

**The Mental Image and Aphantasia**

by

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Most of us can see mental images. When we daydream, we rely on our memories to construct a scene. When reading a book, the language acts as a starting point to suggest a scene, which our minds elaborate upon based on our unique experience. As Thomas Ward says in *Creative Thought*, “the important function of language is to convey meaning.” (505). Some people have a condition called *aphantasia* where they cannot see mental images. People with this condition have lived with it and found workarounds, and some may not even realize they have *aphantasia*. For future generations, children’s books with connections to the web improve accessibility and tech knowledge, and could stimulate young minds to develop a creative mental image (Fleishhacker). But even without the ability to visualize, *aphantasics* can still be creative thinkers. A visual artist’s original mental image may not perfectly match the resulting artwork, so it is safe to assume that mental image is not a requirement to make artistic work.

The visual component of a human’s imagination goes by many names. “Visualization,” “mental image,” or “the mind’s eye,” to name a few. In his book *Art as Language*, Garry Hagberg uses the phrase “mental envisagement” (78). According to Pearson, the mind’s eye is defined as a “voluntary experience of creating a conscious sensory experience at will” (1). “Humans are born with a rudimentary ability to conceptualize the sorts of interaction beings of our sort are capable of performing” (Ward 511). As discussed later, not all humans are actually born with this ability. But most of us can visualize almost anything, from an average conversation we recently had with a friend to a fantastical dragon that does not exist.

In *Creative Thought*, Ward brings up his idea called “clamping.” He describes it in these terms: “Conceptualizing the world in terms of possible actions is tightly clamped to or controlled by current environmental stimulation. Clamping is necessary to prevent hallucination” (Ward 512). In other words, when we consciously think about a realistic scenario, we know that we are

not currently *in* that scenario, it is only in our mind. This is what makes a daydream different from a hallucination. We must value "...control over conceptualization, essentially through imagination" (Ward 513).

Of course, the mental image has been studied both through brain scans as well as self-reporting questionnaires. But there may be ethical problems as well as doubts of authenticity in these studies. In *Sensorium*, Kosslyn explains in his brief essay that "a central problem in studying mental imagery is that it is an inherently private event, which has led many to be suspicious of claims about it" (169). However, scientific studies show that "brain structures represent the spatial properties of images in the world through a "mapping" function" (Jones 170).

What happens when we visualize? "In imagery generation, we are combining different content that our senses have previously been exposed to and is stored in our memory" (Pearson 2). This points to the popular belief that we cannot night-dream of a face we have never seen, any characters we do not know would be people we have passed on the street. While this has not been thoroughly researched, it is true that our memories play an essential role in our mind's eye. "If you think of a memory as arising from pictorial input, it becomes a visual memory" (Kosslyn 32).

The images we "see" are not simply "pictures in the head" (Kosslyn 29). Instead, they are "both a representation and a conscious experience" (Kosslyn 29). This means that while the image is a depiction of an object, person, place, etc., it is simultaneously, and importantly, as much about the experience of imagining. This is what makes a mental image different from night-dreams, hallucinations, traumatic flashbacks, and other forms of involuntary, sub- or unconscious images in our minds.

“Visual imagery is a cognitive tool often taken for granted – an assumed precursor to our ability to think, learn, and simulate the world around us” (9). This advice from Dawes reminds us to view visual imagery as a tool that can help us with many pursuits such as art and academia, rather than simply a natural, everyday process to ignore. It is useful; in fact, “many people utilize imagery to perform most forms of visual memory tasks” (Pearson 6).

We can visualize in our minds as a natural thought or as a daydream. We can also visualize a scene when reading a book. In picture books and graphic novels, the scene is already depicted for us visually, leaving much less room to the imagination. But in traditional novels, we naturally imagine each scene, and the characters within them. In book-to-movie adaptations, movie-watchers who have previously read the book may feel a disconnect if the movie is vastly different from their mind’s eye when reading. Their discontent shows that our visions when reading are important to us, and are truly how we see the book taking place. But without an external factor such as a movie adaptation or book cover, no two individuals share the exact same vision of the settings. It is different still from the author’s own vision when writing the book. The language of a book, its written or spoken text, can heavily influence our mental image of the setting and characters, and that mental image is constantly changing with new details in the book.

