresu and Baingio Pinna**

The aim of this work is to investigate the problem of perceptual organization of color through an integrated study based on art, vision science and biology. The color organization is approached starting from the amodal completion of shape and by introducing the phenomenal notions of modal and amodal completion of color in the three multidisciplinary domains. Just as a shape is completed amodally behind another occluding shape, so is a color behind another occluding color or behind a bright light reflected by a three-dimensional object. The modal completion of color was studied through children pictorial reproductions of artistic paintings and photographs of real objects/animals. The phenomenal results showed the effectiveness of the amodal completion of colors used by artists and by nature in biological coloration. Some general principles of the amodal completion of color, useful to understand the more general problem of phenomenal organization of color in art, vision science and biology, are suggested.



## POSTERS 2

**The dynamics of fading and afterimages in contemporary art**

**Rob van Lier and Arno Koning**

We studied artworks of the Dutch contemporary painter Roland Schimmel whose work appeals to various low-level visual processes like Troxler fading and afterimage formation. The artworks at Schimmels' exhibitions have been described with terms like a 'hallucinogenic experience', a 'dreamworld', and a 'perceptual machine'. Many of Schimmel's paintings are relatively large and comprise vague, near isoluminant colors, with additional high-contrast black disks. Here we present an eye-tracking study showing that the appreciation of these artworks depends on eye-movements. The black disks attract the observers' attention and guide eye-fixations and saccades, causing visual changes that turn the static display into a dynamic piece of art. When the eyes fixate on a disk, the colors in the periphery tend to disappear from awareness (due to troxler fading), whereas the immediate surrounding of the disk is perceived with a glowing afterimage halo (due to microsaccades). When the eyes make a saccade, the faded colors in the periphery reappear, whereas the afterimage of the previously fixated black disk suppresses the weakly colored background at the new location. The painter has found an intuitive way to control and guide eye movements in order to trigger an intriguing artful perceptual play of fading and afterimage effects.

**Listening to paintings**

**Arno Koning and Rob Van Lier**

We studied appreciation and eye movements while watching paintings and hearing music simultaneously. The presented paintings were either from William Turner (landscape sceneries) or from Wassily Kandinsky (abstract art). The music was either classical (e.g. Pastorale symphony 1st movement by Beethoven) or Jazz (e.g. Move by Miles Davis). Considering

the two different painting styles and the two different music styles we first hypothesized that the crossmodal conditions could be labeled as congruent or incongruent. That is, we hypothesized that landscape sceneries would better fit with classical music, whereas abstract art would better fit with jazz music. In a judgement task we have combined 10 Turner paintings and 10 Kandinsky painting with either classical music or jazz music. Sixty observers judged the fit between painting and music on a 7 point scale. The results clearly approved this hypothesis. More in particular, observers judged the incongruent conditions to be rather odd. This was the case for both the Turner-Jazz combinations and the Kandinsky-Classical-Music combinations. We further report a subsequent eye tracking experiment in which we investigate in what way congruency affects looking behaviour (in terms of number of fixations and saccade length).

**Does art shape our perceptual world? A study with visual illusions.**

**Silvia Savazzi, Chiara Bagattini and Chiara Mazzi**

We have recently described [Beck et al., 2010, Journal of Vision, 10(7), 965] a new illusion such that the taller of two equally wide stimuli looks thinner, and conversely that the thinner of two equally tall stimuli looks taller. Here, we asked people with and without artistic abilities to adjust the size of one of two stimuli in order to match their height. If proficiency in drawing shapes the way we perceive the world, we would expect the artists to be less sensitive to visual illusion than controls. We tested 14 subjects with strong drawing proficiency and 13 control subjects with no drawing proficiency. The participants were asked to adjust the height of two stimuli made in a such a way that they were never large the same. The stimuli were either bodies or rectangles. We found that the illusion was stronger [$F(1,25)=22.206$, $p<0.001$] with bodies (3.65%) than with rectangles (1.73%), in line with our previous results. More importantly, as predicted, we found that artists (2.02%) were reliably [$F(1,25)=110.820$, $p<0.001$] less sensitive to visual illusion than controls (3.36%). Our results show that, differently from controls, artists can judge the height of an object regardless of its width.



**Structural regularities in paintings: correspondence to natural scenes and human visual processing**

**April Schweinhart and Edward Essock**

Structural content in natural scenes is biased in spatial scale (1/frequency) and orientation (H>V>>Oblique) (Simoncelli & Olhausen, 2001, Annu. Rev. Neurosci., 24, 1193-1216 ; Hansen & Essock, 2004, JOV, 4(12), 1044-1060). Neural encoding appears to 'undo' these biases thereby whitening the image (e.g. Essock et al., 2009, JOV, 9(1), 1-15). Recent studies have compared the statistical regularities of natural scenes to those of paintings (e.g., Graham & Field, 2008, Perception. 37, 1341-1352). Presumably, art emphasizes structure that is de-emphasized by the neural biases so that the art looks 'right' when viewed. Although priorthese studies have shown a similar bias of scale in art, the bias of orientation hasn't been clearly addressed. To explore the relationship between human processing of orientation and the oriented structure in paintings we have compared museum paintings of landscapes and portraits to a random sample of photos of natural scenes and faces. In a second study, we commissioned 15 artists to paint a scene as accurately as possible, allowing for the first time a direct comparison of content in paintings and an image of exactly the same scene. Through these investigations we have determined that painters overemphasize anisotropies found in real- world images in their paintings.

**Neural Correlates of Object Indeterminacy in Art Compositions**

**Alumit Ishai**

Indeterminate paintings invoke an unusual state of awareness in which form and color become dissociated from the semantic meaning. We used representational, indeterminate and abstract

paintings to study object recognition. Our behavioral studies show that subjects identified familiar objects in all paintings, albeit with longer response latencies for abstract compositions. Using fMRI, we found that all paintings evoked activation in a distributed cortical network. Representational paintings activated the temporoparietal junction, which mediates the binding of visual features and spatial locations, whereas abstract compositions evoked imagery-related activation. A short training session on object recognition in cubist paintings resulted in significant behavioral and neural changes. Trained subjects recognized more familiar objects in more paintings and showed enhanced activation in the parahippocampal cortex. Moreover, trained subjects were slower to report not recognizing any objects, and their longer response latencies were correlated with activation in the fronto-parietal regions. Thus, in order to resolve the object indeterminacy, subjects adopted a visual search strategy and used mental imagery and contextual associations. Our studies provide empirical evidence for the proactive brain framework and for Gombrich's suggestion that we use 'schemas' (i.e., stored structures of knowledge), when we view works of art, in order to form expectations.

**Chaotic Colour Sequences and their Application to Colour Illuminations**

**Kenkichi Fukurotani**

Chaotic dynamics were described by a set of, at least, three first-order differential equations with respect to state variables. The three state variables span a three-dimensional phase space. The solution of differential equations represents a trajectory in the phase space. Mapping the three state variables to three primary colours of red(R), green(G) and blue(B), the phase space becomes a colour space and the trajectory represents a chaotic colour sequence. The trajectory never crosses over itself though it remains within a limited space. Therefore, the chaotic colour sequence never exhibits the same colour as



before. I implemented chaotic colour illuminator with R, G and B LEDs and a microcontroller chip that solved chaotic systems of differential equations in real-time. I examined chaotic colour sequences from 60 chaotic systems. As a rule, impression of chaotic colour sequences differed from that of random colour sequence: smoothly changing colour of chaotic sequences had periodicity to some extent but unpredictability as well, bringing comfortable rhythmic feeling and occasional surprise of unexpected colour appearance into observers. However, each chaotic colour sequence had inherent nature. Selection of an appropriate chaotic system was important to design the chaotic colour illumination for a specific scene.

