Creating a high impact poster: Art or Science?

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What is a poster? Why?

- What a poster **is**
  - Static visualization of an **oral story**

The ABCs of Oral Storytelling by Verena Tay

Objective

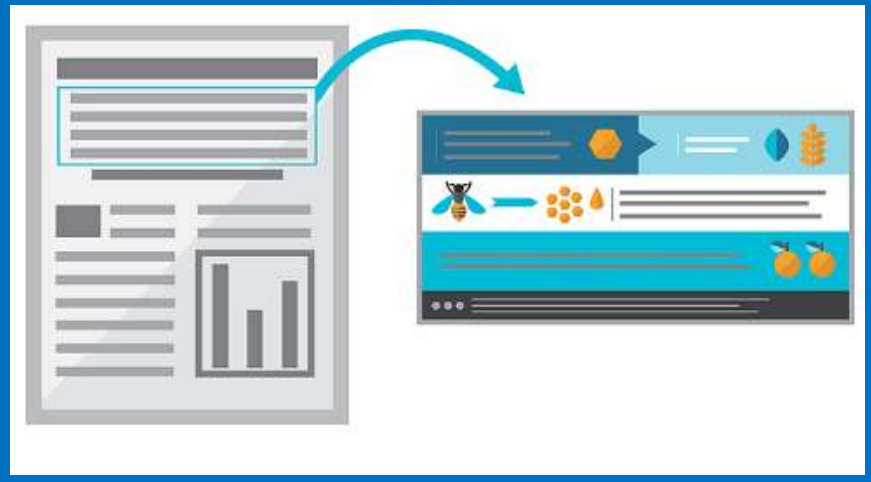
Storytelling is one of the most powerful tools a teacher can use to engage students. Humans love listening to stories, we often learn facts, morals and language skills better through stories told to us. This 6-hour workshop is designed for teachers who wish to captivate their students through oral storytelling, and incorporate oral storytelling activities in the classroom.

Transferable Skills

- How to choose and adapt stories appropriate to your needs.
- Rehearsal skills : Connecting to your chosen story and learning a story without memorisation
- Bringing stories alive : Developing an expressive voice and body
- Using props : Enhancing the storytelling experience
- Relating to your audience : Interaction skills and techniques to encourage participation

https://moonshadowstories.com/events/full/the_abcs_of_oral_storytelling

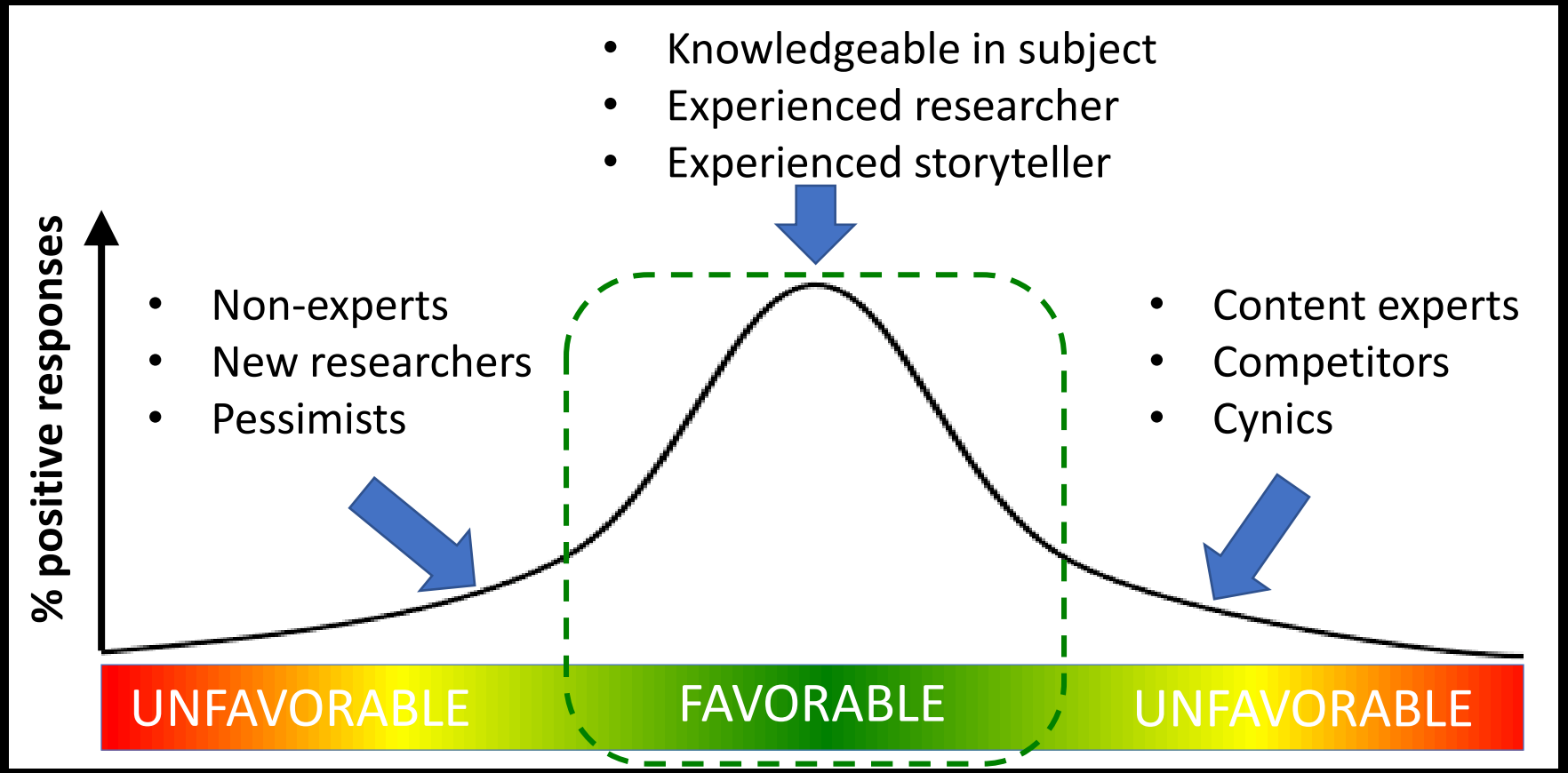
- What a poster **is not**
  - A place to copy/paste ideas from research manuscripts
  - A printed mass of jargon and lingo
  - A platform for all your Figures/Tables



https://blogs.lse.ac.uk/impactofsocialsciences/2018/05/11/how-to-design-an-award-winning-conference-poster/

Step 1: Know your audience

- The highest probability for success is to develop a poster and oral story that align with the **masses**
- Avoid trying to please **the few**



Step 2: Tell a story

The land where I was raised

I was born in Grants, NM near Acoma Pueblo (Sky City). NM is the only state in the US that has a constitution in both Spanish and English, the official languages of New Mexico. However, there are over 13 different languages spoken in New Mexico, and an additional 40+ dialects.

The heritage of my ancestors

I am neither genetically Latino, nor of the Acoma people. I am genetically of the Houma people (near New Orleans), yet I do not claim ancestry in any official way.

I am “salsa”, or “mestizo”. My ancestors were Scotch-Irish, Norse, French, and Native American.

Lean on your cultural storytelling traditions

Storytelling in my life

The land where I was raised

https://nochedecuentos.org/resources/storytellers/

https://www.youtube.com/watch?v=gdng-9nqkks

As a young poetry major, I was regularly involved with Latin storytelling groups (similar to Noche de cuentos) and also Native storytelling groups (see talk by Will Tsosie)

The heritage of my ancestors

When visiting my family, I encountered storytelling through Houma traditions (e.g., Pow Wow), and learned about Scotch-Irish storytelling traditions (ghost stories!)

Lean on your cultural storytelling traditions

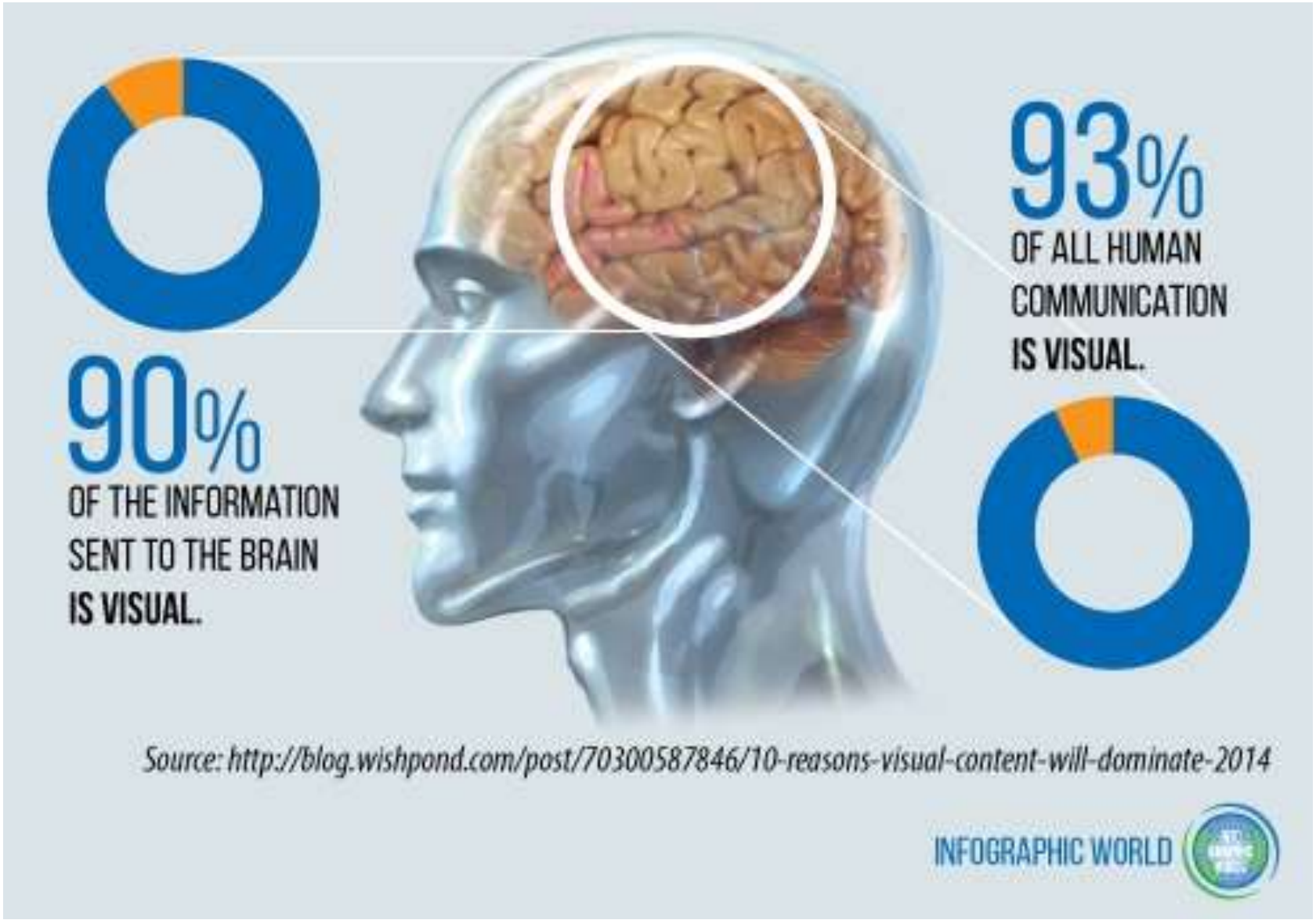
Develop your own “style”

- You are uniquely you…
  - By default your stories are unique, if you embrace your experiences and surroundings
  - You are the only person who knows all the facets of your research project
    - Committee members are content experts
- Searching for novelty by reading manuscripts is a lonely effort with very little output…
  - You have all the tools you nee to tell a good story
- If you are struggling, stop trying to define it!
  - Just tell your story as it can only be told by you

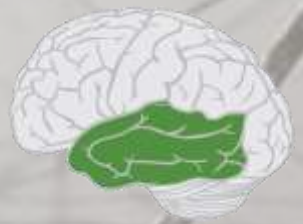
<u>You</u> *are the only novelty in this building!*

Regardless of the style, storytelling is the "gateway" to your audience

-human beings are social creatures

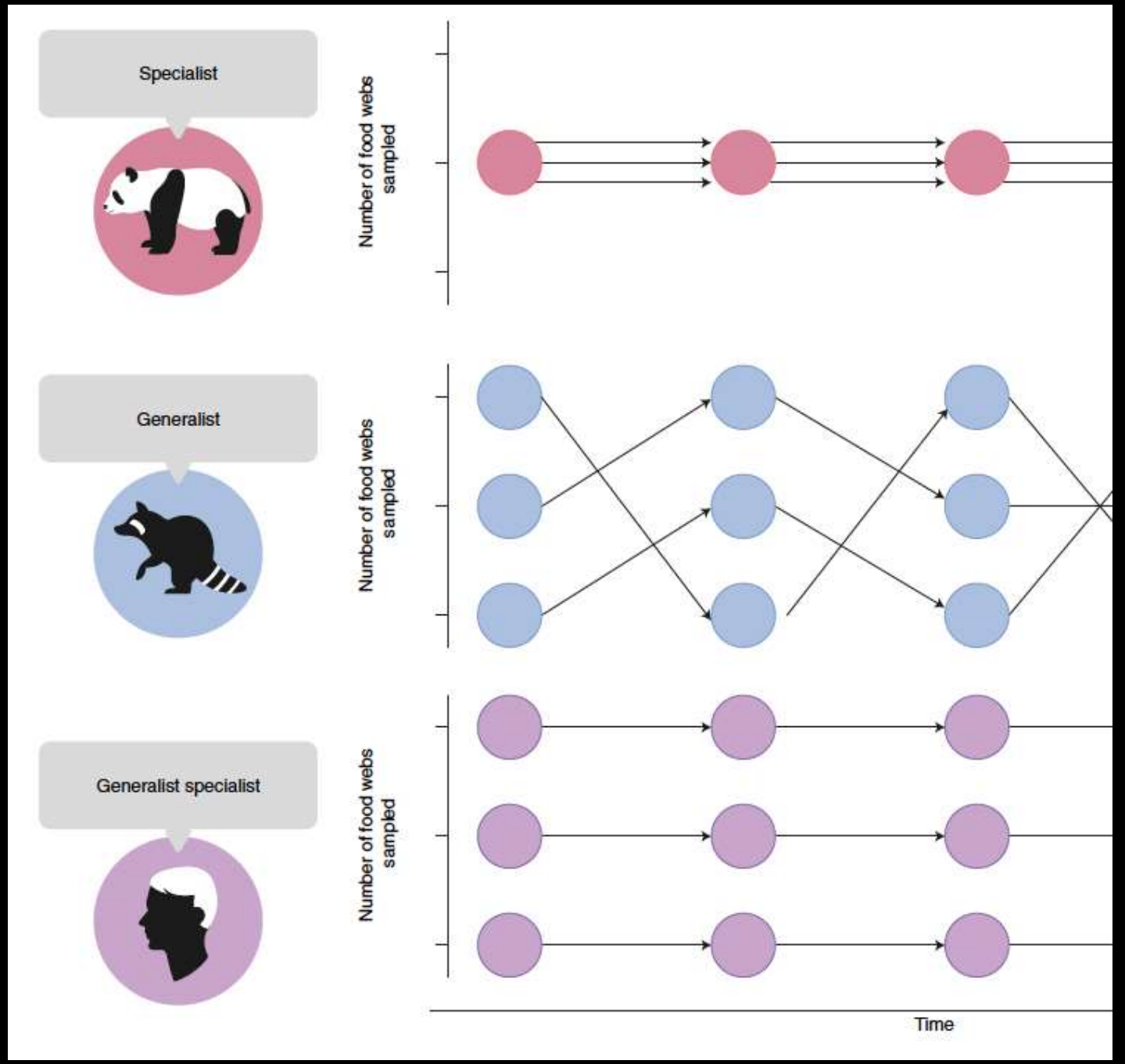

90%
OF THE INFORMATION
SENT TO THE BRAIN
IS VISUAL.
93%
OF ALL HUMAN
COMMUNICATION
IS VISUAL.
Source: http://blog.wishpond.com/post/70300587846/10-reasons-visual-content-will-dominate-2014
INFOGRAPHIC WORLD

