

Sensation and Perception featuring Mona and Bob

A Two-Day Lesson Plan by Michael Sandler, Arlington High School

This pair of lessons is intended for an introductory class or AP Psychology. The first lesson uses the *Mona Lisa* to demonstrate how peripheral vision allows us to see things our central vision cannot. The second lesson features an exploration of monocular cues using a landscape by Bob Ross. Although Sensation and Perception occupy different pillars, I teach them in succession since my textbook includes them in the same curricular unit.

National Standards for High School Psychology Curricula (February 2022) with learning targets are as follows:

Sensation (Biological Pillar)

2.2 Students are able to describe the visual sensory system

Perception (Cognition Pillar)

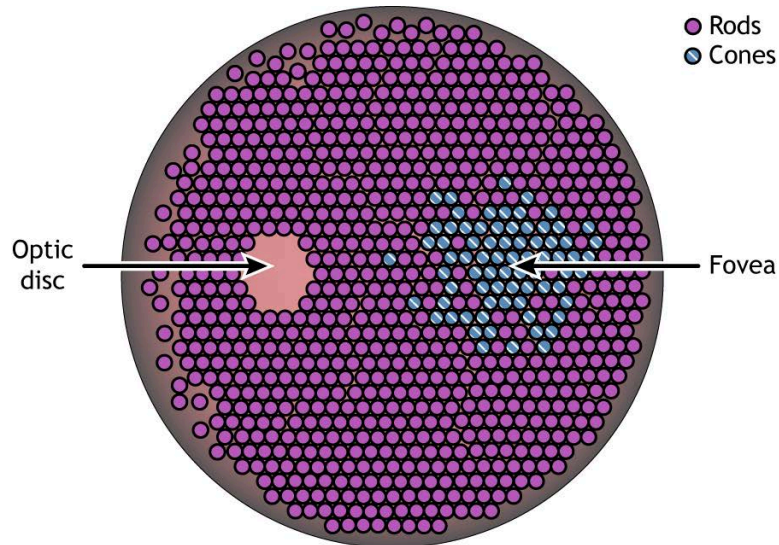
2.2 Students are able to describe binocular and monocular depth cues

Day One | Central and Peripheral Vision and Mona Lisa

Prior to this lesson, students have read about or been introduced to the anatomy of the eye, and should be familiar with the terms *rods*, *cones*, and *retina*.

I like to engage students with exercises in divergent thinking since so much of school requires coming up with one correct answer. I start class with the question “Besides straining pasta or other foods, what else could a colander be used for?” I have, among other things, an old colander in my classroom that I’ll model for them; you could alternately project a photo of one like [this](#). After a few minutes of brainstorming and then sharing their answers, I reveal that it can be used as a basic model for the human retina, substituting the colander’s holes for rods and cones, the two different photoreceptor cells.

To the whiteboard! Using a black marker for rods and a colored marker for rods, I diagram their locations on the retina. Alternately, one could share this illustration of receptor density:



(Note: the illustration is for the left eye)

The main points to convey are that cones are responsible for fine detail and color vision and are clustered in the fovea in the center, the rods lie in the periphery of the retina, function in dim light, and detect motion in order to direct our foveal vision.

To drive home the fact that cones exist almost exclusively in the fovea, and that cones do not, I project [this graph](#):

