

AUTHOR'S NOTE:

Synesthesia is something I have been interested in for years. The correlations between color and other cognitive pathways are extraordinary to study and understand. When I was a little kid I loved playing with color alphabet blocks. I loved to match the letters with colors, and build things according to the rainbow, and then see the word that they created. These correlations have evolved in my head to what has become my current fascination with synesthesia. This project was created to allow me to delve further into my fascination with this subject, and begin to understand the phenomenon that is synesthesia.

This past year, I was tested for learning disorders, and found out that I have a prominent case of ADHD, which I had been learning to cope with for most of my life. As with many other kids with Dyslexia, ADHD, ADD and other learning differences, my brain's way of comprehending and archiving information is very unorthodox. The mind is capable of unbelievable things, and only bits and pieces of them can begin to be understood. I am interested in exploring the sensory pathways that information passes through, and studying the overlap that can be found throughout many of these cognitive sections. Obtaining a thorough understanding of this overlap evokes ideas of how our mental capabilities can change and receive information in new ways. The neural connections between our senses contain outstanding potential.

When one sensory pathway is able to cause a direct reaction in another sensory pathway, it is called synesthesia. This rare neurological condition allows people to taste emotions, hear texture and see sound. Less intense versions allow direct correlations between color, text or numbers and translate these visual aspects into each other. Though synesthesia-like qualities often appear in the brains of those with different degrees of learning disorders and/or autism, only 1% of our population actually experiences synesthesia, and the strange capabilities of their minds create numerous questions for neuroscientists, as well as for the rest of us. Through research, I hope to answer the question of whether or not it is possible for the average brain to experience synesthesia, and if this induced synesthesia has any effects on the overall cognitive experience. Through complex studies and experimentation, scientists use synesthesia to attempt the translation of ordinary cognitive pathways into each other, as well as create the ideas of intensifying an experience through multiple different senses. In doing so, we open up a multitude of opportunities for those of us without synesthesia to experience this extraordinary condition.

In the past, synesthesia has been defined by many different things, but what exactly is synesthesia? In Scientific terminology, synesthesia is a neurological condition in which stimulation of one sense produces experiences in one or more completely different sense. The word synesthesia comes from the Greek words *syn*, meaning together, and *aisthesis*, meaning perception; therefore, synesthesia literally means, "joined perception."¹ Neurologically, synesthesia is associated with differences in the amount of something called myelin. Myelin is a fatty sheath that covers neurons and allows neural signals to travel more quickly between senses. Synesthates have an increased amount of myelin around their neurons, and because of this, the interactions between the sensory parts of the brain are different from that of the average brain.

¹ McCormack, Dan. "Online Etymology Dictionary." Online Etymology Dictionary. Douglas Harper, 2001. Web. <<http://etymonline.com/?search=synesthesia>>.

As of recent research, synesthesia is also thought to be a dominant genetic trait carried by the X chromosome. Because it is believed to be carried through the X chromosome, synesthesia is more common in women, showing to be three times more common for women than men in the US, and around eight times more common in the UK. Those with synesthesia, however, are very few. Approximately only 1% of the world's population (about 1 in every 100,000) qualifies as a synesthete.² Another similar quality in synesthates is learning disorders. Those diagnosed with ADD, ADHD, Dyslexia and Autism, or any combination of these, are not only more prone to synesthesia, but often are able to experience occasional synesthesia-like experiences. This can be explained by the learned compensation that is often noticed in people with the disorders. Because of the underdevelopment in the frontal lobe of the brain (the area that controls planning, organization and impulse control), a person with a learning disorder is required to further develop other parts to his or her brain in order to compensate, and an action that often allows certain neural connections to form that would not otherwise be present. 15% of all those with learning disorders are believed to be undiagnosed synesthates. These different factors and traits all contribute to what we refer to as a synesthesiac Condition.

