

Neurocultural Health and Wellbeing

Series Editors: L. Lorusso · B. Colombo · A. Porro · N. Wade

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Neuroscience and Art

The Neurocultural Landscape

 Springer

Neuroscience and Art: The Neurocultural Landscape (2024)

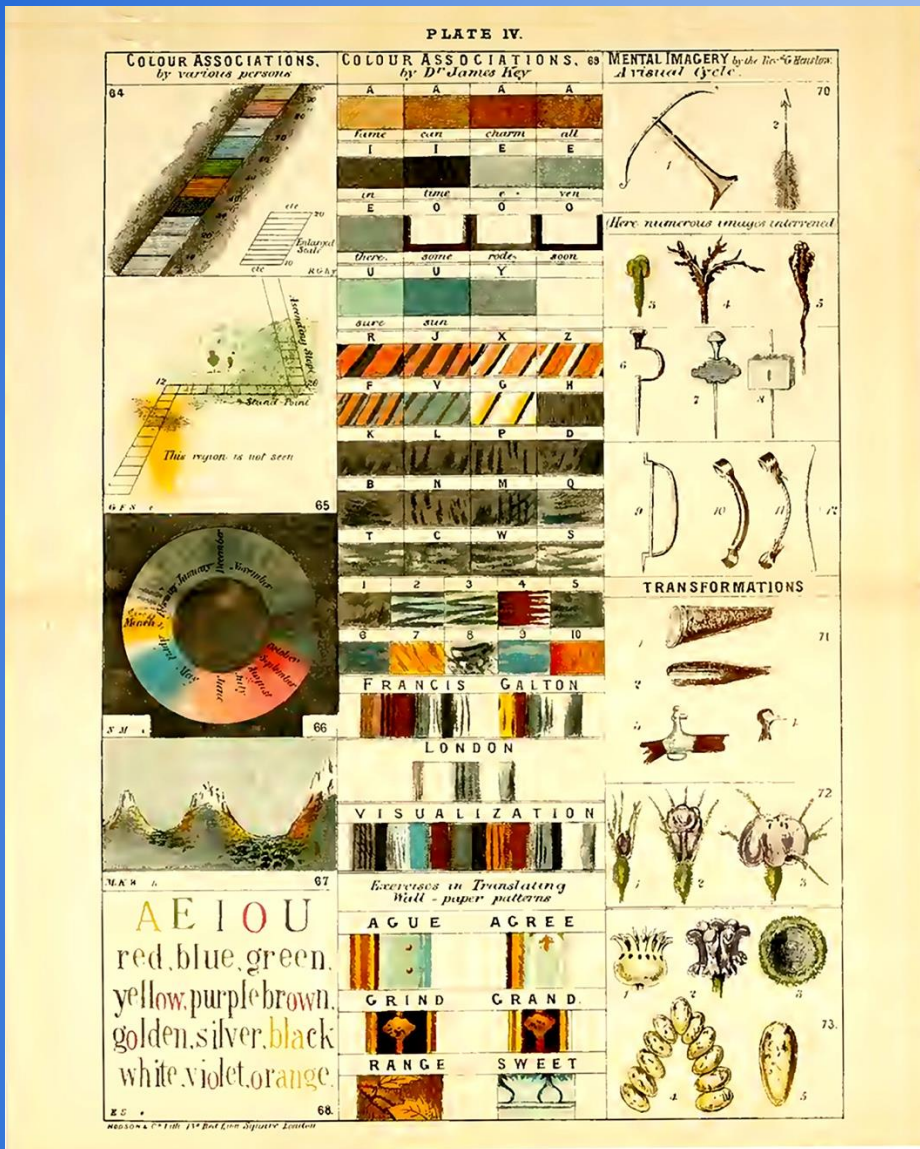
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Neuroscience and Art: The Neurocultural Landscape

- This book is focused on how understanding ourselves as humans is incomplete without considering both biological and cultural aspects.
- The book examines this through neuroculture.
- Neuroculture allows the text to explore the power of art in creating a bridge between cultural and neuroscientific lines of inquiry.
- Looking at both clinical and non-clinical populations, the text examines:
 - historical foundations,
 - distinguishes congenital/developmental conditions from those that are acquired,
 - emphasizes how the brain constructs our sensory experiences,
 - and accentuates that art includes the use of motor skills, memory, active visualization, the development of specialized skills, and so forth



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- 4 Social and Environmental Modifications: Dynamics of Change

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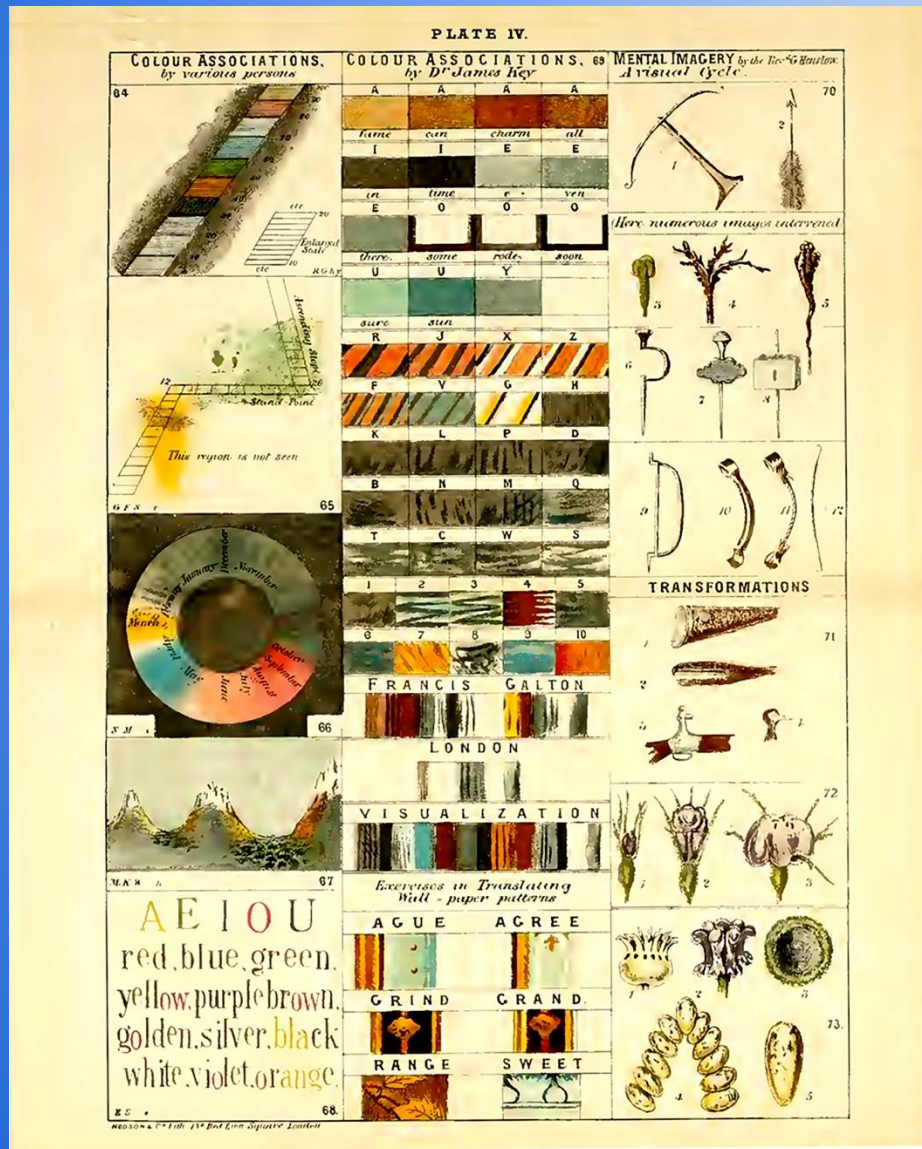
Part III The Neurocultural in Practice