- Our brains have 100 billion neurons
  - **30 percent devoted to visual processing**
  - 8 percent for touch
  - 3 percent for hearing
- The temporal lobe (supposedly for hearing & smell) is intimately tied to vision.
  - Functions include:
    - perception,
    - face **recognition**,
    - **object recognition**,
    - memory,
    - language,
    - emotion



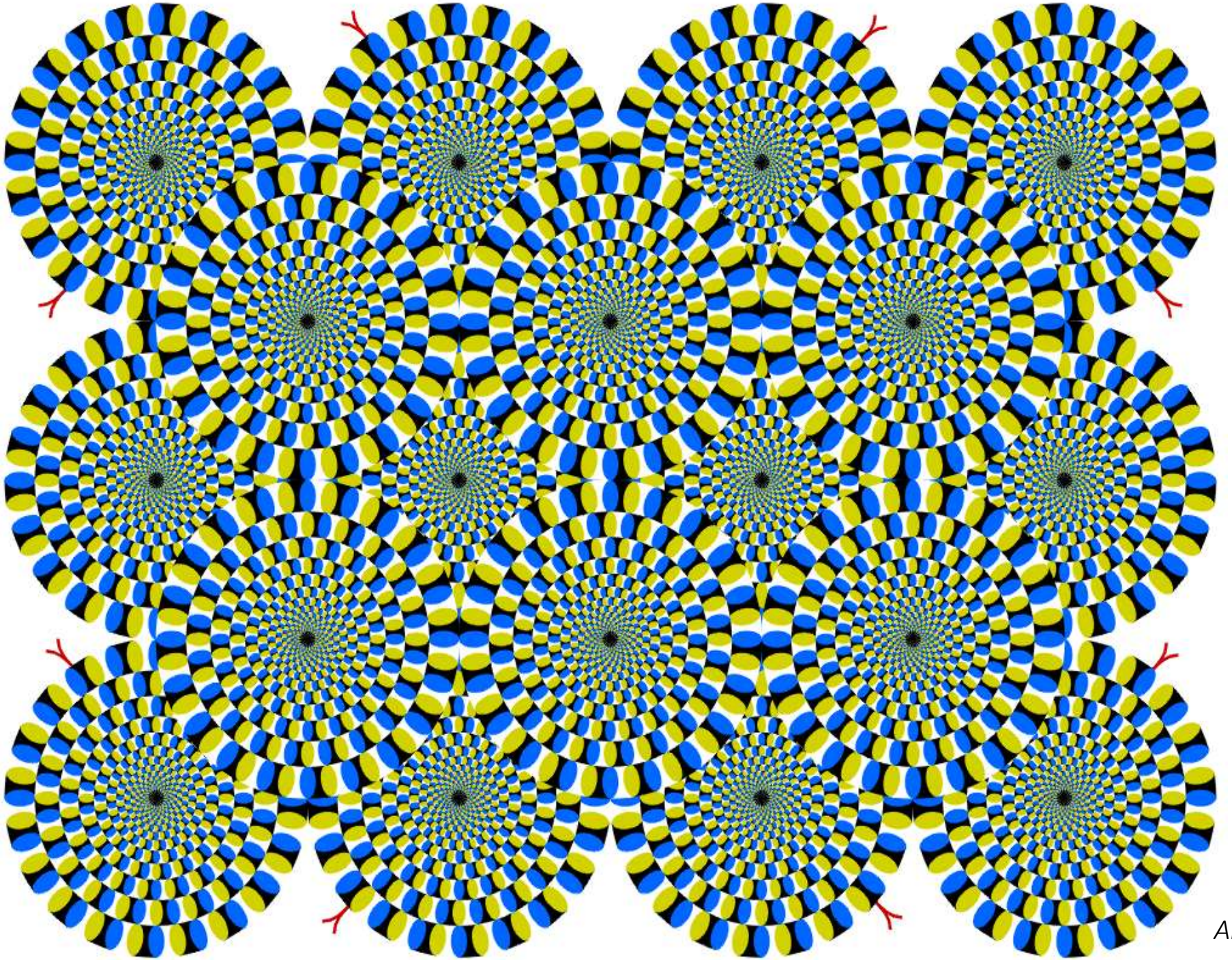
Homo sapiens: The generalist specialist

- *Homo sapiens* unique niche allowed early members of our species to adapt to, and specialize in, living in wildly different environments.
- But…
  - How good are we at processing information from flat, 2D surfaces?



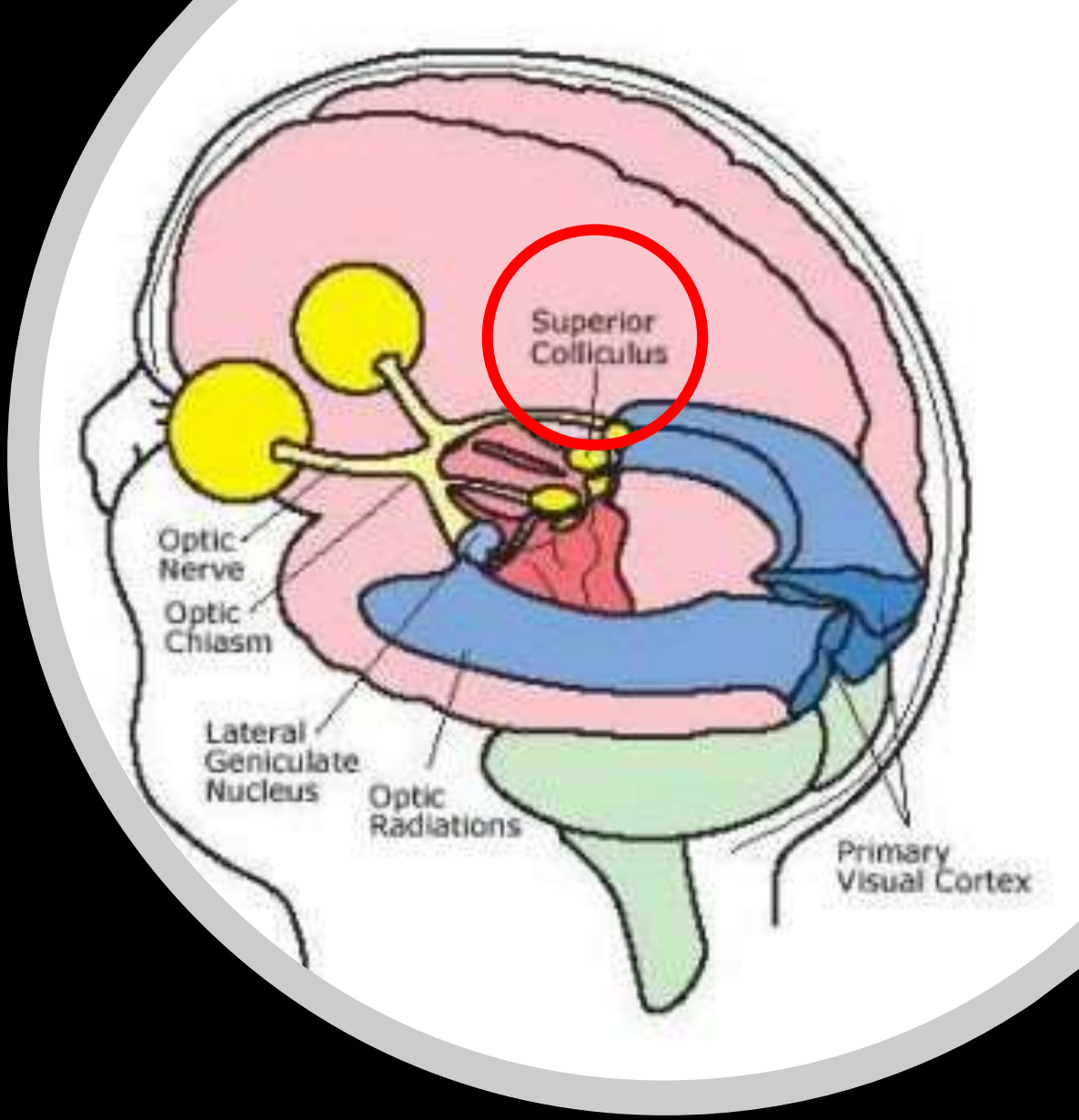
http://blogs.discovermagazine.com/deadthings/2018/07/30/generalist-specialist/#.XHXj4lNKjOQ

Rotating snakes



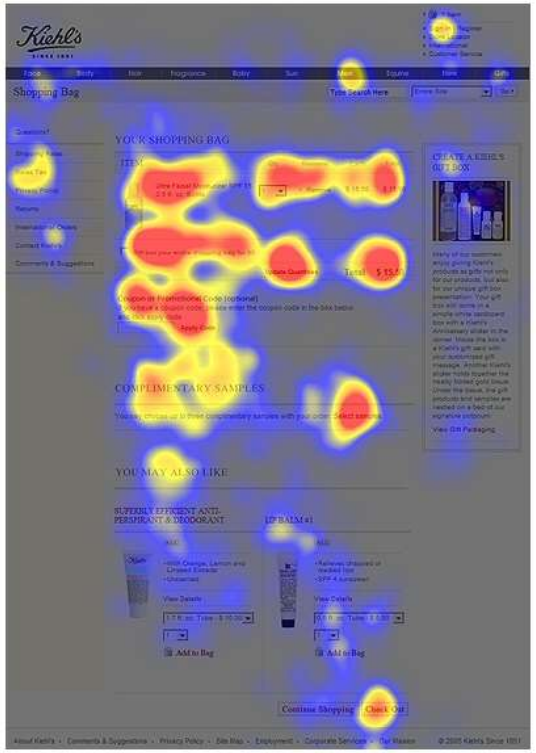
Akiyoshi Kitaoka

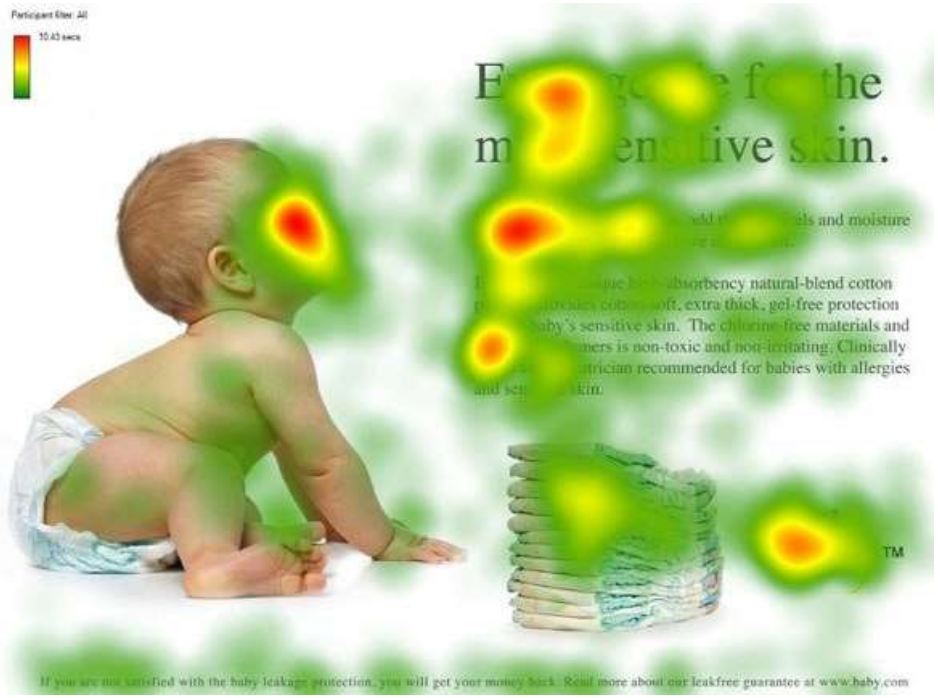
- **KEY POINT**: One of the first areas of the brain to receive optical information from a 2D surface is the superior colliculus
  - Controls gaze and head turning and can **subconsciously** trigger rapid head and eye movement
  - **Rapidly** determines relative distance, direction, and speed in the absence of constructed 3D images.
  - Information is sent to primitive brain structures that have been well established as modulating **emotion and heuristics**
  - **Not** responsible for fusion of the two perspectives from our eyes into a 3D image



Superior colliculus = autonomic responses (flight or fight)

https://www.psychologytoday.com/us/blog/brain-sense/201208/3d-vision-and-the-brain



