Oliver Sacks

HALLUCINATIONS

PICADOR

Introduction

When the word "hallucination" first came into use, in the early sixteenth century, it denoted only "a wandering mind." It was not until the 1830s that Jean-Étienne Esquirol, a French psychiatrist, gave the term its present meaning—prior to that, what we now call hallucinations were referred to simply as "apparitions." Precise definitions of the word "hallucination" still vary considerably, chiefly because it is not always easy to discern where the boundary lies between hallucination, misperception, and illusion. But generally, hallucinations are defined as percepts arising in the absence of any external reality—seeing things or hearing things that are not there.[1]

Perceptions are, to some extent, shareable—you and I can agree that there is a tree; but if I say, "I see a tree there," and you see nothing of the sort, you will regard my "tree" as a hallucination, something concocted by my brain or mind, and imperceptible to you or anyone else. To the hallucinator, though, hallucinations seem very real; they can mimic perception in every respect, starting with the way they are projected into the external world.

1. My own favorite definition is that given by William James in his 1890 *Principles of Psychology*: "An hallucination is a strictly sensational form of consciousness, as good and true a sensation as if there were a real object there. The object happens to be not there, that is all." Many other researchers have proposed their own definitions, and Jan Dirk Blom, in his encyclopedic *Dictionary of Hallucinations*, includes dozens of these.

Hallucinations tend to be startling. This is sometimes because of their content—a gigantic spider in the middle of the room or tiny people six inches tall—but, more fundamentally, it is because there is no "consensual validation"; no one else sees what you see, and you realize with a shock that the giant spider or the tiny people must be "in your head."

When you conjure up ordinary images—of a rectangle, or a friend's face, or the Eiffel Tower—the images stay in your head. They are not projected into external space like a hallucination, and they lack the detailed quality of a percept or a hallucination. You actively create such voluntary images and can revise them as you please. In contrast, you are passive and helpless in the face of hallucinations: they happen to you, autonomously—they appear and disappear when they please, not when you please.

There is another mode of hallucination, sometimes called pseudo-hallucination, in which hallucinations are not projected into external space but are seen, so to speak, on the inside of one's eyelids—such hallucinations typically occur in near-sleep states, with closed eyes. But these inner hallucinations have all the other hallmarks of hallucinations: they are involuntary, uncontrollable, and may have preternatural color and detail or bizarre forms and transformations, quite unlike normal visual imagery.

Hallucinations may overlap with misperceptions or illusions. If, looking at someone's face, I see only half a face, this is a misperception. The distinction becomes less clear with more complex situations. If I look at someone standing in front of me and see not a single figure but five identical figures in a row, is this "polyopia" a misperception or a hallucination? If I see someone cross the room from left to right, then see them

crossing the room in precisely the same way again and again, is this sort of repetition (a "palinopsia") a perceptual aberration, a hallucination, or both? We tend to speak of such things as misperceptions or illusions if there is something there to begin with—a human figure, for example—whereas hallucinations are conjured out of thin air. But many of my patients experience outright hallucinations, illusions, and complex misperceptions, and sometimes the line between these is difficult to draw.

Though the phenomena of hallucination are probably as old as the human brain, our understanding of them has greatly increased over the last few decades.[2] This new knowledge comes especially from our ability to image the brain and to monitor its electrical and metabolic activities while people are hallucinating. Such techniques, coupled with implanted-electrode studies (in patients with intractable epilepsy who need surgery), have allowed us to define which parts of the brain are responsible for different sorts of hallucinations. For instance, an area in the right inferotemporal cortex normally involved in the perception of faces, if abnormally activated, may cause people to hallucinate faces. There is a corresponding area on the other side of the brain normally employed in reading—the visual word form area in the fusiform gyrus; if this is abnormally stimulated, it may give rise to hallucinations of letters or pseudowords.

2. We cannot be certain whether other animals have hallucinations, although "hallucinatory behaviors" have been observed in laboratory animals as well as in natural settings, as Ronald K. Siegel and Murray E. Jarvik described in their review of the subject.

Hallucinations are "positive" phenomena, as opposed to the negative symptoms, the deficits or losses caused by accident or disease, which neurology is classically based on. The phenomenology of hallucinations often points to the brain structures and mechanisms involved and can therefore, potentially, provide more direct insight into the workings of the brain.

