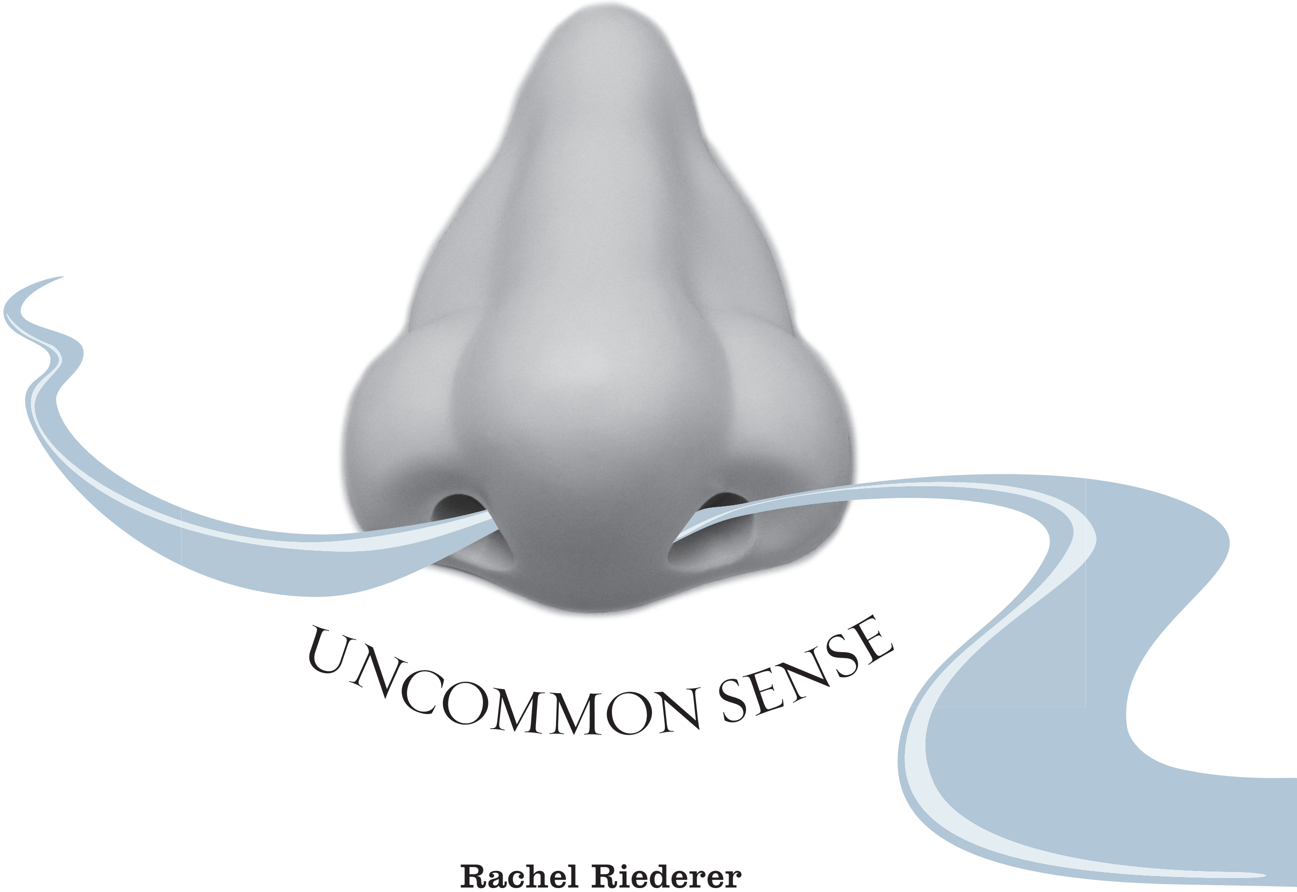
ESSAY



UNCOMMON SENSE

Rachel Riederer

Inside the topsy-turvy world of hearing colors and seeing sounds

When Lidell Simpson was almost old enough for kindergarten and still hadn't started speaking, his parents took him to Memphis to see a specialist. The doctor diagnosed him with aphasia: Lidell would never acquire language and would have to go to a special school. The prediction turned out to be wrong. Lidell went to regular school, and he has acquired more language than most—in college, he studied German, Russian, and Arabic. The specialist was the first of many physicians to misdiagnose Lidell—one even tried to put him on antipsychotics. It's hard to blame Lidell's doctors for their confusion. As Lidell puts it: "One of the worst things you can say to a doctor is 'I hear light.'" He knew something different was happening in his brain; this knowledge was part of what motivated him to study foreign languages. "I experienced so much of my senses that you can't express in English," he told me, more than fifty years after that first misdiagnosis. "I started out learning other languages to find the right words."

