Scientific report
ESF Exploratory Workshop on

Neuroesthetics: Where Art and the Brain Collide

Milan (Italy), 23 - 26 September 2009

Convened by:

Riccardo Manzotti

SCIENTIFIC REPORT

Executive summary of the workshop

The workshop was held from Thursday September 24 till Friday September 25, 2009 at the IULM University, Milan. 17 participants from 7 European countries (Denmark, France, Germany, Italy, Belgium, Spain, and United Kingdom) and 1 participant from the United States attended the meeting and discussed. Unfortunately, the participant from Switzerland (Jill Scott) had to pull out at the last moment. Overall, the workshop fulfilled the aim of a broad representation both from most European countries and from the many relevant scientific and cultural backgrounds requested by the suggested workshop topics.

Thanks to the workshop, the main scholars in the emerging field of psychology of art could compare their different approaches using a neutral language and discussing freely about their goals. The event achieved to outline a few possible common grounds for future research activities. First, there is a considerable interest in using cognitive and neural inspired techniques to help art historians, museum curators, art archiving, art preservation. Secondly, cognitive scientists and neuroscientists are rather open to use art as a special access to peer inside the structures of the mind. Third, there are artists who explicitly draw inspiration out of current research on various aspects of the mind. Fourth, during the workshop, a converging methodological paradigm emerged around which more specific efforts could be encouraged.

The workshop has increased communication with and between the different communities and marked the start of a fruitful interaction between independent, yet conceptually close, groups of research at the boundary between art and the mind sciences at large. Overall, the workshop demonstrated the richness of the subject and highlighted a series of possible practical and scientific areas for further development. The meeting helped in making visible a growing academic community that is currently scattered in several separate departments.

A first concrete outcome of the workshop is the awareness of a strong new scientific approach at the boundary of humanities and more traditional sciences (either neuroscience or cognitive science): the externalist approach. To exploit it, a short term goal is to publish an edited book centered on externalist approaches to art. Such a goal will allow the community to strengthen their links and to focus on a series of application and research targets.

Scientific content

Given the highly heterogeneous cultural origin of the speakers it was paramount to endorse an open minded frame of mind that would allow discussing openly the many conflicting issues. This was indeed the case and an open confrontation ranged from the very first talk.

As it was planned the workshop had a fourfold structure that mirrored the existing critical issues. More specifically, the first half day aimed at providing a deep overview of the current state of the art of neuroestethics. The second half day focused on cognitive science researches explicitly targeted at aspects of artistic experience. On Friday 25 morning, the workshop was devoted to art historians and artists involved in shaping a self-aware cognitive dimension in art. Finally, the last half day exploited the emerging externalist view of cognition and phenomenal experience to gather scholars sharing this view as to the nature of aesthetic experience.

In greater detail, the workshop started on Thursday September 24 with introductory talks on the commitment of IULM University in supporting the workshop as well as fostering future initiative at the crossing between art and science (Patrizia Nerozzi as the Head of the Hosting Faculty of Language and Literature, IULM). Then, Semir Zeki (University College, London) gave the first talk summarizing the current state of neuroesthetics, its goals, and its challenges. He stressed the importance of the conscious mind as the true common ground

between science and humanities and the possibility to develop common tools given the recent discoveries in the study of human perception. In particular he presented ambiguity as a possible research target crossing both perception and aesthetics as a fundamental category of human experience. The next speaker, the neurologist Andreas Bartels (Berlin) described the insights we can get from the neurobiology of fundamental emotions such as love or sexual attraction, so to understand how aesthetic categories are shaped in cognition. Finally the morning benefited by Alexander Abbushi's presentation of the goals and activities of the Association for Neuroesthetics. Although the very first session revealed the depth of the chasm between humanities and hard sciences, it was encouraging to see of the multiple issues shared by most of the conveners (conscious experience, subjectivity, emotions, cognitive aspects of aesthetics experience, and many more).

The second unit (the afternoon) was devoted to technology either inspired or devoted to art by and large. The first speaker, Domenico Parisi (CNR, Rome) adopted an operational approach to art suggesting that it is possible to study art from a cognitive standpoint that avoids any ontological commitment. Once art is thus modeled it can conversely be exploited to improve current artificial agents' performances. Rather surprisingly but poignantly, Jaime Gomez (Engineering, Madrid) argued passionately in favor of the epistemically revolutionary role of art. This has not to be underestimated both for social side-effects and for epistemical underpinnings. The tagline was that a technological version of art is not a simple technological challenge but a disturbing ethical and social issue. A talk that was all the more interesting since it was made by an engineer by formation and scientific position. The third speaker, Ron Chrisley, a distinguished cognitive scientist, showed how the notion of synthetic phenomenology could be used to study perception and to flesh out a cognitive model of aesthetic experience and art. Eventually, Antonio Chella (Computer Science, Palermo) showed a series of successful examples of the use of technology in order to improve users' everyday experience of art ranging from robots in museum to software tools for archiving artworks.

