Summer 2020

Illustrating Neuroaesthetics

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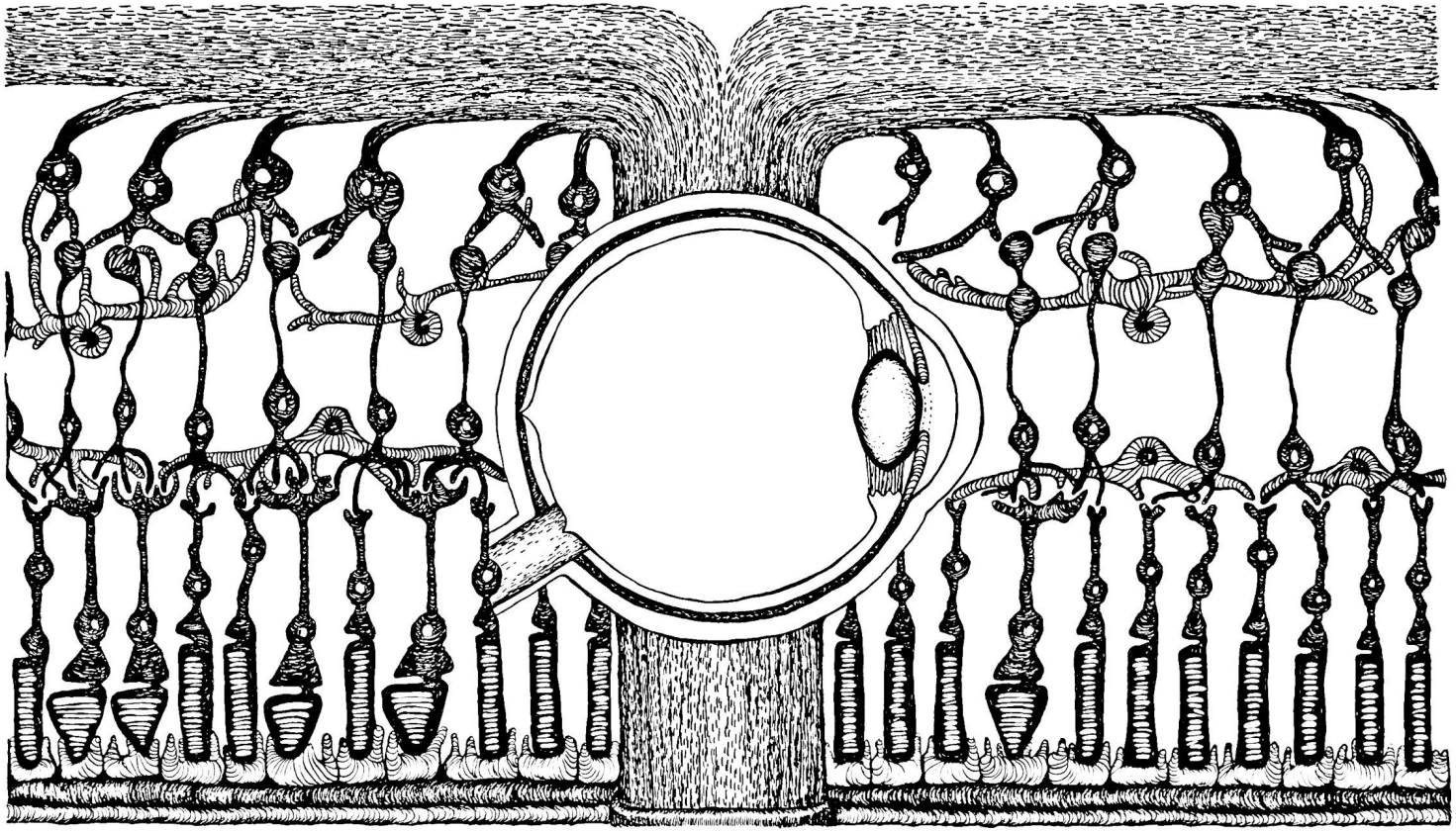
This body of art attempts to bridge two subjects, visual art and neuroscience. It does so by illustrating five topics in neuroaesthetics, the study of how we see and perceive art. I believe beautiful things can happen at the intersections of interdisciplinary subjects and wanted to explore this one further.

While each piece has its own summary of the science the work is illustrating, I hope for some it is just a jumping off point for learning about a new subject, whether that be art, neuroscience, or something in between.