An author would typically have an idea of not only the direction of the story but also each individual sentence before writing it. Hagberg states, “The sentence must have existed complete in the mind prior to its utterance” (80). This is not stated perfectly, as we have all lost our train of thought when speaking or gotten confused in the middle of a sentence while writing. But it is true that we must have some idea with where the sentence is going, or we would not be able to even start.

Our visualizations start with words and their meanings. If a book states there is a chair, we all will think about that chair. But not all of us imagine the same chair. As Ward states, “What is a chair for you may not be a chair for a small child, and vice versa” (509). So, we all have different ideas of a chair, and Ward argues that each word is really about the action we associate with it. Continuing with the chair example, “the meaning of a chair is the sort of human, bodily action that it affords” (Ward 509). And speaking on the sentence, “the meaning of a sentence is the actions that it sanctions [...] The meaning of a particular sentence is not given solely by the sentence, but nor is the meaning of the sentence arbitrary” (Ward 514-515).

*One and Three Chairs* was an art installation expanding on the question “What is a chair?” Joseph Kosuth displayed a photograph of a chair, an actual chair, and the dictionary definition of ‘chair.’ It was intended to make viewers question if any of these three were most authentically a chair (see fig. 1).



Fig. 1. Photograph of art installation. Kosuth, Joseph. "One and Three Chairs." MoMA, [https://www.moma.org/learn/moma\\_learning/joseph-kosuth-one-and-three-chairs-1965/](https://www.moma.org/learn/moma_learning/joseph-kosuth-one-and-three-chairs-1965/).

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Each reader has a unique experience due to everyone assigning different meanings to the words. "There is little that is transparent between words and meaning. Instead, meaning is the result of a creative, constructive process" (Ward 495). Some words called *anaphors* refer to earlier words. Pronouns are examples of anaphors, and if a previous sentence is misinterpreted, then an anaphor's meaning becomes ambiguous. But "ambiguity of meaning is not peculiar to pronouns; just about any word or phrase can be used in a variety of senses" (Ward 496).

Many languages, including English, make heavy use of simile and metaphor. In literature, "metaphor is not infrequent" (Ward 497). But for native speakers, "metaphorical language appears to be understood as easily as the equivalent nonmetaphorical language" (Ward 497). In fact, "Virtually any word can be made to take on multitudes of meanings depending on the context" (Ward 497). For example, the phrase "grab a chair" might make someone visualize a scene in which the speaker motions to extra chairs on the side, which the addressee should pick up one of and move it to a table to sit down at. Another person might see a scene where the chairs are already laid out, and the addressee only needs to take a seat. However, we all still think of the chair as an object to sit upon. "Language can be used to direct behavior toward real objects because the cognitive representation based on the language is about those real objects, not just about the text" (Ward 498).

The time it takes "to read a sentence referring to a room recently visited by a protagonist is a monotonic function of the distance between the protagonist and the room" (Ward 504). It takes us less time to read about a setting we have read about recently than one we have not read

about for several chapters. This may have to do with our mental recreation of the visuals taking longer.

Ward asks, “What makes a string of sentences hang together rather than remain a random collection?” (515) For a book to make sense, its sentences must be linked, following an idea or theme. If we were to visualize a scene from one sentence, and the next made us visualize something completely different, we would usually see that as strange and challenging to read.

Pictures are accessible to all, whereas language must first be learned (Kosslyn 33). If someone cannot read a language, pictures would be helpful for them. For those who can read, we still use pictures in our minds as a reading aid. But what about those who cannot form those pictures?

While the term aphantasia was first mentioned in the nineteenth century, research into the condition is relatively new, with academic papers on the topic being published mainly starting in the mid-2010s. Aphantasia is defined as a “lack of ability to voluntarily generate visual imagery” (Dawes 1). When the majority of us think of an apple, we can see an apple in our mind. Perhaps it is a cartoonish or fuzzy, vague apple, but it is still an apple. An aphantasic - someone who has aphantasia – does not see an apple. People with aphantasia are able to describe things well, but they simply cannot visualize what they are describing (Zimmer).