The day ended with a long discussion as to the common epistemical ground among the participants. In particular it was discussed the troublesome issue of reduction. On the one hand, effective reduction is welcomed in the scientific community. On the other hand, scholars of humanities are afraid that unjustified reduction is going to dismiss essential aspects of human experience. In the case of art, the discussion couldn't have been livelier. However, the topic was ideal to start bridging and merging the various communities at the workshop.

The first session of the second day was spent to listen to various experiences originated inside either the artistic community or the art historians' community. The morning was a balanced presentation of various arts: literature, music, digital art, and visual art. The first speaker, Antonella Sbrilli (History of Art, Rome) presented an impressive research on the use of model of mental images to collect, store, retrieve, manage, and archive works of art. The model exploited the difference between pictures and mental images, whereas the later are a complex manifold of meaning and semantic relations among different kind of epistemic entities. She stressed the difference between current search engines such as Google and the way in which the mind preserves and retrieves memory. Her group has collected thousands of image descriptions formulated by artists trying to describe their own

work. The careful analysis of the essential features of such descriptions is going to be a precious step both to model mental images and to archive artwork in a content and meaning manifold. Timothy Park (writer, UK) was the next. He capitalized his working experience as a writer to dwell on the complex interplay between words, time, thought, meaning, and language. It's not an easy task to squeeze all the multilayered and multifaceted nature of literature into an operational or neural model of it. He observed that any cognitive model of art should account for intentionality, unity, semantics, and, above all, the fact that any work of art imposes an order on reality. The notion of order, which is a sequence in many forms of art, is thus preliminary to any neuroesthetics. Then, Sabine Marienberg (Academy of Art, Berlin) introduced the topic of musical experience using a series of examples from the

history of Music where subjective experience, perception, and knowledge couldn't be disentangled without loosing both the meaning of the aesthetic experience and the perceptual content. She stressed the importance of considering various aesthetic media. Later, Ruggero Pierantoni (Accademia delle Belle Arti, Urbino), delved into the recent psychology of art, tackling with various interrelated notions that risk hindering any future development of neuroesthetics. The morning session was concluded by John Cailey (Providence, USA) who described his work as an artist exploiting virtual reality technology to build worlds for the linguistic aspects of art. His artworks showed how many classic distinctions between various art forms are historically outdated.

In the afternoon, the workshop focused on a real example of how aesthetics, psychology, neuroscience, and philosophy of mind could merge seamlessly to produce a unified attempt crossing all disciplinary boundaries. The advantage viewpoint exploited was externalism. Riccardo Manzotti (IULM, Milan) presented an externalist view of the mind and discussed many elementary notions that badly need some preliminary conceptual clarification in order to set a workable epistemic framework – namely, time, unity, and order. In doing so, Manzotti explicitly pointed out to the many common trails with previous presentation such as those given by Parks, Zeki, Sbrilli, and Chrisley. The following speaker, Erik Myin (Universiteit Antwerpen, Antwerpen) outlined in greater detail the overarching externalist model of the mind, showing how it could be applied to cases of aesthetic experience. He showed that such a framework avoids the usual dichotomy between mental and physical domain thus endorsing practical and theoretical new ways to tackle with subjective experience. Then, Joel Kruger (University of Copenhagen, Copenhagen) applied enactivism (a version of externalism) to the case of music both from a developmental perspective and from an aesthetic one. Music experience is some kind of activity and it can thus be explored from this advantageous viewpoint. Finally, Stephane Dumas, being an artist involved in various neuro-inspired artworks, gave a general overview of the outcomes of his community ranging from examples of bio-art to complex neuro-inspired installation where the boundary between mind and world was blurred.

After the last speaker, Arianna Ciula, the ESF delegate, presented the goals and the activities of ESF with special focus on the various instruments. The workshop ended with a rather long discussion about the follow-up activities, the common goals and the shared tools and methods.