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Book and chapter abstracts available at www.amyione.com

Plate IV from Francis Galton's *Inquiries into Human Faculty and Its Development* (1883). This compilation is an abridged summary of Galton observations on mental imagery. This book brought what we now call synesthesia to the attention of the scientific community.

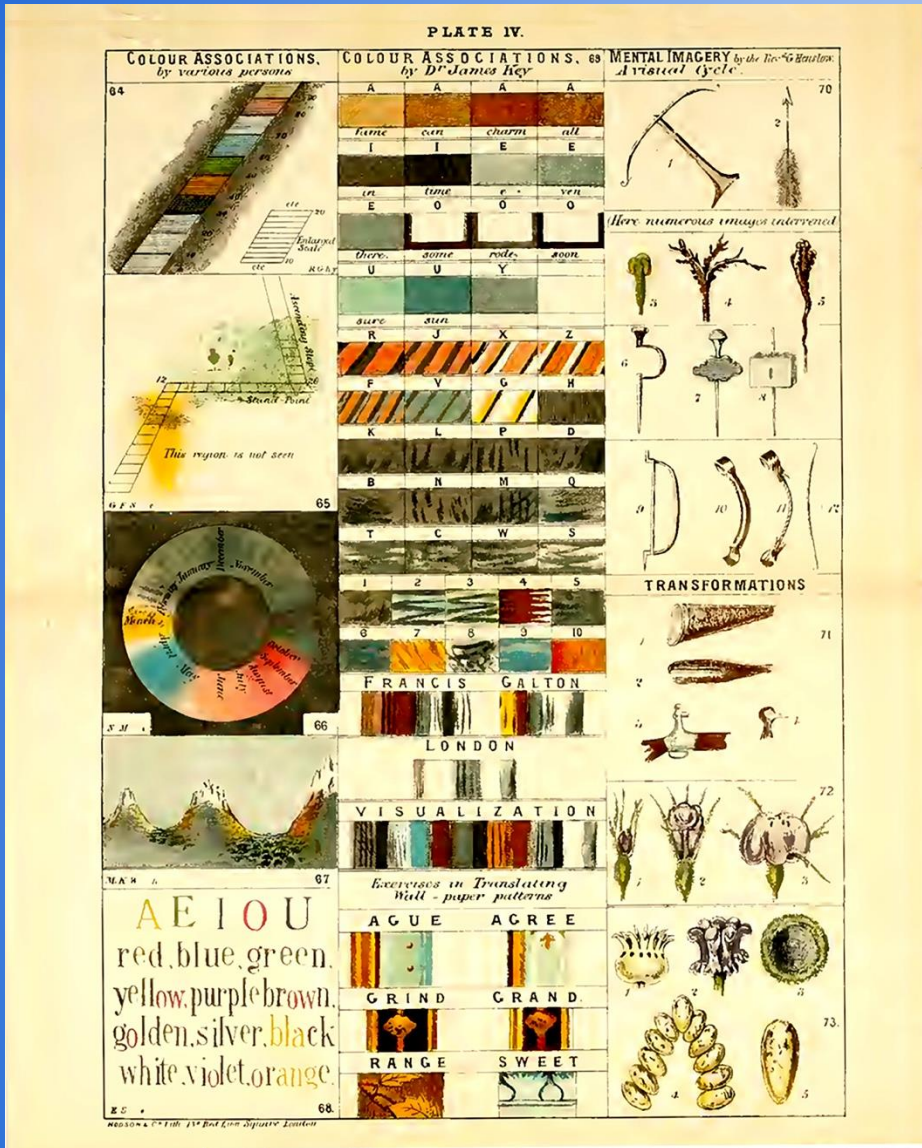
Sir Francis Galton, *Inquiries into Human Faculty and Its Development*, 1883



Although Galton is probably best known for his contributions to the nature versus nurture debate. *Neuroscience and Art: The Neurocultural Landscape* broadens our understanding, using neuroscience and art in conjunction with the human experience.

In other words, we now know that genetic and environmental strategies are both important and influence brain development. Both help us to understand how the brain functions as well as the unique ways in which each individual functions.

Left: Plate IV from Francis Galton's *Inquiries into Human Faculty and Its Development* (1883).



- Galton's compilation on the left is an abridged summary of his observations on mental imagery. We now call this modality synesthesia, as discussed at the end of this talk.
- Key here is that whereas Galton had initially concluded that these were no more than associations, he was soon convinced that this was a physiological phenomenon despite its kinship to mental imagery.
- By 1883, he had concluded synesthesia is fixed and automatic in nature

Sir Francis Galton, *Inquiries into Human Faculty and Its Development*, 1883

Inquiries into Human Faculty and Its Development emphasized that the differences among humans are profound:

It will be seen in the end how greatly metaphysicians and psychologists may err, who assume their own mental operations, instincts, and axioms to be identical with those of the rest of [humankind], instead of being special to themselves. The differences between [humans] are profound, and we can only be saved from living in blind unconsciousness of our own mental peculiarities by the habit of informing ourselves as well as we can of those of others.

Chapter 1: Historical Neuroculture

Chapter 2: Early Experimentation, Theories, and Applications



These two chapters examine the historical foundations of contemporary views, showing how our understanding of anatomy, brain function, sensory input evaluation, and higher-order functions have changed over the course of time. Looking at historical material in terms of observation, experiment, theory, and applications allows us to comprehend current understandings of brain functions, brain injury, sensory modalities, brain plasticity, and the brain/culture exchange. A key variable here is that it was not always understood that the brain constructs our sensory experiences.

Jan Steven van Calcar c. 1499–1546) is assumed to have been the illustrator of Vesalius' *De humani corporis fabrica libri septem* or *On the Fabric of the Human Body* (1543), which contained many intricately detailed drawings of human dissections.



