

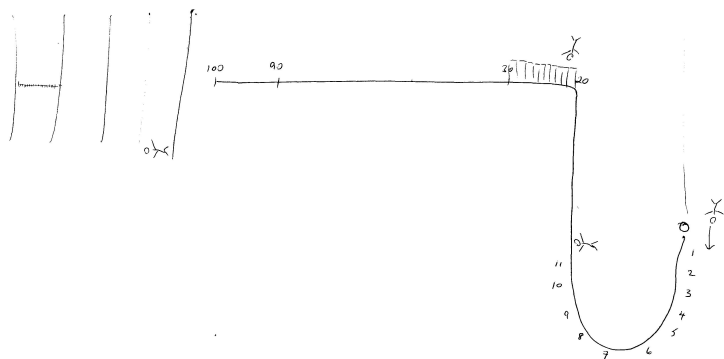
## Aliens in the family

People with synesthesia experience the ordinary world in extraordinary ways. Words can have tastes; names can have color; and the sequence of numbers may glide through space. Most definitions of synesthesia emphasize that there is an ‘extra’ sensation that is tagged on to what would normally be expected. For example, the sound of a flute may be a pastel lemon color. The sound is both heard and seen, but the color does not replace the heard sound – it coexists with it. This is why synesthesia is regarded as an extra sensation. Of course, for someone with synesthesia it doesn’t feel like there is something extra because they have experienced the world this way for all their life. On the contrary, to a synesthete, it seems like there is something *absent* in the experiences of the people around them. To a synesthete, the color of a musical note may be just as much of a property of the music as the note’s pitch and it doesn’t feel, to them, like it is extra. The New York artist, Carol Steen, describes it in the following way:

There have been times when I have had one sensation such as toothache and observed the color of the pain, its taste and smell. All these synesthetic perceptions are aspects of one overall experience. I perceive them as related in the same way that windows, a door and front steps combine to become the image of a house.

Synesthetes can always vividly remember the moment in their life that they discovered that their way of experiencing the world was fundamentally different from the people around them. It is fascinating that this insight into their own experiences comes about only by contrasting it with what other people claim to experience. We just take our experiences for granted unless they are questioned in some way. When revealed to be different they can suddenly take on an importance that they never previously enjoyed. One of our research volunteers, Debbie, describes the moment that she inadvertently ventured out of the synesthesia closet.

## 4 THE FROG WHO CROAKED BLUE



**Figure 1** Debbie experiences numbers arranged in space, and she can vary the perspective from which her 'number form' is viewed. Each number would also have its own unique color to her.

I did not 'discover' my synesthesia until I made a comment to my parents in my mid-twenties about a number. They were disputing some number that I had given them as a statistic and I said, by way of proof, that it could not have been seventy and had to be forty because it was a red number with a warm feel, and it was only halfway up the line to 100. It is extremely strange when the two people who know you better than anyone else regard you as though you were a complete alien. I then went on to describe how my numbers are not only colored, but also have very distinct patterns, as does time – the time of day, days of the week, months within the year, and the years themselves.

Debbie's drawing of her arrangement of numbers in space is shown in Figure 1. She is able to vary the perspective from which the pattern is observed, and this is illustrated by the different positions of the 'little men'. Each number would also have a color.

The colors that people experience tend to be very precise and they rarely seem to change over time. The synesthetic color doesn't override the true color. They seem to coexist and compete for attention. The colors and the

experiences are very hard to put into words. Some synesthetes see the color as if it is on the page, but they still claim to be able to see that the text is truly black and white. Others describe the colors on some kind of 'inner screen' or perhaps floating in space at a fixed distance from their body. I received the following email from a synesthete, Rosemary, after she had listened to a radio documentary about synesthesia. This was one of the very first times that she had attempted to put her own experiences into words.

I read in black and white and THINK in color. The word 'Scotland', for instance, is visible to my eyes as black, but is sensed as color in my head. I sense 'Scotland' spelled out in my head and the initial letter, S, lends an overall color to the feel of the whole word. In Scotland's case, gloss white, whilst the colors of the remaining seven letters are less significant and trail off into the distance. I've found it so hard to name colors. Words appear to be the wrong medium for what my brain 'sees' and 'feels'. For instance, after listening to your radio programme I at first thought of one of the brightest letters of the alphabet – the letter Q. I asked myself 'what color is Q?' The first answer I came up with was that 'Q was Q-colored'. I then realized this was nonsense, that Q wasn't a color; Q was an intense shade of pink. But 'pink' sounded totally wrong to me as the word 'pink' is composed of four colors beginning with brown (brown being the color of the letter P in 'pink'). Next I wondered why Q was pink, and straight away got the answer that Q was pink because queens were pink, but immediately realized that this was nonsense too – 'why are queens pink?' (the word 'queen' is probably pink because the letter Q is pink, but that doesn't help either). Next, I thought of the letter S, which is gloss white and, asking myself 'why', I assumed it was because snakes were white! Again, nonsense.

