

# HPSC0111 – Science, Art and Philosophy



## Course Syllabus

2018-19 session | Dr Chiara Ambrosio | Email address [c.ambrosio@ucl.ac.uk](mailto:c.ambrosio@ucl.ac.uk)

This module explores the interactions between science and art from the mid-nineteenth century to the present. Its philosophical focus is the notion of "representation", conceived as a crucial common link between scientific and artistic visual practices. Integrating the history and philosophy of scientific and artistic representations, the course will address a broad range of issues. These will include questions on the nature and role of visual representations in scientific and artistic practice, what counts as "objective" and "accurate" representation, when and how images count as "evidence", and whether the relations between science and modernism contribute to overturn the common sense view that "art invents, science discovers".

## Course Information

### Basic course information

|                  |  |
|------------------|--|
| Course website:  | n/a  |
| Moodle Web site: | Search "HPSC 0111 – Science, Art and Philosophy" (enrolment key: "Darwin") |

|                  |  |
|------------------|--|
| Assessment:      | See separate “assessment” section  |
| Timetable:       | <a href="http://www.ucl.ac.uk/timetable">www.ucl.ac.uk/timetable</a><br>Remember to check your personal timetable regularly for the venue of lectures and tutorials.<br><b>Note: some of the lectures will be based in museums and galleries. Please refer to the weekly schedule below for further details.</b> |
| Prerequisites:   | none   |
| Required texts:  | See separate reading lists   |
| Course tutor(s): | Chiara Ambrosio  |
| Contact:         | <a href="mailto:c.ambrosio@ucl.ac.uk">c.ambrosio@ucl.ac.uk</a> ; office phone 02076790166  |
| Web:             |  |
| Office location: | Room 1.2a, 22 Gordon Square  |
| Office hours:    |  |

## Schedule<sup>1</sup>

| UCL Week | Topic  | Date   | Reading (see detailed weekly reading list below) |
|----------|--|--------|--|
| 20       | Module introduction – Why Representations?   | 10 Jan | Kern   |
| 21       | Denotation, Convention and the Riddle of Style (Art Museum Lecture)                | 17 Jan | Goodman <u>or</u> Gombrich                       |
| 22       | Representation, Classification and the Order of Things                             | 24 Jan | Foucault   |
| 23       | Truth-to-Nature (Art Museum Lecture)   | 31 Jan | Daston and Galison                               |
| 24       | Representation in Philosophy of Science  | 7 Feb  | Suárez   |
| 25       | Reading week   | 14 Feb |  |
| 26       | Representation in the Age of Mechanical Reproduction (Tutorials in the Art Museum) | 21 Feb | Daston and Galison                               |
| 27       | Modernist Visions  | 28 Feb | Henderson <u>or</u> Galison                      |
| 28       | Representing Time: Seriality and Duration (Tutorials in the Art Museum)            | 7 Mar  | Canales  |
| 29       | Visualisation Lost and Regained  | 14 Mar | Galison  |
| 30       | The Future of Representations  | 21 Mar | Daston and Galison                               |

<sup>1</sup> For further information regarding assessments (including word counts, late submissions and possible penalties) please refer to the STS appropriate programme page i.e B.Sc or M.Sc

## Assessments

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### Summary

|                             | Description  | Deadline                                   | Word limit | Deadline for Tutors to provide Feedback |
|-----------------------------|--|--|------------|---|
| <b>Coursework 1<br/>40%</b> | Journal article in the style of <i>Leonardo</i> magazine | 1 April                                    | 2500       | 25 April                                |
| <b>Coursework 2<br/>40%</b> | Poster   | 8 April                                    | n/a        | 1 May                                   |
| <b>Coursework 3<br/>20%</b> | Poster presentation                                      | 26 April<br>North Cloisters<br>from 1.30pm | 10 minutes | 7 May                                   |

**Please note: UCL's service standard for returning feedback is four weeks from the submission of your coursework. The deadlines for feedback above aim at returning your feedback within two weeks (14 working days). There may be delays on the deadlines above depending on unforeseen circumstances at the time of marking, but even in that case I aim to return feedback within three weeks at the latest.**

### Specific Criteria for Assessment for this Module:

The assessment for this course is project-based. This means that you will have to do the thinking once, and settle on a topic you will research throughout the term. Your project will then be assessed in three ways: a written piece (*Leonardo* article), a visual piece (poster) and an oral component (presentation).