This may seem hard to understand for those of us with vivid imaginations, but aphantasia is simply how some people’s minds are. While people with vivid imaginations may choose an artistic career, those with aphantasia are more likely to have a career path related to science or mathematics (Zimmer). In fact, “people without any imagery can still perform visual working memory tasks” (Pearson 6). There is a potential benefit discovered in a study, showing that

“people with aphantasia scored slightly higher than controls on spatial imagery questionnaires” (Pearson 8). This suggests that aphantasics may have a better grasp on object distance and relativity, possibly due to a lack of object imagery.

While we do not have a concrete number, it is estimated that tens of millions of people globally have aphantasia (Zimmer). The clarity of one’s mental images can be thought of as a spectrum, with aphantasia at one end, most people somewhere in the middle, and hyperphantasia at the other end. Hyperphantasia is a hyper-realistic mental image capability (Zimmer). Pearson defines it as the capacity for “highly vivid, almost realistic imagery” (6). It can also be referred to as eidetic imagery (Pearson 9). If tens of millions have aphantasia, then millions more have hyperphantasia. “Based on their surveys, Dr. Zeman and his colleagues estimate that 2.6 percent of people have hyperphantasia and that 0.7 percent have aphantasia” (Zimmer).

Although recent, there have been a few studies on aphantasia. A paper by Dawes reported on a major study of aphantasic individuals. The study “compared a group of self-identified aphantasic individuals with two independent control groups of individuals with self-reported intact visual imagery on a range of questionnaires” (Dawes 2). The second control group was to account for gender differences in the aphantasic sample and the first control group. 267 aphantasic people were counted in the study. 83% of them spoke English as their first language, and 88% identified as White/Caucasian. Most participants originated from the United States of America. 24% of aphantasic people had a history of mental illness, while 18% of people did in the control group, suggesting that aphantasic people could be more susceptible to mental illness (Dawes 2).

The study consisted of an extensive questionnaire, with each participant rating themselves in many areas. As expected, “aphantasic participants rated their visual imagery



ability as being significantly lower compared to control group one” (Dawes 4). In addition, the aphantasics had “significantly lower scores than controls on the object imagery component” (Dawes 4). They had “significantly reduced imagery across all sensory modalities (not just visual)” (Dawes 8). But it was shown that “only 26.22% of aphantasic participants reported a complete lack of multi-sensory imagery altogether” (Dawes 4). This includes imaginings of sounds, smells, tastes, and feels. In general, the aphantasic people reported having a “lower ability to remember specific life events” (Dawes 6), and a “near total inability to imagine future hypothetical events in any sensory detail” (Dawes 6). Therefore, a person with aphantasia is more likely to have a better ability to remember the past than to imagine the future, visually. It was a surprise to the researchers that they found “no significant differences between the groups in reports of emotional arousal and reactivity associated with remembering stressful past events” (Dawes 6). In addition, they found no difference in the number of daydreams between groups, but aphantasics tended to have fewer night dreams (Dawes 6).

It is possible for aphantasia to develop following a surgery. However, the majority of people with aphantasia were born with it; they have no memory of being able to visualize (Zimmer). Most people with aphantasia never recall having a visual memory. As the study reported, “only 9/267 (3%) in aphantasic sample reported acquired imagery loss – majority since birth” (Dawes 8). Even though it is thought of as primarily a mental condition, those with aphantasia also do not have physical responses when recalling visual memories, such as goosebumps on the skin or pupil dilation (Zimmer).

The current children’s literature scene is exploding with multimedia. This can introduce children to computers, add another element of engagement, and even provide accessibility

features. “Mobile devices, multimedia publishing, and social technologies are having a major impact on the reading experience” (Lamb).