Though it is possible to experience synesthesia-like experiences, true synesthesia must be qualified by certain factors. Dr. Richard Cytowic, an American Neurologist who participated in a lot of very prominent work with synesthesia in the 1980's, was able to consolidate research into five defining qualities of synesthesia. First, the sensations experienced must be involuntary, meaning that synesthates are not able to willfully repress or initiate their synesthesia. Second, the sensations are actually projected into the environment of the synesthate. This means that the color is actually seen by the person, rather than it simply translating in their head. Third, all the sensations must be durable and generic, meaning that they remain constant over an extended period of time, and do not evolve or change. Fourth, the sensations are memorable, and are, in fact, often the most well remembered aspect of any interaction. Fifth and finally, the sensations are emotionally attached. This means that any sensation can have effects, and/or be affected by any input from a surrounding environment.³

Each of these qualities must be present for one to be considered a synesthate, though this is still occasionally disputed. A condition called Paresthesia is often mistaken as synesthesia. Paresthesia is an induced synesthesia that takes place after the loss of a limb. Remapping of the cortex after an amputation results in a phenomenon known as "phantom limb," or "phantom sensation," which is a reference to the further development of any sense for the afflicted person. However, this is not considered an actual form of synesthesia for the fact that the condition is not presented from birth, and has been triggered by an experience. The multiple requirements for diagnosis are part of what make synesthesia so specific, and in connection, make it so unique.

Within the broad classification of synesthesia, there are many sub-categories that make each and every synesthate unique from others, and in fact, make it impossible for any two synesthates to be exactly the same. The most common form of synesthesia is often referred to as Color-Grapheme synesthesia, or the transition of graphics to color. This can be experienced as color seen in anything from letters and numbers to sign language. Other types of synesthesia include Lexical-Gustatory synesthesia, which is color, text or word sounds translating to taste,

² Booth, Shannon. "Synesthesia." Synesthesia. Macalester, n.d. Web. 06 May 2013. <<http://www.macalester.edu/psychology/whathap/UBNRP/synesthesia/intro.html>>.

³ Cytowic, Richard E. (2002). Synesthesia: A Union of the Senses (2nd edition). Cambridge, Massachusetts: MIT Press. ISBN 0-262-03296-1. OCLC 49395033

and Chromesthesia, which is sound to color. Many people often experience more than one type of synesthesia, allowing them to experience a larger range of unusual sensory changes. It is also possible for people without synesthesia to experience smaller, less extreme versions of the conditions. These experiences are due to something called Applied or Induced synesthesia. Applied synesthesia is onset through experience, and not technically considered in the same classification as actual synesthesia.

Many synesthetes use their unique abilities in their day-to-day life. Taria Camerino, a Lexical-Gustatory Synesthete, is a pastry chef living in Atlanta, GA. Taria has the ability to taste color, as well as emotion. Each color has a unique taste to her, and she uses her ability to aid her in her baking. Because of her synesthesia, Taria is able to make pastries that taste of emotions, and enjoy palatable tastes that she associates with certain colors, allowing her to create dining experiences that are beyond what anyone has ever done before.⁴ Another Lexical-Gustatory Synesthete is a sommelier from Las Vegas, Nevada. Much like Taria, Jaime Smith is able to taste color and smell. In his line of work, which is based off of one's ability to smell, he finds this condition extraordinarily useful, as he is able to taste the difference in a wine by just the slightest change in color. Though tasting color and sound is by all means a very interesting ability, it is not always as wonderful as it would seem. James Wannerton from Blackpool, England experiences lexical-gustatory synesthesia as well; tasting words or word sounds. He is a board member of the UK synesthesia Association and works to help those with synesthesia adjust to their hectic lives. James says he often finds it difficult to remember people's names, but he can remember how their names taste. Another difficulty with his synesthesia, he says, is eating out at restaurants. The overall chatter and multiple voices often become very overwhelming for his taste buds. Because of his overwhelming amount of sound induced tastes, he says that if the food does not agree with the sound tastes, or is delivered on a blue plate, or any color that does not taste agreeably, per se, it could ruin the taste of the whole meal, and he would not be able to eat any more.