The Healing of Tobit, c. 1625, Bernardo Strozzi. The archangel Raphael helping Tobias to heal his blind father Tobit.

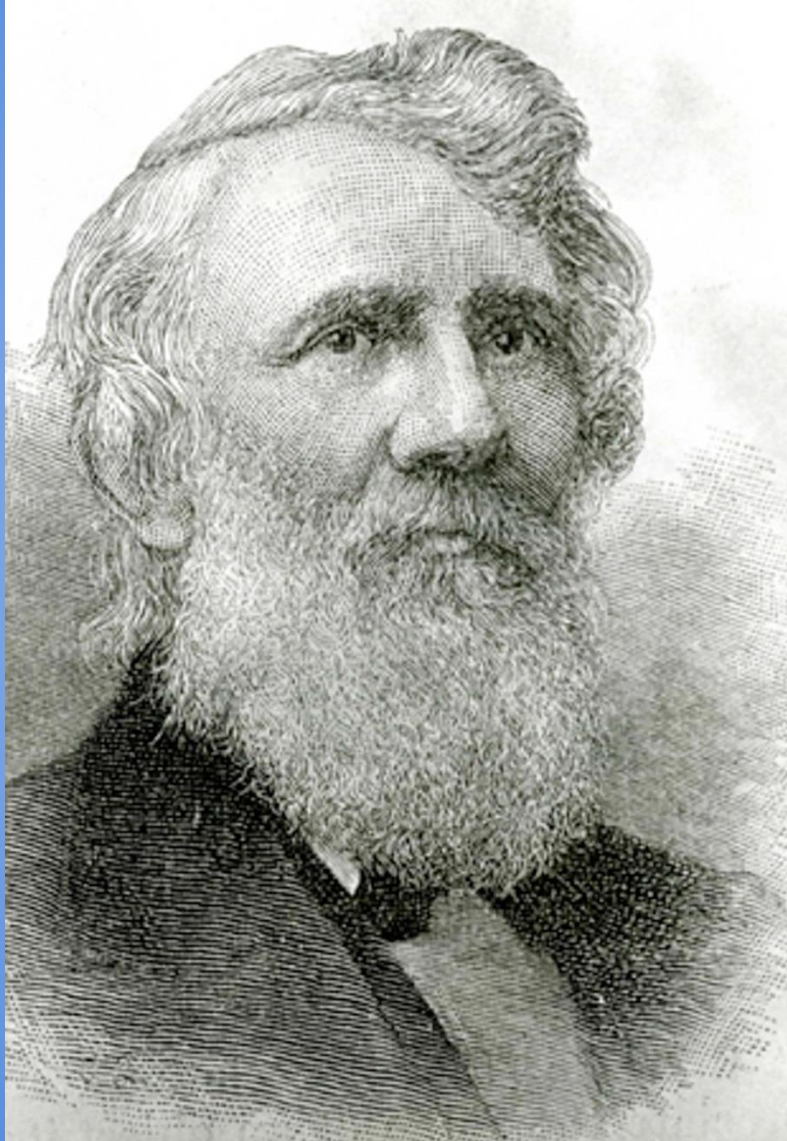
Chapter 3: Biological and Genetic Perspectives

Chapter 4: Social and Environmental Modifications: Dynamics of Change

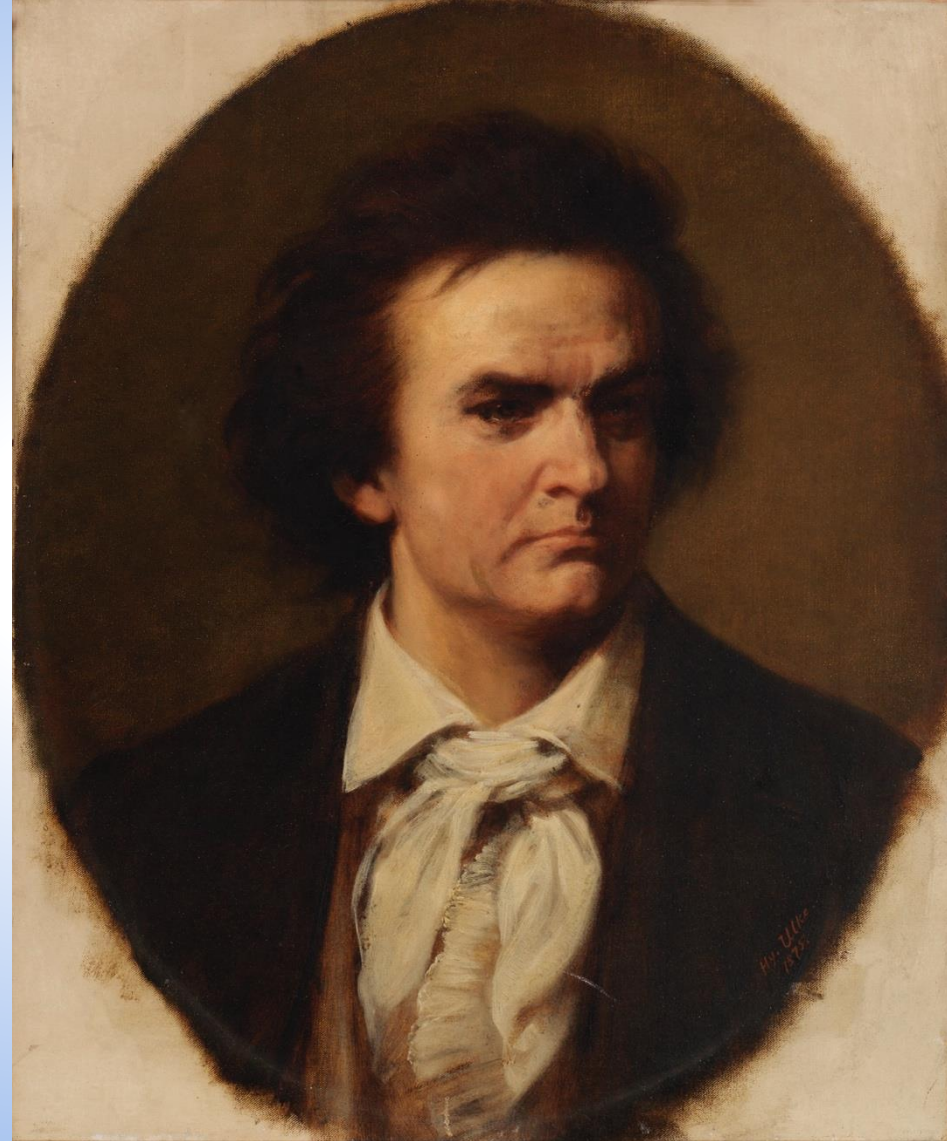
These two chapters underscore the complexity of brain development. As both chapters point out, these are not separate topics in individual lives.