The “Spaceheadz” series by Jon Scieszka includes websites that kids can visit and sign up for. “39 Clues” series has an interactive website: you can create an account, participate in secret missions, upload codes, and view photos and colorful graphics. The Search for WondLa by Tony DiTerlizzi has a website that uses augmented reality. You will feel as though you are looking through the eyes of the main character. “The Magnificent 12” series by Michael Grant has a website with “extensive, brightly-illustrated content.” And there is an interactive map, and you can register and create an avatar. Finally, “The Amanda Project” series is a website “created” by the characters. It features a community forum, and users can upload fan art, which has been included in the books. This one is more oriented toward teenagers (Fleishhacker).

In Lamb’s article, she comments on the state of multimedia reading. “Given these new realities, it's time to expand the meaning of the phrase reading a book [...] First, let's tackle the definition of reading. What's involved with the activity?” To read as well as comprehend requires an understanding of the language at the level being used. Perhaps one also has to interpret what they are reading in their mind so that it is not simply a collection of symbols on a page. Since the meanings of sentences are author-introduced and reader-defined, everyone experiences the act of reading a bit differently.

Lamb continues to point out that “today's readers expect to be immersed in multimodal resources that combine a variety of modes and media.” She questions, “But does technology-based reading enhance or distract from the learning experience?” (Lamb). For most people, the question is up for debate. But for someone with aphantasia, a book involving another vivid, enticing element can only enhance their reading experience. An aphantasic child, too young to

realize that others have mental images while they do not, would greatly benefit from a vivid picture book with an accompanying website that truly brings the story to life.

Intention comes first for artists, but an artist may not always know their vision. Hagberg states, “Artists may be confused or deluded about their beliefs and practices” (85). He explains that mental imaging is an almost necessary capability and process for visual artists, especially artists in a time before the internet or even mass media. In order to create a work, an artist has to visualize in their mind what that work is going to look like. They don’t necessarily need to be able to see a vision of the completed work, but at least the section they are working on before putting paintbrush to canvas (Hagberg 75).

“Creative thought requires relative quiet: suppressing the environment is effortful, and the amount of effort is determined by the attention-getting qualities of the environment” (Ward 518). According to this quote, it may be a challenge for people with hyperphantasia to think creatively. The more vivid a mental image, the more attention-grabbing it may seem, making it harder for a hyperphantasic person to think outside of the box of their already vivid mind.

An aphantasic person can still engage in creative thought processes. As Ward puts it, “We talk ourselves into states that can be interesting, exciting, and sometimes creative” (519). Anyone who can think can be creative. While aphantasics may not have as much inclination toward artistic pursuits, they are still completely capable of following any of their passions. On the contrary, Hagberg states, “Visual artworks are the outward manifestations of mental images” (78). This would imply that a mental image is strictly necessary to produce a visual artwork. The mental image is helpful, sure, but by no means necessary. For example, an aphantasic visual artist might make heavy use of reference images and textual descriptions of what they want to create. However, Hagberg also states that “Intelligible discussions of the artist's intentions will

not concern the relations between an image of the work itself in the mind of the artist and a physical object purported to be the material embodiment of that image” (98). In simpler terms, it is not wise to compare an artist’s supposed mental image of their work to the work itself. If those are separate, then surely anyone’s visual art piece does not rely on their original mental image or lack thereof.

On my way back to Purchase College in August, after a year and a half of not being on campus, I decided I should start thinking about an idea for my senior project. I came up with a few ideas: a series of songs made electronically, graphic design pieces, or a game. Something that kept coming back to me was the idea of how when I read a book, certain house rooms are reused in my mind. Sometimes I imagine the same living room for multiple books. It is not my living room, and it is not a living room I remember ever seeing, but that is what my mind comes up with for ‘living room.’ Details are added based on details described in the book, but the foundation remains the same across certain novels. Expanding on this, I thought about how everyone has a different mental image when reading that same scene.

My initial idea was to make an art project in which I depicted my own mental images from many book scenes in an artistic way. I began with sketches and thought I might expand to graphic design. I tried using free 3D scene constructors online, such as Roomstyler and floorplanner. I tried to make the rooms I had sketched out in those programs. They were not very intuitive for me so I did not feel that I had much success with them, and none stood out to me as the program I wished to use for my project.

