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## The Color of Sound: An Insight on Chromesthesia

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## Why is science always the green folder?

*An explanation on synesthesia and chromesthesia and the science behind it*

If you were a student in America, more likely than not, you probably experienced the controversy of what color each class subject should be. Some may say math was yellow... others that it's red and some may even say it's green or blue. Most people attribute the colors for each subject based on what one teacher said when they were younger and thus stuck by those colors. But after conducting my own research, I have found that everyone (and after searching the internet), that science is almost always the green folder. But why is this? Why is science green? Well honestly I cannot tell you that. But what I can tell you is that this phenomenon is similar to another phenomenon: Chromesthesia.

Associating certain colors to school subjects (a concept if you will) is on a very basic level, similar to how some people (like me) associate colors to sounds.

This comes from a physiological phenomenon called Synesthesia, which is basically the blending of two or more senses (or if you want to get technical, according to Google: he production of a sense impression relating to one sense or part of the body by stimulation of another sense or part of the body.)

With six senses, and a variety of combinations, one can imagine just how many different sub phenomena exist from Synesthesia – Chromesthesia being one of them. Except chromesthesia is scientifically annotated as “sound → color” showcasing that it's sound that triggers a color to appear. Another example is grapheme → color, which is when letters and numbers cause colors to form (something I also have).

The key thing about people with chromesthesia (or any version of synesthesia) is that it is not voluntary, a teacher doesn't tell us that Kanye West's *Runaway* is deep red with light purples and blues splashing around. It all just comes automatically and is different for everyone. (insert big typography of chromesthesia definition).

Synesthesia is idiosyncratic, meaning that just because two people have it, they don't necessarily have the exact same experience as each other. For example, Arthur Rimbaud sees 'A' as black but to me 'A' is sort of a magenta-y red color (more on the alphabet later).

This phenomenon is something someone is born with and develops/strengthens over time. In fact it's thought that a lot of people are born with it but because it's not focused on, it gets lost over time. Furthermore, it also appears to be heritable within families as seen with Vladimir Nabokov whose parents were both synesthetes.

Even though a few synesthetes experience multiple forms of synesthesia, those who have chromesthesia almost always certainly have another form of synesthesia (I have three).

When it comes to how synesthetes (sin-es-thee-ts) actually 'see' these colors, there's two different ways: some people actually see them in a physical space, almost like a hallucination and others just picture them in their mind – which is how it is for me.

But again, everyone sees all this differently and there's many ways people conjure up the colors in their head. Some see lines, others squares, a few see squiggles, and the cool people (like me) see circles. (SHOW THE VARIATIONS)

For most synesthetes, the appearance of these is often described like a fireworks show, where colored shapes move and rise then fade away.

This is important to note because some people might think that they have synesthesia but then go on to describe elaborate landscapes and pictures when that's completely not it. As described in *Synesthesia and the Arts*, the shapes and patterns are really basic and simple. They “differ from the images often visualized by non-synesthetes while listening to music, which tend to be far more complex and painterly”. So to the people who do see things that are more complex and thought for a second that you might have a phenomenon... sorry pals, but you just have a vivid imagination...

### **Is the Letter A actually Red?**

One of the biggest scientific experiments that seems to support how it's possible is from a research conducted on the different parts of the brain. Even though this research focuses more on why people associate colors with letters and numbers, its principles still can be applied to the overall cross-sensory experience of synesthesia.

As most of us know, the brain is divided in a bunch of sections but we're gonna focus on the green section in the left hemisphere and the red section. The green section is where the brain recognizes letters and numbers (graphemes) and the red section is where the brain perceives color. Because the sections are right next to each other it's theorized that there is increased cross talk between the two sections.

“Normally the V4 complex [the red area mentioned earlier] is activated only when viewing real colors in the outside world. The fact that other visual areas were not activated in this study suggests that the activation of V4 alone is sufficient to consciously perceive color” (*Wednesday is Indigo Blue*).

Then years later, Julia Nunn and her colleagues did a separate experiment that also found that spoken words for synesthetes do create an activation in the brain in the area for color vision.