- Art offers a particularly robust entry point for examining the complex variations of neurotypical and neuroatypical conditions (e.g., autism, down syndrome, deafness, etc.).
- Artwork also brings to light the longer history of conditions because they are often illustrated or described in literature, history, and biography long before they are medically characterized.

Congenital and Acquired Deafness

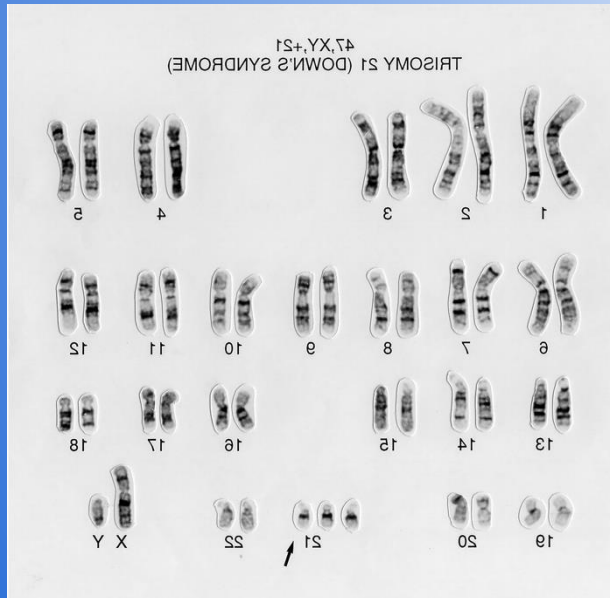


John Carlin, painter and writer



Ludwig van Beethoven, musician and composer

- In the sixteenth century, disabilities were often presented in comical terms or as symbols of evil.
- This painting, *The Adoration of the Christ Child* (1515), is unusual in showing the nativity scene at night, and in showing that one angelic figure and an onlooker appear to share the appearance of Down syndrome.
- Based on the long history of using family and friends as models it is possible that those depicted were known to the artist. Of particular cultural interest here is that depicting a Down-faced angel goes against the attitudes of the time.



Color Blindness

Retinal color blindness: **Color blindness** or **color vision deficiency** is the decreased ability to see color or differences in color

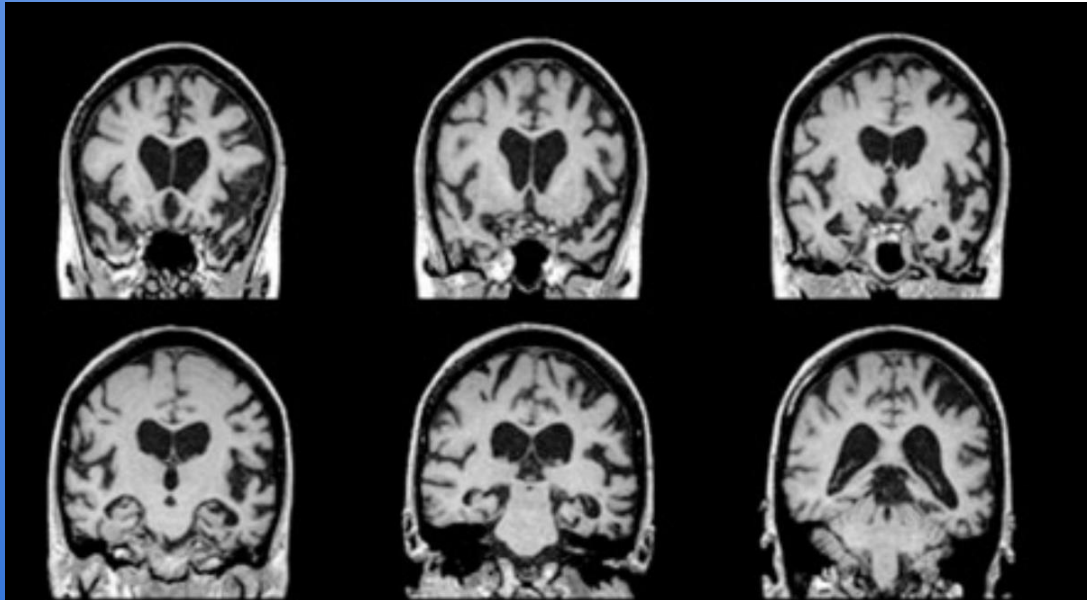
Cerebral colorblindness (monochromacy or achromatopsia): Total color blindness, there is no ability to see color. A person cannot perceive colors even though the eyes are capable of distinguishing them. Some sources do not consider these to be true color blindness, because the failure is of perception, not of vision.

Artist **Meghan Sims** was born with a rare vision condition called Achromatopsia, c. Being an achromat, Sims is colorblind, near sighted and extremely light sensitive. Her unique way of seeing the world inspired a lifelong curiosity with the concepts of perception, light, shadow and the emotional values of color. She, too, began to incorporate colors she could not see into her work

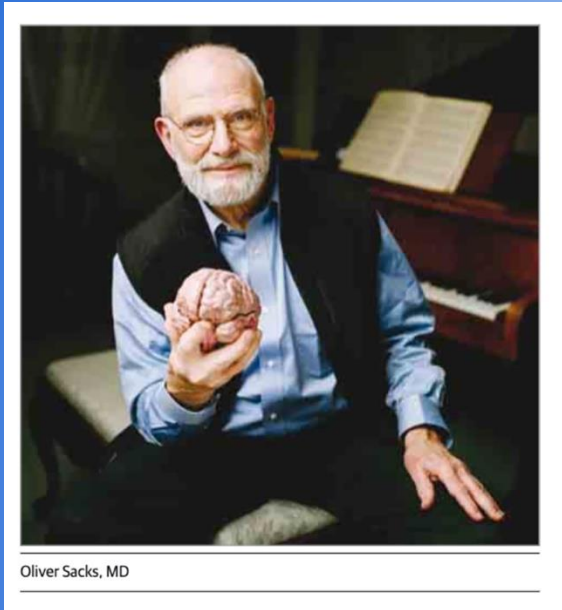
The Abstract artist **Jonathan Isaacson**, called the colorblind painter by Oliver Sacks, lost his ability to see color and his synesthesia after a small stroke that occurred after a car accident. He found his monochromatic world ghostlike and depressing. He began to incorporate color he could not see into his work about two years after his stroke

Chapter 5: A Luminous Presence: Iris Murdoch (1919–1999)

Novelist/philosopher, Murdoch's health, cultural contributions, and biography emphasize the complexity of human experience. Her medical profile included the hearing loss that she initially noticed around age 35, as well as the onset of Alzheimer's disease in her seventies. Studies of her brain degeneration after her death were correlated with the syntax in handwritten manuscripts she penned for her novels over the course of her career. Her academic writings added perspective on the historical linkages among neuroscience, the arts, and neuroculture discussed in earlier chapters.