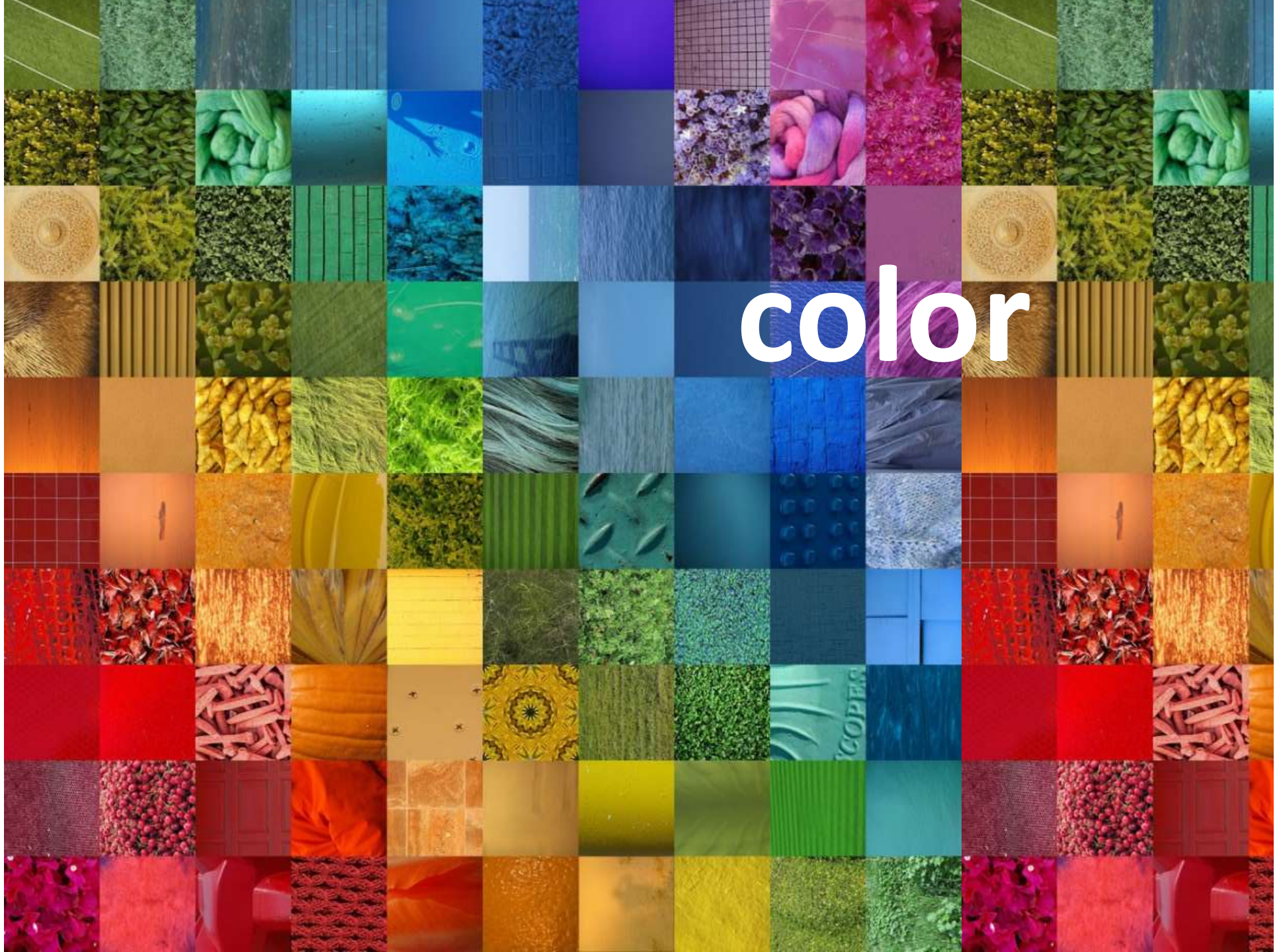


Superior colliculus at work

- The human brain is wired in such a way that we can make sense of ***lines***, ***colors*** and ***patterns*** on a flat surface.
- While individual tastes vary, the brain responds especially strongly to conventions that *mimic what we see in nature*

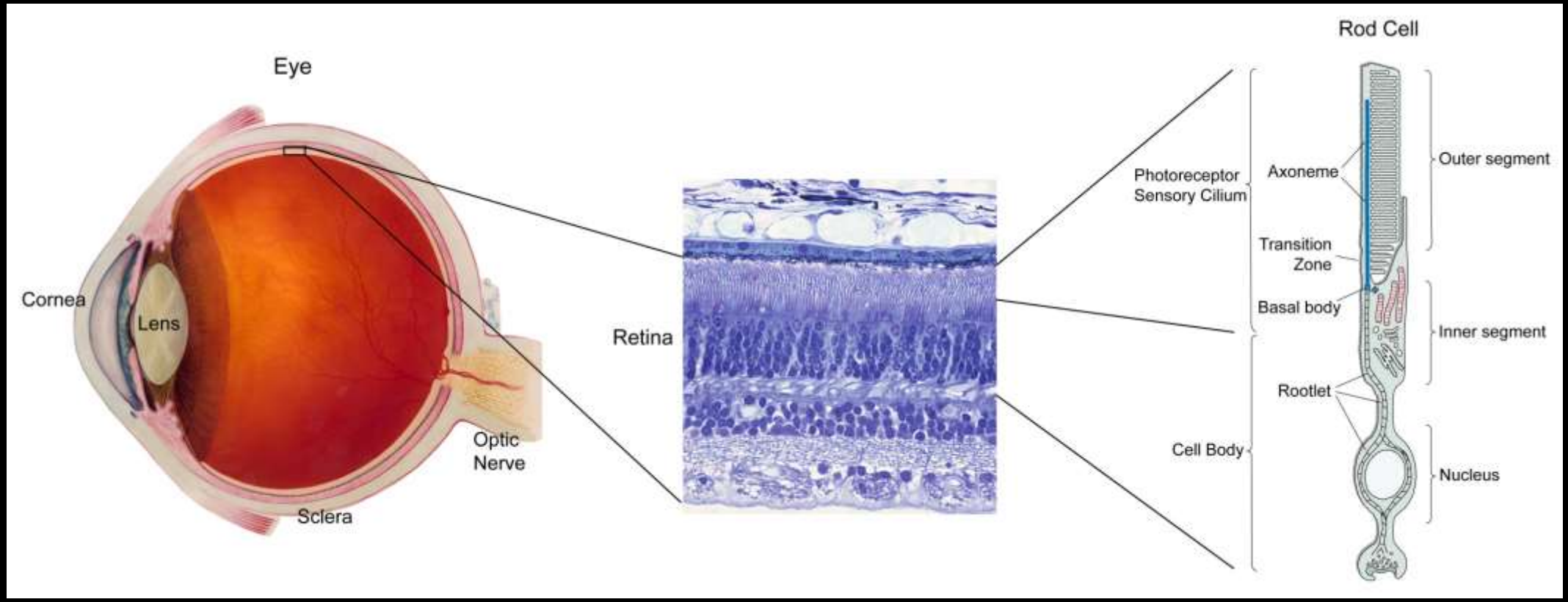
The easiest way to tap into this is by appropriate use of *space* and *color*

http://www.cnn.com/2012/09/15/health/art-brain-mind/index.html


color

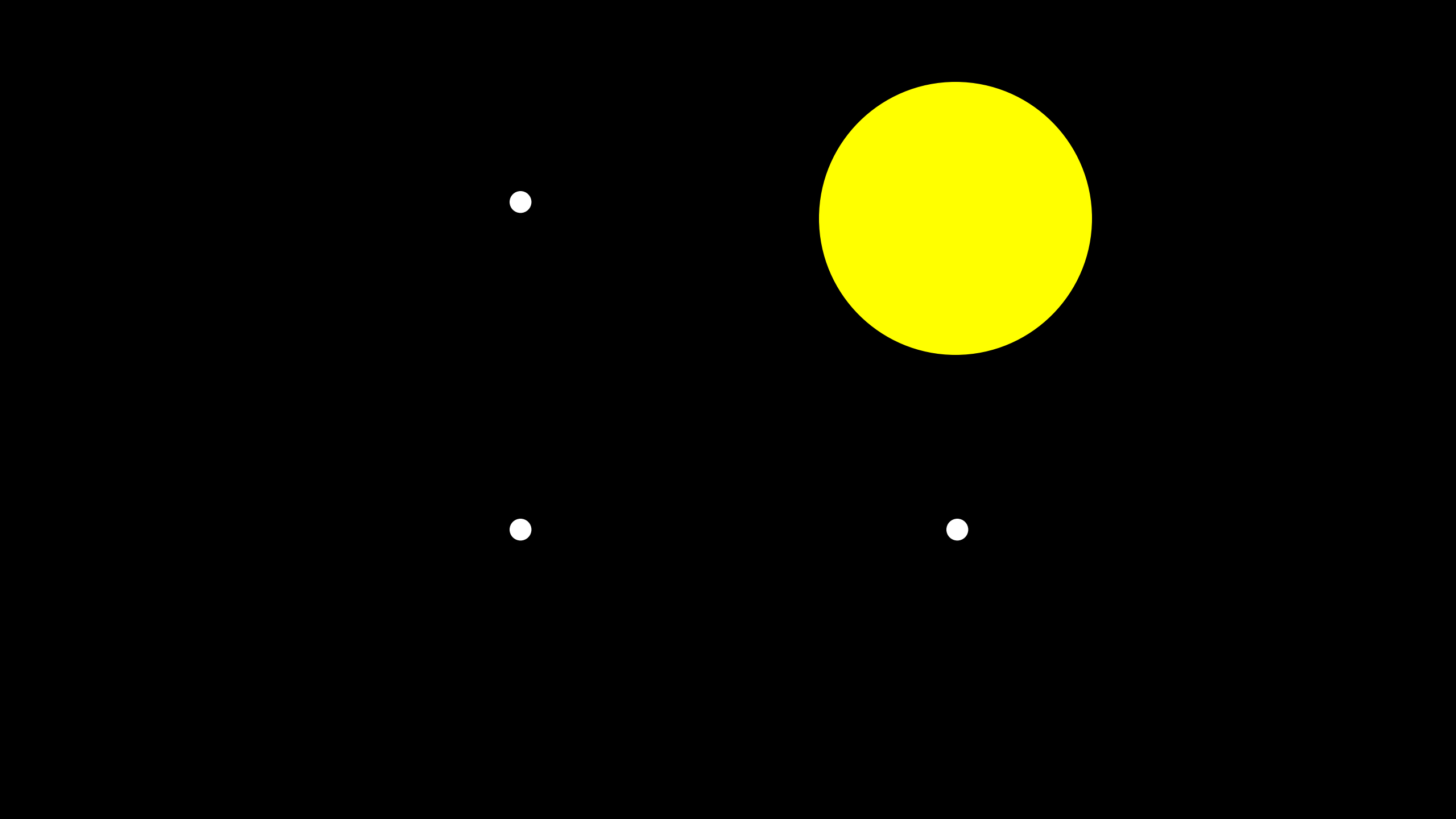
What is color?

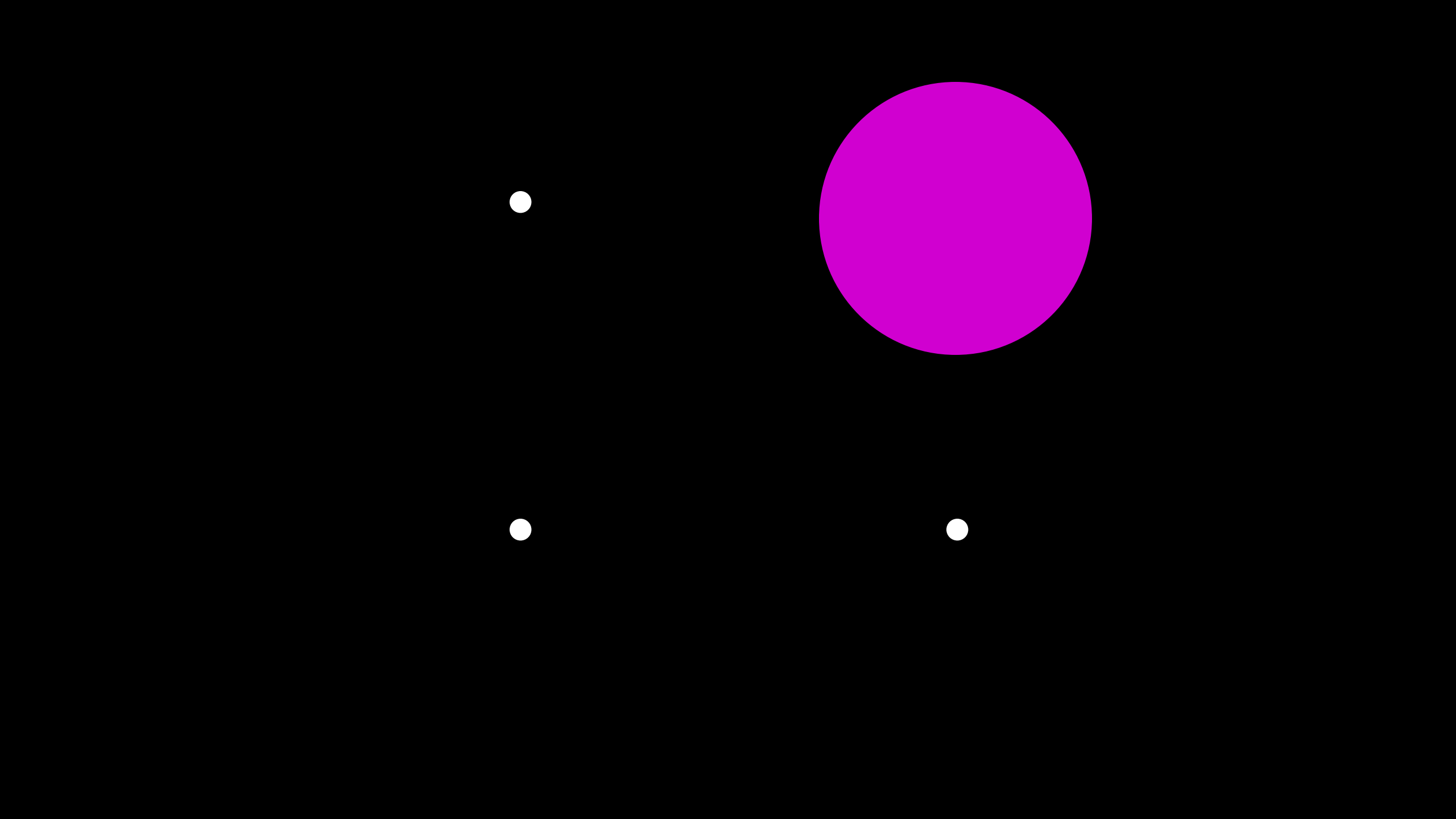
- Most people have three kinds of cones in the retina: red, blue and green
- Your brain compares the activities in two or three cones during phototransduction (the conversion of a photon to a neuro-signal)



Let’s isolate color

On the next slide, stare at the large colored dot for ≈60 seconds and then look at one of the adjacent white dots for ≈10 seconds





When you look at the white "dot" and your eyes "see" a large dot that is not there…

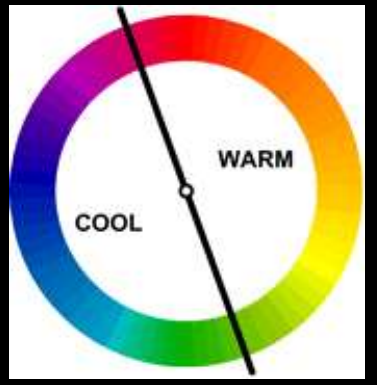
- You are seeing the complementary "afterimage"

The biochemistry behind this: Certain neurons in the retina and thalamus are **turned "on" by yellow** but **turned "off" by mauve**. Others are turned "on" by mauve and turned "off" by yellow.