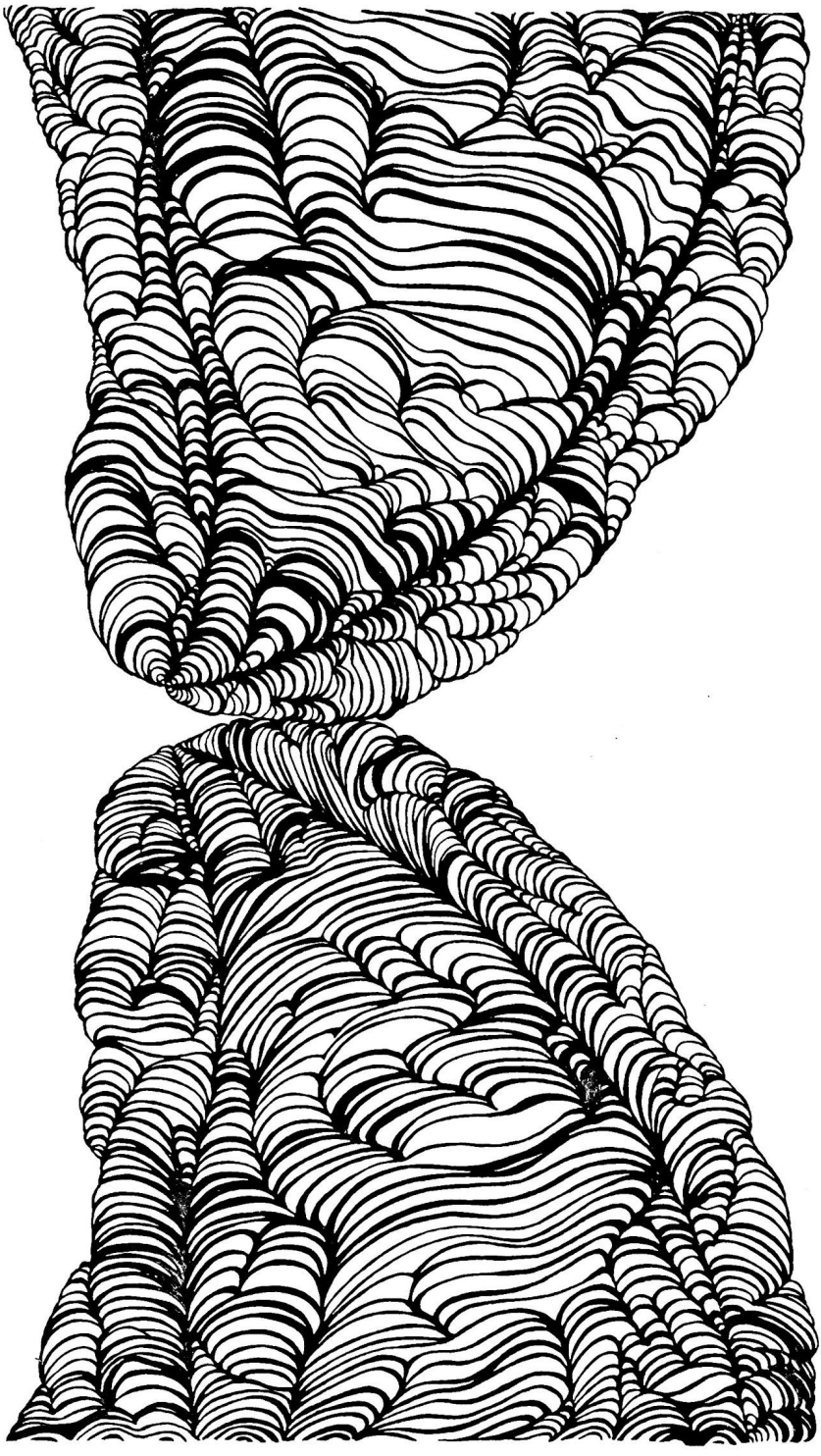


Anatomy of an Eye (2020)
Pen and ink on bristol board
10 in x 16 in

Drawing One: Anatomy of an Eye

Vision starts with the eye where light waves are translated into neurological signals. In the center of Anatomy of an Eye, there is a cross section of a human eyeball. Going from right to left on the drawing, light waves travel through the cornea, which blends and focuses the light. Next, the light passes through the anterior chamber to enter the pupil. This is surrounded by the iris, which uses muscle to control the size of the pupil depending on how much light there is available. After passing the pupil, lightwaves enter the lens and are then focused on to the retina.

