

Vision, Brain and Art / Summer 2016
Humanities and Social Sciences, KAIST

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Course Description:

The relationship between vision, brain science and art would be remote and vague at a first glance. However, when we give a thought about a definition of the function of both the brain and art, "to represent the constant and essential features of objects, and thus allow us to acquire knowledge about the world (Zeki, 1999)," it manifests the surprising connection of them. Our brain does not accept the external world as given. As the world is ever-changing, seeing objects from different angles, distances, and in different light conditions always result in different percepts. Without a constant mechanism, however, we would have been so susceptible to this vulnerable vision and lost our survival value a long time ago. Visual brain thus discounts all natural variations and has interests in the constant, enduring, and invariable properties of objects in the world. This active processing eventually guarantees acquiring the knowledge about the essential characteristics of the world.

Just as the visual brain does, art has a similar purpose, seeking out a way to represent the natural world as reliable as possible through various media. Throughout history, artists have struggled to transfer the 3-D reality into the 2-D picture plane, convey the movement into the static form of sculpture, and register the organic form of life into inorganic material substances. In summary, brain and art share a common task: to extract information about the constant and essential aspect of the visual world.

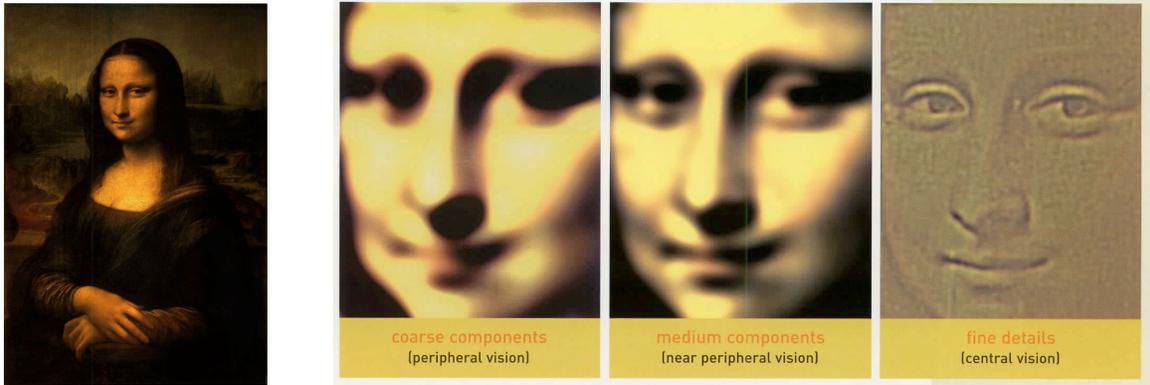
However, if the goal of science is to uncover generalization, artistic experiences are deeply engaged with the particular. While keeping an eye on this tension between science and art, this course introduces students on how to interpret and evaluate images (irrespective of whether they are from high art or popular culture) from a cultural, sociological, and historical perspective. A critical discussion on the power relationship inherent in the process of gaze, representation, and interpretation will be encouraged.

This course is thus designed to offer an interdisciplinary approach to the principles of brain functioning and its process of visual information as manifested in art works of various cultures. A comparative study of artistic representation in different principles will illustrate the human processing of visual events and the nature of sensory systems. Co-taught by a vision-scientist and an art historian, this class will provide an integrated understanding of cognitive process of perception and the comprehension of art beyond intuitive and often uninformed appreciation of its aesthetic values.

Course Highlights:

Leonardo Da Vinci achieved the sculptural volume of the figure through his virtuosity in highlighting and shading (*chiaroscuro*) and subtle application of tinted varnish, which resulted in a smoky haze over the surface (*sfumato*). The ambiguity of the famous *Mona Lisa* smile is traditionally attributed to Leonardo's fascination with *chiaroscuro* and *sfumato*. *Mona Lisa*'s lips are upward, but actually only its shade is turned upward. In other words, the painter created the illusion of smile without actually representing one. Vision science offers a systematic explanation that completes this understanding of the painterly skills and techniques. As the above figures demonstrate, her smile is more apparent in coarse-information component of the image, and is therefore more apparent to peripheral than to central vision. This shows that her expression

varies depending on where the viewer is looking, which results in its elusive quality. This juxtaposition of art history and vision science proves that a work of art is a reflection of how the brain represents the knowledge about the natural world, and that by analyzing the way brain operates when looking at a work of art we can possibly broaden our appreciation of both the art and science.



Readings:

Margaret Livingstone, *Vision and Art: The Biology of Seeing* (New York: Harry N. Abrams, 2014).
 Semir Zeki, *Inner Vision: An Exploration of Art and the Brain* (Oxford: Oxford University Press, 1999).
 Robert L. Solso, *Cognition and the Visual Arts* (Cambridge: The MIT Press, 1994).
 E. H. Gombrich, *Art and Illusion: A Study in the Psychology of Pictorial Representation* (New York: Phaidon Press, 2004).
 Anjan Chatterjee, *The Aesthetic Brain* (New York: Oxford University Press, 2014).
 John Berger, *Ways of Seeing* (London, Penguin Press, 1977).

The course grade is based upon:

- Attendance (10%): Missing more than 8 classes will automatically lead to an F.
- Two Exams (60%): One about half way through the course and one at the end. Exams will cover material from lectures and the book. Exams will consist of short essays and one or two longer essays.
- Project report (30%): Project topic will be announced (around at the end of the 2nd week).

Schedule (tentative):

Period	Topics	Contents
Week 1	Function of the Brain and of Art	<ul style="list-style-type: none"> • Introduction to Vision Science • Physiological Basis of Vision: Art of Receptive Field, Visual Pathways • Introduction to Art as <i>Mimesis</i>
Week 2	Form and Color in Vision and Art	<ul style="list-style-type: none"> • Spatial Frequency Theory • Central/Peripheral Vision • Evolution of Impressionism • Retinex Theory • Color Mixing and Resolution • Georges Seurat and Neo-Impressionism
Week 3	From 3-D to 2-D and Motion	<ul style="list-style-type: none"> • Stereopsis • Monocular Cues & Creating the Illusion of Depth • Linear Perspective and the Renaissance Masters

		<ul style="list-style-type: none"> • Cubism and Conceptualized vision • Illusion of Motion • Capturing the Movement: From Futurism to Op Art
Week 4	Ways of Seeing	<ul style="list-style-type: none"> • Is There Such Thing as Art? • Visual Communication • Work of Art in the Age of Mechanical Reproduction • Power Relationship Inherent in the Process of Representation and Gaze