Chapter 6: Biography and Biology: Oliver Sacks (1933-2015)



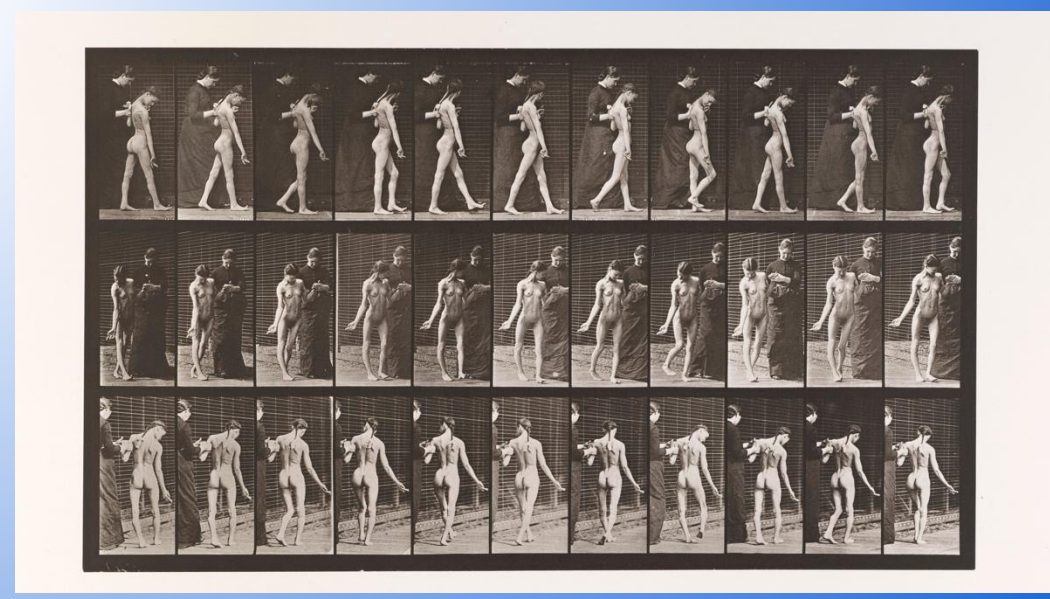
This chapter introduces Oliver Sacks (1933–2015) as a doctor, a writer, and a neurologist who reported on his own neurological conditions. He introduced his patients as more than their pathologies. They were struggling to adapt and survive. Particular attention is given to four of his works:

- (1) *Migraine* (1970);
- (2) *Awakenings* (1973); which, made him a worldwide figure;
- (3) *A Leg to Stand On* (1984), a more personal book, that tells of an accident Sacks had in Norway that resulted in a disturbance of proprioception and how music proved therapeutic;
- (4) “The Man Who Mistook His Wife for a Hat,” published in 1985, was originally presented as a case involving agnosias. The autopsy showed atypical Alzheimer’s disease.

Chapter 7: Neuroculture and Image Technology

One reason to examine technological developments neuroculturally is that they demonstrate the brain is creatively involved in activities that alter the world, art, and culture.

Another, in neuroscientific terms, is that just as earlier adjustments to our knowledge base furthered our grasp of physiological functions but did not completely replace the value of engaging with gross anatomy and individuals, these new technologies advanced our knowledge base and cultural possibilities without fully replacing earlier methods for exploring the human brain, psychology, art, and culture.





Auguste Renoir.

- While not a severe problem in 1892 when executing *Two Young Girls at the Piano*, on the left, the painting shows how he painted one year after arthritis began to limit Renoir's mobility and motor skills, which was one of the health conditions he dealt with for the last 20 years of his life.
- The screen shot on the left shows his arthritic hands and was shot a few years after his stroke in the spring of 1912, when he was 71.

C. C. Wholey, M.D.
This disorder is generally known as
Double Personality
Because there is but one well defined Second Personality in addition to the Original Personality.

a



b

(In this regression the patient had to acquire experience as any child would acquire it. She had to learn things over again - like the use of a spoon and how to put on her clothes. The remain-

c



d

Family seen fifteen years later.

e



f

Still shots from a case study of multiple personality recorded in 1923 by Drs. C.C. Wholey and Edward J. Carroll of the Western Psychiatric Institute.

Four Case Studies

1. Buster Keaton: “The Boy Who Can’t Be Damaged”
2. Ingmar Bergman (1918–2007): *Persona* (1966)
3. Two Italian directors and their strokes: Luchino Visconti (1906–1976) and Federico Fellini (1920–1993)
4. Anterograde Memory Impairment: a radical form of amnesia that affects the ability to formulate new long-term memories
 - Christopher Nolan’s *Memento*
 - American artist Kelly Tribe (b. 1973), crafted a work titled *H.M.* (Henry Molaison) that incorporates the physical mechanisms of moving images into a reconstructed portrayal of the patient



Chapter 8: War and Art: Brain Injuries, Trauma, and Empathy

Wars stimulate medical advancements, create a need for therapeutics, and foster a range of artistic reactions, such as the trauma evident in Picasso's *Guernica*, a cry against war.

Chapter 9: Neurocultural Therapeutics and Applications

A range of approaches that intersect with therapeutics: neurology, psychology, neuropsychology, psychiatry, occupational therapy, and art therapy followed by case studies.

Chapter 10: Translation and Education

The benefits of translation and education are further discussed in terms of healing, academic projects, and outreach provided by community centers. All of these cases demonstrate that a translation of a subjective experience into another form opens a gateway for learning and communication.



Picasso's *Guernica*, 1939: A cry for peace

Right: Jean-Dominique Bauby's *The Diving Bell and the Butterfly*, a book in which he translated his own pathological experience with locked-in syndrome. Julian Schnabel's award-winning commercial film *The Diving Bell and the Butterfly* followed.



Chapter 11: Faces and Face Blindness (Prosopagnosia)

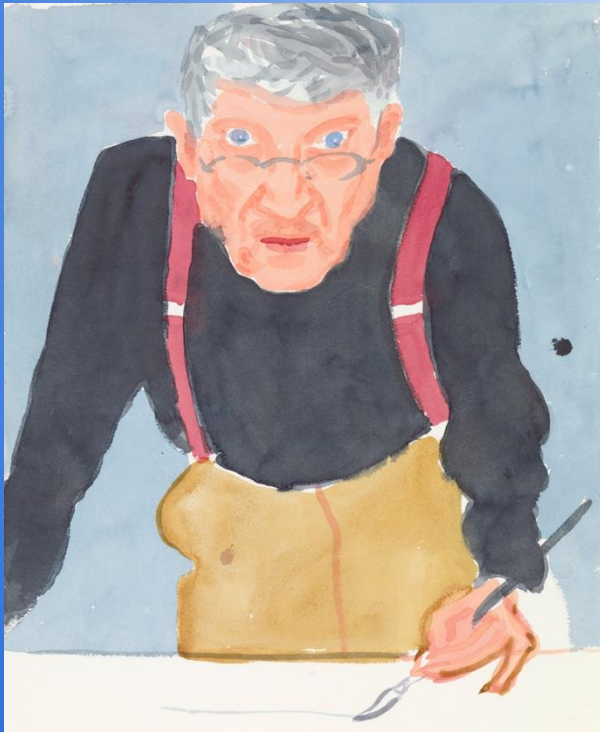
Prosopagnosia is a cognitive disorder of face perception in which the ability to recognize familiar faces, including one's own face, is impaired, while other aspects of visual processing and intellectual functioning remain intact.