**The 3D stereoscopic world from the spectator's scope: Adjusting 3D content from pattern of systematic errors**

**Cyril Vienne, Laurent Blondé, Didier Doyen and Pascal Mamassian**

When observers are asked to match the depth of an object according to its width, they often report systematic errors that are related to the distance plane of reference that observers took into account to make estimations of depth (Johnston, 1991, Vision Research). As a matter of fact, spectators of 3D stereoscopic sequences will tend to overestimate the depth of nearest objects while the depth of far objects will be underestimated. This phenomenon creates a serious problem in that the veracity of 3D shape is distorted when one attempts to restore the metrics of a captured 3D world. As such, the main goal of this study is to investigate whether Observers may have a more vivid experience of depth when the 3D content is adjusted according to their intrinsic properties, and more specifically on their accommodation state. Observers thus judged the naturalness of stereoscopic static or moving scenes that were submitted to various transformations of the disparity map. We discuss the results we obtained from the psychophysical experiments and from the subjective reports of naturalness. The present study emphasizes the link between

the phenomenology of perceiving depth and the need to adapt content according to display limitations.

**Psychophysical scaling of circle size with and without depth cues**

**Marcelo Costa, Adsson Magalhaes and Balázs Vince Nagy**

We used the magnitude estimation to obtain the apparent size of circles under two different experimental conditions: with a black background and with a line gradient to evoke depth perception. Twenty-two subjects with normal or corrected-to-normal visual acuity (mean age= 21.3yrs; SD= 1.6) were tested. The procedure consisted of two gray circles luminance of 40 cd / m2, 10 degrees apart from each other. On the left side was the reference circle (VA of 1.1 cpd) in which was assigned an arbitrary value of 50. The subjects' task was to judge the size of the circles appearing in the right side of the monitor screen assigning the number proportional to the changed size, relative to the reference circle. Seven different sizes (0.6, 0.8, 1.0, 1.1, 1.3, 1.4, 1.5 cpd at 50 cm) were presented in each condition. Our results have shown a high correlation for circle size and depth conditions (R= 0.987 and R= 0.997) between the logs of the stimuli and the subject response. The exponents obtained were 0.69 and 1.09, respectively. The circle size was judged subjectively closer to the physical size in the depth condition that in the condition free of other visual cues.

**Assessment of the Rule of Thirds in Photographs Taken by Amateurs**

**Seyed Ali Amirshahi, Christoph Redies and Joachim Denzler**

For evaluating the aesthetic quality of an image, most proposed metrics include an assessment of the rule of thirds as one of their most important features [Li et al, 2009, IEEE J Sel Topics Signal Process, 3, 236-252] [Datta et al, 2006, ECCV, 3, 288-301]. Previously, we introduced a new method to assess whether images follow the rule of thirds. We showed that, on average, aesthetic paintings by famous painters and photographs by professional photographers do not follow this rule. In this paper, we assess the rule of thirds in 2 databases of photographs taken by amateur photographers. The first database consisted of 274 randomly selected photographs from the photo-sharing website Flickr.com; these photographs were tagged as aesthetic. The second database consisted of over 700 images taken by one of the authors who is an amateur photographer. Results were compared to various other image databases of aesthetic or non-aesthetic images that do or do not follow the rule of thirds. The results show that, like professional photographs, amateur photographers do not follow the rule of thirds when taking photographs.



**Position and orientation of faces in film: an analysis of the main male character in eight action movies.**

**Marco Bertamini and Carole Bode**

Although studies have examined compositional biases in static images, few have extended the research to films. Specific scanning mechanisms, and a left visual field attentional bias predict that actors may be filmed in an asymmetrical way. The literature also suggests a left cheek bias (at least for females) and in relation to implied motion there is evidence for a left to right bias in paintings. We analyzed eight films by four directors of different nationalities, each with a male actor in the major role. The Directors were: Leone (A fistful of dollars; The good the bad and the ugly), Ford (The searchers; The man who shot Liberty Valance), Kurosawa (Yojimbo; Sanjuro), Chahine (Struggle in the valley; Struggle in the pier). The analysis focused on three compositional aspects: a) the facial orientation of the actor (which cheek faced the viewer), b) the position of the actor (right or left side of screen), and c) the movement of the actor. There was a general inward bias (facing towards the inside of the frame) but the orientation of the cheek, the position on screen and the movement had different patterns in Western (Ford, Leone) and non-Western films (Kurosawa, Chahine).

**Da Vinci's La Bella Principessa and the uncatchable smile**

**Michael Pickard and Alessandro Soranzo**

In 1998, a little known picture was sold for a modest sum in a New York saleroom and in so doing attracted the attention of the art world. Painstaking analysis by the Oxford art historian Martin Kemp and others, revealed it to be the work of Leonardo Da Vinci (Kemp & Cotte, 2010, Hodder & Stoughton). Given the considerable interest in La Bella Principessa, it is perhaps surprising now to suggest that it may contain an illusion. The Principessa mouth appears to change shape dependant on whether it is viewed in foveal or peripheral vision and this in turn changes the facial expression and ambience, generating an 'uncatchable smile' experience. Experimental data showed that the uncatchable smile experience can be obtained also by approaching the picture from distance and, when a digital version of the picture was used, by either blurring or pixelating the image. The effect is similar, and perhaps stronger, to that described by the Harvard neurobiologist Margaret Livingstone, in her account of the Mona Lisa's enigmatic smile (Livingstone, 2002, Abrahams). The question arises as to whether Leonardo deliberately used such an artefact as a subtle embellishment to the overall aesthetic - after all, who can resist an uncatchable smile?

**Does drawing faces make you a super-expert of faces? An investigation of face perception and recognition abilities in visual artists**

**Christel Devue, Catherine Barsics and Serge Brédart**

Face recognition abilities might constitute a continuum with developmental prosopagnosia and outstanding face recognition capacity at each extreme. 'Super-recognizers' display better face processing abilities than controls and show a larger face inversion effect (FIE) [Russell et al, 2009, Psychonomic Bulletin & Review, 16 (2), 252-257]. Hence, FIE could reflect a specific visual experience/expertise with faces compared to other objects rather than a qualitatively different kind of processing. In this experiment we tested face processing abilities of visual artists who practice portraiture, as well as more general visual perception and recognition skills, in order to contribute to the long-lasting debate about a possible special status of faces. If some special processing faces benefit from is due to expertise, artists' practice might lead to better perceptual and possibly recognition performance with upright faces compared to controls, while increasing the FIE. Because they need to take both configural and featural information into account to reach a satisfactory likeness, artists might also make a differential use of these facial cues compared to controls. Preliminary data indicate that face processing performance might indeed be linked to perceptual expertise with faces.