The right word for Lidell's condition is *synesthesia*, a neurological condition in which the senses "cross" or "blend" together. Synesthesia takes many forms. Some synesthetes hear sounds when they see certain colors, some see colors when they smell certain odors, some taste flavors when they hear certain words, and so on. Synesthesia is idiosyncratic; even when people have the same form, the individual pairings of stimulus and perception don't match. Lidell's is particularly distinctive, because he is nearly deaf and spent his early childhood years in silence. When Lidell's parents didn't believe the specialist, they took him to get fitted for a hearing aid, and Lidell's silent-movie world transformed into a talkie. But even when the TV was off or Lidell wasn't wearing his hearing aid, the sounds of his favorite cartoons did not stop. He still heard the pings, beeps, and boi-oi-oi-oings, but they weren't coming through his ears. Instead, the sounds were linked to things he saw: a flashing light, a passing car, a swooping bird. In Lidell's brain, all these things make sounds: "It's kind of like I live in a world of sound effects by the Looney Tunes people." And it isn't just motion that produces the sounds: "Everything I see, taste, smell—comes back to me as sound." Lidell likes to say that though he's deaf, he doesn't know silence.

Synesthetes generally have two epiphany stories. The first is the moment they realize they are different. Lidell remembers asking a friend if he was bothered by the beeping of the red light blinking on the town's radio tower. The friend looked at him as if he were crazy, and he quickly learned not to talk about the experience, which he privately named his "photonic hearing." The second epiphany is the moment they realize they are not crazy, and not alone.

Pat Duffy, an artist and synesthete, tells a story about finding out as an adult that she has music-to-color synesthesia, something she has experienced her whole life but had never been able to articulate. When she read an article in the *New York Times* about the artist Carol Steen's synesthesia, she felt she "had come out of a closet [she] didn't even know existed." She e-mailed Steen, saying simply, "I hear with my eyes." Steen replied, "Welcome to the club." In 1996, the two met in Steen's loft in downtown Manhattan to compare life notes. That day, Steen says, "the ASA was born."

The ASA, short for the American Synesthesia Association, does work toward creating a strong community for synesthetes, but it is also largely concerned with spreading scientific understanding. When I started reading about synesthesia, my immediate question was What is it like? If you see letters as different colors, what do the colors look like? How much easier is it to do anagram puzzles? If flavors produce colors, where exactly do you see the colors, and how long does the vision last? Is it distracting or pleasant? Do you choose certain foods because you like the color palettes they produce? I decided to attend that year's ASA annual conference, which was happening in Hamilton, Ontario, in the hope of finding out.

Talking with conference attendees put me in mind of late nights as a teenager, staring for hours and chewing on mildly psychedelic questions, variations on What if what I call green, other people see as red, but we're just using the same word?, Do you see what I see?, and Is my mind the same as everyone else's? The answer was always, somewhat disappointingly, yes.

Do you see what I see? The question gets at the very foundation of shared experience—the bedrock of reality, even sanity. Listening to the synesthetes at the conference, whether it was Lidell explaining how his hearing aids amplify sound-sound and drown out the vision-sound or the organization's president describing the floating masses of color that appear when he tastes certain flavors, I realized I was surrounded by people for whom the answer to this question is a resounding no.

The opening night of the conference, we—a group of scientists, synesthetes, and interested hangers-on like myself—gathered in the McMaster University campus chapel for the first set of presentations. As a group, we underwent several of the usual tests for synesthesia. One of the most common forms of synesthesia is grapheme-to-color, in which different letters appear to be different colors, no matter what color ink they're printed in. It is often identified by the Stroop test, which relies on the fact that people who can read (and who are not hampered by problems like dyslexia) do so automatically. In the brain, reading happens faster than other tasks, such as identifying color. So, if you see the word *blue*, you read it almost instantaneously. If it is in blue ink, and someone asks you the ink color, you will identify the color almost instantaneously. However, if *blue* is written in red ink, and someone asks you to identify the ink color, your response will be delayed. Not by much—just a fraction of a second—but a fraction of a second is a long time in the brain. When you see the word, you will read *blue* before you recognize the red ink, and in the process of answering the question you will experience a few milliseconds' worth of cognitive dissonance, that is, your brain taking the tiniest moment to recognize and resolve the contradiction between text and ink.