This might seem demanding, but there is method in the apparent madness of this assessment. The three forms of assessment are pedagogically complementary, and they aim to foster all the skills (critical thinking, visual thinking/object-based research, oral argumentation) we cultivated in the module. These are skills you will need in life no matter what career you will decide to embark on. And you will be able to use the poster and article in your portfolios for job applications, while the presentation will build your confidence in public speaking for job interviews.

Detailed information on the assessment is available on moodle. Look at the "**project survival guide**" and "**poster guidance**" documents in the assessment tab on moodle.

## Aims & objectives

### Aims:

The aim of this course is to explore the notion of “representation” as a crucial link between scientific and artistic visual practices. Drawing on a variety of interpretative tools from analytical and continental philosophical traditions, the course will address a range of philosophical questions arising from the parallel histories of representations in science and art. These will include issues concerning the nature and role of visual representations in scientific and artistic practice, what counts as “objective” and “accurate” representation, when and how images count as “evidence”, and whether the relations between science and modernism contribute to overturn the common sense view that “art invents, science discovers”.



### Objectives

By the end of the course, students will have acquired the necessary analytical and interpretative tools to engage critically with a broad range of visual materials and to establish interdisciplinary parallels between visual representations in science and in the visual arts.

## Module plan

### Teaching format:

This course comprises a two-hour lecture (Wednesdays) and a one-hour seminar (Fridays). In each lecture, I will explain the readings assigned for the current week. In some cases, I might give you a choice between two or three optional readings, and you will be expected to read them in preparation for the seminars on Fridays.

For each seminar, I would like you to find a representation that will stimulate further thoughts and discussion on the readings. By “representation” I mean an object, image, video, piece of music or anything else of your choice that might be relevant to the readings assigned each week. I would like you to pitch the object for a couple of minutes, and we will then discuss with the rest of the class how the object connects to the readings for a particular week. For tutorials that take place in the Art Museum (after reading week), I will provide objects on display, and you will have to link them to the readings for the relevant weeks.

After reading week we will run two tutorial sessions on poster design and assessment in general. As in professional academic practice, the poster, short article and presentation which form your assignment are complementary to each other and should be approached as a coherent and unified research project. More details on this will be given in the lectures and seminars. Please refer to the additional documents on moodle for the format of the poster and for further details on what is required for the article in the style of the journal Leonardo.

## Weekly Schedule with Readings

### Lecture 1 – Thursday 10 January Introduction: Why Representations?

#### Required readings:

Stephen Kern, *The Culture of Time and Space 1880-1914*, Cambridge, Mass.: Harvard University Press, 1983.

(Introduction; Chapter 1 “The Nature of Time” and/or Chapter 6 “The Nature of Space”).



### Part 1. How do representations “represent”?

### Lecture 2 – Thursday 17 January Denotation, Convention and the Riddle of Style

[Note: This lecture will take place at the UCL Art Museum]

#### Required Readings:

Choose one of the following:

Nelson Goodman, *Languages of Art*. Indianapolis: Hackett, 1976.

(Introduction; Chapter 1 “Reality Remade”. You might want to consider also the following extracts from chapter 2: “Exemplification” (pp. 52-57) and “Samples and Labels” (pp. 57-68).

Ernst Gombrich, *Art and Illusion* London: Phaidon, 1960.