Assesment of results

Two key aspects of this workshop were 1) the definition of the future goals of neuroesthetics on a theoretical level and 2) the definition of set of a selected concrete applications and research projects. We believe that, in the limits of a onetime event, the workshop was successful as to both issues. Further, the workshop succeeded in achieving a third result: it defined a very operative and concrete short term goal that could be used as an intermediate step to achieve a greater cohesion and knowledge inside the community.

We aim at publishing the result of the workshop in two different ways. The former will be a common document that will summarize the different views expressed during the workshop. It should highlight the link with other existing initiatives and institutions as well as sketch the European state of the art of neuroesthetics. The latter will consist in editing and publishing a book centered on the notion of an emerging consensus as to the externalist approach both to cognition and aesthetics. The conveners have already positively verified a few selected international scientific publishers as to the possibility of an edited volume on this topic.

During the workshop five main possible areas of further intervention were singled out. They are networking, technology for art, aesthetic theories, art as a probe, and science inspired art. A few words are needed to explain each of them.

Networking activity. The conveners and most of the participants to the workshop agreed that it is important to form a core group around which new initiatives could be organized. An important help in this regard will be given by cooperating with already existing network such as the Association of Neuroesthetics represented by its president, Dr. Alexander Abbushi.

Technology for art. This was one of the most crowded and active areas covered during the workshop. There is a huge potential for applications that exploit new results in perception studies in order to improve art experience by and large. These applications consist in (but not exclusively): artwork analysis by means of software and hardware tools (Chella showed examples of chromatic analysis of visual arts by means of automatic tools), archival of artworks in a content driven fashion (Sbrilli, Chrisley, Manzotti), museology, simulation of artistic processes, human-machine interfaces art oriented (Chella).

Aesthetic theory. This represents the state of the art of the field. It was not a unitary area though. There were three main streams of research: neuroestehtics as such (Zeki, Bartels, Abbushi), cognitive oriented aesthetics (Chrisley, Parisi, Chella), externalist-enactivist inspired aesthetics (Manzotti, Parks, Myin, Krueger, Pierantoni).

Art as a probe inside the mind structures. This was the most shared attitude although it is perhaps the most difficult view to be transferred into either applications or research project.

Science-technology inspired art. Given the increasing interest of science in shaping the mind of the future (both theoretically and technologically), many artists feel that they have either to embody or to exploit these new dimensions. A perfect example was provided by John Cailey whose digital literature in cave virtual reality environment is a synthesis of such approaches. Equally interesting was the work carried on by Stephan Dumas and his Creative Skin group aiming at blurring the boundary between the artist's mind and the beholder's experience.

In sum, the outcome of the ESF Exploratory Workshop is going to be a multifaceted series of initiatives and cooperation between active group whose common ground, to use shorthand, is understanding art by means of the scientific understanding of the mind and viceversa.

Final Workshop programme

24 September 2009

09.30-09.45	**Welcome by Host Institution**
	Patrizia Nerozzi (IULM University, Milan)
09.45-10.00	**Introduction to the Workshop**
	Riccardo Manzotti (IULM University, Milan)
10.00-13.00	**Morning Session: Fundamental of Neuroesthetics**
10.00-11.00	**Presentation 1 "A neuroesthetic approach to ambiguity"**
	Semir Zeki (Imperial College, London, UK)
11.30-12.00	**Presentation 2 "The neurobiology of love"**
	Andrea Bartels (Dept. Logothetis, Berlin, DE)
12.00-12.30	**Presentation 3 "The future perspective of neuroesthetics"**
	Alexander Abbushi (President of the Association of Neuroesthetics, Berlin, DE)
12.30-13.00	**Discussion**
14.00-18.30	**Afternoon Session: Cognition between art and mind**
14.00-14.30	**Presentation 1 "Art in the machine"**
	Domenico Parisi (CNR, Rome, I)
14.30-15.00	**Presentation 2 "Mapping New Neural Pathways"**
	Jaime Gomez (Universidad Politecnica, Madrid, ES)
15.30-16.00	**Presentation 3 "Painting an experience? How aesthetics might assist a neuroscience of sensory experience"**
	Ron Chrisley (University of Sussex, Falmer, UK)
16.00-16.030	**Presentation 4 "Preliminary experiences on information processing applied to artistic phenomenology"**
	Antonio Chella (Università di Palermo, Palermo, I)
17.00-19.00	**Discussion on follow-up activities/networking/collaboration**
19.00-20.00	*Visit to the Romaneque Basilica of S.Ambrogio*