**Lighting for artworks: subjective evaluation of different light sources**

**Elisabetta Baldanzi, Alessandro Farini and Giancarlo Castoldi**

For this experiment, made at the National Institute of Optics Lab located in the 'Opificio delle Pietre Dure'of Florence (the main italian centre for restoration of artworks) we have selected 12 subjects with no specific professional characteristics, ranging from 12 to 45 years old ('normal subjects') and 5 subjects, experts of arts and restorers at the Opificio delle Pietre Dure di Firenze ('expert subjects'). The aim of the experiment is to evaluate the preferences of the selected subjects exposed to different types of illuminating techniques of an Artwork. We selected three different paintings, two from renaissance (Raffaello's Madonna del Granduca and Anonymous 'Madonna del Velo', one was contemporary (Rasario's 'L'assoluto della Luce'). The four light sources available were a full spectrum modulated light with LED sources, a projectors with AR111 halogen sources, a projectors with a standard LED 3200 K and an illuminators equipped with 2 LED PCBs. In all the situations illuminance was the same (270 Lux). The three artworks were placed in

turn over a dedicated easel in the Laboratory of INO-CNR. Each artwork was illuminated sequentially by the selected illuminators. Each subject declared his/her own ranking of preferences among the proposed illuminations. The preferred illuminators by the 'normal' subjects was the two innovative LED sources instead of the traditional ones; The subjects appreciated the impressive effect produced by the illuminators with LED more with the figurative artworks than the abstract one; 'Expert' subjects do not show a significant preference in relation to a particular type of lighting source, but seem more orientated toward the 'traditional' lamps. This could suggest a dichotomy between the lighting for 'normal' subjects (with emphasis on color and appearance) and for 'expert' subjects (with emphasis on a philological approach)

**Effect of color and brightness on perception of beauty in fractal images**

**Gwan Ho Lee, Woo Hyun Jung and Seungbok Lee**

The purpose of this study is to examine the impact of basic visual property on perception of beauty using fractal images. To control the influence of prior experience on perception of beauty, fractal images were used as stimuli. Correlation coefficient between beauty scores of color images and gray images was calculated to investigate the effect of color on beauty perception. In addition, brightness effect on perception of beauty was examined via manipulating brightness of images into 3 levels. The results showed that beauty scores of color fractal images were lower than those of gray images and correlation between them were very low. In brightness condition, the darkest images were perceived as the least beautiful, but change of brightness had no impact on beauty perception. These results suggest that beauty perception could be influenced directly by basic visual property such as color, shape, brightness and contrast. Also, these results indicate that perceived beauty would be decreased when combination of basic visual property exceeds a certain level. 'This work was supported by the National Research Foundation of Korea Grant funded by the Korean Government(NRF-2010-371-H00008).'



**How long does it take to determine that you like a painting?**

**Andrey Chetverikov**

The study of time taken to make various judgments has been shown to provide valuable insights into the nature of those judgments. Yet little is known about the temporal dimension of aesthetic judgments. The aim of this study was to analyze the relationship between judgment time, exposure time, and tasks given to observers. I expected that the more difficult is the tasks given and the shorter is the exposure time, the longer it would take to make a judgment. Subjects (n = 30) evaluated the paintings presented for 1,5,10,15, or 20 seconds using either left-to-right or right-to-left 6 point 'like - dislike' scale. They also determined the type (landscape or portrait) of painting and whether it is familiar to them. Half of the subjects were also asked to determine the period when the painting was created. The results show that the evaluation time was longer for moderate judgments, regardless of the exposure time and scale direction. The additional task increased judgment time, but only when the left-to-right scale was used. The results suggest that the aesthetic judgment is related to the tasks given to the observers, but this relationship can be moderated by amount of cognitive control.

**Banksy's graffiti art reveals insight into surface completion processes**

**Nava Rubin**

Kanizsa's square may be the best known example of perceptual surface completion: a whole shape is perceived where only fragments of its bounding contour are present. But surface completion also plays a major role in perceiving whole objects from two-tone images (eg, Mooney faces), since lighter facets of the objects often merge with the background (or darker facets, for dark backgrounds). For Kanizsa surfaces, it has been long known that placing the inducers on textured

backgrounds sometimes eliminates, and at other times enhances, perceptual completion (Ramachandran, Ruskin, Cobb, Rogers- Ramachandran and Tyler, 1994). Banksy's art reveals similar effects in two-tone images. To minimize on-site production time, Banksy renders his famous graffiti objects (eg, the rat) by stencil, spreading single-color paint over pre-fabricated templates. What comes next reveals the artist's insight into perceptual processing: When the wall is smooth or finely-textured, Banksy leaves the regions previously covered by the stencil unpainted, relying on perceptual completion to segregate them from the (identically colored/textured) background. But when the wall has large-scale or continues texture, such as bricks -- the very cases when perceptual completion breaks down -- Banksy takes the extra time to fill-in the unpainted surfaces with another color.

**Video and digital modeling for the representation of the Philips pavilion's project by Le Corbusier.**

**Gabriella Curti**

With this contribution I would like to call attention to Philips pavilion's project, a unique synthesis between art and technique. In this, designed by Le Corbusier, the visitor felt the experience of a space 'continuous' and involvement in a series of 'visual events', unusual at that time. I believe that is extremely important to study today, with the possibilities offered by the 'digital modeling', the novelty that Le Corbusier in 1958 wished to present to the International Exhibition of Bruxelles. He called it his 'electronic poem' where light, colour, sound and rhythm would have to involve the viewer in a unique and unrepeatable event. The creativity of Le Corbusier expressed in particular in the 'optical scene' which involved the use of three major components: the use of projection film (écran), the use of layers of bright color (ambiances) and the projection of overlapping geometric shapes in black and white (tri-trous). The combination could produce in the public over the amazement connected to a wonderful intense emotional strain. Through digital modeling and the use of video I would propose the architectural space and the other suggestions made by Le Corbusier, who worked on the representation of shapes, colours and sounds.



**The effect of valence and arousal on aesthetic preference: A developmental perspective**

**Dragan Jankovic and Ana Orlic**

Although the role of emotion in aesthetic preference has been extensively studied so far, previous studies have rarely considered the combined effect of valence and arousal, and up to date, no studies have examined this issue from a developmental perspective. In the present study, images that varied in valence and arousal were used as affective primes under optimal condition, and novel Chinese ideographs served as targets in the affective priming procedure. Participants from three age groups (9-, 13- and 19-year-olds) were asked to evaluate ideographs preceded by affective primes as beautiful or ugly. The results showed that both valence and arousal had significant effect on aesthetic preference in all three age groups. Respondents liked the most ideographs preceded by the positive stimuli, then ideographs preceded by neutral and negative stimuli, respectively. This effect was stronger for the older than for the younger respondents. On the other hand, the positive effect of arousal on aesthetic preference was enhanced when ideographs were preceded by the neutral stimuli, especially among younger respondents. These results suggest a complex interplay between valence and arousal in the aesthetic evaluation, as well as certain age-related specificities.

**The beauty of simulacra**

**Sonja Durajlija Žinic**

There have been numerous reports, in various cultures, in the past and nowdays of the occasional perception of human or animal shapes or other motifs in random and vague stimuli of diverse origins (e.g. sky, rocks, trees, etc.). There are two famous quotes of the great Michelangelo Buonarotti

that confirm his use of such simulacra in the creation of his artworks, the shorter of which is: 'I saw the angel in the marble and carved until I set him free'. According to sceptic Shermer (1), who called it 'patternicity', 'tendency to find meaningful patterns in both meaningful and meaningless noise' is evolutionarily advantageous for the human species. I will present here eight simulacra from stellar clouds, walls, furniture and an film, in which complex and detailed images of humans, animals and symbols of the heart can be perceived. In these examples, every part of the particular object is in the right place and in correct proportion to the other parts. The perceived simulacra are presented both in original, digitally processed and in drawn versions the aim being to investigate the richness and continuity of the details by which they are constituted, to discuss the origin of their aesthetic value and to contribute to a scientific and artistic study of the role of simulacra and 'patterniciity' in the generation of visual artworks in the past and present of art.

1.Michael Shermer (2011), The Believing Brain. Times Books.