In nonsynesthetes, the test simply shows that reading is a faster, more automatic mental process than color identification. But when tailored for people who claim to have certain types of synesthesia, it can provide verification of what's going on in their brains. For example, if someone experiences colored numbers, and they always see twos as red, they will be slower to identify the ink color if they see a two printed in blue; they're dealing with the same momentary conflict as when most people see the word *blue* written in red ink.

One synesthesia researcher, a neuroscientist who himself experiences colored graphemes, explained his synesthesia by saying that, to him, it isn't an extra sense; it is just how things are. He gestured at a brown wall and said, "When you think about synesthetes, you think they see as everyone else does, plus something else. But my perception doesn't feel extra. Like the color of that wall isn't extra; it just is that color." (He has been able to replicate the experience for nonsynesthetes by projecting a black *A* and a red *A* onto the same space and quickly flicking back and forth between the two, giving the sensation that there's only one letter, occupying one place, and that it is both entirely red and entirely black.)

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Another common test is the "pop-out." To illustrate this test to the crowd in the dim chapel, another researcher put up a slide of a large white circle filled with black fives and twos presented in a simplified typeface, similar to the way they appear on digital clocks. Mostly, the circle was full of fives. There were a few twos scattered throughout, she told us, and they formed a shape. People straightened up and leaned forward, squinting to see better. After several seconds of audience murmuring, the researcher removed the slide. She asked if it had been hard to see the shape, and the crowd muttered collectively in the affirmative. Then she put up a slide of what we would have seen if we all had number-to-color synesthesia: a white circle full of red fives, with a triangle of green twos clearly and immediately visible. We were amazed; we were starting to understand. In the row behind me, a young man stared at the screen, still as frustrated as we had all been a moment earlier. He turned to the woman next to him and said despondently, "I hate being color-blind."

At the conference, What is it like? quickly gave way to How does it work?, a much harder question, and one that until fairly recently, science was not able to begin to answer. For many years, the study of synesthesia was mainly devoted to recording the experiences of synesthetes. The first such report on synesthetic experience came from Francis Galton, polymath, amateur eugenicist, and half cousin of Charles Darwin. In 1880, Galton chronicled the experiences of a young man who saw number lines arranged around him in space. For a few decades following that, synesthesia was widely studied, and in the late 1800s and early 1900s there was a significant cachet attached to synesthetic art and artists. Baudelaire and Rimbaud wrote poems about synesthesia. Kandinsky wrote about it and perhaps used it in his art. By the middle of the twentieth century, synesthesia was still present, of course—Nabokov was describing his colored graphemes and putting them to dazzling use in his anagrammatic wordplay—but the study of the condition had fallen out of psychological vogue. Emphasis in the scientific community shifted to behaviorism, which largely ignores internal psychological processes like perception. Then, in 1980, the physician Richard Cytowic resurrected the study of synesthesia after meeting a synesthete and hearing about the condition for the first time. He was having dinner at a friend's house when the host tasted the dish and exclaimed, "Oh dear, there aren't enough points on the chicken!" Cytowic was immediately fascinated. He began researching the phenomenon and working on a case study of the dinner host. In 1993, he published *The Man Who Tasted Shapes*, a book that brought synesthesia back into the public and the scientific consciousnesses.

Around the same time, the neuroscientist V. S. Ramachandran set out to discover the neural basis for synesthesia. For his work in visual processing and sensory perception, Ramachandran has been called "the Marco Polo of the brain." Rama—as he's called in the synesthesia crowd (the field is still quite small and all the major researchers know one another on a first-name, or even nickname, basis)—did some of the most pioneering work toward uncovering how the condition might work. Using an imaging technique called fMRI, which shows which parts of the brain are being activated by measuring the flow of oxygenated blood, Rama demonstrated that when grapheme-to-color synesthetes see a number, the area of the brain that processes color vision and the area responsible for number recognition both "light up." When the rest of us look at a four or a five, only our number-recognition areas activate. Essentially, Rama's research verified that synesthetes aren't imagining their perceptions or making them up—the blood flow in their brains proved that synesthesia is real.