25 September 2009

09.30-13.00	**Morning Session: Neuroesthetics and art: past and future**
09.30-10.00	**Presentation 1 "Artists writing images: examples in contemporary art"** **Antonella Sbrilli** (La Sapienza University, Rome, I)
10.00-10.30	**Presentation 2 "Grey matter of words: some reflections on consciousness, writing and health"**
	Tim Parks (novelist and translator, Cambridge, UK)
10.30-11.00	**Presentation 3 "Consciousness and art: from music to literature"**
	Sabine Marienberg (Funktion des Bewusstseins, Berlin, DE)
11.00-11.30	**Presentation 4 "*Art and illusion* into the realm of time"**
	Ruggero Pierantoni (Urbino University, Urbino, I)
12.00-13.00	**Presentation 5 "Cave art"**
	John Cayley (Brown University, Providence, USA)
14.00-18.30	**Afternoon Session: Aesthetic Experience beyond the brain**
14.00-14.30	**Presentation 1 "Art, brain and the world: a physical unity"**
	Riccardo Manzotti (IULM University, Milan, I)
14.30-15.00	**Presentation 2 "Is esthetics in the head?"**
	Erik Myin (Universiteit Antwerpen, Antwerpen, BE)
15.00-15.30	**Presentation 3 "An enactivist model of music"**
	Joel Kruger (University of Copenhagen, Copenhagen, DK)
15.30-16.00	**Presentation 4 "Creative skin. An alternative to major trends in neuroesthetics"**
	Stephane Dumas (Sorbonne, Paris, FR)
16.00-16.30	*Coffee / Tea Break*
16.30-18.30	**Presentation of the European Science Foundation (ESF)**
	Arianna Ciula (SCH)
17.00-19.00	**Discussion on follow-up activities/networking/collaboration**

Final List of Participants

Convenor:

1. **Riccardo MANZOTTI**
   Institute of Behavior, Consumers and
   Communication
   IULM University
   Milan
   Italy

ESF Representative:

2. **Arianna CIULA**
   Humanities Unit
   European Science Foundation
   Strasbourg
   France

Participants:

3. **Alexander ABBUSHI**
   President
   Association of Neuroesthetics (AON)
   Berlin
   Germany

4. **Andreas BARTELS**
   MPI for Biological Cybernetics
   Dept. Logothetis
   Tübingen
   Germany

5. **John CAYLEY**
   Digital poet
   Brown University
   Providence
   USA

6. **Antonio CHELLA**
   Dipartimento di Ingegneria e Informatica
   Università di Palermo
   Palermo
   Italy

7. **Ron CHRISLEY**
   Director of the Centre for Research in
   Cognitive Science
   University of Sussex
   Falmer
   United Kingdom

8. **Stéphane DUMAS**
   ESAAD LETA-CRE
   University Paris I
   Paris
   France

9. **Jaime GÓMEZ RAMIREZ**
   Autonomous Systems Laboratory
   Universidad Politecnica de Madrid
   Madrid
   Spain

10. **Joel KRUEGER**
    Center for Subjectivity Research
    University of Copenhagen
    Copenhagen
    Denmark

11. **Sabine MARIENBERG**
    Berlin-Brandenburgische Akademie der
    Wissenschaften
    Berlin
    Germany

12. **Erik MYIN**
    Centre for Philosophical Psychology
    University of Antwerp
    Antwerpen
    Belgium

13. **Domenico PARISI**
    Institute of Cognitive Sciences and
    Technologies
    National Research Council
    Roma
    Italy

14. **Timothy PARKS**
    University of Cambridge
    Cambridge
    United Kingdom

15. **Ruggero PIERANTONI**
    Scholar on perception and art
    Politecnico di Milano
    Accademia Belle Arti di Urbino
    Genova
    Italy

16. **Antonella SBRILLI**
    Università degli Studi di Roma La
    Sapienza
    Roma
    Italy

17. **Semir ZEKI**
    Laboratory of Neurobiology
    Department of Anatomy
    University College of London
    London
    United Kingdom

Statistical breakdown of participants

A total number of 17 participants attended the meeting. There was one last minute cancellation (Jill Scott, CH). A list of all attendees is given above.

By country

Italy	5
UK	3
Germany	3
DK	1
France	1
Belgium	1
USA	1
Spain	1

By approximate age

< 40	5
40 – 55	8
> 55	3

Gender

Male	14
Female	2

Riccardo Manzotti (main convenor)
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Milano, 25 Ottobre 2009