What makes this all different from just vivid imagination, is that when looking at brain activity from a synesthete and someone with a vivid imagination, it's been found that the brain activation patterns aren't the same – furthering that synesthesia is not just people being really creative.

On top of the cortex system, the limbic system is where it is suspected that synesthesia *actually* happens. The limbic system is typically concerned with our emotional life and plays a role in the creation of our memories. It's basically thought that cross-sensory perception happens subconsciously in most people, hence why it happens here (specifically in the hippocampus, the area that brings information together, processes it and separates the brain into sections – if the mitochondria is the powerhouse of the cell, the hippocampus is the powerhouse of the synesthetes). Particularly because this is where “the highly processed information from sensory receptors about the world converts in the form of a multisensory evaluation of it” (Synesthesia and the Arts).

Think about it like with food. The perception of food uses almost a cross-sensory example at all times. Take the temperature, the smell, color or even the sound of food (like the crunch of an apple). Though it isn't exactly the same thing, it goes to show that our brain is capable of doing things similar to the cross-sensory experience that synesthetes experience.

Now, as mentioned previously, some researchers speculate that *everyone* was born with this but only some are able to keep it throughout their life. This sort of comes from the idea that cross-talk between sections of the brain happens in everyone but albeit to a smaller degree in most people.

Historically this can be seen in the metaphors we have grown accustomed to and it's speculated that these metaphors arose because of people having some form of synesthesia. Think of metaphors like “that outfit is loud” (when looking at a bright and bold look) or “the sharp cheddar cheese”. But no evidence really exists to support this except that these people were quite creative with their words.

Historically, forms of synesthesia (specifically chromesthesia) can be seen within old writings from philosophers and the Greeks.

In fact, Plato himself wrote a myth where the planets each had a hue and a tone to each one. Each tone played in harmony showed the creation of cosmic equilibrium. Now as cool as that

sounds, synesthetes can't just stand in a line and create world peace or something, but Plato had a cool idea.

A few Greek Theorists are actually the ones who started to pioneer musical and artistic terms together. It started with thinking about the 'color' aka the quality of sound itself which is now known as the *timbre* (tam-ber) of music. After further looking into colors and sound they found many similarities between the two including how the slight change of either one creates a series – changing the pitch half a step makes a note flat or sharp, adding black, white or grey to a color changes its saturation. These types of similarities are what led to the similar terminologies in both worlds.

Even though it's all idiosyncratic, there are a few things that are similar in many people. For example, a lot of the time the commonality of the letter is attached with the commonality of the color. That's kind of why the letter A tends to be red for a lot of synesthetes. It's also similar for chromesthetes in the sense that for most, higher pitch sounds tend to be brighter and lower pitched sounds tend to be darker.

### **The colors behind your favorite artists**

If you think about terms used in both music and art, you'll find that there's a lot of the same words (thank the Greeks for being uncreatively creative with their word choices).

Artists and Musicians couldn't be more the same then they are different. Many artists have tried creating visuals for musical compositions and musicians have also tried to embody visual ideas into sound. Here are a few musicians and artists with synesthesia that you may or may not know:

#### [Duke Ellington](#)

Duke Ellington is one of the biggest Jazz icons in history but what most people don't know is that Ellington not only had an amazing talent in jazz but in color too. Despite not necessarily being an artist, he did once dream of it – the man ran a small business of signs and posters as the designer while still playing in ensembles! Music and art went hand in hand for him.

Ellington stated "I hear a note by one of the fellows in the band and it's one color. I hear the same note played by someone else and it's a different color. When I hear sustained musical tones, I see just about the same colors that you do, but I see them in textures."

#### [Dev Hynes](#)

The singer behind Blood Orange is the one and only Dev Hynes and that might just be why his music induces some of the prettiest colors when listening to it. Hynes also has chromesthesia and he appreciates it greatly, “The way it works for me is my sight and sound senses are combined. Every sound I associate with a color and every color I associate with a sound. The way I see things is constant streamers across the room, bouncing off from every touch and every sound. Over the years, I’ve learned what color palates I love most.”