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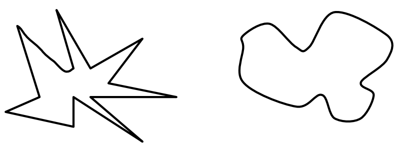
Tests for synesthesia and fMRI imaging are still important for today's researchers, who need to know that their subjects are really experiencing synesthesia, but the emphasis is no longer on proving that the condition is real, which is widely accepted. Scientists now ask more in-depth questions, such as What mechanisms cause it?, What can it tell us about how brains process sensory information?, and Why do some people have it and others not?

Daphne Maurer studies the development of synesthesia in babies—or rather, the pruning away of synesthetic connections that naturally occur during everyone's childhood. Synesthesia, she notes, works just like the "normal" senses—it is automatic, people have it their whole lives, and the pairings are consistent over time. Hearing music activates an adult's auditory cortices. But when babies—synesthetes or not—hear music, there's activity in both the auditory and visual centers of the brain. As infants and young children, her work suggests, we might all be synesthetes. Maurer theorizes that as babies get more and more sensory experience, the brain regions—and individual cells—specialize, and those extra connections start to fade.

In one of Maurer's experiments, one hundred percent of two-and-a-half-year-olds matched higher-pitched noises to lighter colors and lower-pitched noises to darker colors. There are many other examples of this, and not just in children. Even in neurotypicals (as nonsynesthetes are known), some of these extra connections remain. Although only synesthetes experience conscious perceptions across sensory borders, we all have associations that cross those lines, but they are subconscious. This kind of communication between different senses ("cross-modal interaction," to the synesthesia set) is something that we all do. Studies show that when people hear a sound accompanied by motion or other visual stimulation, they will report that sound as being louder than when they hear the exact same noise on its own. People perceive their hands to be drier if they hear an amplified rubbing sound while they rub their hands together. Pictures seem brighter if accompanied by a sound; sounds seem louder if accompanied by a bright flash. Even our sense of balance (vestibular sense), governed by fluid levels in the inner ear and unrelated to vision, can be affected when we see moving images. It is shocking to experience these tests, to realize just how much the quirks of your brain's anatomy and chemistry mediate what you thought was your objective perception of the world. But it also makes sense in a way. Audio and visual information enter the body at different points, but they both end up in the brain. The brain is full of circuitry, and signals move fast. Why shouldn't they zap into each other's territories from time to time?

Interplay between the senses doesn't just create these interesting but low-level pairings; it's also involved in higher-level functions, such as making aesthetic judgments. Sensory information enters the body through chemical receptors in the nose and on the tongue, light-sensing cells in the eyes, and nerve endings that detect pressure on or change of temperature in the skin—but it all travels via nerve cells up the spinal cord and into the brain. Different areas of the brain process different information; there are separate centers for all these types of sensory signals. But the sensory input doesn't stop in those centers; it travels on. All our sensory information converges in the brain area responsible for making aesthetic judgments, the orbitofrontal cortex. The specialized mono-sensory regions tell us if a person's eyes are blue or brown, or if a dish is sweet or savory. The orbitofrontal cortex answers different questions: Is his face handsome? Is her perfume appealing? The same part of the brain that decides if an entrée tastes delicious or mediocre also decides if a piece of art is beautiful or ugly. Some scientists have suggested that this kind of sensory convergence has an evolutionary underpinning—the appraisal of food. To know if you can eat an apple, you note its color, smell, firmness. It makes sense that cavemen who made their aesthetic judgments using multiple senses in tandem would eat rotten food less often, thus staying alive and passing on their genes so that today we all process information this way.