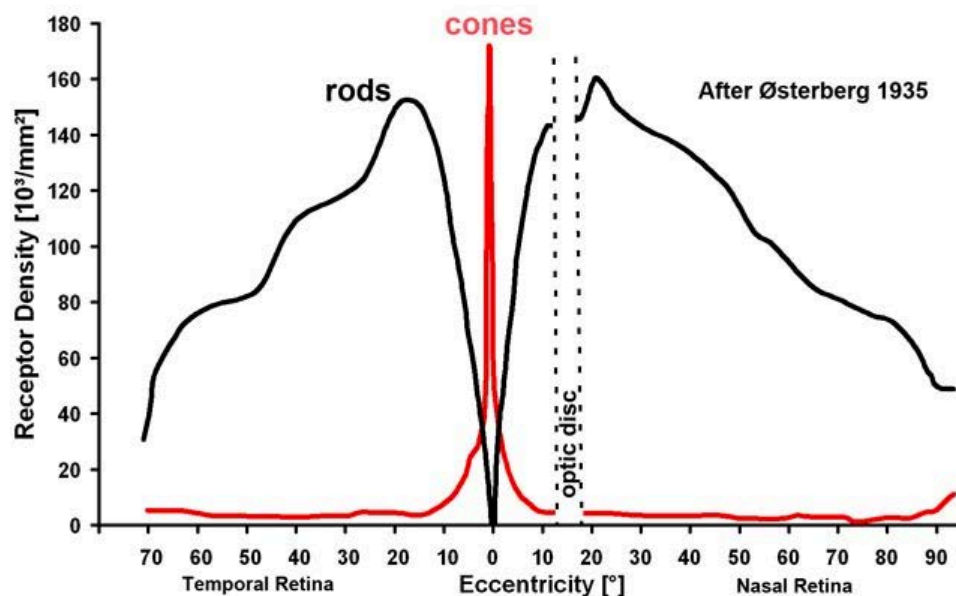


Fig. 20. Graph to show rod and cone densities along the horizontal meridian.

At this point, I introduce the vocabulary term *eccentricity*, which refers to the distance or angle from the center, as labeled on the x-axis. I ask if anyone knows what having eccentric tastes in music or fashion means; hopefully there's at least one student willing to share their love of some esoteric music genre that's a bit off-center. Interpreting the graph, the area with the highest concentration of cones is the fovea or center of gaze. As objects move as few as ten degrees out of foveal vision and into peripheral vision, rods are the primary photoreceptions.

(The session by Maria Vita and Mike Hamilton from NCSS 2024 would slot in perfectly for an AP Psychology class.)

Next, pass out photocopies of [this diagram](#), :



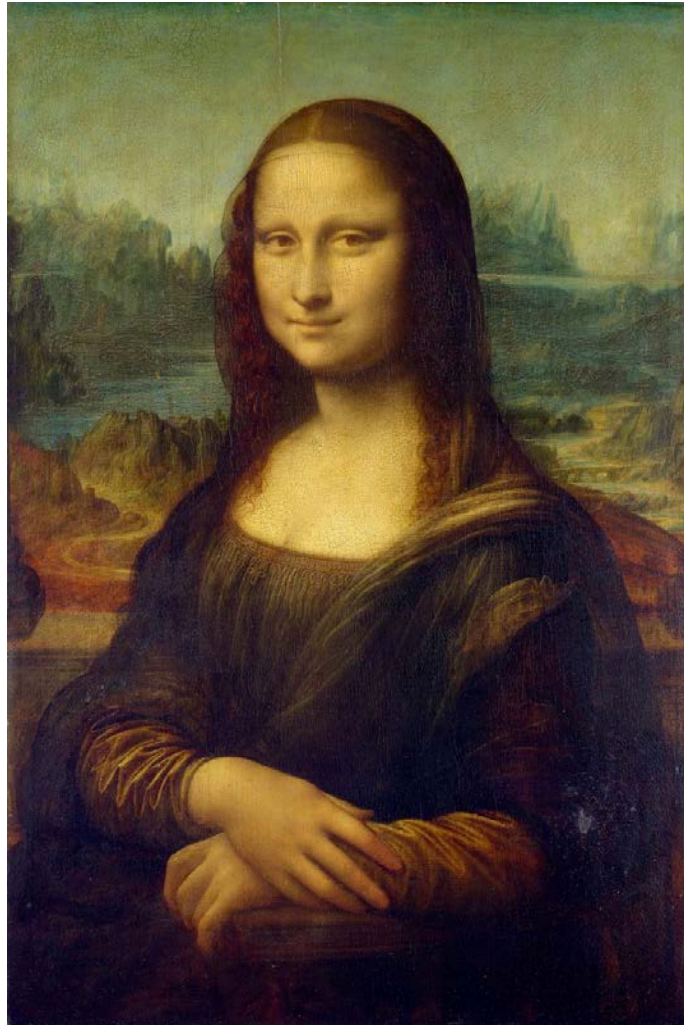
Instruct students to hold the paper at arm's length and stare at the dot in the center. Repeatedly remind them **not to let their focus waver off the dot**. Ask them to say the letters out loud and in unison after you prompt them. (e.g. "Outermost letter at 3 o'clock," etc.)