I was chatting with my roommate, “Amy,” about my project ideas one day at dinner. She told me that she did not experience the mental images I was talking about. I had never heard of anyone like this before. I asked her about what happened, then, when attempting to picture something or someone. She replied that when she tried to imagine her mother’s face, she knew in her mind that her mother has blonde hair, blue eyes, and round cheeks. But the resulting ‘mental image’ resembled something closer to an abstract Picasso painting than anything resembling her mother. Amy knows the details, but her mind isn’t able to form something from those details.

Through another friend, KristyLynn, I learned there was a name for this condition – aphantasia – and that she had it too. Online, I found some articles about aphantasia and could learn more about it. I learned that everyone who had it was different – KristyLynn could not even form the Picasso painting version of her loved ones. While Amy had vivid dreams she could recount, KristyLynn could rarely remember a dream. The two met each other one day and conversed about aphantasia, so I was able to compare their experiences with one another and reconcile the spectrum of differences in my mind.

My advisor suggested I make a constructor for people with aphantasia. Similar to how the 3D constructors I had used earlier help people to visualize space, perhaps I could make my own tool to help people with aphantasia visualize a scene from a book.

During the Fall 2021 semester, I took the class New Directions in Virtual Space. The class focused on the program Unity 3D, which is primarily used to make games and other 3D experiences. While I understood the basic concepts, I always felt that something didn’t quite click in my brain with Unity. Therefore, I was hesitant to use Unity for my constructor. I looked

into other game-making engines, as well as open-source software. But in the end, I settled on using Unity after finding some tutorials to help me along.

It was a challenge from the beginning to find a book scene to display alongside the constructor, as instruction for building the room. I wanted the passage to be from a book that had no visual adaptation – no movies, TV shows, or picture books based on it. This way, there would not be an external form of media that would influence how users visualized their scene. My advisor suggested it should also be a relatively well-known book, so that people could recognize it. My options were quite limited and not very fun. Eventually, over spring break I decided to simply write the passage myself. I didn't have to credit any book, and could shape the passage to make the 3D objects that I chose to include.

This square bedroom has wooden furniture. The floor is carpeted and the walls are white. A bed and bedside table are against one wall, with a bookshelf against another. A dresser and stool are near the bed. There are two chairs in the room, one with arms and one without.

I originally wanted to include a system where people could choose the color of the wall and floor themselves, but I was not sure where to start with that and figured it would take too long and was not detrimental to the success of my project.

Initially, the UI of my program featured two rooms: one being the bedroom, which users were to construct their scene in, and the other being a storage room, to house the unused furniture items. A hallway connected the two. I quickly realized the storage room was not sustainable as it became too full and made some items hidden behind others, not allowing a user to easily pick them. After long hours (and more tutorials), I was able to create a menu system

with categories that showed and hid groups of items. Instead of dragging unneeded items back to the storage room, I created a trash can which deleted the item on collision. To start over, or for new users, I made a reset button.

Once I learned I would be using a touch screen for my project, I considered how users would rotate the items. My original script allowed rotation through a right click, which on a touch screen means using two fingers. That wasn't intuitive, so I made a rotate button, but users would have had to be holding the object with one finger and pressing the button simultaneously with another in order to rotate the 'selected object.' I realized that as my viewpoint in the program was only of two walls and the floor, users only really needed the object rotated in two directions. I simply included two instances of each object in the menu, a right-facing version and a left-facing version. For a few objects that looked the same on all sides, I only included one instance of the object. Each object in my menu system had a small image of the object so people would know which they were bringing into their scene.

My menu system used a simple color palette with yellow, purple, and pink. The colors were muted and unobtrusive. I used an online tool to check for color accessibility so that the text color would be visible over the background color for any colorblindness condition. I think it is always important for accessibility in any art piece whenever possible, but especially one that deals with another condition (aphantasia).

The most difficult part of making my project was the coding. Unity uses the coding language C# which is quite challenging for me. I prefer HTML and CSS. After defining exactly what I was looking for and a lot of searching, I found a tutorial on YouTube that included the person's code for a drag-and-drop system. This formed the basis of my code. It had the initial rotating function as well.