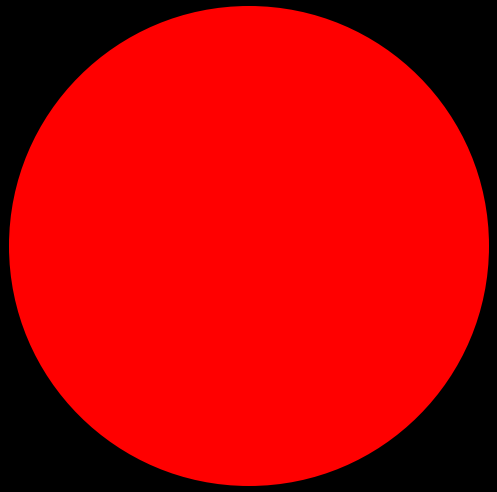
If you detect a color at a particular point on the retina, you cannot simultaneously detect the opposing color at the same point. In other words, it is impossible to see a "yellowish mauve"

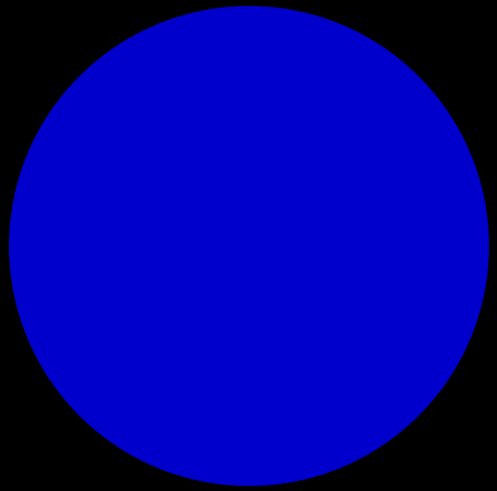
The complementary "afterimage" occurs because you saturate one of your neuron sites (e.g., yellow). To establish equilibrium, the complementary site (e.g., mauve) is activated and a false image is created.

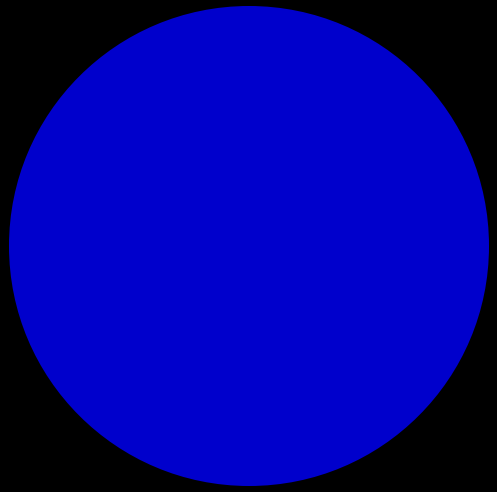
This is true for any two complementary colors

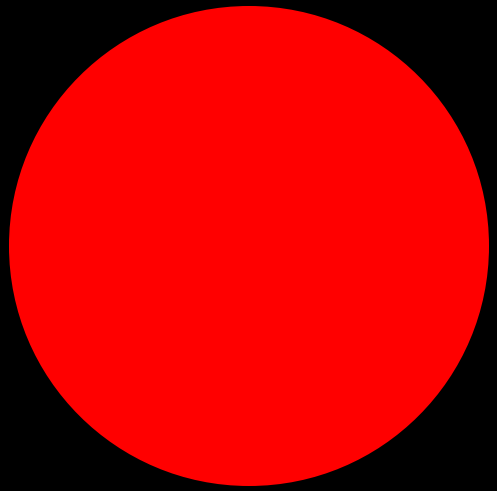


See supplemental section

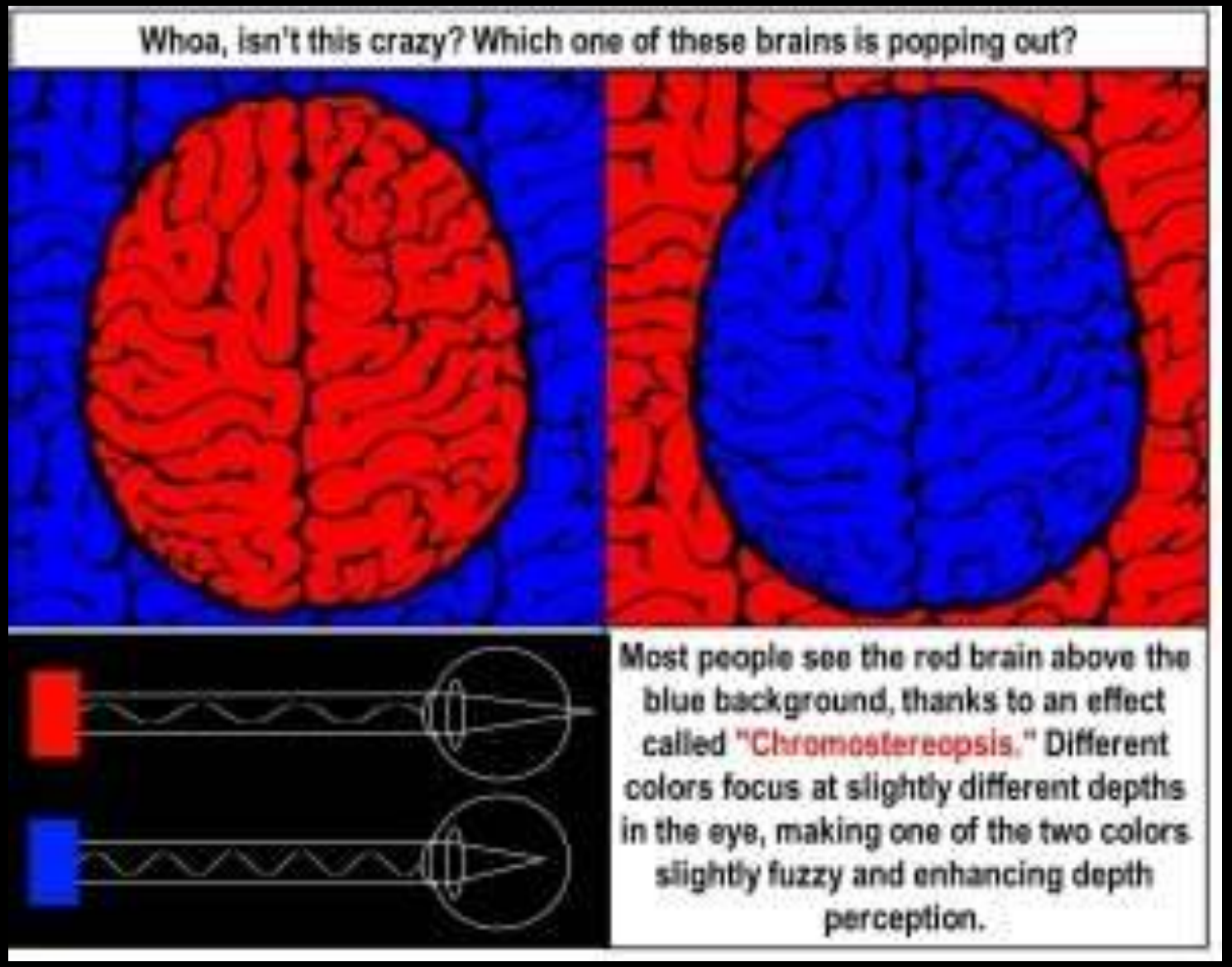






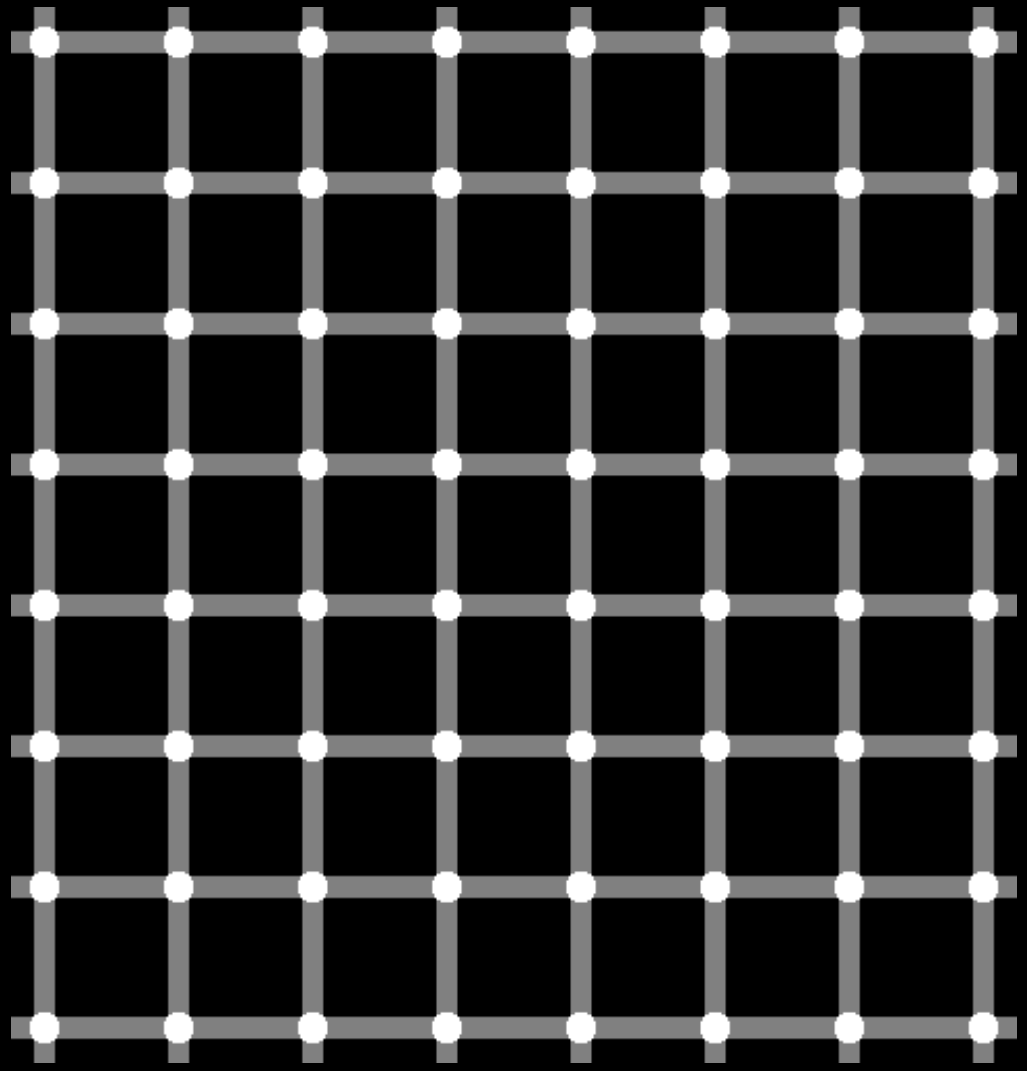


Effect is called chromostereopsis

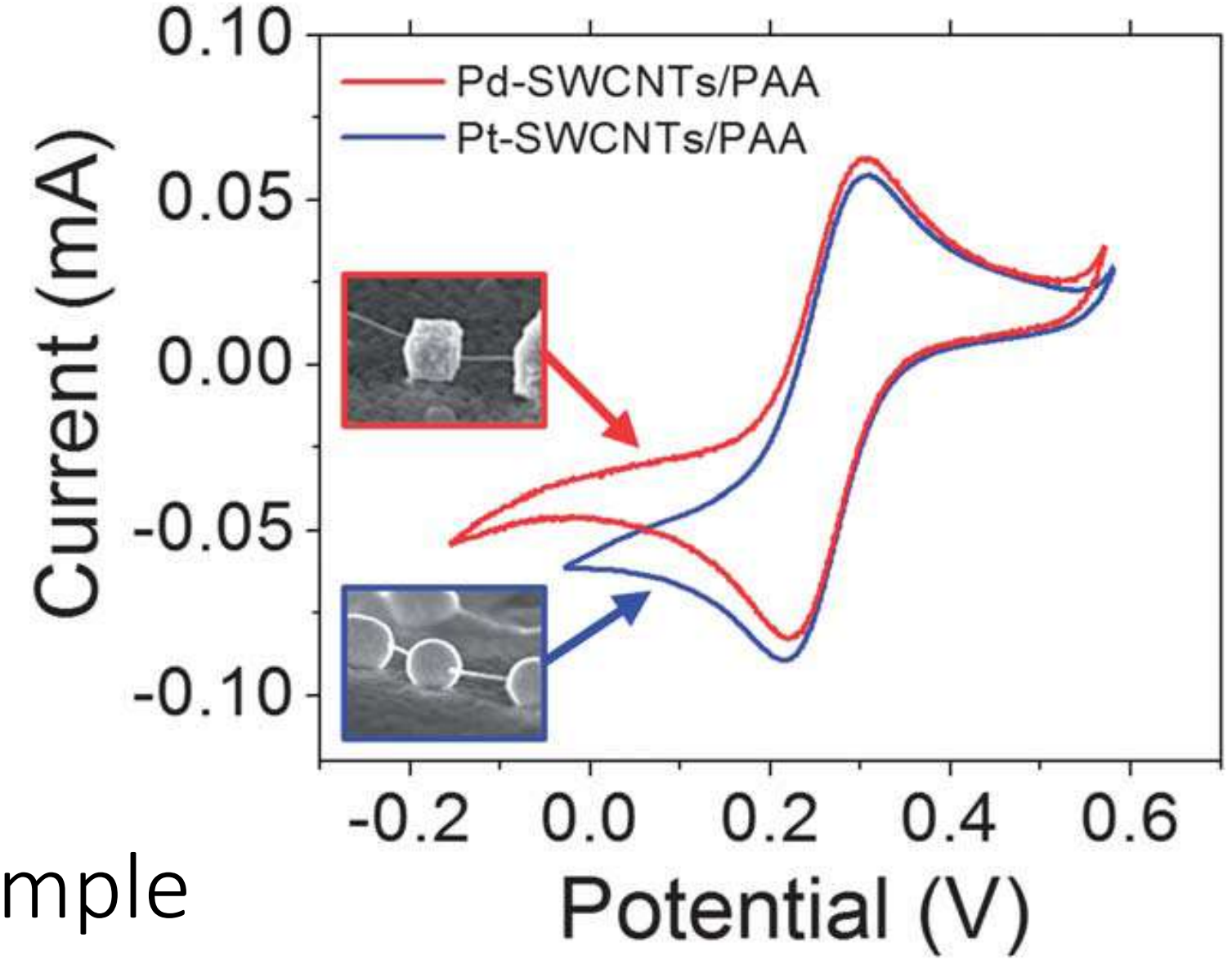


https://digi-colour.tumblr.com/post/131008032847/chromostereopsis-which-brain-seems-the-most