(“Psychology and the Riddle of Style” (introduction); Chapter 2 “Truth and the Stereotype”)

#### Further Readings:

On/by Nelson Goodman

- Nelson Goodman, *Ways of Worldmaking*, New York: Hackett, 1978.
- Douglas Arrell, "What Goodman Should Have Said about Representation", in *The Journal of Aesthetic and Art Criticism*, vol. 4, no. 1 (1987), pp. 41-49. (also reprinted in Elgin 1997, below).
- Catherine Z. Elgin, *Nelson Goodman's Philosophy of Art*. (New York: Garland Publishing, 1997).
- Alessandro Giovannelli, "Goodman's Aesthetics", *The Stanford Encyclopedia of Philosophy* (Summer 2010 Edition), Edward N. Zalta (ed.), URL= <http://plato.stanford.edu/archives/sum2010/entries/goodman-aesthetics/>
- Richard Rudner (ed.). *Logic and Art: Essays in Honor of Nelson Goodman*. (Indianapolis: Bobbs Merrill, 1972)

#### On/by Ernst Gombrich

- Ernst Gombrich, *Meditations on a Hobby Horse*. London: Phaidon, 1963.
- Ernst Gombrich, Julian Hochberg and Max Black, *Art Perception and Reality*. Baltimore: The John Hopkins University Press, 1972.
- Ernst Gombrich and Didier Eribon, *Conversations on Art and Science*. New York: Abrams, 1993.
- Onions J. (ed.). *Sight & Insight. Essays in Honour of E.H. Gombrich*. (London: Phaidon 1994).
- Sheldon Richmond, *Aesthetic Criteria: Gombrich and the Philosophies of Science of Popper and Polanyi*. Amsterdam and Atlanta, GA: Rodopi, 1994.
- Christopher Wood, "E.H. Gombrich's Art and Illusion: A Study in the Psychology of Pictorial Representation, 1960", *The Burlington Magazine*, vol. 151 no. 1281 (2009), pp. 836-839.

### **Lecture 3 – Thursday 24 January**

#### **Representation, Classification and the Order of Things**

##### **Required Readings:**

Michel Foucault, *The Order of Things* (London: Routledge, 2002).

(Preface and extracts from part 1: 1. Las Meniñas; 2.1 "The Four Similitudes"; 3. Representing)

##### **Further readings:**

- Svetlana Alpers, "Interpretation without Representation, or the Viewing of Las Meniñas", in *Representations*, vol. 1 (1983), pp. 30-42.
- Svetlana Alpers, *The Art of Describing. Dutch art in the seventeenth century*. (Chicago: University of Chicago Press, 1983).
- Svetlana Alpers, "The Studio, the Laboratory and the Vexations of Art", in Jones, C. and Galison. P. (eds.), *Picturing Science and Producing Art*. (London: Routledge

University Press 1998), 401-417.

- John Searle, "Las Meniñas and the Paradoxes of Pictorial Representation" in *Critical Inquiry* vol. 6 no. 3 (1980), pp. 477-488.

### **Companions and secondary sources on Foucault:**

- Gutting, Gary and Oksala, Johanna, "Michel Foucault", *The Stanford Encyclopedia of Philosophy* (Summer 2018 Edition), Edward N. Zalta (ed.), URL = <<https://plato.stanford.edu/archives/sum2018/entries/foucault/>>.
- Johanna Oksala, *How to Read Foucault*, London: Granta Books 2007.
- Gary Gutting (ed.), *The Cambridge Companion to Foucault*, Cambridge: Cambridge University Press, 2009, 2nd edition.
- Gary Gutting, *Michel Foucault's Archaeology of Scientific Reason*, Cambridge: Cambridge University Press, 1989.

### **Lecture 4 – Thursday 31 January**

#### **Truth-to-Nature**

**[Note: This lecture will take place in the UCL Art Museum]**

#### **Required Readings:**

Lorraine Daston and Peter Galison, *Objectivity*. New York: Zone Books 2007.  
(Chapter 2, Truth-to-Nature)

#### **Further Readings:**

- Lorraine Daston, "Objectivity and the Escape from Perspective", in *Social Studies of Science*, vol. 22, no. 4 (1992), pp. 597-618.
- Lorraine Daston and Peter Galison, "The Image of Objectivity", in *Representations*, no. 40 (1992), pp. 81-128.
- Lorraine Daston "On Scientific Observation", in *ISIS*, vol. 99, no. 1 (2008), pp. 97-110.
- Lorraine Daston and Peter Galison, "Epistemologies of the Eye", in *Objectivity* (New York: Zone Books 2007), pp. 17-51.