An even closer look of the retina is illustrated behind the eyeball. Starting at the bottom with the outermost cells in the retina are the photoreceptor cells. These consist of cones (the ones that look like cones) and rods (the ones that look like rods). Cone photoreceptors are best for color and vision acuity, while rod photoreceptors are best in low-intensity illumination. Above the photoreceptor cells are bipolar cells, followed by ganglion cells. In between these layers are horizontal and amacrine cells that provide lateral linkages. From the ganglion cell axons the resulting visual information enters the brain via the optic nerve.



Visual Pathways (2020)
Pen and ink on bristol board
10 in x 16 in

Drawing Two: Visual Pathways

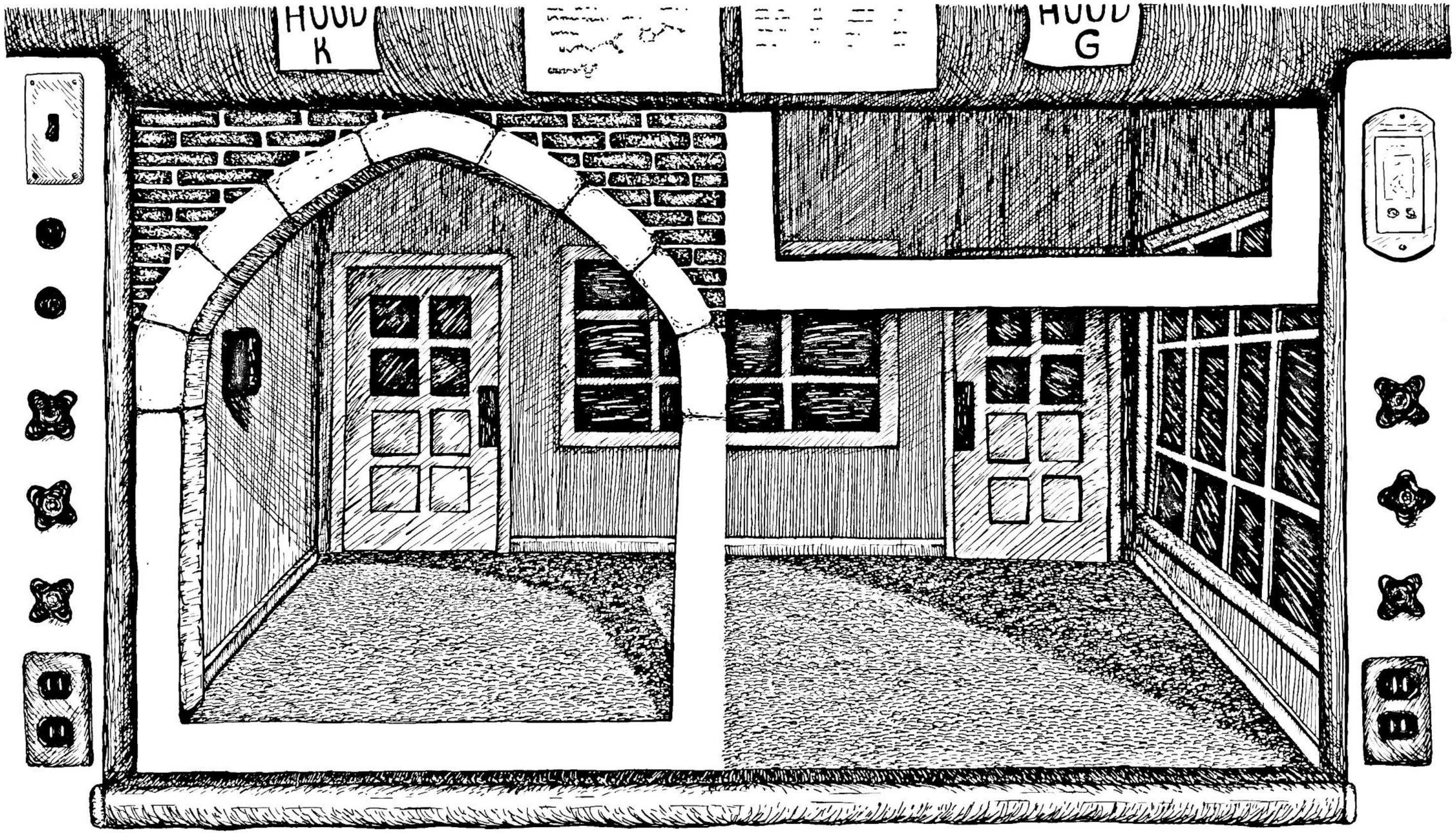
From the optic nerve, visual information travels through the thalamus to the back of the brain into the primary visual cortex (V1). This part of the brain is illustrated twice in back to back brains in the second drawing, Visual Pathways. This series of lines not only creates an illusion of three-dimensional folds on the brain, but also highlights the next locations in visual processing, the dorsal stream and ventral stream, through emphasis on fictional folds where these systems occur. At this intermediate stage, the brain “discerns which surfaces and boundaries belong to specific objects and which are part of the background” as well as grouping features to make distinct objects (Kandel, 28-29).