Hallucinations have always had an important place in our mental lives and in our culture. Indeed, one must wonder to what extent hallucinatory experiences have given rise to our art, folklore, and even religion. Do the geometric patterns seen in migraine and other conditions prefigure the motifs of Aboriginal art? Did Lilliputian hallucinations (which are not uncommon) give rise to the elves, imps, leprechauns, and fairies in our folklore? Do the terrifying hallucinations of the night-mare, being ridden and suffocated by a malign presence, play a part in generating our concepts of demons and witches or malignant aliens? Do "ecstatic" seizures, such as Dostoevsky had, play a part in generating our sense of the divine? Do out-of-body experiences allow the feeling that one *can* be disembodied? Does the substancelessness of hallucinations encourage a belief in ghosts and spirits? Why has every culture known to us sought and found hallucinogenic drugs and used them, first and foremost, for sacramental purposes?

This is not a new thought—in 1845, Alexandre Brierre de Boismont, in the first systematic medical book on the subject, explored such ideas in a chapter titled "Hallucinations in Relation to Psychology, History, Morality, and Religion." Anthropologists including Weston La Barre and Richard Evans Schultes, among others, have documented the role of hallucinations in

societies around the globe.[3] Time has only broadened and deepened our appreciation of the great cultural importance of what might at first seem to be little more than a neurological quirk.

I will say very little in this book about the vast and fascinating realm of dreams (which, one can argue, are hallucinations of a sort), other than to touch on the dreamlike quality of some hallucinations and on the "dreamy states" which occur in some seizures. Some have proposed a continuum of dream states and hallucinations (and this may be especially so with hypnagogic and hypnopompic hallucinations), but, in general, hallucinations are quite unlike dreams.

Hallucinations often seem to have the creativity of imagination, dreams, or fantasy—or the vivid detail and externality of perception. But hallucination is none of these, though it may share some neurophysiological mechanisms with each. Hallucination is a unique and special category of consciousness and mental life.

The hallucinations often experienced by people with schizophrenia also demand a separate consideration, a book of their own, for they cannot be divorced from the often profoundly altered inner life and life circumstances of those with schizophrenia. So I will refer relatively little to schizophrenic hallucinations here, focusing instead on the hallucinations that can occur in "organic" psychoses—the transient psychoses sometimes associated with delirium, epilepsy, drug use, and certain medical conditions.

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3. La Barre provided an extended review of anthropological perspectives on hallucination in a chapter published in 1975.

Many cultures regard hallucination, like dreams, as a special, privileged state of consciousness—one that is actively sought through spiritual practices, meditation, drugs, or solitude. But in modern Western culture, hallucinations are more often considered to portend madness or something dire happening to the brain—even though the vast majority of hallucinations have no such dark implications. There is great stigma here, and patients are often reluctant to admit to hallucinating, afraid that their friends and even their doctors will think they are losing their minds. I have been very fortunate that, in my own practice and in correspondence with readers (which I think of, in some ways, as an extension of my practice), I have encountered so many people willing to share their experiences. Many of them have expressed the hope that telling their stories will help defuse the often cruel misunderstandings which surround the whole subject.

I think of this book, then, as a sort of natural history or anthology of hallucinations, describing the experiences and impact of hallucinations on those who have them, for the power of hallucinations is only to be understood from first-person accounts.

Some of the chapters that follow are organized by medical categories (blindness, sensory deprivation, narcolepsy, etc.), and others are organized by sensory modality (hearing things, smelling things, etc.). But there is a great deal of overlap and interconnection between these categories, and similar hallucinations may occur in a wide variety of conditions. Here, then, is a sampling which I hope will give a sense of the great range, the varieties, of hallucinatory experience, an essential part of the human condition.

I

Silent Multitudes: Charles Bonnet Syndrome

One day late in November 2006, I got an emergency phone call from a nursing home where I work. One of the residents, Rosalie, a lady in her nineties, had suddenly started seeing things, having odd hallucinations which seemed overwhelmingly real. The nurses had called the psychiatrist in to see her, but they also wondered whether the problem might be something neurological—Alzheimer's, perhaps, or a stroke.

When I arrived and greeted her, I was surprised to realize that Rosalie was completely blind—the nurses had said nothing about this. Though she had not seen anything at all for several years, she was now "seeing" things, right in front of her.