#### **Historical Case-Studies**

- Lorraine Daston and Elizabeth Lunbeck (eds.), *Histories of Scientific Observation*. Chicago and London: University of Chicago Press, 2011. (see especially Part 1: "Framing the History of Scientific Observation, 500-1800")
- Peter Galison and Caroline Jones, *Picturing Science, Producing Art*. New York and London: Routledge, 1998 (see especially Part 3, "Seeing Wonders").
- Reinhard Hildebrand, "Attic Perfection in Anatomy: Bernhard Siegfried Albinus (1697–1770) and Samuel Thomas Soemmerring (1755–1830), in: *Annals of Anatomy*,

187, vols 5-6 (2005), pp. 555-573.

- Ann B. Shteir and Bernard Lightman (ed.) *Figuring it out: Science, Gender and Visual Culture* Dartmouth College Press, 2006 (see especially part 1, chapters 1-3).
- Patrick Singy “Huber’s Eyes: The Art of Scientific Observation before the Emergence of Positivism”, in *Representations*, vol. 95, no. 1, pp. 54-75.

The story of Wandelaar’s rhino:

- Chiara Ambrosio, “Objectivity and Representative Practices across Scientific and Artistic Visualisation”, in A. Carusi et al. *Visualisation in the Age of Computerisation*, London: Routledge 2014, pp. 118-144.

## Lecture 5 – Thursday 7 February

### The Conundrum of Representation in Philosophy of Science

#### Required readings:

Roman Frigg and Matthew Hunter (eds.) *Beyond Mimesis and Convention: Representation in Art and Science* (Dordrecht: Springer, 2010) (Introduction)

Mauricio Suárez, “Scientific Representation”, *Philosophy Compass* (2010) vol. 5, no. 1, pp. 91-101.

#### Further readings:

- Ambrosio, C. “Iconic Representations and Representative Practices”, *International Studies in Philosophy of Science*, vol. 28 (3), 2014, pp. 255 - 275
- Otavio Bueno, George Darby, Steven French and Dean Rickles, *Thinking about Science, Reflecting on Art*, London: Routledge, 2018.
- Black, M. *Models and Metaphors*. Ithaca and New York: Cornell University Press, 1966.
- Roman Frigg and Stephan Hartmann, S. 2006. “Models in Science”. *The Stanford Encyclopedia of Philosophy* (Summer 2009 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/sum2009/entries/models-science/> .
- Ian Hacking, *Representing and Intervening*. Cambridge: Cambridge University Press, 1983.
- Mary Hesse, *Models and Analogies in Science*, Notre Dame: Indiana University Press, 1966.
- David Kaiser, “Stick-Figure Realism: Conventions, Reification and the Persistence of Feynman Diagrams”, in *Representations*, no. 70 (2000), pp. 49-86.
- Morgan, M. and Morrison, M. (eds.). *Models as Mediators. Perspectives on Natural and Social Science*. Cambridge: Cambridge University Press, 1999.
- Demetris Portides, “Scientific Representation, Denotation and Explanatory Power”, in: Raftopoulos, A. and Machamer, P. (eds), *Perception, Realism and the Problem of Reference*. Cambridge: Cambridge University Press, 2012.
- Mauricio Suárez, “Scientific Representation: Against Similarity and Isomorphism” in:



International Studies in the Philosophy of Science (2003), vol. 17 no. 3:225-244.

- Julia Sánchez-Dorado “Methodological Lessons for the integration of Philosophy of Science and Aesthetics”, in O. Bueno et al. *Thinking about Science, Reflecting on Art*, London: Routledge, 2018, pp. 10-26.
- Bas van Fraassen, *Scientific Representation: Paradoxes of Perspective* (Oxford: Oxford University Press, 2008).