The ASA conference's keynote speaker, Jamie Ward, addressed the issue of synesthesia's evolutionary usefulness in his presentation, as he does in his recent book, *The Frog Who Croaked Blue*. (Synesthesia is great for titles: the weekend's presentations included "Making Scents of the Senses" and "A Colorful Appetite for Music.") Ward began his talk by noting some of the many instances of cross-modal perception in people who don't have synesthesia. One famous demonstration is the Kiki Bouba test. Ward brushed quickly past it. "The Kiki Bouba shape thing, of course, we all know about that" got a ripple of laughter from the crowd. Here's what happens in the Kiki Bouba shape thing: subjects are shown two shapes, like these



and asked which one is a Kiki, and which is a Bouba; they almost always respond the same way. Regardless of whether or not a subject speaks English, or even speaks a language that uses a Latin alphabet, he will call the jagged shape a Kiki and the rounded shape a Bouba. It just seems natural. But really, why should it? There must be some crossing or blending of the senses happening to make the sound of a *k* seem "sharp" or "hard" in the same way that a shape is spiky and the sound of *oo* seem related to curved lines.

This is not synesthesia, Ward is careful to note. Synesthesia is related to something we all do, but it is still special. Understanding what is meant by "sharp cheddar," or "bitter cold," after all, is not the same as seeing red As. Ward's talk moved quickly and covered a lot of terrain. At bottom, though, he is interested in whether there is some evolutionary basis for synesthesia—it's clearly not a defect, which means it wouldn't be selected against in evolution, but is it useful? He points out that in this context, it doesn't make sense to talk about synesthesia as a monolithic thing. Seeing music would have very different consequences on a person's life than hearing cartoon noises when cars drive by, seeing colored graphemes, or tasting shapes, so the different forms must be considered individually.

Ward thinks that mirror-touch synesthesia, a rare type in which the synesthete feels physical contact that is happening to someone else—that is, if you see someone being caressed on the cheek, or punched in the jaw, you yourself feel that caress or punch as if it were happening to you—is evolutionarily useful. Everyone has this to a small degree. Our brains have mirror neurons that fire in the same way both when we experience a physical sensation and when we see someone else experience it. This could be the neural basis for empathy; mirror-touch synesthetes are, not surprisingly, more empathetic than most. And high levels of empathy are evolutionarily useful, helpful in forming cohesive groups.

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There's also the notion that synesthetes who experience various forms of sound- and color-related synesthesia are more artistic than others. Art itself may not be evolutionarily useful, but it may be linked to other kinds of creativity that are more directly related to survival. Other types of synesthesia have proven useful as mnemonics: one grapheme-color synesthete was able to memorize the digits of the number pi—oh, just the first 22,500 or so digits—because, for him, numbers evoke colors and textures, and he was able to recite the numbers by imagining the visual image of pi. And some researchers, including Ramachandran, have proposed that synesthesia may be linked to the evolution of language. After all, everybody knows a Kiki from a Bouba. Ward mentioned this at the conference, saying—carefully, with ever so much respect—that he does not agree with this notion. If everyone can do it, then it's not synesthesia.

Some questions posed at the conference hung unanswered in the air, and I was curious about how the greater community of scientists handles them. I sought out Ed Hubbard, who, as a grad student working with Ramachandran, helped to make Kiki and Bouba famous, and met with him at Rockefeller University, where he works as a researcher. Hubbard has another idea about the importance of Kiki and Bouba: they are an example of how sensory integration leads to higher-level cognition. "We think that this is important," he told me, a few weeks after the conference, "if we want to understand a simple concept like jaggedness—something can be jagged looking, or jagged feeling, or even jagged sounding." Of course, Kiki and Bouba—both the shapes themselves and the words—are extreme examples. Not all sounds match up to geometric shapes. "Some scientists," Hubbard explains, "have said, 'Well, this is cute, but how much does it prove generally?'" But several scientists have done studies with variations on the Kiki Bouba test—using more trials and a wider variety of words and shapes—and have found that this mapping between sound and shape consistently occurs.

Hubbard, along with Ward and the psycholinguist Julia Simner, have been determining a theory of how synesthesia, in all its forms, might work. They are looking at the connections between brain regions in many different types of synesthesia. "We've been working toward what we refer to as the 'Grand Unified Theory of Synesthesia,'" Hubbard says, "with our tongues squarely planted in our cheeks."

The theory itself is serious, and is actually called the "theory of anatomically constrained cross-activation." When Hubbard and Ramachandran used fMRI to show that grapheme-to-color synesthetes have activation in the brain areas dedicated to color processing and number recognition, the image revealed something else as well. The color-vision processing area and the number-recognition area are right beside each other on a ridge in the temporal lobe called the fusiform gyrus, situated close to the center of the brain at about ear level. Noting that the most common types of synesthesia (colored graphemes, colored music) involve brain areas that are located near one another, Ramachandran proposed the adjacency principle, which suggests that the proximity of the involved brain regions allows for easier crossing of neural wires. In their Grand Unified Theory, Hubbard, Ward, and Simner have refined the adjacency principle: "It's not really adjacency," Hubbard explains. "It's the probability of having anatomical connections."