### [Franz Lizst](#)

Anyone who considers themselves a piano player knows the name Lizst. His name is a household name for piano players but he was also a great conductor and composer. Many have stated that he would use color comparisons to help his orchestra play the way he imagined (even if everyone didn’t really understand what mans was saying): “O please, gentlemen, a little bluer, if you please! This tone type requires it!” Or, “That is a deep violet, please, depend on it! Not so rose!”

### [Frank Ocean](#)

It’s nearly impossible to love music, specifically R&B and not have heard of Frank Ocean’s name. Despite only having two complete albums, his music has established itself as certified classics. Regardless of your taste in music, Frank Ocean has shown that his music is universal and beautiful not only in lyrics but in sound. In fact his first album is inspired by the color he remembers his first love to be, orange.

### [Wassily Kandinsky](#)

If you’re an artist and haven’t checked out Wassily Kandinsky’s art, you should definitely do so. This synesthete artist creates a lot of his works with inspiration or from the musical pieces he has heard. For him, music and color were directly tied to each other, each note having an exact hue. He used color, line, shape, and texture to create a rhythmic visual experience that evoked an emotional response. In fact, Kandinsky gave many of his paintings musical titles, such as *Composition* or *Improvisation*.

Vincent Van Gogh\*

Even though it isn't confirmed, Vincent Van Gogh

## Discovering the Color of Music

One of my earliest memories as a child is sitting at the computer with my dad and watching and listening to music videos from a variety of artists, some of which include: Daddy Yankee, Akon, Kanye West, 2Pac and Brooks & Dunn. In particular, Kanye West's *Graduation* album stuck out to me because the music videos for the singles matched the colors that my brain imagined. Despite being only about 5 years old, this album impacted me so much despite the fact that I, one, did not really understand English, and two, I had never seen colors so strong and vibrant. I immediately figured that the latter reason was why my dad loved the album almost as much as I did and so I never questioned the colors dancing in my mind.

After spending years listening to music with my dad, there was a slow transition to instead bond with my brother over music. Since we both had similar experiences with my dad, we had a lot of crossover in our favorite artists and genres as we grew older.

It wasn't until I was in middle school, talking to my older brother about music, that I realized that maybe, just maybe, I had something that other people didn't.

We were in the kitchen, listening to the folk group, The Lumineers and I innocently told my brother, "You know, I love folk music because it's such pretty greens and warm browns." My brother (who is colorblind may I add), looked at me like I had said that I had murdered someone.

At the time, I didn't really process how confused my brother was because he followed up by just asking me what my favorite music genre was. R&B was immediately my answer:

"The rich royal and navy blues with velvety purples that the soulful music creates and blood reds of the deep vocals or golden yellow of the higher pitched melodies, makes R&B the most beautiful and my favorite of the genres."

"Lupe, what the fuck are you talking about" – was my brother's immediate answer.



Because my brother is colorblind, my immediate thought was not “maybe *I’m* the weird one” it was “damn, my brother must *really* be colorblind, what a weirdo” (turns out I was the weird one).

Thus, my curiosity peaked.

Like most people with synesthesia, I am not the only one who had this type of experience. Many synesthetes think that everyone shares this ability to a certain extent or figures that everyone has it but experiences it differently. Then they are extremely shocked to realize that what we have is actually not something that everyone has. In fact about 1 in 23 have any form of synesthesia which sounds common but once you get into the different types, it becomes more rare. (SHOW RATES – highlight my stuff)

After learning the things mentioned in the first three chapters, I did have a quick existential crisis... but after getting over that, I kind of just ignored this phenomenon because 1) no one else had it and 2) I knew that people would just not understand what I had. It wasn't until I had to create this site that I looked back and put together all the aspects of my life that are affected by this phenomenon.

Because I'm a polymodal synesthete (meaning I have more than one form of synesthesia), I have separated each into different sections based on how it affects different parts of my life\*. \*Since art and music are such big aspects of my life, these have their own dedicated chapters so just you wait

One of the biggest reasons I figured everyone had synesthesia was because of the color coded letters and numbers that we would play with as kids. From magnets, to toys, to just the general learning experience of letters and numbers, they were almost always color coded. It would always bother me that it was just the plain rainbow order almost every time because that's not how I ever saw the colors of letters and numbers. Of course now I know that the colors were just meant to be easy and recognizable for children to learn along with the letters and numbers, not because the creators had synesthesia. So taking matters into my own hands, this is how letters and numbers *truly* are (to me at least).