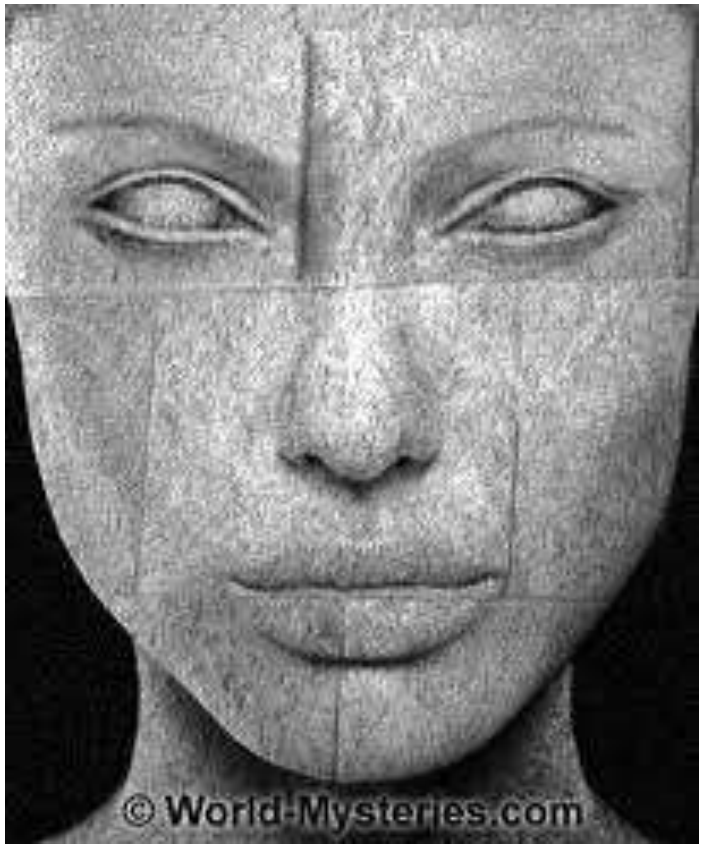
Scintillating grid: Color is **not** limited to RGBY

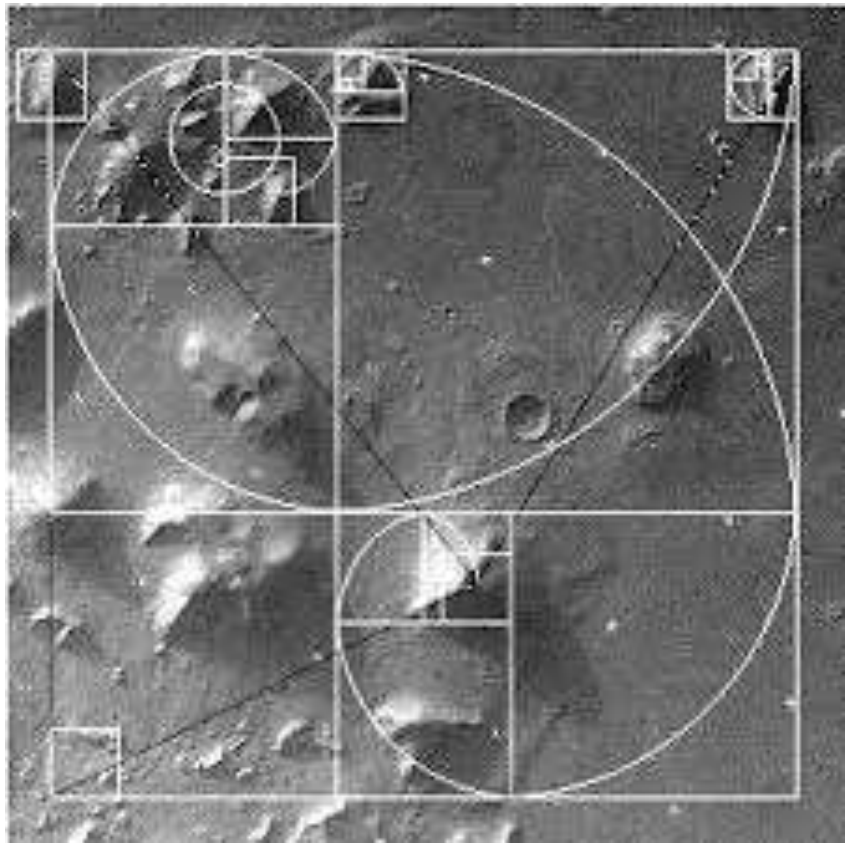


Count the black dots!



Simple Example



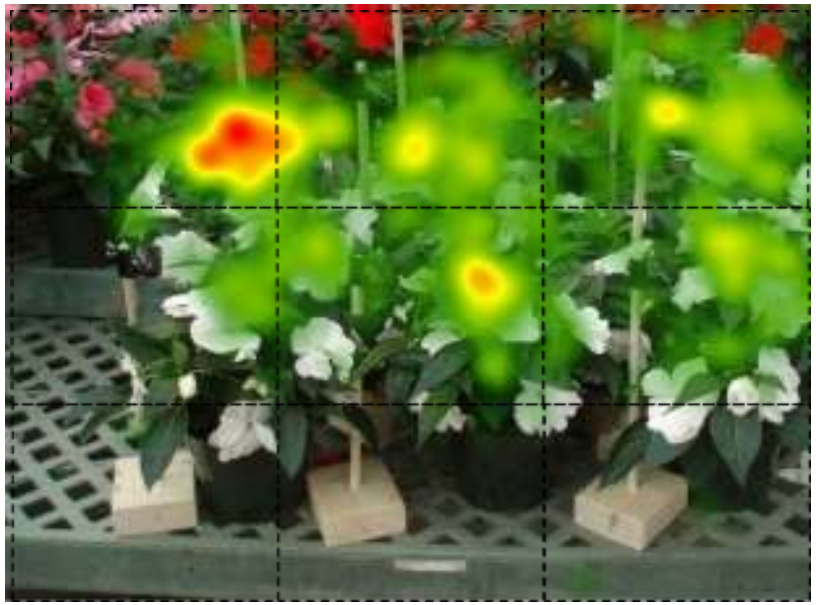


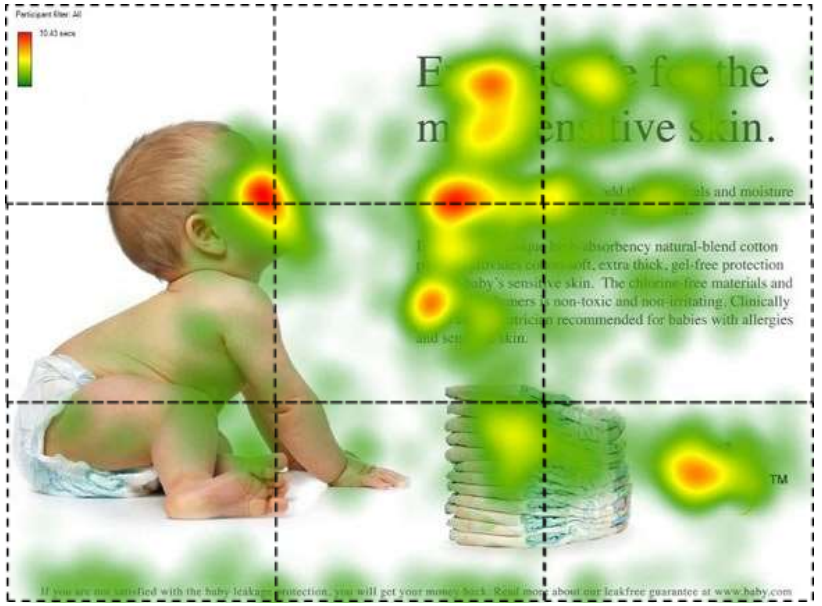
Space and position

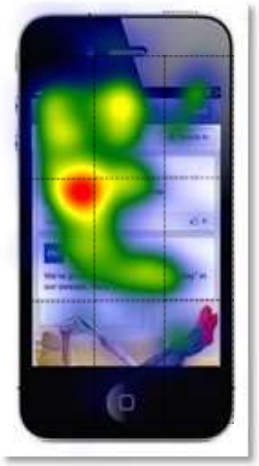
Rule of thirds

- Basic technique that photographers use to frame their shots
- Subjects placed exactly in the middle can often make for an uninteresting photo
  - Why?
    - Superior colliculus heuristic classification

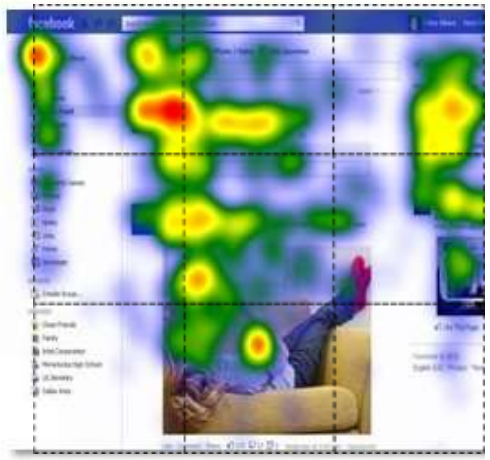
Eye tracking studies: Superior colliculus at work