**Aesthetic experiences through the visual arts differ from real-life visual perception: Evidence from studies with fMRI**

**Sarita Silveira, Aline Lutz, Evgeny Gutyrchik and Ernst Pöppel**

As much as neurofunctional processing of visual artworks may be exemplarily for visual perception in general, it is a specific case of visual information processing. Artworks may either represent the world in a naturalistic way or differ from habits of viewing. Investigating the underlying mechanisms of perceiving artworks we conducted two studies using functional magnetic resonance imaging. We could show that there are neurofunctional differences in observing art or non-art images if same objects are presented. This was indicated by a higher activation within the sensorimotor cortex during the perception of artworks. Even within the visual arts scenes that match potential expectations can be differentiated from such scenes



that can never occur in real life, because they would violate physical laws. Looking at naturalistic paintings leads to a significantly higher activation in the visual cortex and in the precuneus. Humans apparently own a sensitive mechanism even for artistic representations of the visual world to separate the impossible from what potentially matches physical reality (Silveira et al., 2012, Perception, in press).

**Evaluation of attractiveness and beauty in visual artworks - adaptation and Fourier statistics**

**Gregor Hayn-Leichsenring and Christoph Redies**

We define face attractiveness as the physical allurement of the person depicted, and beauty as a pleasing composition of the image, in accord with philosophical theories. To investigate dependencies and differences between the two aesthetic features, we used face portraits by artists and asked participants to rate them according to their attractiveness and beauty. We found a highly significant correlation between the ratings of the two features. To probe the neural correlates of attractiveness and beauty perception, we studied adaptation to the two features. For faces photographs, adaptation to highly complex features such as age, gender and ethnicity has been reported previously. Here, we demonstrate highly significant adaptation effects on beauty and attractiveness in art portraits. Next, we asked whether the rating of beauty is correlated with spatial frequency (Fourier) properties that have been previously associated with aesthetic visual perception [Graham and Redies, 2010, Vision Research 50(16):1503-1509]. We found for abstract art that the slope of log-log plots of radially averaged (1d) Fourier power correlates with the beauty ratings. In conclusion, our study suggests that specific neural circuits mediate aesthetic perception in the human visual system and that beauty ratings correlate with higher-order statistical properties of abstract artworks.

**How perception of ambiguous figures is affected by fixation and instruction**

**Priscilla Heard and Ayesha Pullen**

Forty participants viewed seven ambiguous figures including duck-rabbit, E.G. Boring's young girl - old woman, and goose-hawk under different conditions while having their eye movements tracked and indicating what they were perceiving. Instructions to 'try to see' one of the two possible percepts led to that percept being perceived significantly more, and there was a tendency for fixations to cluster around focal features. Instructions to fixate a spot located on a specific part of the figure affected what was perceived. For some figures such as the duck-rabbit or goose-hawk perception flips to a different object which faces the opposite direction. Fixation on a spot to the side of the figure led to the perception of the figure where that side corresponded to its front. The data will be discussed in terms of object perception attention mechanisms that are both focal feature and whole object based.

**WATERMARKED is an artwork that places words and repeats them within a varied landscape, eliciting different associations and meanings**

**Carol Laidler and Pat Jamieson**

The source of the River Frome lies just outside Bristol. The river curves round in an arc and then flows towards the Avon at the heart of the city. As it enters the city's boundaries much of this little river has been covered over and culverted in concrete. In the process of mapping the physical and metaphorical course of the River Frome we have been walking upstream along its length, from where the river spills into the Floating Harbour, along its 20 mile course to its source. Stopping to flypost simple words that have differing resonances within their urban and rural settings, we have left a paper trail of words creating a textual map. We are interested in how encountering these words in the landscape alters the experience and perception of the landscape, and how the meaning of the word is changed by the context in which it is placed. The act of photography and exhibition adds another layer. Installed in an interior space the black and white photographs of the words in the landscape are not merely documentation.



## Plenary Lecture by Jan Koenderink

**Experimental Phenomenology: Art & Science**

Visual awareness is known through first person accounts. Its "convincing arguments" are ad oculos. Arguments are persuasive when the audience shares the intended experience. Both visual artists and scientists depend upon this creative aspect. Both book progress through experiments only. Of course both their audiences and their goals are generally different. So is their concept of "understanding". This largely involves the extent, and the way to which one is prepared to transform aspects of visual awareness into reflective thought, necessarily discarding emotive and qualitative aspects. In both cases progress is measured by the increased control over the visual awareness of oneself and – especially! – others through optical manipulations. Success is measured through the overt fascination of the intended audiences. Whereas scientists tend to focus on formal clarity (hence their obsessive fascination with perspective), artists tend to value the suggestiveness of obscurity (hence their common reference to poetry). I discuss pros and cons of either approach in both fields of endeavor.

# Sunday 2nd September

## SYMPOSIUM: M. Massironi and Arte Programmata e cinetica: visual research and art, art and visual research

### Massironi and Arte Programmata: a brief review of research into perception

**Ugo Savardi**

Manfredo Massironi started his research into the psychology of perception well before he began his academic research. His extended experience of individual research interweaved with the development of an artistic movement known as Arte programmata e Cinetica (or Gestaltic Art), which had its origins in the late fifties and which still continues today in the work of various international artists. The phenomena studied range from the interaction between light and environment to perceptual invariants in anamorphoses, anomalous contours, figure-ground segregation, the perception of folding, reflections and many more. These topics will be analyzed synoptically and their link with research on the same phenomena which has been carried out in university labs will be discussed. This will demonstrate how the contribution offered by the Experimental Phenomenology of perception to both art and the psychology of perception is still topical. .

### Canaries from doodles and other visual exercises

**Daniele Zavagno**

Manfredo Massironi was indeed a contemporary Renaissance humanist, driven by endearing curiosity towards the fields of architecture and interior design, art, perceptual sciences, visual communication, psychology of art, and story telling. Both his intellectual and his artistic works are rich of insightful ideas. Sometimes such ideas were offered to the reader in terms of a playful exercise, some other times they were disguised in the form of a short story. I will attempt to trace the imaginary line that connects Manfredo's stories and his proposed exercises to his own scientific and artistic interests. If my hand and mind are steady enough, the result should deliver an imaginary portrait of Manfredo Massironi.



### The visual arts as on-field experimentation

**Rossana Actis Grosso and Daniele Zavagno**

Starting from the seminal study by Massironi (2002) on the way in which a temporal dimension is conveyed by means of static images, we develop a general hypothesis, according to which the evolution of the representation of the time course in visual arts is mirrored in the evolution of the concept of time in children, who, according to Piaget (1946), undergo three stages in their ability to conceptualize time. We preliminary tested this hypothesis with an experiment where 40 children (aged 4-7 years old) were presented with the reproduction of two medieval paintings (and the respective line-drawing cartoon versions), which stand, according to our hypothesis, for an intermediate stage in the evolution of art. We hypothesized that only children who are at Piaget's Stage II of time conceptualization should immediately understand the pictorial representation. Despite the small sample of children examined, results are consistent with the hypothesis. A follow-up on the same children was also run one year later. Results suggest that the study of the visual arts can help to distinguish between the perceptual and the cognitive constraints in the representation of the succession of events, as Massironi suggested.

### Pictorial representation and the psychology of visual art

**Daniela Bressanelli and Enrico Giora**

The representation of reality is one of the most fascinating issues in aesthetics and art theory. It has been pointed out since the ages of ancient philosophers that a painting is not a mere copy of a natural object but it consists in an active interpretation of it. Correspondingly, a pictorial image implies a fine balance between the information embedded in the

natural scene and the elements chosen by the artist. Figurative images have therefore to satisfy two requirements: (i) the similarity to the depicted object to which they refer to, and (ii) the creative way to represent that object, depending on the artist's aim. In graphic representations a crucial role is thus played by the employment of pictorial cues. Few pictorial features are sufficient to represent the characteristics of a visual object with exhaustiveness and communicative power. The combination of simple pictorial signs like lines and textures may elicit complex perceptual outcomes regarding objects' shape, material properties, depth information, up to expressive qualities as causal relationships and time displacement of events. Manfredo Massironi's contribution in the study of pictorial representation is here presented and discussed in the light of the current theories of psychology of visual art.