Chapter 12: Synesthesia and the Senses

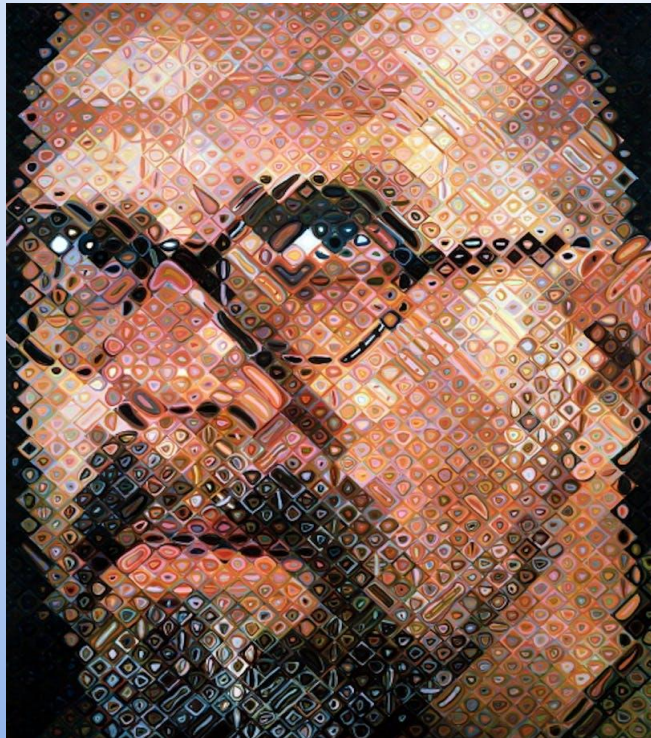
Synesthesia is generally defined simplistically, and as a phenomenon in which the stimulation of one sensory or cognitive pathway leads to involuntary experiences in a second sensory area. In this respect, it offers an example of a deviation from the rubric that we have five distinct senses.

Chapter 11: Faces and Face Blindness (Prosopagnosia)

This chapter turns to neurotypical and neuroatypical faces in research, artistic practices, and as a medium of human communication. Topics include a summary of the face historically, research surrounding the inability to decipher faces (prosopagnosia), and the array of ways human faces influence neurocultural perspectives.



Left: David Hockney: “*Self Portrait with Red Braces*,” 2003. Watercolor on paper.



Right: Chuck Close: *Self Portrait*, 1997

See: [Dialogues between Neuroscience and Society: Neuroscience 2012 on YouTube](#)

English primatologist and anthropologist Jane Goodall (b. 1934) discovered her prosopagnosia later in life:

“In the course of my travels, one thing detracts from my enjoyment of meeting people. I suffer from an embarrassing, curiously humbling neurological condition called prosopagnosia, which, translated, means I have problems in face recognition. I used to think it was due to some mental laziness, and I tried desperately to memorize the faces of people I met so that, if I saw them the next day, I would recognize them. ... Sometimes I knew that people were upset when I did not immediately recognize them—certainly I was. And because I was embarrassed, I kept it to myself. Quite by chance, when talking to a friend recently, I found that he suffered from the same problem. I could not believe it. Then I discovered my own sister, Judy, knew similar embarrassment. Perhaps others did, also. I wrote to the well-known neurologist Dr. Oliver Sacks. Had he ever heard of such an unusual condition? Not only had he heard of it—he suffered from it himself! And his situation was far more extreme than mine.”

Three Stages of Close's Career

1. In the 1970s his distinctive heads were admired by both the cognoscenti and the public. His work was celebrated, and most found his vibrant friendly personality appealing.
2. In 1988 a seizure left him paralyzed from the neck down. The cause was diagnosed as a spinal artery collapse.
3. From 2016–2017 to his death in 2021. Several women accused him of sexually inappropriate verbal behavior when he was alone with them in his studio. On the medical side, Close had received a diagnosis of Alzheimer's disease in December 2013. This was amended to frontotemporal dementia in 2015. Frontotemporal dementia is caused by a group of disorders that gradually damage the brain's frontal and temporal lobes.

Artist Chuck Close, who has had a major impact on American art and culture was awarded the highest honor conferred by the United States on an artist: the National Medal of Arts in 2002.

“When I was 5, I asked my father for an easel and he made me an easel. Then I asked both of my parents, who were very poor, to buy me a set of genuine artist oil paints in a wooden box that I saw in a catalogue, which they did. And then when I was 8, long before I was physically disabled, I realized I had a learning disability. In the ‘40s and ‘50s nobody knew about dyslexia, they just assumed that you were dumb or lazy, so I had terrible academic problems. I couldn’t memorize anything. I still literally cannot add or subtract. I don’t know the multiplication tables”



Chapter 12: Synesthesia and the Senses

“Neither I nor any of the synesthetes I have interviewed have experienced their synesthesia as a ‘pathology’—although if it can be accurately described as such it is unique in being one of the very few that virtually none of its hosts wish to be cured of!”

Synesthete and Synesthesia Researcher Patricia Lynne Duffy

- Synesthesia is generally defined simplistically, and as a phenomenon in which the stimulation of one sensory or cognitive pathway leads to involuntary experiences in a second sensory area. In this respect, it offers an example of a deviation from the rubric that we have five distinct senses.
- Synesthesia research shows that there are possibly over one hundred forms of synesthesia and that the range of the research includes genetics and imprinting as well as epigenetic and environmental factors.
- Contemporary and historical research demonstrates that synesthesia speaks to the idea that there is no “typical” human mind, brain, or body.
- Also emphasized is that synesthetic artwork and metaphors form a large and inspirational overlay to our cultural milieu, giving it a depth of expression that greatly enhances our mutual experiences.