**Thursday 14 February – READING WEEK, no lectures/seminars**

## **Part 2 – Representations “in Action”**

**Lecture 6 – Thursday 21 February**

**Representation in the Age of Mechanical Reproduction**

**[Note: This week’s tutorial will take place in the UCL Art Museum]**

### **Required readings:**

Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007)  
(Chapter 3, Mechanical Objectivity)

### **Further Readings:**

- Chiara Ambrosio, “Composite Photographs and the Quest for Generality: Themes from Peirce and Galton”, *Critical Inquiry* vol. 42 no 3 (2016), pp. 547-579.
- Chiara Ambrosio, “‘Beauty is the Universal Seen’: Objectivity as Train Vision in Alfred Stieglitz’s Experimental Aesthetics”, *Visual Studies* vol. 29 no. 3, pp. 250-260.
- Walter Benjamin, *Illuminations*. London: Pimlico, 1999. (this collection of essays contains “The Work of Art in the Age of Mechanical Reproduction”).
- Walter Benjamin, *The Work of Art in the Age of Mechanical Reproduction*. London: Penguin Books, 2008.
- Peter Geimer, “Image as Trace: Speculation about an Undead Paradigm”, in *differences*, vol. 18, no. 1, pp. 7-28.
- Carlo Ginzburg, “Family Resemblances and Family Trees: Two Cognitive Metaphors”, in *Critical Inquiry*, vol. 30 no. 3 (2004), pp. 537-556.
- Andreas Mayer, “The Physiological Circus: Knowing, Representing and Training Horses in Motion in Nineteenth Century France”, in *Representations*, vol. 111, no. 1 (2010), pp 88-120.
- Francis Ribemont, Patrick Daum and Philip Prodger (eds.), *Impressionist Camera: Pictorialist Photography in Europe, 1888-1918* (London: Merrell, 2006)
- Susan Sontag, *On Photography* (London: Penguin Classics 2008)
- Joel Snyder, “Visualisation and Visualizability”, in Peter Galison and Caroline Jones (eds.), *Picturing Science, Producing Art* (New York and London: Routledge, 1998)

## Lecture 7 – Thursday 28 February

### Modernist Visions

#### Required readings:

Choose one of the following (you can use the remaining article as optional reading):

Linda Dalrymple Henderson, "X-Rays and the Quest for Invisible Reality in the Art of Kupka, Duchamp and the Cubists", in: *Art Journal* vol. 47 (1988) pp. 323-340.

Peter Galison, "Aufbau/Bauhaus: Logical Positivism and Architectural Modernism" in *Critical Inquiry*, Vol. 16, no. 4 (1990), pp. 709-752.

#### Further readings:

- Chiara Ambrosio, "Cubism and the Fourth Dimension", in *Interdisciplinary Science Reviews*, vol. 41, no 2-3, pp. 202-221.
- Willard Bohn "In Pursuit of the Fourth Dimension: Guillaume Apollinaire and Max Weber" in: *Arts* vol. 54 (1980), pp. 166-169.
- Linda Dalrymple Henderson, *The Fourth Dimension and Non-Euclidean Geometry in Modern Art*, Princeton: Princeton University Press, 1983). See also the second edition, MIT Press 2013.
- Linda Dalrymple Henderson, "Editor's Introduction – Writing Modern Art and Science", in *Science in Context*, vol. 17 no. 4 (2004), pp. 423-466. (you can use this issue of *Science in Context* as a source of further material on Modernism and Science)
- Linda Dalrymple Henderson, *From Energy to Information: Representation in Science and Technology, Art, and Literature*. Stanford: Stanford University Press, 2002.
- William R. Everdell, *The First Moderns: Profiles and Origins of Twentieth Century Thought*. Chicago: University of Chicago Press, 1999.
- Gerald Holton, "Henri Poincaré, Marcel Duchamp and Innovation in Science and Art", in *Leonardo*, vol 34 no. 2 (2001), pp. 127-134.
- Stephen Kern, *The Culture of Time and Space 1880-1918*, Cambridge, Mass.: Harvard University Press, 1983.
- Arthur I. Miller, *Insights of Genius*. Cambridge, Mass.: The MIT Press, 2000.
- Arthur I. Miller, *Einstein, Picasso. Space, Time and the Beauty that Causes Havoc*. New York: Basic Books, 2001.
- Gavin Parkinson *Surrealism, Art and Modern Science. Relativity, Quantum Mechanics, Epistemology*. New Haven and London: Yale University Press, 2008.