As a Mexican-American, because letters have their own colors, and words (due to their sound) can have their own colors as well, speaking two languages gives an extra little twist to this phenomenon. Given that Spanish was my first language, it was very

interesting growing up seeing which words matched up and which words didn't. For example: water and agua both are blue (albeit different shades), but kitchen and cocina are two different colors, a warm brown and a golden yellow (respectively). (INSERT IMAGES)

Jean Milogav (a Swiss Synesthete) stated in *Wednesday is Indigo Blue*, that because her colors are determined by the physical appearance of each letter rather than their sound, it's always the spelling that determines the color – and it's usually the same for me. Unless I really focus on the sound of the word or I don't really know the spelling of a word, the sound of a word can be a different color than the spelling of the word. Typically if a sound has softer sounding letters (like agua or harmony) the word is lighter but if it has harsher, sharper sounds (like kinetic or carpenter) the words can be normal or darker shades. Funny enough, words with strong K sounds can sometimes be neon to me (like the word kinetic).

### *Meeting Red People*

I'm sure you've heard about people "seeing" others' auras or getting 'vibes' from people. Well, I literally see the color of people's auras once I get to know them.

You may think it's witchcraft (and at this rate I'm starting to think so too) but it's a form of synesthesia called (INSERT NAME HERE). Definition??

When I first meet people, there's a faint color that appears in my mind but as I learn more about them the color either changes or develops into the right tone for them. Sometimes it matches with the color their name induces and other times the two just pair together in my head. (EXAMPLE)

Because of the added (sound → color synesthesia) chromesthesia that I have, their voice also becomes a third color to join their palette. (ANOTHER EXAMPLE)

But there are some people who don't see color in their head when meeting people. Someone like LH (initials used for privacy) who actually sees the person's aura around them. (IMAGE)

LH has had this form of synesthesia for as long as she can remember. She also has a slight grapheme → color synesthesia which mainly manifested itself in helping her learn English (as it is also her second language). Similar to me, due to the different

colors of each letter, just because a word means the same thing in Spanish and English they can still be different colors.

The colors don't have a specific meaning or pattern that she has noticed, except for one: a black outer glow. When someone has black surrounding them, she avoids them as much as possible because she has come to find that those people end up being not very good people. She has even helped her husband to choose what people to work with. He has even come back to confirm that people she told him not to work with did end up being good people. Apart from this one color, all other colors don't seem to necessarily pair up with personalities.

For example, for her son and me she sees us as generally yellow and even though we have some a few personality traits, we are otherwise quite different in personality. Fun fact: I see her son as orange in aura, has a grey name but a warm brown for a voice.

On a separate note, I may or may not have come into a discovery after interviewing my friend's mom because she and I both are synesthetes and we're both related to someone who is colorblind... So does seeing extra color remove color from someone else in the family tree? Did my friend's mom keep too many colors when giving birth to her son? Did my mother forget to give some colors to my brother and then ended up giving the extra to me? Does every colorblind person create an equal opposite reaction synesthete? I'll get in contact with a scientist, do some research and get back to this...

### *Painting with Sound*

Growing up, art was something that fascinated me almost immediately. My mom had been an artist growing up and I'm guessing that her love for art was also bestowed on me.

I always loved drawing as a kid and art was my favorite class (apart from music) all throughout my school years. Anything crafty or artistic and I'd give it my all in trying to create something amazing. And with that, I always paid special attention to colors. Colors were always something I loved since I started doing art, even if most of what I did was just sketching. Instead of playing with dolls all the time as a kid, I would play

with my Crayola markers or colored pencils as if they were dolls and had personalities. (SHOW COLORED PENCILS PLAYING LOL)

This further developed into my love for coloring and using colored pencils or pens to color things. When coloring things in I always took into consideration what the personality of the object was or what the object just was and would pick colors from there. (SHOW COLOR BOOKS)

After elementary school, middle and high school were focused practically all on music (more on that in the next chapter). But, I still took art classes on graphic design in high school that helped me decide that that's what I wanted to pursue as a career. Even though in these years I didn't really focus on my chromesthesia in art since it was all focused on my music, in university it finally started to show itself again.