**Exploring the visual structure of reflections inside and outside a laboratory**

**Ivana Bianchi**

Reflections are interesting perceptual phenomena. They have inspired both scientific research into the psychology of perception (and na√Øve optics) and also research into art. After a brief review of some of the main questions and findings which have emerged from experimental studies on the perception and understanding of reflections (Bertamini et al, 2010, Attention Perception & Psychophysics, 72, 1948-1964; Bianchi & Savardi, 2008, Perception, 5, 666-687; Lawson & Bertamini, 2006, Perception, 35, 1265-1288; Savardi, et al. 2010, Acta Psychologica, 134, 1-15), we will explore the use of mirrors and the manipulation of reflections carried out by Massironi in a series of works of art as well as considering other artists of the Arte Cinetica e Programmata movement. Both art and science can make us aware of some of the processes involved when we look into a mirror.



**Op Art and Perceptual Intuition.**

**Gert van Tonder**

The 1960's Op Art movement is best known for their characteristic use of bold black and white patterns, remembered well because these works elicit vivid perceptual effects. The metaphors chosen by artists themselves to convey their own sense of what is occurring, perceptually, resist direct translation into scientific terms. Yet, they are the originators of these powerful works and as such, their intentions and opinions should be of considerable interest to scientists wishing to explore perception in Op Art. In this presentation, I would like to show examples where the appropriate interaction with Op Art enables specific scientific insight into a long standing problem related to contrast processing in the human visual system. The insight goes as far as providing clear evidence regarding the theoretical and physiological origins of the observed perceptual effects. Surprisingly - or in hindsight, perhaps not surprisingly - this insight reciprocally leads to greater understanding of the composition of the artwork. This understanding culminates in fresh insight into the artistic intuitions and intentions behind the visual effects used, offering a clear scientific translation of the apparently obscure metaphors used by Op artists when describing the role of visual perception in their compositions.

## TALKS: Session 4

**Automatic Analysis of Emotions Conveyed by Abstract Painting**

**Victoria Yanulevskaya, Elia Bruni, Jasper R.R. Uijlings, Andreza Sartori, Elisa Zamboni, Francesca Bacci, David Melcher and Nicu Sebe**

Last century, the painters of the abstract art movement employed basic visual features such as colours, shapes, and texture to convey emotions. We investigate which elements of the painting are associated with positive and negative emotions

by analysing 500 abstract paintings from the collections of Modern Art Museum (MART), Rovereto. Specifically, we concentrate on paintings by Carlo Belli, Aldo Schmid, Luigi Senesi, and Luigi Veronesi, as their work is not the result of an improvisation but it is part of a deep theoretical reflection on the elements that make a painting. To obtain the ground truth, each painting was scored by 20 people as carrying a positive or negative response on a Liekert scale of 1-7. We use the state-of-the-art Bag-of-Words classification framework [Sivic and Zisserman, 2003, International Conference on Computer VIsion, 2, 1470-1477] to automatically predict emotional conveyed by the artwork and obtain an accuracy of around 80%. Additionally, we are also able to visualize how each element of a painting contributes to the overall emotional impression. This allows answering the important question why a specific painting is perceived as positive or negative. Many of the features identified by the computational analysis conform to principles outlined by the artists.

**Fractals, scale-invariance and visual preference**

**Branka Spehar and Richard Taylor**

At present, there exists a set of suggestive links between aesthetic preference, the fractal properties of images, and the statistics of natural scenes. We have previously shown that humans display a consistent preference for a certain range of fractal dimension across fractal images of various types (Spehar et al., 2003, Computer & Graphics, 27, 813-820). While some have suggested that fractal-like patterns are inherently pleasing because they resemble natural patterns and scenes, the relation between aesthetics, scale invariance of natural scenes and fractals (especially those defined as binary boundaries) remains unclear. Here we examine visual preference for 1/f noise images of varying slopes and compare these directly to preferences measured for a comparison set of thresholded (black and white) images. We found no significant differences in preferences between gray-scale images and



binary comparison images obtained by simply thresholding the original gray-scale images. For both set of images, the visual preference peaked for images with the amplitude spectrum slopes from 1.25 to 1.5, thus confirming and extending the previously observed relationship between fractal characteristics of images and visual preference.

**Kafka's Castle: Vision and Imagination in Visual Art and Literature**

**Emily Troscianko**

This paper shows how literature can provide a context for drawing connections between visual perception, imagination, and visual art. Visual perception is an important element of literary art and the experiences it induces in readers: the ways in which characters are described as perceiving the fictional world have significant effects on readers' imaginative responses to this world (see e.g. Troscianko (ET), 2010, Language and Literature, 19, 151-171). I describe an experimental paradigm in which I evaluate experiences induced by the opening of Kafka's The Castle by 1) using a simple online measure of 'presence' (see e.g. Troscianko (T) and Hinde, 2011, i-Perception 2, 216 (in press)) and 2) asking participants to draw what they had imagined while reading. The results enrich the connections that can be drawn between specific approaches within vision science, notably the sensorimotor account of vision and visual consciousness (e.g. O'Regan and Noˇ, 2001, Behavioral and Brain Sciences, 24, 939-1031), and theories/concepts relating to visual detail and perspective in visual and verbal art. The empirical convergence of visual and verbal art helps us tease out distinctions between imagining, seeing, and conceptualising seeing, and suggests further avenues for exploring how vision acts as a mediator of aesthetic experience.

**Aspects of experience of beauty**

**Slobodan Markovic**

In a previous study we specified three dimensions of the subjective experience of visual stimuli: Hedonic Tone, Regularity and Arousal (Markovic and Jankovic, 2001, Perception, 30. ECVP Supplement, 30). These dimensions included descriptors which expressed different aspects of the experience of beauty: Hedonic Tone (descriptor: pleasant), Regularity (harmonious) and Arousal (interesting). The purpose of the present study was to specify the relationship between the judgment of beauty and judgments on the other three descriptors. Participants judged sixteen achromatic abstract visual patterns on four seven-step bipolar scales: beautiful-ugly, pleasant-unpleasant, harmonious-disharmonious and interesting-boring. The multiple regression indicated that the judgment of beauty was closer to judgments of pleasure than to judgments of harmony and interestingness. Inter-corelations suggested a model with one central cluster which included beauty and pleasure (correlations about 0.7), and two lateral descriptors, harmony and interestingness (correlations with descriptors of the central cluster were about 0.5); the correlation of harmony and interestingness was not significant. These results suggest that the concept of beauty can be reduced to pleasure, but that it includes two relatively independent aspects - harmony (beauty as figural goodness) and interestingness (beauty as impressiveness).

**Goodness-of-fit of oriented elements within a rectangular frame**

**Stefano Guidi and Stephen E Palmer**

Previous research (Palmer & Guidi, 2011, Perception, 40, 1428-1446) has shown that the structure of a rectangular frame strongly influences the perceived goodness-of-fit of small circular probe positioned within it. The centre is consistently rated as the best position, followed by positions along the vertical, horizontal and local diagonal symmetry axes. In the three present experiments we investigated how an element's goodness-of-fit is influenced by the relationships between its structure and that of the frame. Fit-ratings of isosceles triangles at different positions and orientations, revealed strong orientational effects, especially when the probe's axis of symmetry aligned with the frame's axes of symmetry, and directional effects when they point into the frame and/or toward the right. Fit-ratings within rectangular frames at different orientations (0¬∞, 45¬∞, 90¬∞, and 135¬∞) showed that these orientational effects were more strongly driven by alignment with the rectangle's sides than with gravitational or retinal reference frames. When line segments or small ovals were used with a denser space sampling, fit-ratings for the less-strongly-oriented ovals were lower, and ratings tended to decrease along the angle bisectors with distance from the corners. The results are relevant to the empirical study of aesthetic response to images within rectangular frames.