Another interesting Synesthete is a man named Neil Harbisson from Northern Ireland. He is a contemporary artist, composer and cyborg activist, and is best known for his self-extended ability to hear colors and to perceive colors outside the ability of human vision.⁵ Born completely colorblind, Neil has a small computer chip implanted in his brain that senses color, and plays corresponding tones. Neil is a clear example of someone whose brain overdeveloped in the color and sound areas becoming far more advanced than the average brain, and ultimately allowing him to hear colors. Laura Rosser is another well-known Chromesthesia. She is best known for her work as a pianist who hears color and composes pieces accordingly. As shown, synesthesia is a condition that affects people's lives to a very full extent, practically requiring them to work with it and allow it to control their lives. Almost all synesthetes in history work in some line of occupation that their synesthesia takes part in, and often stand out within their occupations for their unique and intriguing work.

As many synesthetes work with their synesthesia in their everyday jobs, a number of those affected work in the visual arts. Carol Steen is a painter who experiences multiple types of

⁴ Carlsen, Audrey. "Some People Really Can Taste The Rainbow." NPR. NPR, 18 Mar. 2013. Web. <<http://www.npr.org/blogs/thesalt/2013/03/12/174132392/synesthetes-really-can-taste-the-rainbow>>.

⁵ Harbisson, Neil. "Neil Harbisson: I Listen to Color." Lecture. Ted Talks. June 2012. Ted. Ted, July 2012. Web. <http://www.ted.com/talks/neil_harbisson_i_listen_to_color.html>.

synesthesia, including Color-Grapheme synesthesia, Chromesthesia and touch-induced forms of synesthesia. Her paintings feel very reminiscent of early minimalistic works due to her effort to simplify the sensations she experiences. She most often utilizes her music-to-color synesthesia and touch-to-color synesthesia in creating her art, and believes that her condition allows her to experiment with art in new and uncharted ways. Similar to Carol is a woman named Marcia Smilack. Marcia uses her synesthetic experiences to help guide her towards creating images that are aesthetically pleasing and appealing to her. Smilack takes pictures of reflected objects, mostly using the surface of the water, or glass, and manipulates them to reflect certain feelings or emotions that she experiences with her emotion to color synesthesia. Though synesthesia is a fairly new addition to the world of visual expression, it is by all means intriguing and interesting, opening up new doors in the artistic realm.

Synesthesia in art has just begun to show up in the past century, and in my art personally, I've taken an interest to it in my own art as well. The mental condition of involuntarily translating cognitive pathways is an interesting subject that I struggle to understand in my work very often. Though I do not have a true diagnosable form of synesthesia, I am more prone to synesthesia-like experiences due to my learning disorder. This also means that if I were shown a color every time I heard a letter sound, it would become part of my everyday experience with that letter sound. This is an example of applied, or induced synesthesia. In my past works, I have attempted to do exactly this. In one work I was able to completely translate a short story into color by assigning certain colors to certain letters of the alphabet. I had created rules and guidelines in doing this, but ultimately, the colors and letters matched up accordingly in my head after spending a long and dedicated period of time with them. After researching synesthesia much more in depth, I have been able to derive a semi-scientific alphabet-color match up to use in other synesthesia related art projects, as well as a color-to-music note translation. Learning colors is very similar to learning your ABC's and such, in the way that there are definite transgressions in the process. Though each synesthate has a unique and specific alphabet, certain letters are often found to be common colors. These trends are what allowed me to derive a relatively accurate "universal synesthete alphabet" to use in my artwork.

In synesthesia, there are many interesting quirks. Those affected are thrown into a world of color, tastes, sounds and feelings that the average person is unable to experience without assistance. If more people were able to experience synesthesia, it brings up the questions of what could be possible. Synesthesia amongst many would allow a universally understood color language that would change communication in the world forever, as well as create interesting new foreign relationships. Synesthesia could create so much more for mankind, and we are only at the brink of its capabilities. Synesthates are so often known as being the best in their field, or bringing interesting and new ideas to the table, and the mass ability is amazing to think about. They have created incredible new recipes, and gorgeous musical compositions. From stunning artwork, to mind blowing meals, the interactions we are able to have with these people are extraordinary at the least. Synesthesia opens the mind to just a slip of it's capabilities, and by attempting to experience it, you are doing the same. With the immense amount of possibilities, it is possible to gain a further understanding of everything the human brain is capable of, with synesthesia being the very beginning of this world of discovery.

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