**Lecture 8 – Thursday 7 March**  
**Representing Time: Seriality and Duration**

**[Note: This week's tutorial will take place in the UCL Art Museum]**

**Required Readings:**

Jimena Canales “Desired Machines: Cinema and the World in Its Own Image”, in *Science in Context*, no. 24 vol. 3 (2011), pp. 329-359.

**Further readings:**

- Keith Ansell Pearson and John Mullarkey (eds.) *Bergson: Key Writings*. London: Continuum, 2002.
- Henri Bergson, *Duration and Simultaneity*, edited by Robin Durie. Manchester: Clinamen Press, 1999.
- Suzanne Guerlac, *Thinking in Time; An Introduction to Henri Bergson*. Ithaca: Cornell University Press, 2006.
- Jimena Canales, *The Physicist and The Philosopher*. Princeton and Oxford: Princeton University Press.
- Jimena Canales *A Tenth of a Second: A History* (Chicago and London: The University of Chicago Press, 2009)
- Stephen Kern, *The Culture of Time and Space 1880-1914*, Cambridge, Mass.: Harvard University Press. (See especially chapters 1- 4 and chapter 11)
- Mark Antliff “The Fourth Dimension and Futurism: A Politicised Space”, in *Art Bulletin*, vol 82 no. 4 (2000), pp. 720-733.

**Lecture 9 – Thursday 14 March**  
**Visualization Lost and Regained**

**Required Readings:**

Peter Galison, “The Suppressed Drawing: Paul Dirac’s Hidden Geometry”, in *Representations*, no. 72 (2000), pp. 145-166.

**Further Readings:**

- Lorraine Daston and Peter Galison, “Trained Judgment”, in *Objectivity*, New York: Zone Books 2007, pp. 309-357.
- Peter Galison, *Image and Logic*. Chicago: University of Chicago Press, 1997.
- David Kaiser, *Drawing Theories Apart*, Chicago: The University of Chicago Press, 2005.
- Arthur I. Miller, *Insights of Genius* Cambridge, Mass.: The MIT Press (2nd ed.).
- Arthur I. Miller “Aesthetics, Representation and Creativity in Art and Science” in *Leonardo*, vol. 28 no. 3 (1995), pp. 185-192.
- Andrew Pickering, *The Mangle of Practice*, Chicago: The University of Chicago Press,

1995.

- Warwick, Andrew, *Masters of Theory*. Chicago: The University of Chicago Press, 2003.

## **Lecture 10 – Thursday 21 March**

### **The Future of Representations**

**[Note: This week's lecture will take place in the UCL Art Museum]**

#### **Required Readings:**

Lorraine Daston and Peter Galison, *Objectivity*, New York: Zone Books 2007, Chapter 7 (Representation to Presentation)

#### **Further Readings:**

- -- *Tradition Aside. Slade Printmakers of the 1960s*. London: UCL Art Collections, 2007
- Carusi, A.S. Hoel, T. Webmoor and S. Woolgar (eds.), *Visualisation in the Age of Computerisation* (London: Routledge 2014).
- Harold Cohen, "A Self-Defining Game for One Player: On the Nature of Creativity and the Possibility of Creative Computer Programs", in *Leonardo*, vol. 35 no. 1 (2002), pp. 59-64.
- Coopmans, J. Vertesi, M. Lynch, S. Woolgar, *Representation in Scientific Practice Revisited*. Cambridge, Mass. The MIT Press, 2014.
- M. Lynch and S. Woolgar *Representation in Scientific Practice*. Cambridge, Mass.: The MIT Press, 1990.
- R. Hamblyn and M. J. Callanan, *The Data Soliloquies*. London: UCL Environment Institute, 2009.
- Andrew Pickering, *The Cybernetic Brain*, Chicago: The University of Chicago Press, 2009.
- Christiane Paul (ed.). *A Companion to Digital Art*. Oxford: Wiley, 2016.
- Rainer Usselman, "The Dilemma of Media Art: Cybernetic Serendipity at the ICA London", in *Leonardo*, vol. 36, no. 5 (2003), pp. 389-396.