Maybe synesthesia is a little like obscenity: hard to define exactly, but we know it when we see it.

By connections, he means individual brain cells (neurons) that travel between different brain areas. Neurons are shaped like trees. A neuron's "branches"—long, forking extensions that reach out from one end of the cell—are called dendrites. The dendrites receive signals from adjacent cells. The "trunk" is the axon. Axons can be quite long—the longest human nerve cell travels all the way from the base of the spine to the toes. At the far end, the axon splits into several extensions—like tree roots—each of which terminates in a knob, called a bouton. The place where one cell's bouton communicates with its neighbor's dendrite is called a synapse. Synapses connect these cells in a massive, complex network—there are around one hundred billion neurons in the brain, and each can be connected to up to one thousand other cells.

Within the brain, neurons connect different regions. In fact, nearly every region of the brain connects to every other brain area in an average of seven synapses. "We know that eventually every area has to talk to every other area," says Hubbard. "Certain areas have long-range connections. There are local hubs, and there are areas where there's a lot more connectivity between adjacent regions." But if synesthesia is a product of connections between brain regions, and we all have neurons that travel between brain regions, and the clusters of cells responsible for processing colors, recognizing faces, hearing music, identifying personalities, et cetera, are all connected to one another in a network of forking cells, shouldn't we all have synesthesia?

Ward explains that we all have interactions between the senses (between brain regions), and these connections produce cross-modal perception, which can be thought of as a kind of subconscious synesthesia. Only when those interactions reach a certain strength does something "click," resulting in not a subconscious association, but a conscious, noticeable perception: "a separate experience that other people don't have." It's not necessarily that synesthetes' brains are constructed differently than other people's, but that their neurons behave differently. "It's a *quantitative* difference in brain wiring," Hubbard explains (the neurons connecting brain regions are firing more rapidly, sending stronger electrical impulses between brain regions), "that leads to a *qualitative* difference in experience." (I understand Kiki Bouba and can make aesthetic judgments, but Lidell hears beeps when red lights flash.)

Defining synesthesia seems at first to be a simple neurological matter. But deciding what gets called synesthesia doesn't just dictate which phenomena are the most interesting to study or which can teach us the most about the mind; it determines who gets welcomed to the club.

Noam Sagiv, a neuroscientist who has worked with the trio behind the Grand Unified Theory, is interested in pushing the classic definition of synesthesia. There are good reasons to do so. First, it excludes one of the most common variants, colored graphemes, because color is an aspect of vision. Seeing a letter or number is also vision. Since "modality" refers to the five senses—vision, hearing, touch, smell, taste—seeing red As and purple Bs doesn't actually qualify as "cross-modal." But if colored graphemes aren't synesthesia, what are they? After all, they are automatic, specific, and consistent over time. Maybe synesthesia is a little like obscenity: hard to define exactly, but we know it when we see it.

It turns out to be even more complicated than that. Yes, grapheme recognition and color recognition are both aspects of vision, but they take place at different points in the brain, and at different moments (though, "moment" in this case is a matter of milliseconds) during the visual process. You can think about a "sensory modality" from the outside: we have ears, eyes, a nose, taste buds, and skin—thus, we have five senses. Or you can think about it from the inside: we have brain areas dedicated to seeing colors, seeing textures, recognizing faces, identifying numbers, identifying letters, seeing motion, hearing music, hearing voices, recognizing spoken words, feeling temperature, feeling pressure, feeling pain, and on and on. So maybe the list of senses is actually quite a bit longer.

In his presentation at the ASA conference, Sagiv brought up mirror-touch synesthesia, calling it synesthesia "with a twist." Because if we accept "mirror-touch," shouldn't we have to accept forms in which the stimulation is propioception (our innate ability to know where our body parts are in space—the reason you can close your eyes and touch your nose or clap your hands) and the percept is visual? These forms include autoscopy and heautoscopy, or, if you're not in cognitive neuroscience, out-of-body experiences.