The letters' size has been scaled in proportion to the eye's changing resolution, demonstrating how drastically resolution drops off with eccentricity. (For more, visit [Mind Hacks. Tips and Tools for Using Your Brain](#))

Having established that our central vision comprises relatively little of our visual field, thanks to the concentration of cones in the fovea, I ask the following out-of-the-blue question: *What is the world's most famous painting?* The vast majority of students will respond with *The Mona Lisa*.

Project Leonardo Da Vinci's masterwork or photocopies of it. Wikipedia has a

high-resolution version of *The Mona Lisa* that takes a moment to load. Ask “Is she smiling?” Students' answers will hopefully vary, with most coming to the conclusion that there's ambiguity in her expression. Her lips are upturned at the corners but her eyes seem unimpressed. (Perhaps this would be a good opportunity to revisit the concept of *operational definitions*, wherein different people could independently reach the same conclusion that Mona is either smiling or not.)



Here's the payoff! Show the segment from Nova's [Decoding Da Vinci](#) starting at 38:11 and ending at 44:24. It features neurobiologist Margaret Livingstone discussing how Mona Lisa's smile appears most cheerful when in one's peripheral vision, explaining its lifelike quality.

To finish, either in class or as homework, prompt students to write a paragraph explaining how Leonardo da Vinci made *Mona Lisa* smile only when the viewer is not looking directly at her mouth. They are to use the following terms in their writing: *eccentricity*, *foveal vision*, *peripheral vision*, *rods*, *cones*.

Day Two | Bob Ross: Master of Monocular Cues

Growing up in the eighties and (*shudder to think!*) without cable television, I spent many hours watching Bob Ross on PBS' Channel 2. His calming voice and warm presence somehow made each episode of *The Joy of Painting* a happy little vacation. Decades after his death, Bob Ross remains an icon of kitsch and pop culture, with most students at least familiar with his puffy-haired likeness.

I start this lesson with Mona Lisa back up on the screen and ask students what they recall from yesterday's class. Hopefully, they can still explain why *La Gioconda's* smile is so mysterious.

Next I ask them why this two-dimensional image appears to have depth. I use the website Socrative to gather students' responses, but there are plenty of ways to hear from everyone in the room. Hopefully they cover that Mona is blocking the background, exhibiting *interposition*; the background is blurred, showing *relative clarity*; she is larger than the objects in the background (i.e., *relative size*.) Continue to explain how *relative height* is achieved by having the top half of the painting appear to be farther away from the viewer. *Linear perspective* is not explicitly shown here, but many students have taken an introductory art course that covers this cue and could be in their responses. Also, the beginning of yesterday's video discussed it.

Ask students to cover or close one eye and ask if the same depth cues remain — they should, since *monocular* refers to their one eye.

Note: I cover *relative motion* in a separate lesson, since this monocular cue cannot be achieved with a painting since it is a static scene. For that, I'll project the 1991 [Sonic the Hedgehog video game](#) and share how this quantum leap to 16-bit technology gave Sonic incredible depth as the background moved slower than the foreground. (Your results may vary.)

And now – at long last – we make our way to Bob Ross. Episodes are roughly 25 minutes, so you might need to skip forward if you're short on time, which unfortunately diminishes the meditative quality of his program. I use a different episode each year, but [Island in the Wilderness \(S29 E1\)](#) is a fine one to use. We watch together and indicate which monocular cues his painting utilizes as he's creating it. It's important to pause and remind students that they should be actively watching the show, looking for examples of the cues rather than “zoning out.” Sure, we could skip right to the end of the show and deconstruct the finished painting, but we all deserve some *Joy* during the school day.

As an extension, students could use their knowledge of Gestalt principles and apply them to the same Bob Ross painting. Many feature *proximity*, *similarity*, and *closure* to trick the viewer's eye to see something that's only hinted at.

As a summative assessment, students show what they have learned by taking photos or drawing scenes that exemplify at least five of the monocular cues.

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