The dorsal stream is illustrated by the dark fold tracing the top of each brain. It is commonly nicknamed the “where” system because it discerns where things are with figure ground segregation. While it is a “color blind” process, it is also responsible for spatial organization, as well as depth and motion perception.

Drawing Two: Visual Pathways (cont.)

At the same time visual information processes along the dorsal stream, so is information along the ventral stream. This is shown by the dark fold illustrated along the bottom of each brain. The ventral stream is nicknamed the “what” system because it helps recognize what things are, like objects and faces. It also is responsible for color perception. (Kandel 38)

Because the ventral and dorsal streams have different functions and abilities, “they sometimes create illusions (perceptions that are not accurate) when they work together in a way that the brain does not expect or when they work against each other” (Kimberly K. Turner). Artists from the 1960’s worked with these optical illusions which resulted in Op Art. Visual Pathways follows their lead by manipulating solid lines to create three dimensional depth on two dimensional paper. While the “what” system sees lines, the “where” system sees dark and light values depending on how close the lines are to each other, creating depth.



Interdisciplinary Memories (2020)
Pen and ink on bristol board
10 in x 16 in

Drawing Three: Interdisciplinary Memories

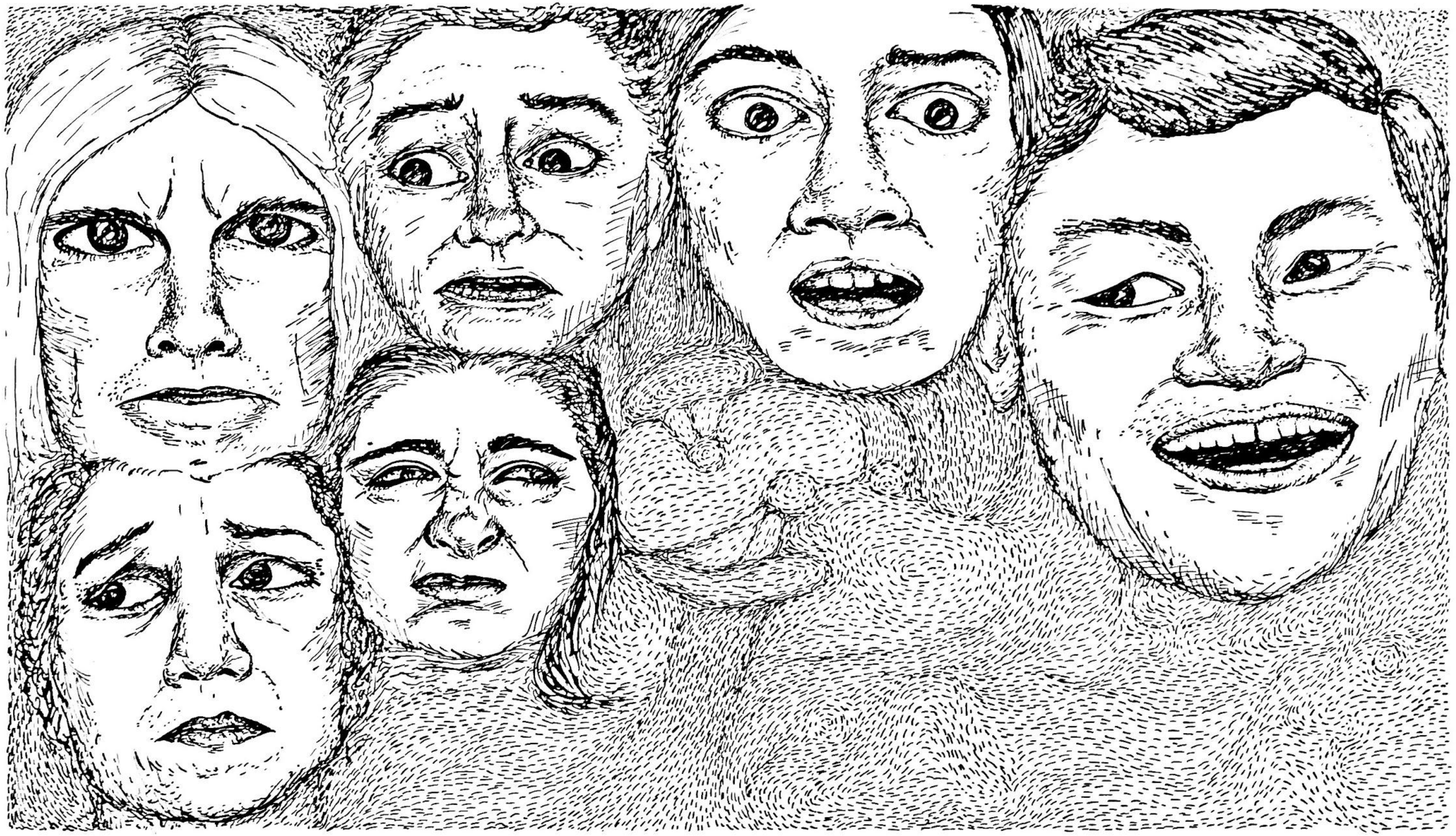
Memory is essential to processing visual information. Implicit memory is essential to seeing with ease, as is semantic for recognizing places, people, and objects, while episodic memory allows us to connect what we perceive with past experiences. Interdisciplinary Memory illustrates that for members of the University of Puget Sound community, specifically individuals who work in the science labs or frequent Kittredge Gallery.