**Mirror Reversal of Artworks**

**Michael Forster and Helmut Leder**

When you would ask an artist if it would make a difference whether his/her artwork is mirrored or not, he/she would be at least annoyed. However, previous research has shown that we cannot reliably distinguish between an original artwork and its mirrored version (enantiomorph). Based on these findings, we conducted a series of experiments further exploring the nature of mirror reversal in artworks. In a first experiment, we compared originals and enantiomorphs of both very familiar artworks and rather unfamiliar artworks for liking, familiarity, and reversal detection. In line with a fluency account, only famous originals had the tendency to be liked more than their enantiomorphs, whereas unfamiliar originals showed no effect of orientation. This effect however, was independent of reversal detection, which was around chance level for all the artworks, regardless of familiarity. In further experiments we address the effects of task variation on judgments of

reversal and liking and the effects of different procedures on recognition of originals and enantiomorphs. Together these findings shed light on the impact of mirror reversal on preference for artworks and on the nature of mirror reversal in image perception and recognition in general.

## TALKS: Session 5

### Assessment Depth Cue Dynamics

**Christopher Tyler and Spero Nicholas**

Monocular depth cues are often designated as 'shape-from-X', where X denotes 'shading', 'motion', 'texture', etc. Depth cues in the real world generally come fully coordinated, with the various cues expressing the same depth structure, even though some may be spatially sparse. When one cue conveys different depth structure from the others, it will typically be downweighted. However, when the focus is on one cue to depth structure, with the others (including the cognitive information) specifying a flat plane, visual processing of the implied depth has a perceptible time course to full development. We measured the perceived depth dynamics for the single monocular cues to depth in a flat plane image by alternating with a stereoscopic image of the same depth structure having an exponential rise time towards its full amplitude. The exponential time constant and amplitude parameters of the comparison stereo dynamics were adjusted by the observers on a trial-by-trial basis to match the perceived dynamics of the monocular depth cues of shading, texture, motion and contrast. In practice, the perceived depth dynamics were complex, with time constants up to several seconds, and varied among cues. Implications for the Bayesian theory of cue reweighting based in reliability will be discussed.

### Art and the brain: the view from dementia

**Cosima Gretton**

By examining the works of artists suffering from dementia, we can gain new perspectives on the neural basis of the perception and production of art. We review the literature in an attempt to highlight common patterns in the changes inflicted on artistic output by three types of dementia: Frontotemporal Dementia (FTD), Alzheimer's Dementia (AD) and Dementia with Lewy Bodies (DLB). We compared the brain areas thought to be involved in artistic production, with areas affected in each dementia type, and the respective neuropsychological findings. In doing so we attempted to identify the neural basis for each observed change in artistic ability. A keyword search on OVID SP PsychINFO and Medline databases, and a reference search, produced 45 articles that were used in the final review. A total of 14 were used as the final cases to be reviewed (AD = 5, FTD = 7, DLB = 2). The results showed that in AD, artists tended towards simplification of colours, loss of perspective and distortion of the image. DLB patients showed more pronounced visuospatial impairments than AD. FTD patients by contrast showed preserved visuo-spatial constructional abilities and an obsessive drive towards artistic production.



### A perspective view of Leonardo Da Vinci's Last Supper

**George Sperling**

Leonardo Da Vinci's mural, The Last Supper, was painted from 1495 to 1498 on a wall of the refectory of Santa Maria delle Grazie, a church and Dominican convent. It was painted in one-vanishing-point perspective. It apparently has not previously been observed that this painting was designed to be viewed from a particular point, approximately in the middle of the refectory, where the church officials would be dining. Viewed from this point, the perspective lines of the structures depicted in the painting blend with the perspective of the room so that the painting presents to the eye the same image as a live re-enactment of the scene. In other words, to a stationary observer at this point, the painting should appear to be a real three-dimensional scene. A photograph of a real re-enactment by actors and a photograph of the painting would be indiscriminable. Leonardo's sophisticated use of perspective

is in start contrast to the large fresco by Giovanni Donato da Montofano painted on the opposite wall, also in 1495. which has the perspective defects typical of medieval art.

**Eye-conographs**

**Nicholas Wade**

Icons are eye-cons: they provide distillations of objects or ideas into simple pictorial shapes (see pdf). They create the impression of representing that which cannot be presented. Eye-cons are tricks of vision so that what is seen does not necessarily correspond to what is presented. They are visual allusions rather than visual illusions, although they can display illusory effects. Iconography can refer to representations of people, and it has been applied to visual artists and scientists: their portraits are often reproduced in histories of art and science. Until the nineteenth century, artists were mostly represented in pigment (paintings) and scientists on paper (engravings). After the birth of photography, both have been captured by the camera and more recently manipulated by computer. Eye-conographs are 'perceptual portraits' of artists and scientists; they combine facial features with the styles and phenomena with which the artists and scientists are associated. The survey commences with eye-conographs of Richard Gregory and Tom Troscianko; it then focuses on the artists and scientists who have produced eye-cons, that is, pictures which are intended to fool the eye.

**Climate, illumination statistics, and the style of painting**

**Isamu Motoyoshi**

There is a remarkable difference in the style of classical paintings between Europe and East-Asia. This diversity may originate from the light environment specific to each climatic zone (Motoyoshi, 2011, Journal of Vision, 11(11): 1188). It is well known that Monsoon Asia is far more rainy and cloudy than Mediterranean. Analysis of large weather database indicates that increasing cloud ratio in the sky decreases contrast and skewness of the 'light field' ($r > 0.84$).



Importantly, these illumination statistics critically constraint visual appearance of natural objects (c.f., Motoyoshi & Matoba, 2012, Vision Research, 53, 30-39). Under light fields of high contrast and skew (Mediterranean), objects tend to have variegated shading, sharp highlights, and cast shadows. Under light fields of low contrast and skew (Monsoon), on the other hand, objects have shadings only in the deepest concavities, and no highlights or cast shadow. Such characteristics are consistent with the styles of paintings in East-Asia and Europe. The consistency was validated in terms of simple image statistics as coded in early visual cortex. These results support the notion humans prefer artworks that represent the average, or canonical, property of light environments in their province.

## TALKS: Session 6

**There are images neither in the mind nor in the world, only pictures**

**Riccardo Manzotti**

There are no images to be seen, since there are images neither in the mind nor in the world. There are only pictures. The notion of image, historically originated in the philosophy of mind of XVII centuries and in renaissance art development is at the origin of several confusion and vagueness. Contrary the common belief that there are there are images stored in computer memory as well as in other electronic devices and that visual perception deals by means of images projected from the outside world inside our retinas, I will try to show that such claims are only metaphorical. As a result, the neuroscientific and psychological literature referring to retinal images, cortical images, visual mental images, natural images, topographic images, retinotopic images, sensory images, after images are based on wrong premises (Shepard 1978; Zimler and Keenan 1983; Kosslyn, Thompson et al. 1995; Beaulieu 2002; Gregory 2005; Manzotti 2006; Kay, Naselaris et al. 2008; Manzotti 2010). Taking advantage of a few selected cases like mirrors,

kaleidoscopes, visual perception, mental images to show that the notion of image is void.