Synesthetes will often name their children to fit their synesthesia and choose their partners on this basis. This quote from one of our synesthetes, Sharon, is typical:

I was thinking the other day about my son's name [Adam]. It is red and yellow like mine. My husband's name is yellow. There

are other names that I considered for my son but in the end I found I just couldn't have a child with a blue or purple name. It would feel like having a stranger in the family.

Synesthesia runs in families, so there is a strong likelihood that the child will have synesthesia themselves, but the child will probably associate a different color to the name, and – worse still – there is no guarantee that the color will be nice. One synesthete changed the spelling of her name from Sarah to Cera because the combination of colors in her original name clashed. Anne does not like the grayness of her name, as she explains:

I don't like my name because it is gray and olive green [a = gray but n = olive green], although the red-orange 'e' at the end makes it a little better. It still reminds me of those Spanish stuffed olives with a red-orange pimento. As the color of names go, it is not great.

When some people tell their parents that the number forty is 'red with a warm feel', they get quite a different response to that experienced by Debbie. 'No! Forty is dark green with a brittle feel' or 'No! Forty is a mixture of brilliant yellow for the 4 and translucent for the 0.' Although synesthesia runs in families, different family members disagree about what the 'correct' color is. George Sachs' youngest sister had synesthesia too, and they disagreed over the colors. I have come across a set of identical twins, Jacqueline and Mary, with similar types of synesthesia but different sets of colors. They hadn't discussed it together as children and they didn't even realize that their way of seeing the world was special until they were in their early twenties when one of them happened to mention it to her mother who regarded it as 'weird'. As Mary puts it:

I don't think I had even realized that my twin had it as well until then. We certainly argue about what colors certain letters are – I really can't imagine that she sees A as red, for example, whereas I see it as green. We have never come to

blows over this. I suppose it is something that has made us a bit closer as it is something we share although in a slightly different way.

The first letters of their alphabets are given below.

	Jacqueline	Mary
A	red	light green
B	deep blue	indigo
C	yellow	dark violet
D	brown	dark brown
E	blue/black	very dark turquoise
F	pale mauve	lilac
G	brown, slightly golden	reddish brown
H	very pale blue	mustard yellow
I	pale gray/white	black

The fact that synesthesia runs in families doesn't automatically make it genetic. Money runs in families too, but wealth isn't genetic. However, there is scientific evidence of a genetic link to synesthesia. If synesthesia was inherited culturally by, for example, a mother teaching her daughter the colors of the alphabet then we would expect close agreement between mothers' and daughters' colors, or between the colors of pairs of siblings. This is not found. Many family members aren't even aware of each other's synesthesia until after childhood. Colored alphabet books have also been suggested to be involved, but this doesn't explain why some people exposed to these books develop synesthesia and others do not. A large survey of synesthetes in Australia compared their colors with those found in colored alphabet books published between 1914 and 1986, and found no evidence of any correspondence. Although synesthetic experiences of color are particularly common, synesthesia can be found for the other senses and different types of synesthesia can co-occur with a family. James Wannerton, whom we will meet again in Chapter 2, experiences tastes for words. For example, 'profit' tastes of unripe, pithy orange and 'peace' tastes of tomato soup. His sister reports a completely different type of synesthesia. When she reads,

she experiences colored letters but the colors appear to be shining through the page. Synesthetes also often have more than one type of synesthesia. This suggests that different types of synesthesia have a common cause. Carol Steen, for example, experiences colors and other aspects of vision from touch, smell, sound, taste and pain. The albino, George Sachs, also had a wide variety of different types. All these facts argue against the view that synesthesia clusters in families because of word of mouth. But these facts also provide some clues as to how the gene is operating. The gene cannot determine exactly what types of synesthesia will be found in a person or what the precise associations will be (e.g. is 'A' red or light green?), but it does seem to increase the likelihood that they will develop some form of synesthesia.

Recent research has started collecting DNA samples from people with synesthesia and their relatives. Cells containing DNA can easily be obtained by gently rubbing the inside of one's cheek and the cell samples can be sent to laboratories in other parts of the world. Geneticists in Dublin (Ireland), Cambridge (UK) and Texas (USA) are currently hunting the synesthesia gene. This research has demonstrated, definitively, that there is a genetic component to synesthesia. However, it is looking less likely that there will be a single synesthesia gene. There may be several genes that are implicated in synesthesia. Perhaps different families have different synesthesia genes, or perhaps there are ten synesthesia genes and a person needs a certain number of these to become synesthetic. At present, we just don't know.