For implicit memory, which uses past experiences to inform the current one without any conscious awareness, seeing in our world seems effortless. To use the third drawing as an example, if one frequents Kittredge Gallery often they are used to seeing the two arches that make its main entrance. This priming, permits them to see that in the drawing, despite the disrupting border and raised left arch. However, if one is more familiar with working in a lab with fume hoods, they will see a fume hood with a weird arch and doors where the experiment should be.

Drawing Three: Interdisciplinary Memories

Consciously recognizing these objects or locations is semantic memory, which “consists of our vast knowledge of objects, words, and concepts” (Shimamura 119). When extracting meaning from a piece of art, one draws on what they know. How one interprets a piece may differ from person to person depending on the memories they have.

This also applies to episodic memory, which includes “events and experiences anchored in a past time and place” (Shimamura 131). Collectively, these memories create a sense of self. I personally identify most with the arts department on campus, but the sciences are a close second. By depicting a mix of science and art memories, I am expressing a form of self-identity. The viewer is then able to see my identity through their personal experiences.



Evoking Emotion (2020)
Pen and ink on bristol board
10 in x 16 in

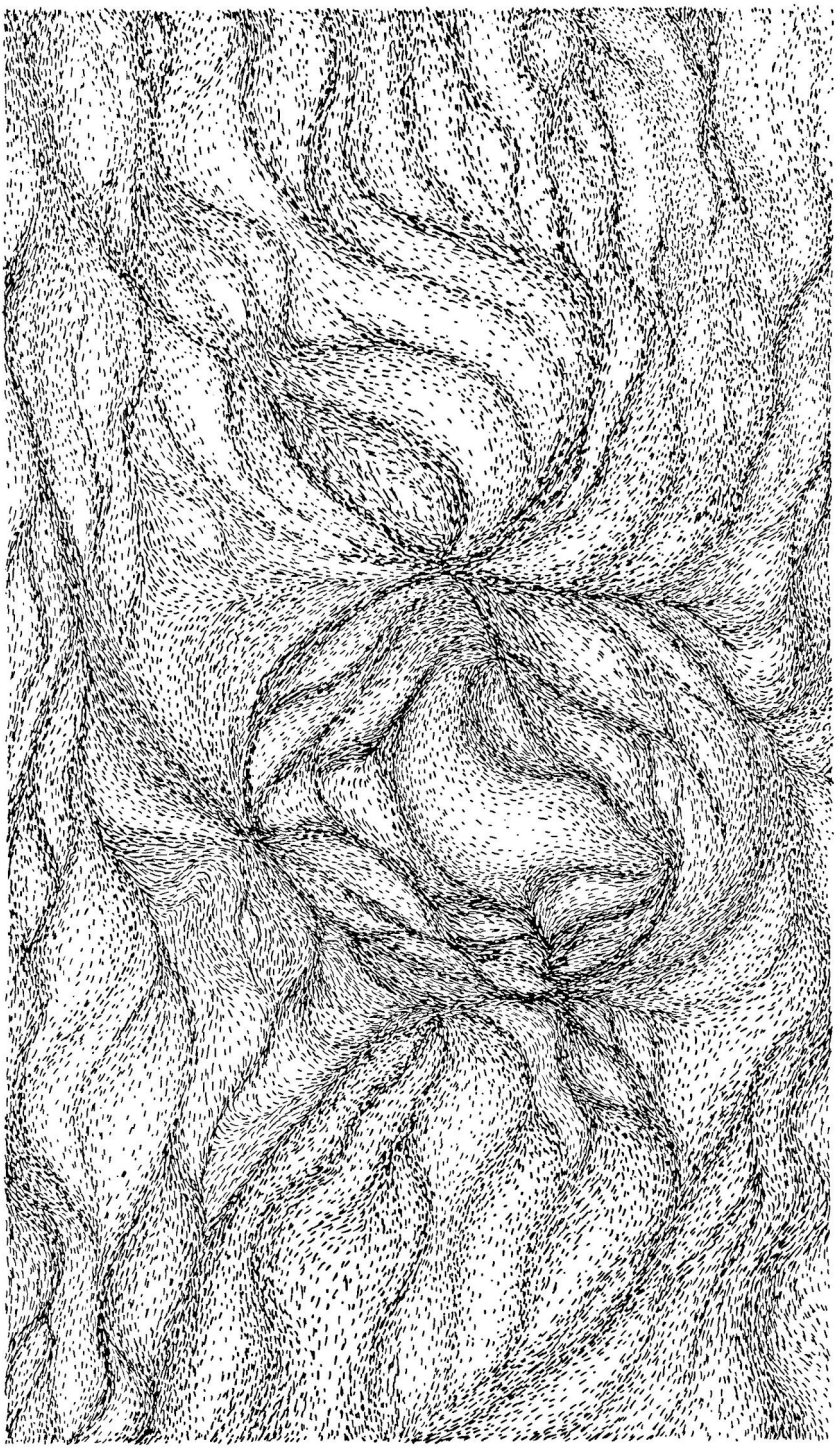
Drawing Four: Evoking Emotions

As a continuation of the third piece, Empathetic Emotions is the possible result of successfully connecting with an artist's work through episodic memories. Arthur Shimamura in his book Experiencing Art: In the Brain of the Beholder, describes how an empathetic relationship between artist and viewer "bridges the intention of the artist with the experience of the beholder," which amplifies emotional responses and a deeper connection with the artist (Shimamura 240).