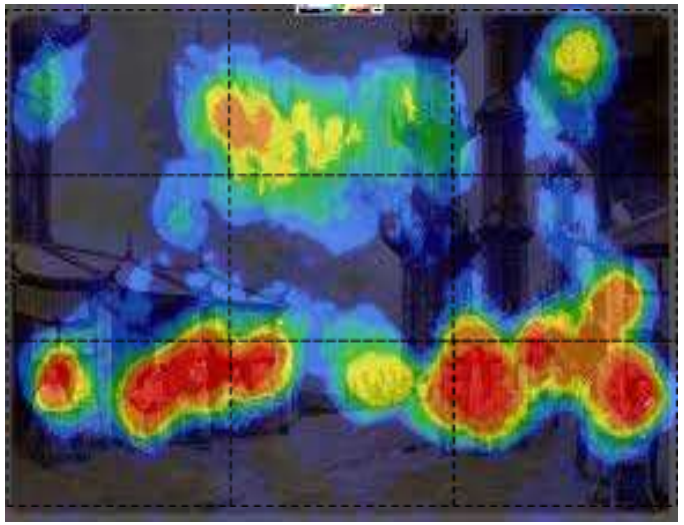


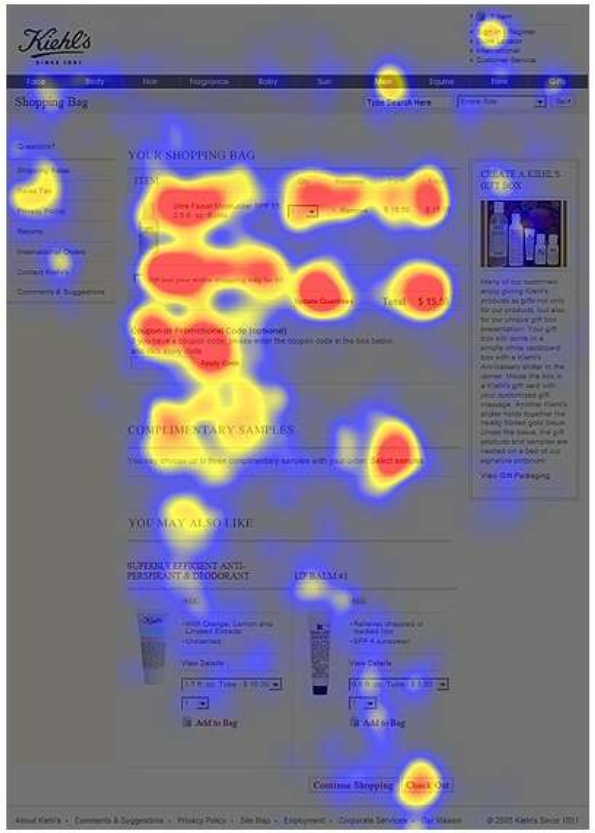


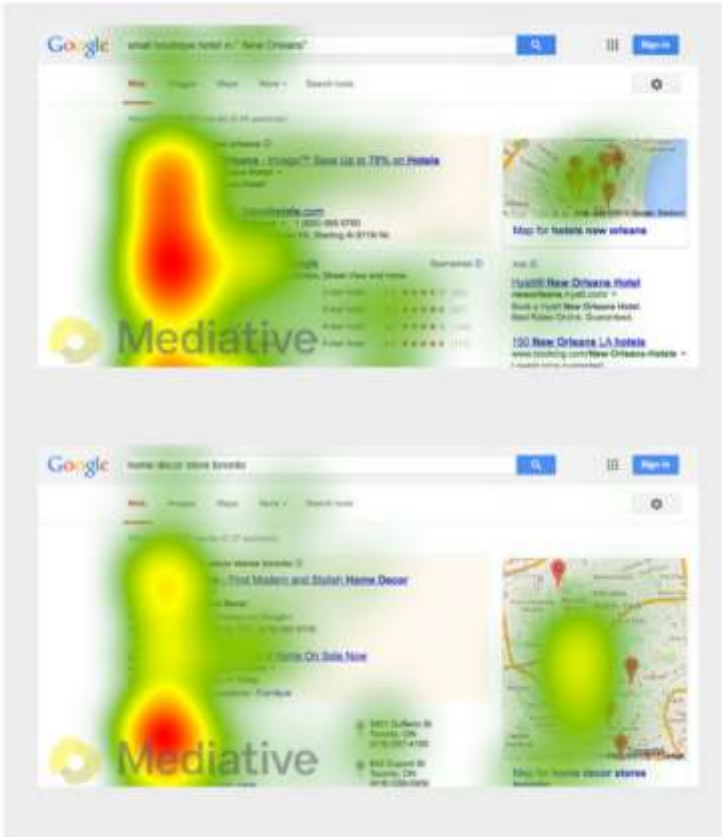
iPhone



Web



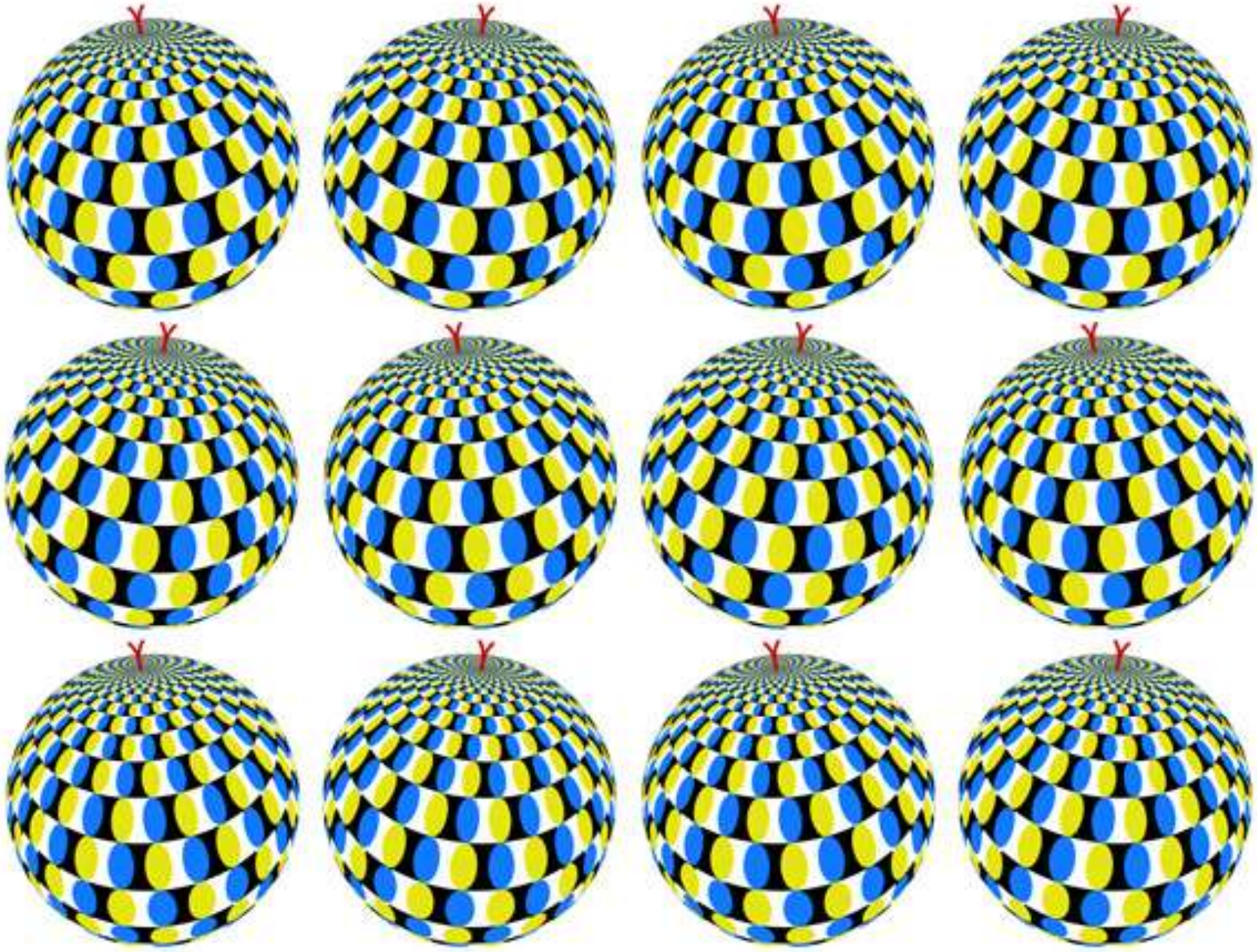




Don’t fret over the edges

You can easily arrange your information on figures using the rule of thirds		
Construct a grid with four intersecting lines or crossing points and 9 rectangles that resemble a tic-tac-toe board		
These four crossing points (also called power points, if you can believe it) are areas you might place your main subject, rather than in the center		

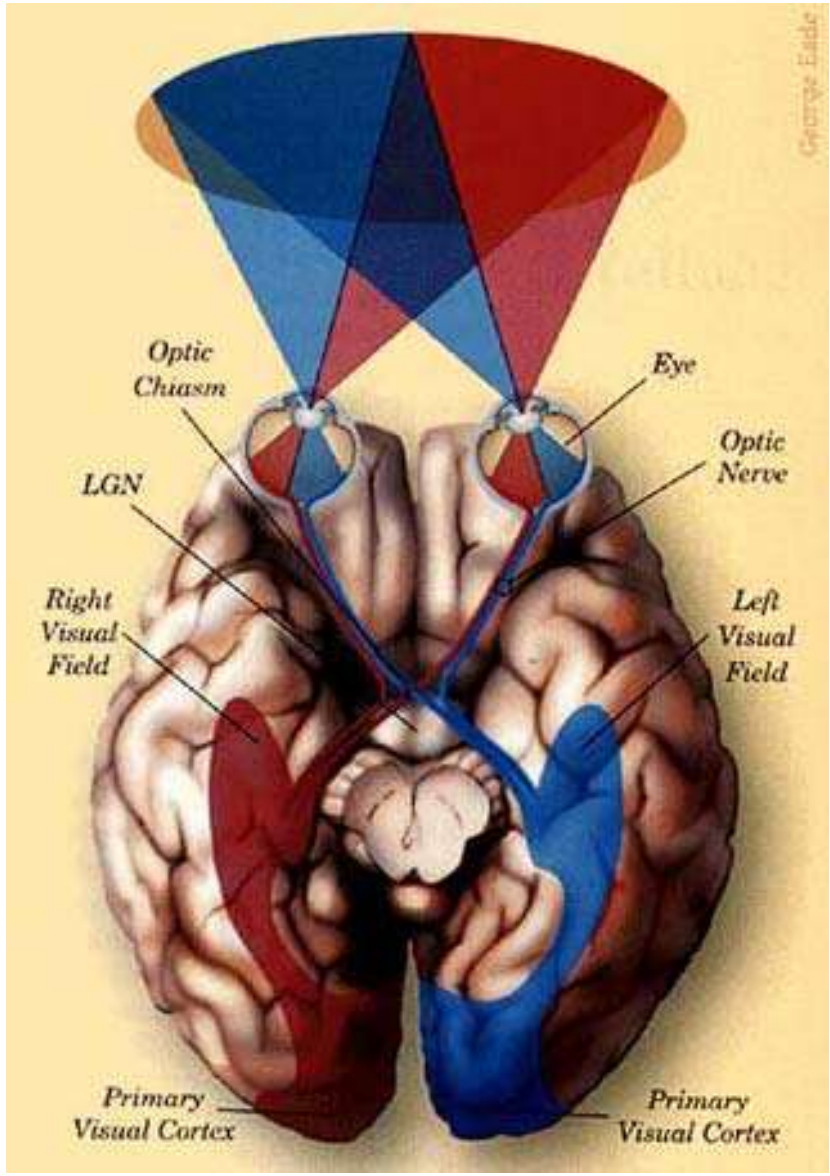
Connecting space and color

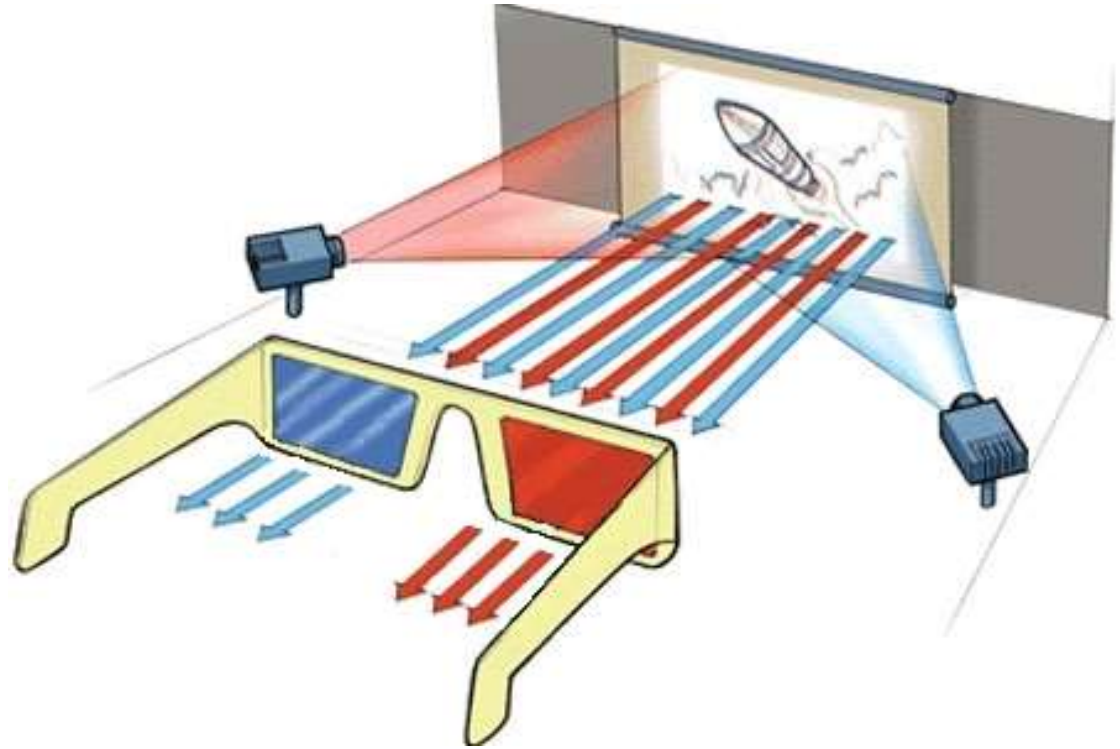


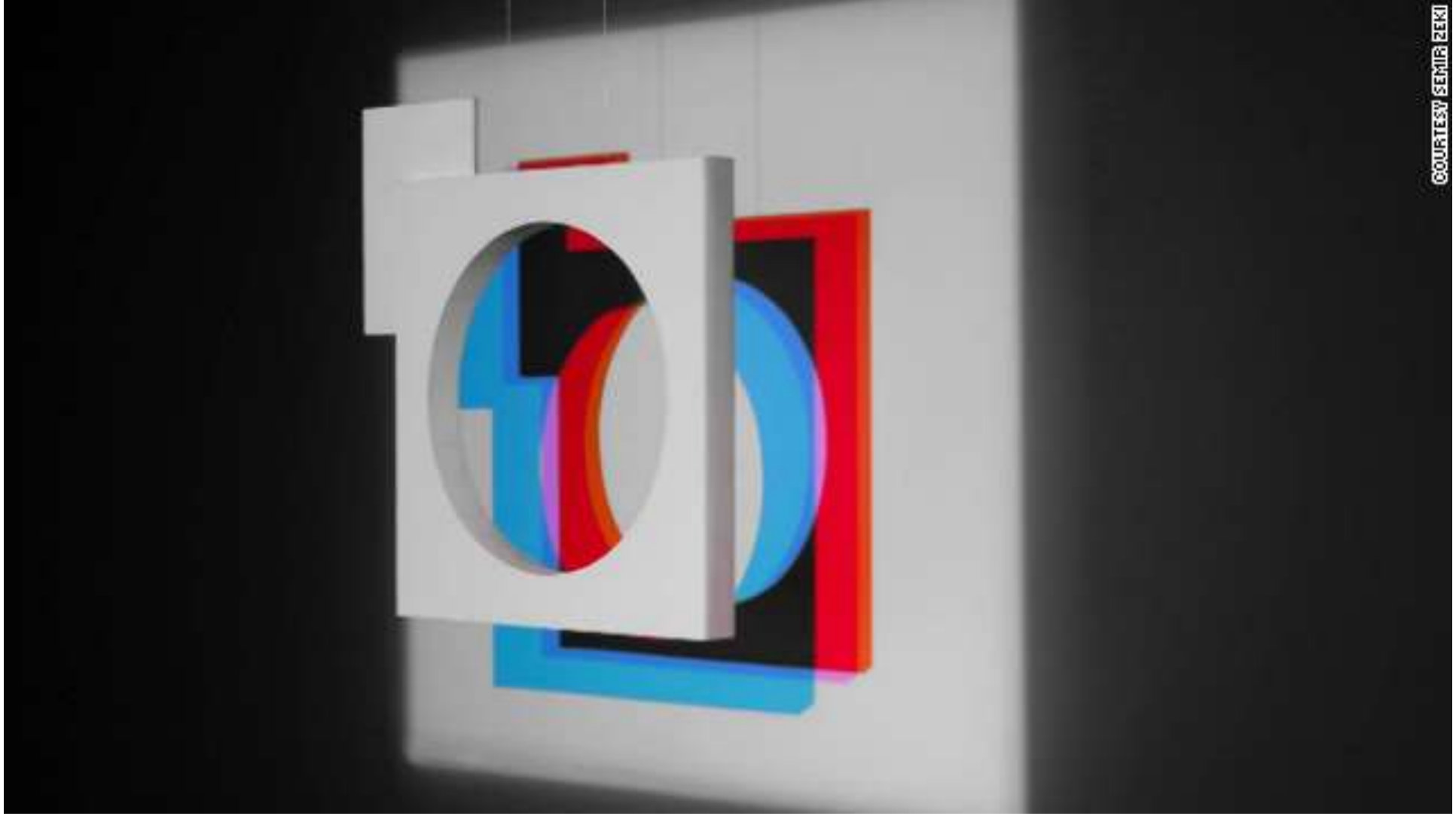
Akiyoshi Kitaoka

Stereographs Were the Original Virtual Reality

https://www.smithsonianmag.com/innovation/sterographs-original-virtual-reality-180964771/