However, there were various changes I needed to make and was not sure how. I turned to my professor Joseph McKay for Unity help, as he taught the class which focused on the program. He helped me to diagnose the problems and write some more code to fix it.

The idea for the menu system came toward the end of spring break, only a couple weeks before the show, so I figured I would try to create it without bothering any professors about it. It took much more work on my own, but using tutorials and with my basic coding knowledge I was able to create a simple menu system.

Our New Media senior show displayed each graduating senior's work in a gallery space. Because there were many of us, the show was split into two groups, with Group A displaying their work at the end of April and Group B displaying at the beginning of May. Each show was up for four days. I was assigned to be part of Group A, the earlier show. I needed to complete my project sooner than some others.

Professor Thayer, my advisor, loaned me a large touch screen device called the HP Slate 21 Pro to display my project on in the gallery. I reset the device and updated a few applications. On the Monday before the show opening, which was on a Wednesday, I brought the device down to the gallery. But when I tried to test my project on it, it would not load. I put it on a website, tried it from my USB flash drive, and even tried putting it on a game site to see if it would load. It was upsetting that nothing worked.

A man from Campus Technology Services (CTS), our college's technology assistance staff, was in the gallery to help students. He figured out that the version of Android that the device was running on was so outdated that it could not support Unity projects. He suggested I could loan a non-touch screen device, but I did not want to do that as I had spent time optimizing



the project for a touch screen. Eventually, we figured out that I would be able to connect a computer to the HP Slate, using the device as an external display, while the project was actually running on the computer.

I set it up on the all-in-one monitor computer, and the display worked perfectly on the touch screen. We hid the computer inside the secret door in the podium that I was given to display my project on. I ended up using the Windows export on the USB to run it on the computer, rather than running it online.

Our opening reception was on a Wednesday from five to eight P.M. We had food, drinks, and friends and family were invited. A few projects were not set up correctly and therefore could not be displayed until the person arrived, which made me feel bad for them, but I was glad mine was up and running. We also had labels printed with our names, titles of our projects, medium, and project descriptions which were stuck on the wall near our projects or our podium (see fig. 2).



Fig. 2. *Mind's Eye*. 28 Apr. 2022.

Of course, I did not stay by my project for the entirety of the show as I wanted to look at my peers' work as well. But when I was near mine, I was happy to answer any questions about it that people had. Some people wanted to know more about the condition of aphantasia, and why I chose to center my project around it. It is tough to explain the condition in a few sentences, but I tried my best.

Many people seemed to like the interactivity of it (see fig. 3), as well as the creativity involved. I got a few comments saying that the person could just stand there and play with it all day! I appreciated that sentiment, although I did not like when people would refer to it as a game. It resembles room design games in a way, but the intention of the piece was to be a tool

rather than entertainment. However, of course the majority of people using my tool were not aphantasic, and therefore were not my target audience anyway.



Fig. 3. *Student Looking at Mind's Eye.* 28 Apr. 2022.

Compared to my grand ideas for its future, my project seems like a small stepping stone in my eyes. Ideally, I would expand on it much more.

Only a few people I was aware of had aphantasia and used my project. They enjoyed it, but the sample size of about four individuals is simply too small to know if my project would be useful within the broader population of those who have the condition. Also, there was no measurement even with those four to see how well it worked for them. That would require a

detailed psychological study with randomly selected aphantasics and surveys before and after. There would probably need to be a second tool with the same passage but the subjects would have to draw the scene themselves, and then the scenes would be compared. I could not do that for my senior project as a New Media major, but I imagine an organization studying aphantasia could.

An expansion of the project itself would include the ability for a user to upload their own passage. This could be from a book, or it could be something they had written. Perhaps it might still be constricted to rooms. The program would identify key words from the provided passage (e.g. “radio,” “bed,” “heater,” and “floor lamp”) and then supply the user with several 3D objects matching those words. The user would choose which objects they liked and place them where they imagine them being in the room, just like my program currently.

With that idea in mind, I did think of my project as a sample of what it could be in the future. Even though I could not make a complicated 3D object-generating algorithm within the given time frame and my current skill set, I feel my program hinted at future possibilities.

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