Synesthesia research Richard Cytowic reported on a professor of neuropathology, with chromatic-phonemic synesthesia and number forms who explained his synesthesia helps him remember various categories:

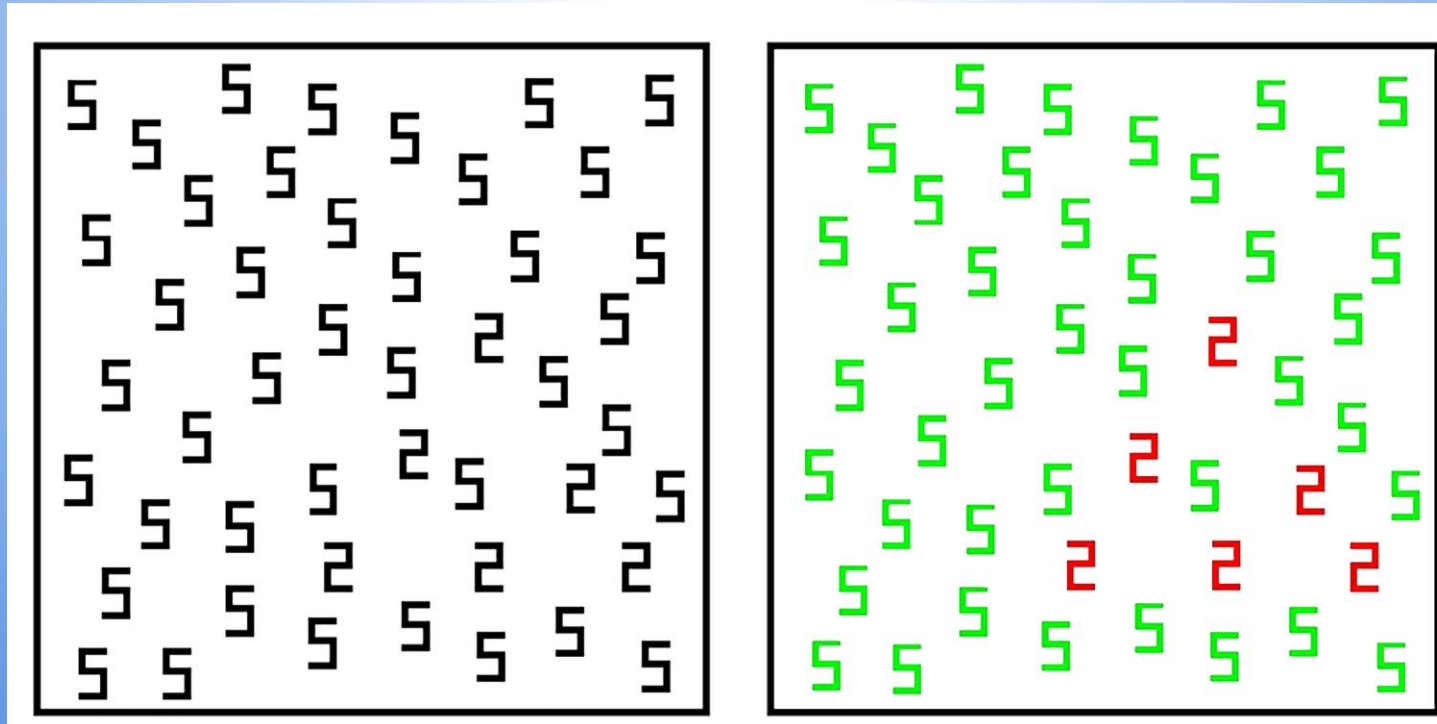
“Let me say that this is a delightful trait to have. I tend to use it consciously and unconsciously to help me remember correct sequences of numbers, words, phrases, letters, to help me remember names and locations of anatomical structures (especially neuroanatomical structures— you should see the beautiful array of colors in the brain!) and neuropathological classifications. I could go on and on, but those will serve as a few examples.”



Two synesthetic colored alphabets. Patricia Lynne Duffy's alphabet is on the left and Carol Steen's alphabet is on the right. Published in *Blue Cats and Chartreuse Kittens* by Patricia Lynne Duffy. Painted by Carol Steen. Courtesy of Patricia Lynne Duffy and Carol Steen.

Stroop effect

- This image demonstrates the automaticity of synesthetic experience. A synesthete might perceive the left panel like the panel on the right.
- In psychology, the Stroop effect is the delay in reaction time between congruent and incongruent stimuli. The effect has been used to create a psychological test that is widely used in clinical practice and investigation. A basic task that demonstrates this effect occurs when there is a mismatch between the name of a color and the color it is printed in.



Louis Bertrand Castel's ~1720 color organ

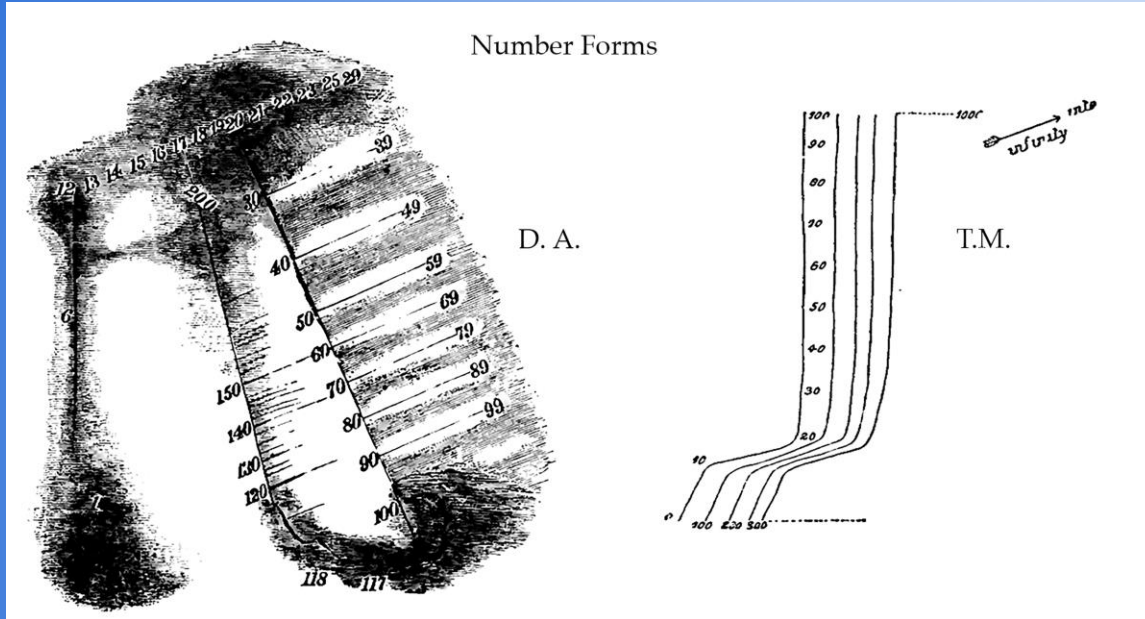


A caricature of Louis Bertrand Castel's "ocular organ" by Charles Germain de Saint Aubin.