While I cannot evoke any emotion in the viewer that I please because everyone has unique emotional responses based on their past experiences, I can depict the six basic facial expressions, understood and expressed amongst all humans (anger, fear, disgust, sadness, surprise, happiness). In this fourth drawing, the faces are drawn on a grid ranging from hedonistic value with bad on the left and good on the right; and arousal with high on the top and low on the bottom.

Drawing Four: Evoking Emotions

In addition to various emotions, one may experience pleasure when looking at art. This feeling is driven by a “reward” circuit in the brain. Mixed into Empathetic Emotions, somewhere between disgust and happiness, this circuit is depicted. One theory of how we came to find similar things beautiful or pleasurable is through evolution. This means that our ancestors that preferred flowering trees with edible fruit were more likely to survive than those who found rotting plants attractive. But as explained for drawing three, our own personal experiences and primed implicit memories also impact what we find pleasure in, as all individuals, cultures, and communities have their own preferences and experiences that they connect most with.



Untitled (2020)
Pen and ink on bristol board
10 in x 16 in

Drawing Five: Untitled

Earlier pieces, Anatomy of an Eye and Visual Pathways, focus on how we take visual stimuli and create a mental image. This is an example of bottom up processing, which takes outside information in. The later pieces, Interdisciplinary Memories and Evoking Emotions, focus more on how information currently held in our brain, like memory, can help us interpret the incoming information. This is called top down processing. But what happens when the visual stimuli is unfamiliar and connecting what we know to what we see is not so easy?

Abstract art presents the viewer with an image their brain is not used to processing. In return, the viewer's response is often much more unique and tailored by their experiences. Untitled gives the viewer the chance to see what they wish without explicit guidance of familiar architecture or universal expressions. This one is all you.

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