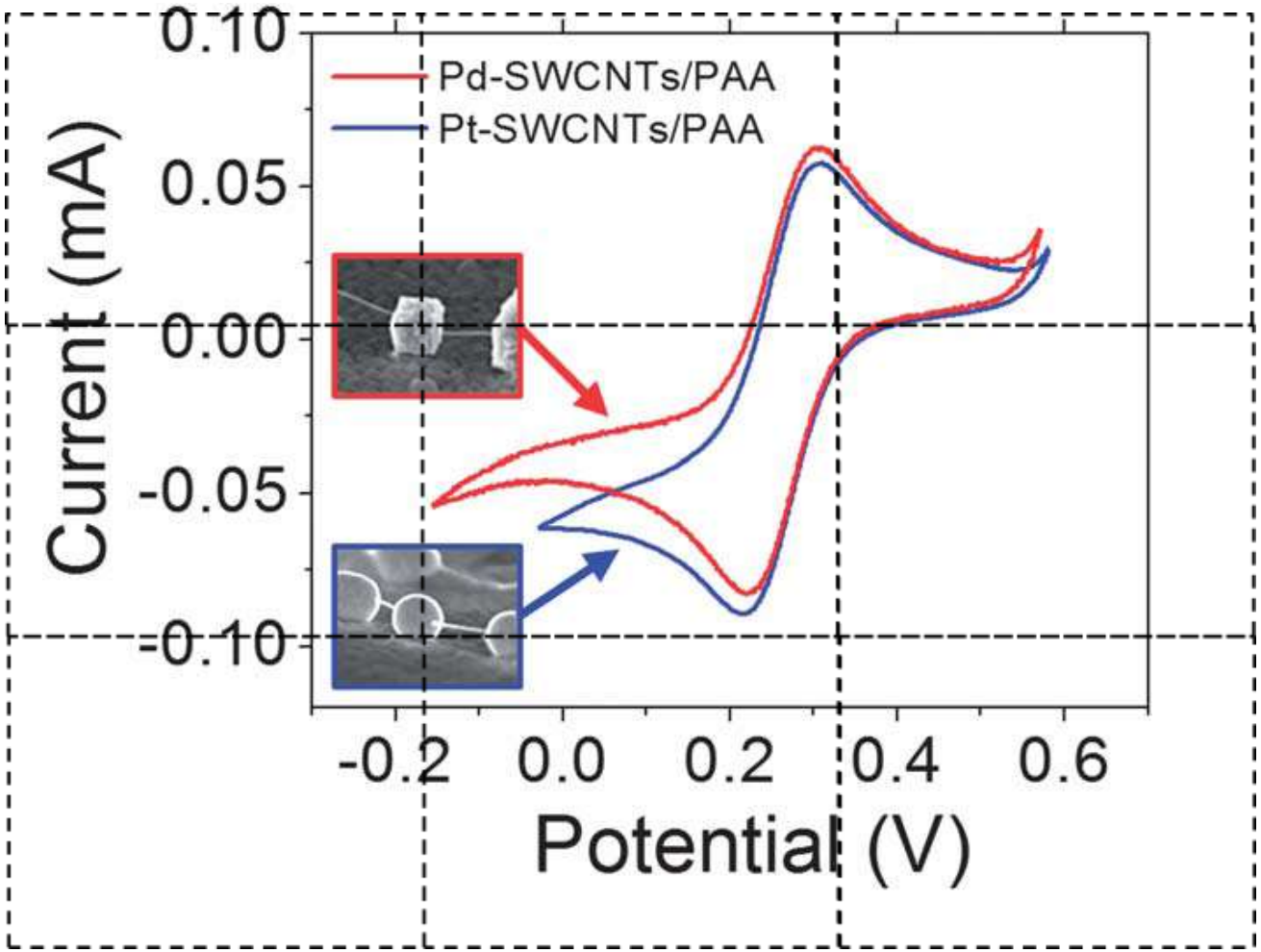

Optic Chiasm
Eye
Optic Nerve
LGN
Right Visual Field
Left Visual Field
Primary Visual Cortex
Primary Visual Cortex





Semir Zeki, professor of neuroesthetics at University College London, created this sculpture "Squaring the Circle." Projecting colored lights on the hanging object creates the illusion of depth.

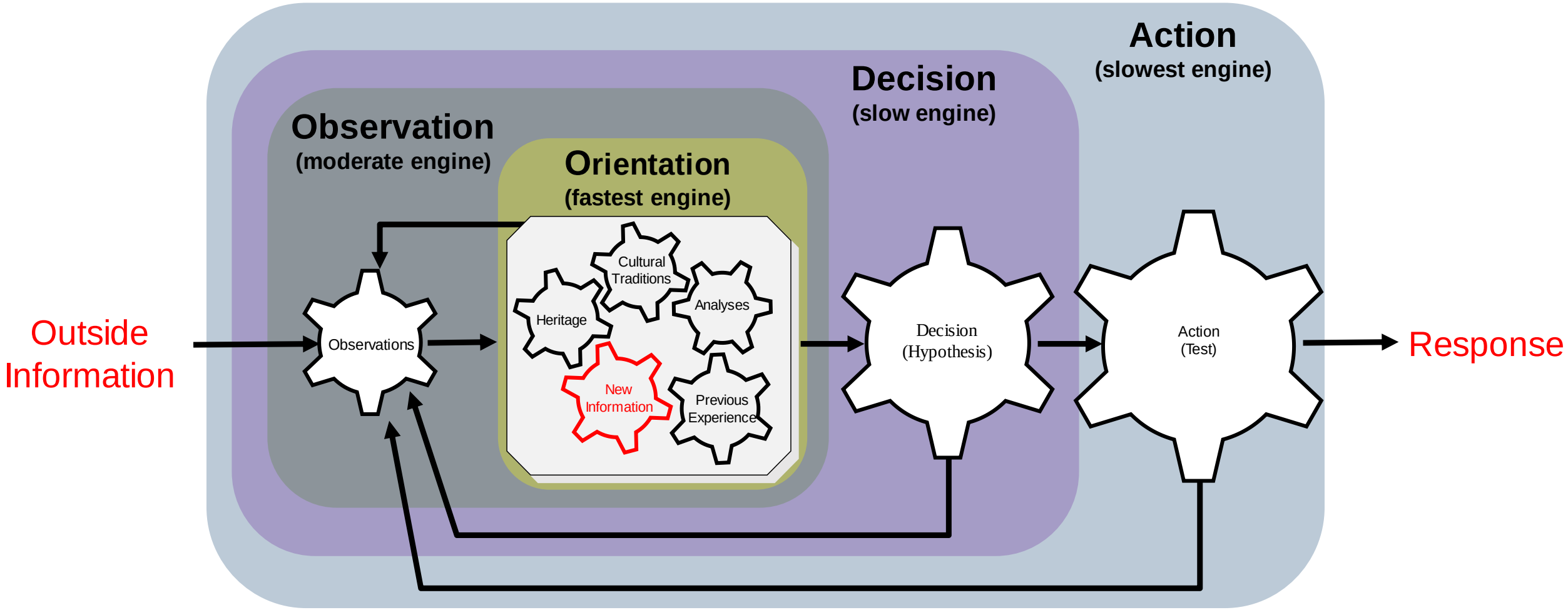
Simple Example



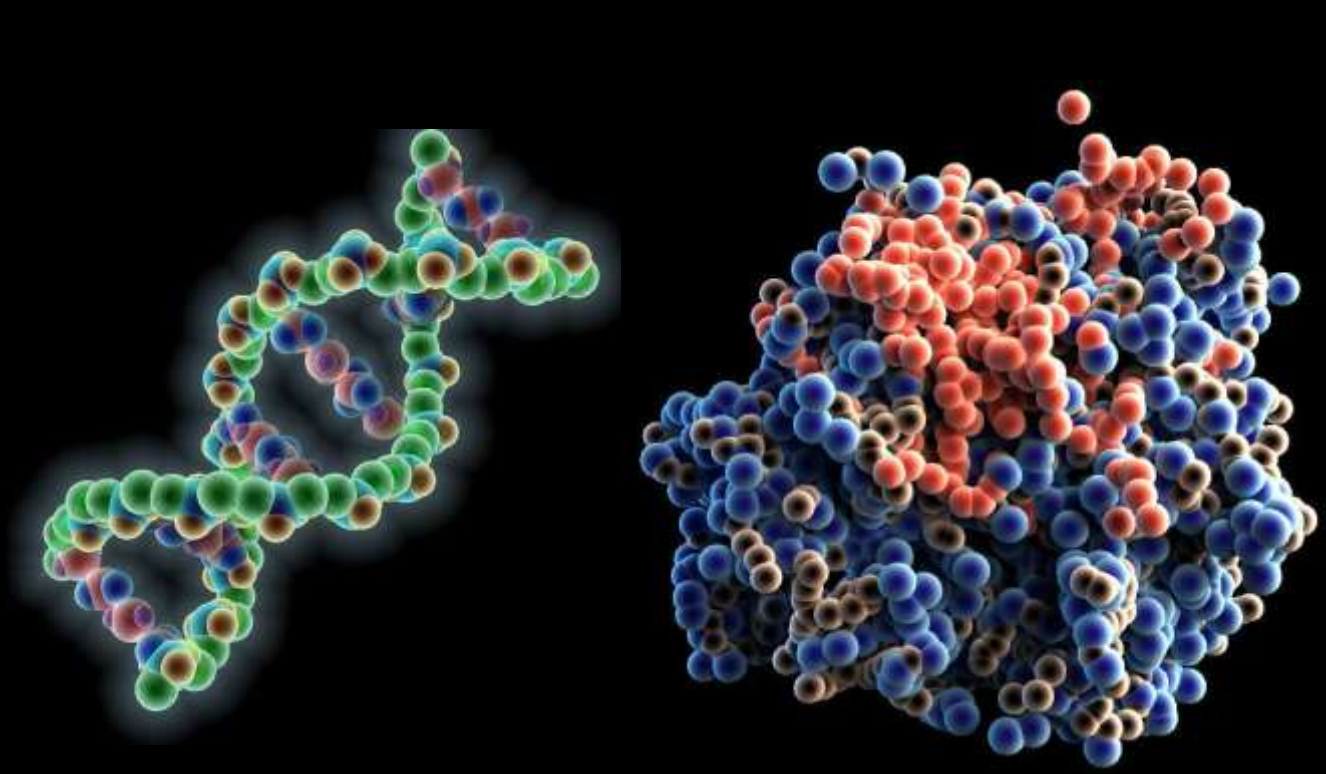
- Most people form a “first impression” within 2 seconds of seeing new information
- Heuristic classification leads to an average of 11 decisions within the first 7 seconds of new information
- A response in this timeframe is **not** driven by higher order (deep) thinking

What the Dog Saw
-Malcolm Gladwell

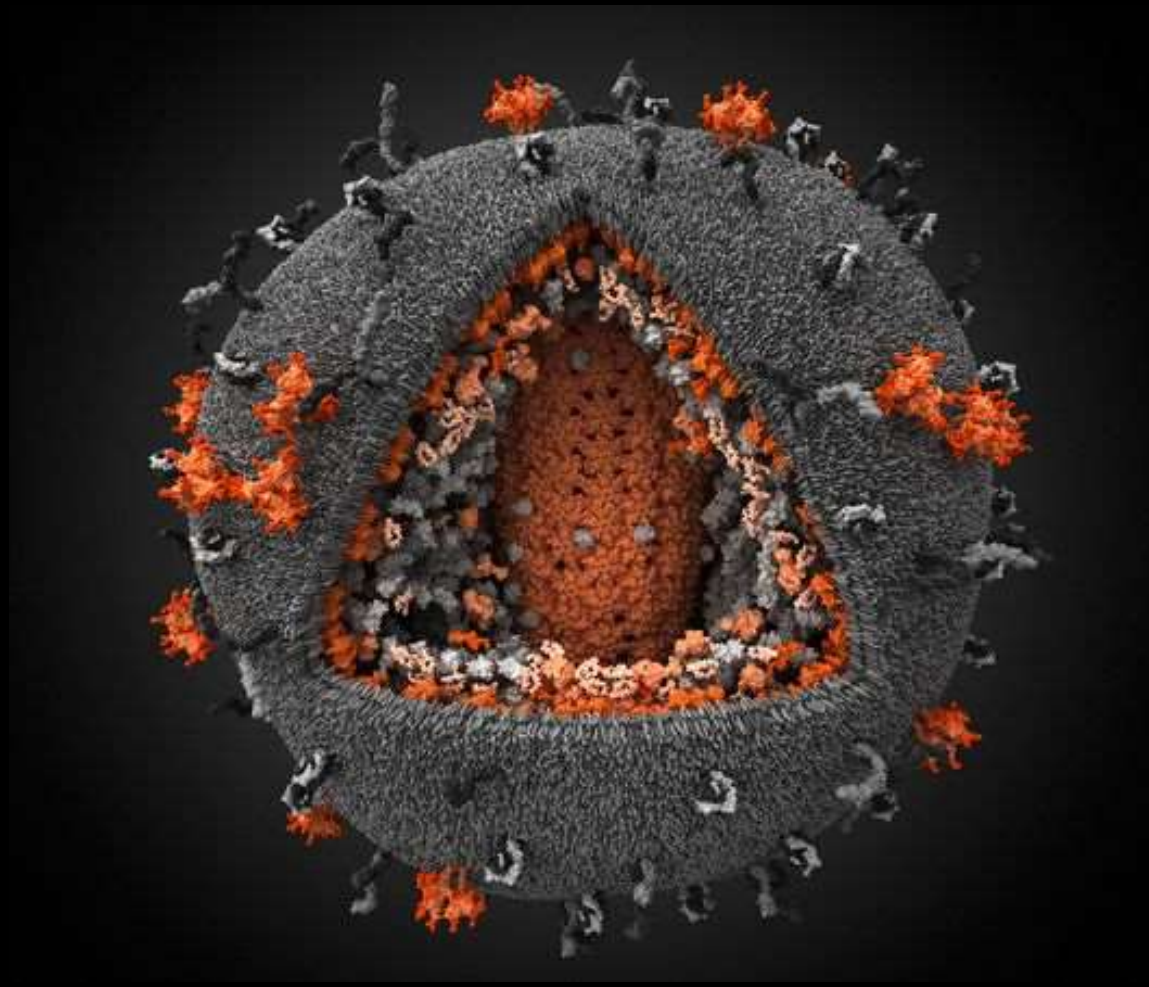
Learning and Decision Making



Creativity is critical



Visual representation of a gene that codes a soluble protein



Visual representation of HIV virus

Rapid point of use nanosensors for monitoring Listeria monocytogenes in food products (NSF Grant CBET-1512659)

Eric S. McLamore, Ag & Bio Engineering, Institute of Food and Agricultural Sciences, University of Florida
Carmen Gomes, Bio & Ag Engineering, Texas A&M University

OVERVIEW: Food spoilage and foodborne infections are two major problems that affect the global food industry. The rich nutrient matrix and high water activity of fresh and minimally processed foods create a favorable environment for the proliferation of specific spoilage organisms as well as foodborne pathogens. According to the United Nations, the economic implications of these problems are stunning: approximately one third of the world's food production is lost annually; in a large extend due to food deterioration associated with microbial activity. In the US, foodborne diseases cause 1.2 million illnesses, 7,300 hospitalizations, 140 deaths, a cost of $1.6 billion, and a loss of 1,400 Quality Adjusted Life Years each year. *Salmonella* Typhimurium, *Listeria monocytogenes* and the "big six" diarrheagenic *Escherichia coli* pathotypes (STEC) are the most predominant FPs that persistently cause infections. The global impacts of this problem are even more alarming, as diarrheal and intestinal infectious diseases caused 38 million global cases of disease with 1.5 million deaths, leading to a loss of 84 million Disability Adjusted Life Years in 2015. **The goal of this collaborative research is to develop rapid, low cost *L. monocytogenes* biosensors based on composites of stimuli-responsive polymer nanobrushes and aptamers**.