The mood in the room shifted when Sagiv made these suggestions—brows wrinkled, eyes narrowed, people frowned at their coffee and muffins or looked around at one another for confirmation that they'd correctly heard what was being proposed. "We can have all of these without being delusional," Sagiv said. Still, it sounded bizarre. A large part of the ASA's work, and the individual quests of many of its members, focuses on educating people about synesthesia and counteracting the notion that synesthetes might in some way be crazy. Adding out-of-body experiencers to the mix didn't sound like a good idea.

The group's reaction was proof of one of Sagiv's main points: that defining synesthesia is not a scientific task but a sociological one—albeit one that is most effective if informed by empirical data. There are reasons for wanting to exclude different variants from synesthesia's conceptual umbrella. There's plain old conservatism, and resistance to include things that might seem "too crazy." Even more interesting is the resistance to expanding the definition so far that it becomes too common, making synesthetes "less special." It's a delicate task. Everyone wants to be special; no one wants to be weird.

Sagiv moved on quickly, saying that while it's compelling and intellectually fruitful to come up with "a very long list of candidate domains" to study, because so many interesting cognitive processes involve making connections between two or more domains, "of course synesthesia is more interesting."

After the conference, I talked with Sean Day, the president of the ASA and a flavor-to-color and timbre-to-color synesthete himself, about Sagiv's idea. Day curates a list of reported synesthetic types online, and there are currently fifty-four. Day's list includes colored graphemes and colored music, as well as rarer types: colored orgasms, emotions that produce temperatures, personalities that produce colors, personified numbers and days of the week. It's easy to understand the disagreement surrounding some of these forms: a brightly colored orgasm sounds awfully close to metaphor, and personified numbers sound awfully close to crazy.

I wondered what Day thought about Sagiv's proposal that out-of-body experiences might be a form of synesthesia. "I thought it was brilliant," he said. But he is careful to qualify his enthusiasm; he thinks that out-of-body experiences probably fall into the same category as eidetic memory (a condition in which people recall memories so vividly that they feel like they are actually reexperiencing moments from their past) and phantom-limb syndrome (another of Ramachandran's specialties, in which amputees continue to feel their missing appendage)—they're not types of synesthesia, but they are related sensory phenomena, and certain aspects may work the same way that synesthesia does. For the moment, Day is saying no to including out-of-body experiences on the list of synesthetic types; he will wait for more evidence.

Some of the contested forms challenge our ideas about what a "sense" is. When "ticker-tape" synesthetes hear speech, they see words spilling out of people's mouths or word balloons with scrolling text. Aura synesthetes see clouds of color around faces. For personification synesthetes, numbers, days of the week, and such, have attributes like gender and age. The mental activities behind these types—connecting text and speech, extracting personality traits, recognizing faces, sequencing, et cetera—are not among those of the five classic senses, a set on which the formal definition of synesthesia (a stimulus in one sense causes a perception in another) relies. But does it matter? "A number of us," says Hubbard, "are moving away from using that strict definition. In a way, that definition is a useful heuristic, but it's not actually going to get us the proper qualities." That's fine with him—he, like the other synesthesia researchers, is content for now to do the research and learn as much as possible. Line drawing can come later. "Traditionally," he says, "definitions should come late in scientific inquiry, not early."

When I asked Hubbard about Sagiv's ideas about out-of-body experiences, he was similarly open-minded. "Out-of-body experiences," he says, "traditionally have this tint of mysticism—much the same way auras do. What I think is really exciting about what's happening in neuroscience is that there is a group of people who were trained as neurologists, trained to talk to people who come in after they've had a stroke or a car accident. These people will tell you crazy-sounding things! But they're *not* crazy—they've just had something bad happen to their brains, and they're telling you what it seems like to them." Hubbard's main point is that with all the problems that come with self-reporting, it's still important to begin by listening, by taking seriously people's accounts of their own experiences, even if they sound outrageous. "When you see somebody having an out-of-body experience, it's not mystical, it's not a step over to the other side; it's really something to do with the brain's mechanism for saying, 'This is your body and this is where you are,' in some sense playing a trick on you, misremembering or misinterpreting something." Ultimately, Sagiv wasn't trying to get out-of-body experiences classified as synesthesia, but to push the boundaries and get people thinking about how different forms of sensation and perception are classified as synesthesia, or as something else. "I think he's raising a very valid question," Hubbard says. "How do we decide?"