Is it possible to carry the synesthesia gene (or genes) but not be synesthetic? Yes. There are many cases of synesthesia, such as Debbie's, in which neither parent has synesthesia. Unless there is an unusually high incidence of synesthesia in milkmen (or mailmen in the US), it is likely that one or both parents could carry the gene without having synesthesia. Synesthesia has also been noted to skip generations such that grandparents and grandchildren have it but the intermediate generation does not. There are even some genetically identical twins in which one twin has

it and the other one does not. This doesn't disprove a genetic theory, but it does prove that genes aren't everything. It is possible that both twins could have the synesthesia gene but only one goes on to develop synesthesia. The real test of the genetic theory lies in the twins' offspring. If both twins have the gene, then the non-synesthetic twin should be just as likely to have synesthetic children as the synesthetic twin. This remains to be seen. Ultimately, any explanation of synesthesia will have to address genetic and non-genetic influences. All the descriptions, so far, speak of synesthesia as a lifelong condition that people are born with. However, there are other types of synesthesia that have different causes. In subsequent sections and chapters, I will discuss how synesthesia can sometimes be triggered by the onset of blindness or can be temporarily induced by drugs such as LSD. Both of these examples illustrate that non-genetic factors need to be considered in a theory of synesthesia.

Vision, and color in particular, is by far the most common synesthetic experience relative to touch, taste, smell and hearing. However, there are many, many types of synesthesia and we shall encounter them throughout this book. One challenge for explaining synesthesia is to offer a satisfactory account of this diversity. Sean Day runs a synesthesia discussion forum (the 'synlist') and compiles a list of different types of synesthesia. Perhaps the most bizarre type on his list is 'colored orgasms'. This is found in one percent of people with synesthesia (note: not one percent of the whole population). One lady who sent me a sheepish email spoke of seeing something like her own private 'firework display' at the critical moment. I do not know whether synesthetic men can experience anything similar.

Carol Steen reports synesthetic sensations in response to touch and pain, and she uses her synesthetic experiences induced by acupuncture as inspiration for her art.

Lying there, I watched the black background become pierced by a bright red color that began to form in the middle of the rich velvet blackness. The red began as a small dot of color and grew quite large rather quickly, chasing much of the

blackness away. I saw green shapes appear in the midst of the red color and move around the red and black fields.

One of the synesthetes that I have encountered, Rolf, experiences colors from smells. The color envelops him like a mist – ‘A smell to me is more than a scent. I don’t know how to write about it – it’s almost like the bits in “Lord of the Rings” where Frodo puts the ring on!’

Everyone knows a synesthete, but not everyone knows that they know a synesthete. And they may not know who the synesthete is. When I have given lectures about synesthesia to audiences of scientists, many will still leave the lecture hall skeptical about whether it really exists. (Scientists are born skeptical.) They may then discuss this crazy lecture with their partner, family, friends or colleagues and, sure enough, someone will say ‘hang on a minute, that’s me!’ It is as if meeting a living, breathing synesthete provides the evidence that no amount of hard science can, especially if that person is one of your trusted acquaintances. The anthropologist Robin Dunbar has argued that the human brain has a capacity to maintain about 150 active social relationships. If we work from this figure, then I estimate that we will all closely know around six or seven people who experience a type of synesthesia involving one of the five classical senses (vision, hearing, touch, taste, smell). There are likely to have been two British prime ministers and two American presidents with synesthesia (don’t ask me who). The figure will be higher if we consider people outside of our immediate sphere (friends we no longer keep in touch with, friends of friends, etc.) and it will be higher still if we extend our search to other types of synesthesia, such as experiencing number or time as arranged in space.

In order to find out how common synesthesia is, we conducted an experiment on passers-by at London’s Science Museum, and my colleague Julia Simner conducted a similar study on the undergraduate population in Edinburgh, Scotland. As well as asking people whether they experienced color when they saw, heard or thought about letters and numbers, we also devised a computer test in

which black letters and numbers were flashed on the screen and people had to choose a color as quickly as possible. Most people chose randomly but those with synesthesia were very reliable in their choice of colors. This enabled us to estimate that this type of synesthesia occurred in one to two percent of the population. A similar result was found in Edinburgh, and the Edinburgh study was also able to consider other types of synesthesia. Colored days of the week were more common than we had originally expected, but we were able to observe less common types such as tasting shapes, and colored music. In total, we were able to identify 22 synesthetes out of 500 students who were initially screened.

Several famous individuals are known to have had synesthesia. Vladimir Nabokov, the author of *Lolita*, had it, as did his son, Dimitri, his mother, and his wife. He describes his colored letters in very precise terms. He notes that the combination of seven letters 'kzspyg'v' creates the rainbow of colors from violet through to red!

In the green group, there are alder-leaf f, the unripe apple of p, and pistachio t. Dull green, combined somehow with violet, is the best I can do for w. The yellows comprise various e's and i's, creamy d, bright-golden y, and u. In the brown group, there are the rich rubbery tone of soft g, paler j, and the drab shoelace of h.

The Nobel prize winning physicist Richard Feynman also saw letters in colors.

When I see equations, I see the letters in colors – I don't know why. As I'm talking, I see vague pictures of Bessel functions from Jahnke and Emde's book, with light tan j's. Slightly violet-bluish n's, and dark brown x's flying around . . . And I wonder what the hell it must look like to the students.

The philosopher Ludwig Wittgenstein may also have had colored letters. In his miscellaneous notes, he muses on the following: 'It's just like the way some people do not understand the question "What color has the vowel A for you?"'

This, of course, implies that Wittgenstein *does* know the color of the vowel A, which makes him a likely candidate for having synesthesia.