APPROACH:

Actuation of chitosan nanobrushes under a variety of conditions. Characterization of electron transport rate and electrostatic behavior under repetitive testing (chitosan details shown below). At pH

If you can read this
- You have really good eyes
- You must eat your carrots
- Good for you!
- You must not read very often?

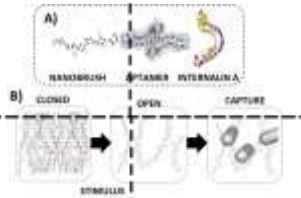


Figure 1. Working mechanism **(A)** Aptamer-functionalized stimulus response polymers **(B)** Actuation of the polymer from closed state to open state will enhance selective capture.

METHODS: Stimulus-response chitosan or PNIPAAM nanobrushes were formed on nanoplatinum or graphene electrodes, respectively. Aptamer-decorated nanobrushes were prepared by EDC/NHS chemistry. Brushes were actuated by changing solution pH or temperature under a variety of capture/sense scenarios.

RESULTS: Actuation of chitosan nanobrushes under a variety of conditions. Characterization of electron transport rate and electrostatic behavior under repetitive testing (chitosan details shown below). At pH <6, amine groups on chitosan are protonated/polycationic; above pH 6 amines are deprontonated/reactive.

Actuation of chitosan nanobrushes under a variety of conditions. Characterization of electron transport rate and electrostatic behavior under repetitive testing (chitosan details shown below). At pH

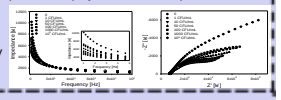


Figure 5. Electrostatic interactions between chitosan and various redox probes during actuation. Changes in electroactive surface area (ESA) were confirmed under repeated stimulation.

Actuation of chitosan nanobrushes under a variety of conditions. Characterization of electron transport rate and electrostatic behavior under repetitive testing (chitosan details shown below). At pH

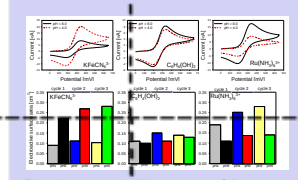


Figure 6. At pH 4.0, sensitivity was 6.1±1.9 Ω (log CFU mL)$^{-1}$; LOD was 6.8±2.7 CFU mL^{-1}; range was 6.8 to 10^9 CFU/mL; res. time was 12 min. As nanobrush is actuated, detection signal increases. LOD was 1.3 ± 0.7 CFU mL^{-1} with t=27 min after 3 cycles of stimulation/capture.

We have proven the system for *E. coli* O157:H7 in vegetable broth (burrs et al., 2016), and we are repeating the experiments for *L. monocytogenes* in various
- food product
- samples (leafy
- greens, cantaloupe,
- fresh cut apples, ice

FUTURE/ONGOING WORK: We are currently testing a variety of food products (cantaloupe, sliced apples, lettuce) and using PCR and standard plate counts to confirm sensor results. We are also confirming targeted capture of *L. monocytogenes* using a secondary tagged antibody in a sandwich format.

REFERENCES:

Burrs et al (2016) Biosensors and Bioelectronics, 85:479-487
Sidhu et al (2016) Proc. SPIE. 9863-14.

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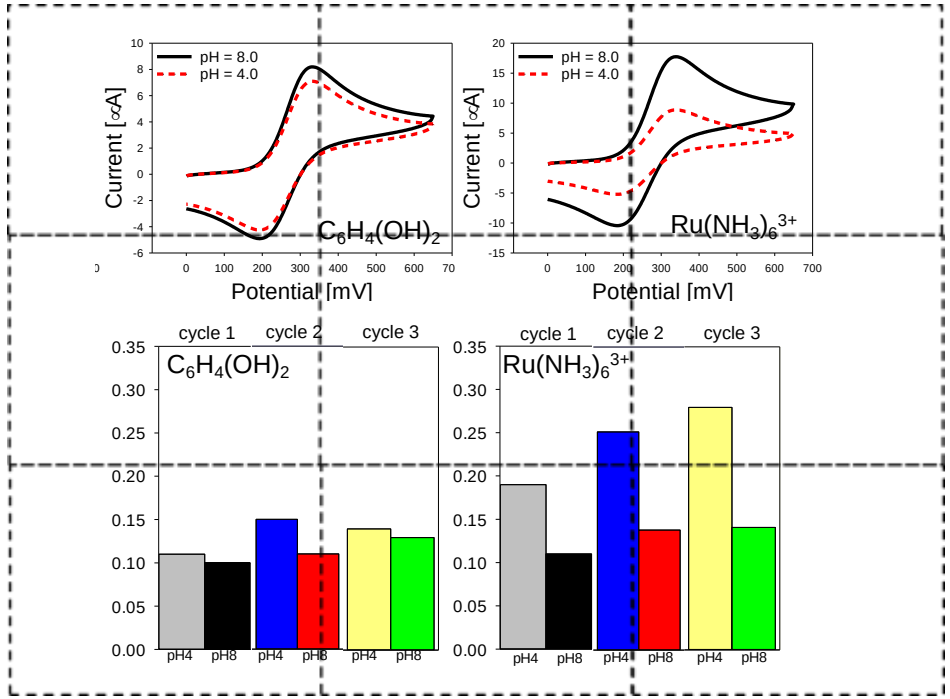
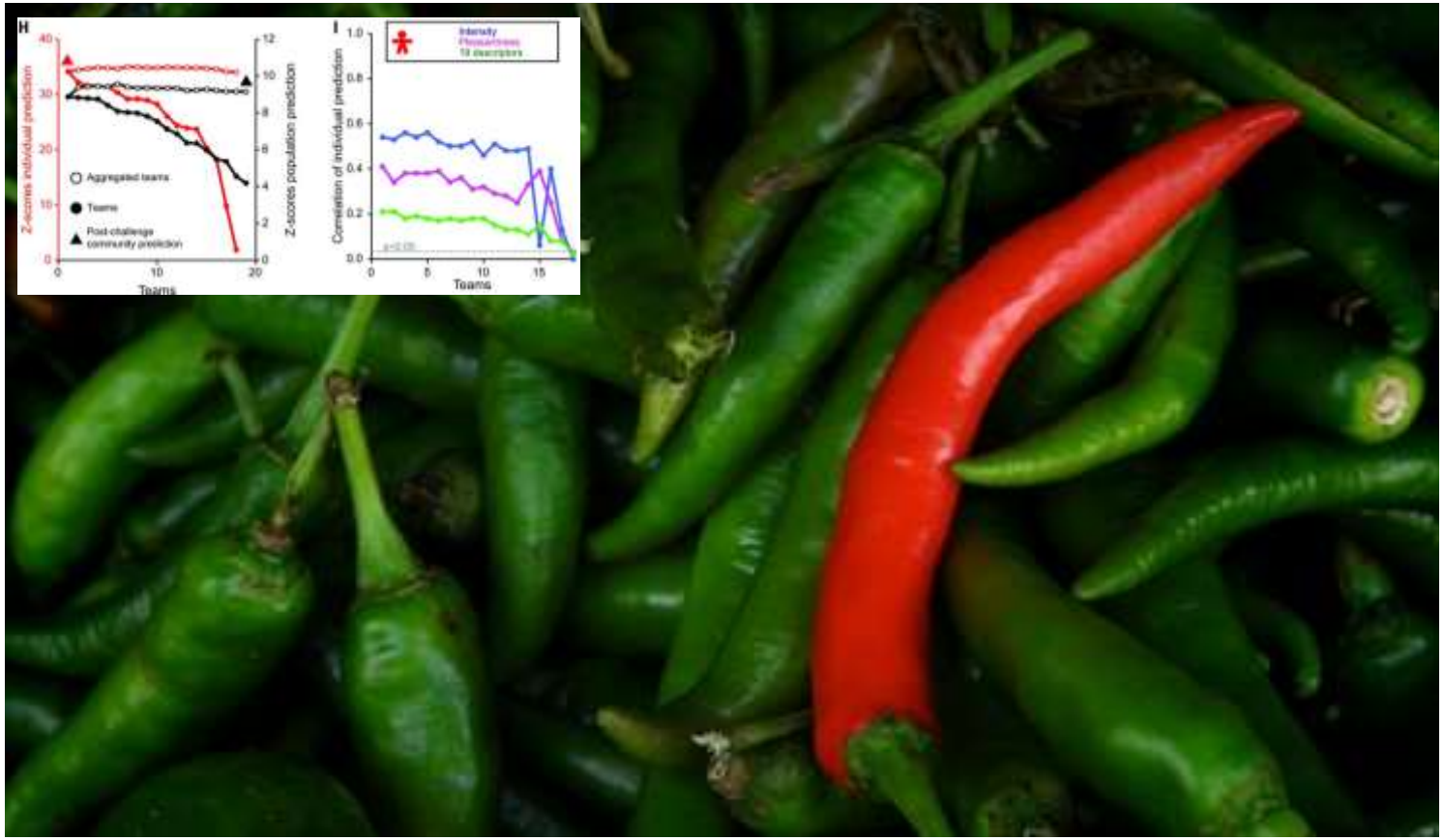


Poster scale patterning

Figure scale patterning

Patterning is paramount

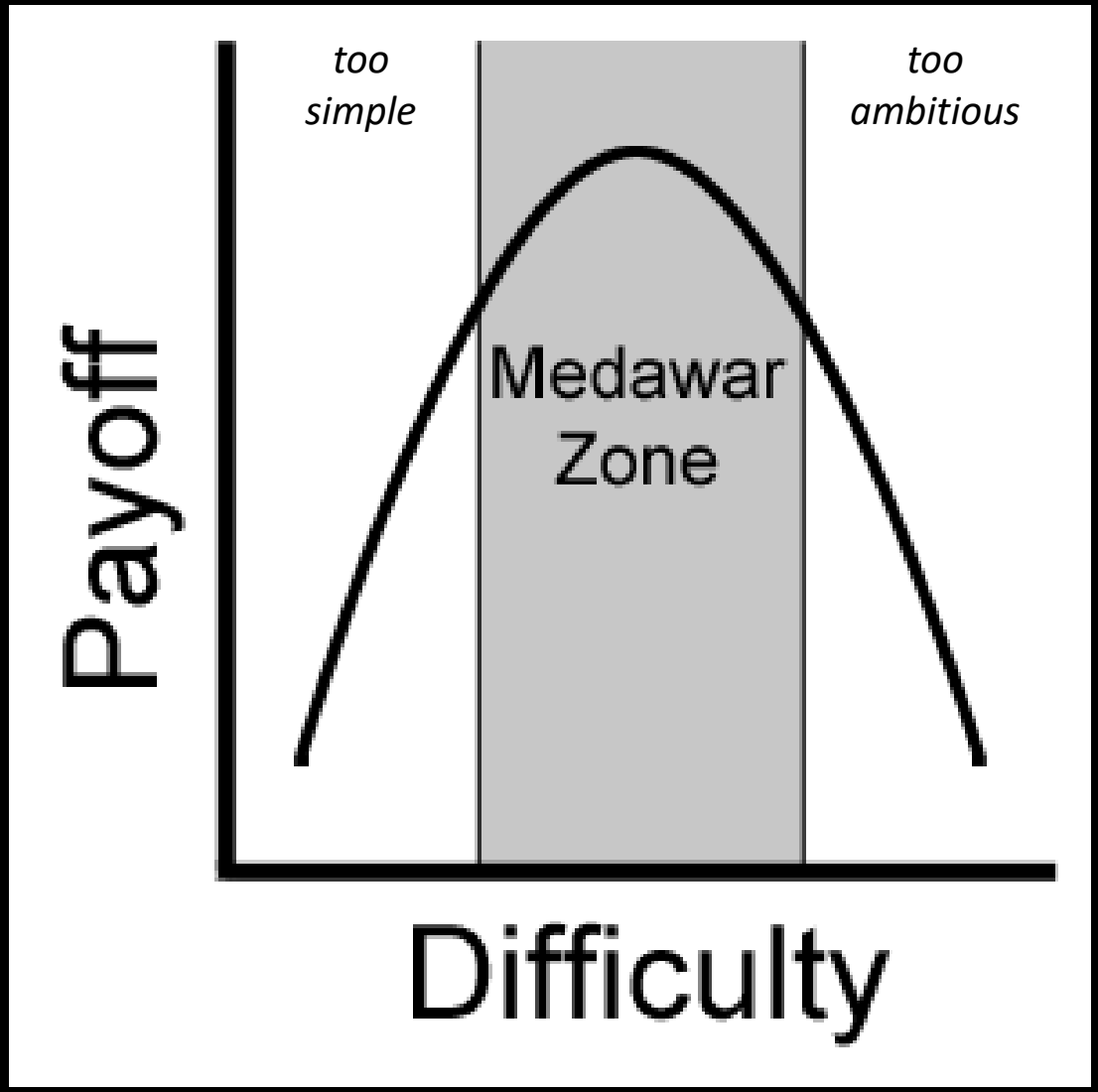


Salience vs. Relevance

- All visually appealing items have a balance between *salience* and *relevance*
- **Salience** is the physical property that sets an object apart from its surroundings
  - Has continuing utility
  - Meets unexpressed needs/curiosities
  - Supports discovery
- **Relevance** is defined as what is most important within an information space
  - Retrospective
  - Meets predefined needs
  - Supports finding information

MAKE TIME:
The Medawar zone and use of visualization

- **<u>KEY POINT</u>**: The Medawar Zone is the area of actions which are most likely to produce fruitful results
- Actions that are "*too simple*" are unlikely to produce novel or significant results
- Actions that are "*too ambitious*" may not succeed at all, or may be rejected by the community at large



Edward Tufte's advice:

Whatever it takes…and nothing more

The status quo

- https://www.acs.org/content/dam/acsorg/events/professional-development/Slides/2016-03-06-poster-slides.pdf
- https://blogs.lse.ac.uk/impactofsocialsciences/2018/05/11/how-to-design-an-award-winning-conference-poster/
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1955747/

Key takeaways

- A poster is a visual “prop” for an oral story
- The poster and the story must be tuned for the audience
- The poster should be general enough that the oral story can be adjusted in real time without contradicting the poster
- Create imagery and text that speaks to the rapid processing center of the brain; use color and space strategically
- The oral story should speak to the higher order processing center of the brain
- Balance salience and relevance