When I started my time at university, one of the ways I would take a break from my work would be by painting. Nothing crazy or as complex as Van Gogh or Kandinsky but I would take inspiration from geometric/cubist inspired artists to create my own paintings. The colors would then come from whatever song stuck out to me while I was drawing out the layout for the painting (SHOW PICS)

When it came time to actually start my design program, I didn't focus so much on color as much as the design. It was mostly because I was focused on actually learning design and I didn't think that there was really any reason to try and use this ability. I mostly didn't think that my teachers would understand what Chromesthesia is or how it would even enhance my projects. But there was one project in particular that allowed me to showcase this special ability.

Our project brief was to create an experimental calendar based off of the music/lyrics from the band, Pixies. I immediately decided that the color scheme for each month would be based off of the color scheme of a different Pixie song. This ended up being an issue because when it came to pairing the song color scheme to a month, it was hard for me to put them together because the months have colors to me too so if I couldn't put a blue song with a blue month, that just felt... wrong. So I had to do some heavy listening to find songs that matched them with a months' color schemes so I wouldn't go crazy.

Now that I've talked about this phenomenon and have used it in two projects, I am definitely considering creating more art using it.

## **Performing the Color Blue**

As previously mentioned, music is what helped me discover that I had this phenomenon. This connection between color and music has created a bond between them that almost feels like it's a part of my heart and soul. Nowadays this is a connection I embrace and use to enhance my experience with the two but when I was younger, I didn't know how to really work and balance the impact that colors had with music.

There's really two sections of my life that colors have impacted music: being a musician and being an avid music listener.

When I became a musician in 6th grade, it was the first time I felt that I could possibly control this phenomenon I had. Up until then, I would hear music and sounds and colors would show up naturally vibrant, muddy, pastel or rich. But when I picked up the flute, the better I could control the tone and sound, the more I would be able to control the saturation and prominence of the color (despite not being able to change the actual color induced).

Even though I joined the middle school band as a fun hobby, this realization as I would practice for class assignments and concerts changed the way I practiced and thought of music. As I went into 7th grade, I took practicing more seriously because I hated when sound created muted, or muddy colors so I always took the time to practice my tone and musicality to play notes that created beautiful, vibrant or rich colors.

This projected my flute career to a whole new level as I dedicated my time to connecting the colors I would play with colors I wanted to hear. This just made me a better musician overall and helped me establish myself as a great musician. For me, I was trying to develop and paint the right colors with my flute sound, but for people listening, they were experiencing strong ability and great musicality.

Listening to music is one of my favorite experiences in life. For obvious reasons, it's an experience that makes music such a different experience for me. I love every aspect of

music, especially the instrumentation but sometimes the lyrics to songs ring just as well as the music itself.

One of my favorite things to do is write down lyrics that I enjoy because of the poetic-ness, my personal connection or ability to relate to them or simply because the lyrics just ring true in some way, shape or form. So, I began writing down these lyrics in notebooks so that I could track them. In analyzing how I categorized them, I noticed that the pens I used to write the lyrics down represent a very similar color to the main color that appears when I listen to that particular song.

Since music has lyrics with instrumentation, it combined my Grapheme → color synesthesia with my chromesthesia to create a very enhanced music listening experience. I've even been told that I *feel* music differently but really I see it differently.

(IMAGE)

\*Because of the limited color options provided by pen companies and my financial ability to obtain them, these colors aren't 100% accurate to the color that is in my mind.

Another way I've done this is by how I've organized my playlists. Because I listen to an extraordinary amount of music (I have more than 5,000 songs in my library) I have a need to organize all of these songs. In my effort to do so, back in (YEAR) I created lists that categorized these songs to me by the main color elicited by the song.

Along with this, there's songs that I've always considered as musical masterpieces. As I relistened to these songs, I figured out why these songs are so beautiful to me – it's because the colors are just as beautiful as their sound.