**Sensitivity to the Fine Scale of Artistic Style**

**Holly Gerhard and Matthias Bethge**

Human observers are remarkably sensitive to statistical regularities of images occurring at the very fine spatial scale (Gerhard et al., 2011, 40 ECVP Abstract Supplement, 18). Here we show that this exquisite sensitivity can also be used to study artistic style. We present a new paradigm for studying the style of an artist's hand, how he makes his brush or pen strokes. Our paradigm avoids potential interference from cognitive expectations evoked by viewing meaningful elements or an entire work of art. Instead, our stimuli are made of small image patches sampled from images of the original art work and tiled together into textures. The task is forced choice. We applied the paradigm to the question of authenticity: what discriminates works done by a master from those of his imitators? We used eight high quality scans of drawings by Pieter Bruegel the Elder and five of drawings previously considered authentic as stimuli for the texture discrimination task. To identify cues used to discriminate Bruegel from his imitators, we filtered the stimuli for the particular statistical regularities they conveyed. We also compared performance in all conditions with a state-of-the-art statistical discriminator. While the model failed with degraded stimuli, human observers always correctly classified the drawings.

**Motion in Art - Art in Motion**

**Johannes M Zanker**

Operating in a three-dimensional world the human visual system is exposed to light changes in three spatial and one temporal dimensions. How would a painter face the challenge to capture such a rich environment on a flat, static canvas? Whereas the rules of occlusion and perspective provide artists with comparatively simple guidance to represent space, a range of rather varied approaches can be found for the representation of motion. Moving on from a symbolic or impressionistic pictorial language for motion, there were several attempt, most notably from the Op Art movement, to recreate an compelling experience of an actual motion percept in arts - such motion illusions have attracted the curiosity of visual scientist to use arts as a tool to understand the mechanisms underlying human perception. In the last decade, the relationship between eye movements and periodic high-contrast patterns that are static but elicit strong motion sensations - such as Riley's 'Fall' - is now well investigated. Whilst this work offers a clear rational to explain the basic mechanisms underlying many of such illusions in their most fundamental configurations, the debate is open whether they can account for other motion illusions experienced in more intricate patterns, such as Leviant's 'Enigma' or Kitaoka's 'Rotating Snake'.



**Depiction of material properties in paintings**

**Bilge Sayim and Patrick Cavanagh**

Artists are able to depict various material properties in paintings, such as transparency, gloss, and roughness, by manipulating pigments of different color and lightness. Often observers perceive these properties in paintings, even when the artist did not attempt to create a photorealistic picture but instead depicted simplified, distorted, or caricatured objects and scenes. For example, artists have successfully depicted transparency in simple line drawings, strongly violating physical constraints of transparency. Such pictures show us that stimuli that deviate from or misrepresent object properties may still trigger the perception of various material qualities. Here, we investigate the techniques artists used to depict material properties in paintings, discussing which principles they followed and which they ignored. We show how such paintings may help us to understand the processes underlying visual inferences in the brain.

**Eastern and Western Perspectives in Traditional Visual Arts**

**Yan Bao**

Representation is essential to both visual perception and visual art. By comparing the representation styles of traditional paintings from a psychological point of view, different perspectives in eastern and western paintings are put forward. While western artists typically use a geometric perspective to give a distance cue in representing the 3D world, eastern artists tend to adopt a negative perspective or vertical representation of distance. While western artists favor object-centered scenes, eastern artists prefer more context-oriented scenes. Western artists frequently show a direct facing view in their paintings, eastern artists typically demonstrate an indirect sideway view in a scene. Western artists are inclined to capture a specific moment from one fixed standpoint, eastern artists favor to integrate different time and space for a holistic representation which can be best perceived with a floating view. Overall, it seems that western artists tend to represent what they 'see' on their retina or visual cortex and try to make what they paint as real as possible, and eastern artists tend to represent what they 'assume' in their brain ---- showing a strong top-down modulation to what they 'see'.

**Historical forerunners of contemporary perspectives in the field of neuroaesthetics**

**Enrico Giora**

Neuroaesthetics is an emerging field of research focused on the idea to pair the psychological experience of artworks with the concomitant neural states, in search of the physiological processes underlying our sense of beauty. The bridge that is often assumed to exist between those heterogeneous areas consists in the hypothesis of common perceptual mechanisms responsible for art experience. Although an involvement of perceptual processes in aesthetic appreciation is widely reasonable, it is nevertheless difficult for this perspective to account for the unbroken changes of styles occurred throughout the history of art, which seem more easily ascribable to culture and subjective taste than to physiological constraints. At the end of the XIX century, art historians and psychologists such as Alois Riegl, Heinrich W√∂lfflin and Theodor Lipps, have already debated about the role played by sensory and psychological processes in aesthetic experience, referring in particular to the case of visual art. In this contribution we provide a critical review of the ideas of those Authors and we discuss them in respect to the opinions present today in psychology of art and neuroaesthetics.



**Neuroaesthetics of ambiguous art: viewing Arcimboldo's artworks.**

**Maddalena Boccia, Federico Nemmi, Emanuela Tizzani, Cecilia Guariglia, Fabio Ferlazzo, Gaspare Galati and Anna Maria Giannini**

Neuroaesthetics is a recent sub-field of investigation in neuroscience. It directs to explain neural basis of human appreciation and creation of art. With this study we want to explore a never investigated aspect in neuroaesthetics: the role of perceptual ambiguity in artworks on the neural basis of aesthetic appreciation. With this purpose, a group of 20 healthy young subjects were recruited for this study. We chose stimuli with different degree of ambiguity and art characteristic: 32 Arcimboldo's artworks, 32 renaissance portraits, 32 ambiguous non-artworks and 32 faces. Ambiguous stimuli (both artworks and not) are characterized by a whole-part ambiguity (as well as in Arcimboldo's). Using a mixed fMRI paradigm we ask to subject to judge the stimuli both in an objective condition (artwork or not) both within their aesthetic appreciation (like it or not). Results from principal contrast show that viewing ambiguous artworks in an aesthetic condition (like it or not) activated inferior frontal gyrus bilaterally, middle temporal and middle occipital gyrus in the left hemisphere, fusifor gyrus, inferior temporal gyrus and angular gyrus in the right hemisphere. Results confirm the hypothesis of a particular

role of ambiguity viewing artworks, showing different neural activation for ambiguous artworks.

**Chinese calligraphy: strokes in motion**

**Jérôme Pelletier and Yolaine Escande**

In a Chinese calligraphy, traces of the brush are not seen by Chinese calligraphers as separations or boundaries either between the strokes themselves or between the strokes and the surface. Despite the blank spaces between strokes and dots, the strokes and dots that form a Chinese character are seen by Chinese calligraphers inter-related, not only between them, but also with the blank spaces of the paper. Since all these various strokes are produced in a sequence of creative gestures with a brush, ink and water on a sheet of paper, our hypothesis is that their phenomenal unity results from a vicarious kind of re-experiencing done by the viewer of the strokes in motion. We bring in two kinds of elements to make our point: the 'physiological' type and the 'characterological' type of vocabulary used by calligraphers to describe their creations as well as some results of a behavioral experiment showing that movements are perceived by na√Øve subjects looking at Chinese calligraphy.

**Ansel Adams Zone System: Techniques for rendering HDR scenes on LDR film media**

**John McCann and Alessandro Rizzi**

The Ansel Adams Zone System, first described in 1949, was a two-step process that described techniques for scene capture and spatial manipulation of the rendered image [Adams, 1981]. The exposures of the film negative was calculated from spot-photometer scene measurements that determined the scene range. That range determined both the camera exposure and the development procedure in order to capture the entire scene range in the negative. Prints have a very limited range, so spatial dodging and burning techniques compressed the scene information into the rendition range. This work describes the Adam's Zone System and the parallel process of our human vision system to capture dynamic range of natural scenes. In particular the work focuses on the parallels with the High-Dynamic Range (HDR) rod/cone response and the LDR range of ganglion cells. Both the Zone System and human vision underline the important distinction of actual and apparent dynamic range of luminance.