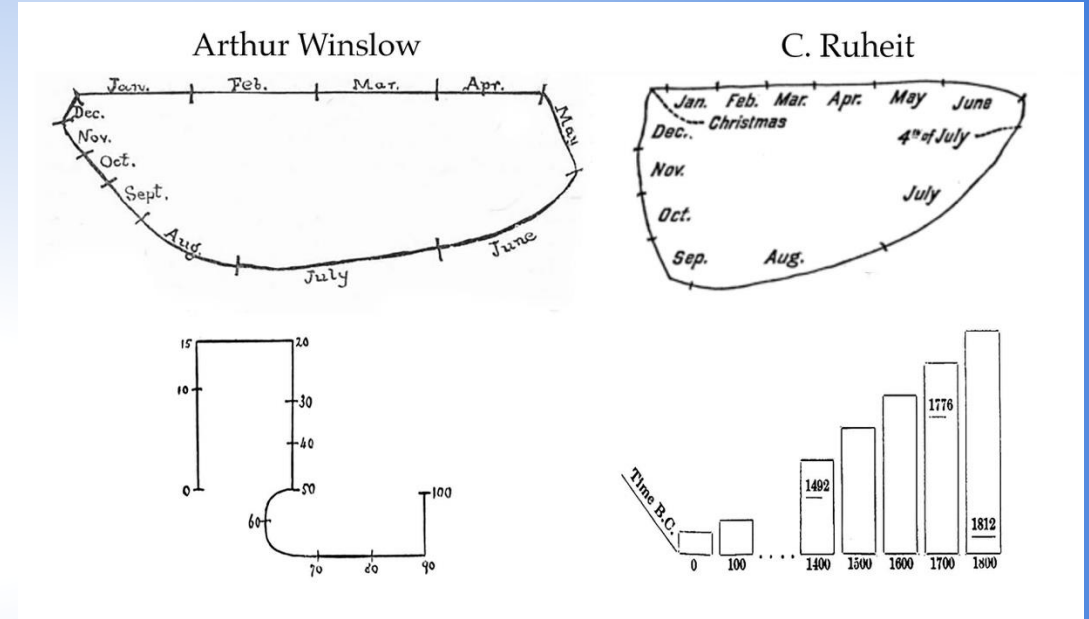
- Castel based his color organ on Newton's idea that musical and color harmonies are related by frequencies of light waves and sound waves. He built an "ocular organ"—a *clavecin oculaire* – around 1720 and exhibited the instrument in 1735.
- Castel's design had colored paper strips on top of a harpsichord. When a key was pressed, the paper strips were lit by candlelight, and the colors would come up.
- This image is also of interest in multisensory terms because it includes a painter's palette at the organist's feet.
- Another multisensory reference is that the musician appears to be scenting the air as he pedals, with the aroma coming from the tube on the harpsichord. Castel even wrote synesthetically, including sound, taste, vision, and color in his description:

For we are born in music, & we have only to open our ears in order to taste it ... and...one has only to open one's eyes in order to taste a Music of colors & to judge it"

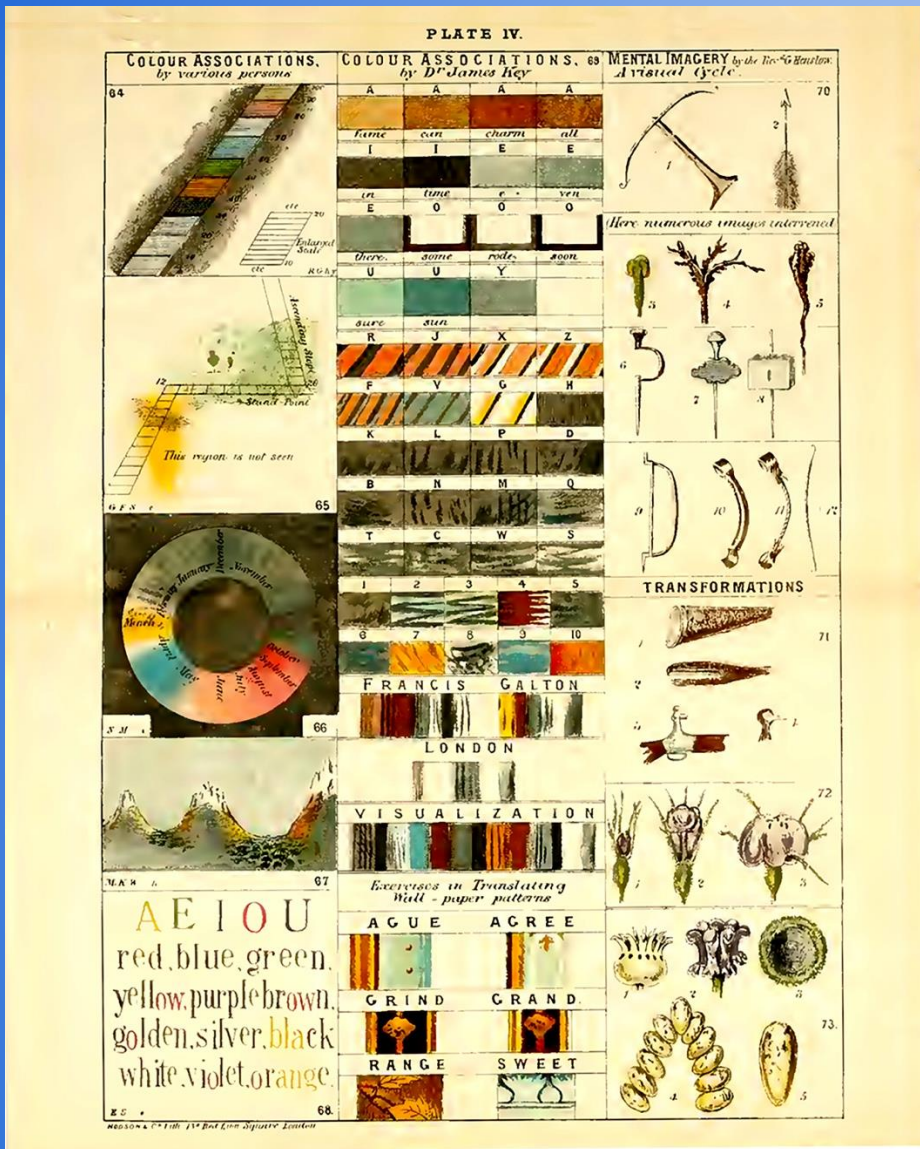
Nineteenth Century Synesthesia Diagrams



Number forms of Francis Galton's patient T. M.
Published in *Inquiries into Human Faculty and Its Development* (1883)



Geometric diagrams of spatial sequence synesthesia published by *Science Magazine* in 1883. C. Ruheit (right) shows how he perceives the months and important dates. Arthur Winslow's conception of the month and his number diagram are shown on the left.



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Conclusion

It is often said that artists are in some sense neurologists, studying the brain with techniques that are unique to them, but studying unknowingly the brain and its organization nevertheless.

Combining artistic works with quantitative research gives us insight into who we are and speaks of the neurocultural experience.

Thank you.

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