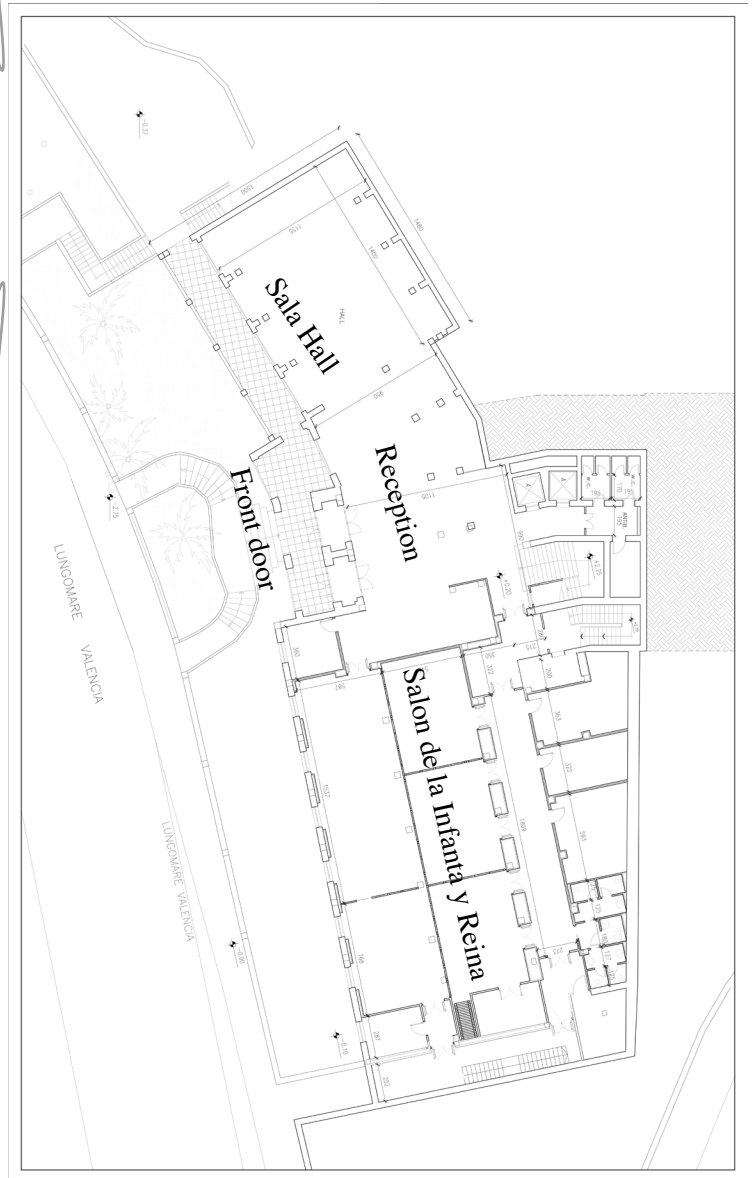


## From VSAC to ECVP by Stephen Grossberg

**Cortical Dynamics of Visual Perception, Spatial Attention, and Conscious Recognition with Applications to Understanding Visual Art.**

There has been a lot of progress in theoretically understanding how our brains see. This progress includes characterization of the laminar cortical circuits for pre-attentively processing 3D boundaries and surfaces; the manner in which boundary and surface representations interact resonantly with attention to generate conscious perceptual experiences; the coordinated use of spatial and object attention to learn invariant category representations with which to recognize objects as we scan scenes with eye movements; the perceptual stability that is achieved despite the evanescent nature of visual cues during visual scanning; and the accumulation of evidence during visual search using contextual cues to understand scenes more efficiently. This talk will provide a self-contained summary of concepts and models for explaining how various of these processes work, and illustrative perceptual and neurobiological data that these models have explained and predicted. The talk will also suggest how these discoveries may clarify how we see visual art, and some of the intellectual struggles that famous artists experienced to achieve their art.

## CARLOS V - GROUND FLOOR

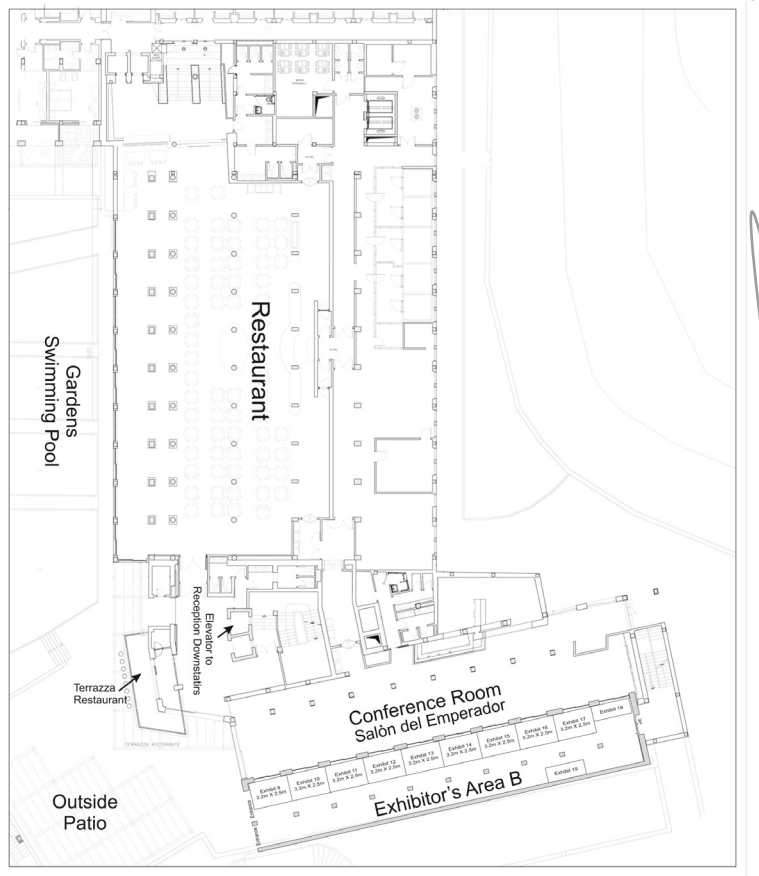









## CARLOS V - FIRST FLOOR



**Stroll&Speak**, a little italian school for non-native speakers, is organizing various activities for the ECVP and VSAC attendees and accompanying people:

**ENTERTAINMENT PROGRAMME**

- FUN AND GAMES FOR KIDS

Recreational activities for children with 2 young assistants providing fun activities with music, games, kids cooking and fun on the beach (a lifeguard will be present to ensure safety).

- WHAT'S COOKING?

Sardinian and Italian cookery lessons (in both Italian and English), for groups of a maximum of 7 people per session (2-3 sessions, from 9.00 to 13.00): agreeing what to cook, going shopping in the market, cooking together and then, the best bit of all, tasting your fabulous dishes.

- SNAPSHOTS OF ALGHERO

Photography sessions in the Old Town of Alghero: the old house entrance doors in the town, the cobblestone streets, glimpses of Old Town life, a 'Dawn and Dusk' tour of the Old Town. A great opportunity to take home unforgettable memories taking your own shots with the guidance of an attentive observer.

- ITALIAN HOUR

Including talks about Alghero's history, the Nuraghi in Sardinia, women and their roles in Sardinian society, plants and animals.

- A DAY IN BESSUDE

Day trip to the beautiful little town of Bessude (40 Km from Alghero). The group will be welcomed in the church square, followed by a 2 hour excursion to the nuraghe of San Teodoro. After a packed lunch and a visit to the town centre of Bessude the participants can then take part in making fresh pasta and desserts with the local women.

For more information and prices please contact:
**info@strollandspeak.com**