"What sort of things?" I asked.

"People in Eastern dress!" she exclaimed. "In drapes, walking up and down stairs . . . a man who turns towards me and smiles, but he has huge teeth on one side of his mouth. Animals, too. I see this scene with a white building, and it

is snowing—a soft snow, it is swirling. I see this horse (not a pretty horse, a drudgery horse) with a harness, dragging snow away . . . but it keeps switching. . . . I see a lot of children; they're walking up and down stairs. They wear bright colors—rose, blue—like Eastern dress." She had been seeing such scenes for several days.

I observed with Rosalie (as with many other patients) that while she was hallucinating, her eyes were open, and even though she could see nothing, her eyes moved here and there, as if looking at an actual scene. It was that which had first caught the nurses' attention. Such looking or scanning does not occur with imagined scenes; most people, when visualizing or concentrating on their internal imagery, tend to close their eyes or else to have an abstracted gaze, looking at nothing in particular. As Colin McGinn brings out in his book *Mindsight*, one does not hope to discover anything surprising or novel in one's own imagery, whereas hallucinations may be full of surprises. They are often much more detailed than imagery, and ask to be inspected and studied.

Her hallucinations, Rosalie said, were more "like a movie" than a dream; and like a movie, they sometimes fascinated her, sometimes bored her ("all that walking up and down, all that Eastern dress"). They came and went, and seemed to have nothing to do with her. The images were silent, and the people she saw seemed to take no notice of her. Apart from their uncanny silence, these figures seemed quite solid and real, though sometimes two-dimensional. But she had never before experienced anything like this, so she could not help wondering: was she losing her mind?

I questioned Rosalie carefully but found nothing suggestive of confusion or delusion. Looking into her eyes with an oph-

thalmoscope, I could see the devastation of her retinas but nothing else amiss. Neurologically, she was completely normal—a strong-minded old lady, very vigorous for her years. I reassured her about her brain and mind; she seemed, indeed, to be quite sane. I explained to her that hallucinations, strangely, are not uncommon in those with blindness or impaired sight, and that these visions are not "psychiatric" but a reaction of the brain to the loss of eyesight. She had a condition called Charles Bonnet syndrome.

Rosalie digested this and said she was puzzled as to why she had started having hallucinations now, after being blind for several years. But she was very pleased and reassured to be told that her hallucinations represented a recognized condition, one that even had a name. She drew herself up and said, "Tell the nurses—*I* have Charles Bonnet syndrome." Then she asked, "Who was this Charles Bonnet?"

Charles Bonnet was an eighteenth-century Swiss naturalist whose investigations ranged broadly, from entomology to reproduction and regeneration in polyps and other animalcules. When an eye disease made his beloved microscopy impossible, he turned to botany—he did pioneer experiments on photosynthesis—then to psychology, and finally to philosophy. When he heard that his grandfather Charles Lullin had started to have "visions" as his eyesight failed, Bonnet asked him to dictate a full account.

John Locke, in his 1690 *Essay Concerning Human Understanding*, put forward the notion that the mind is a tabula rasa until it receives information from the senses. This "sensationalism," as it was called, was very popular with the phi-

losophes and rationalists of the eighteenth century, including Bonnet. Bonnet also conceived of the brain as "an organ of intricate composition, or rather an assemblage of different organs." These different "organs" all had their own dedicated functions. (Such a modular view of the brain was radical at the time, for the brain was still widely regarded as undifferentiated, uniform in structure and function.) Thus Bonnet attributed his grandfather's hallucinations to continuing activity in what he postulated were visual parts of the brain—an activity drawing on memory now that it could no longer draw on sensation.

Bonnet—who would later experience similar hallucinations when his own eyesight declined—published a brief account of Lullin's experiences in his 1760 *Essai analytique sur les facultés de l'âme*, a book devoted to considering the physiological basis of various senses and mental states, but Lullin's original account, which filled eighteen pages of a notebook, was subsequently lost for nearly 150 years, coming to light only at the beginning of the twentieth century. Douwe Draaisma has recently translated Lullin's account, including it in a detailed history of Charles Bonnet syndrome in his book *Disturbances of the Mind*.[1]

Unlike Rosalie, Lullin still had some eyesight left, and his hallucinations were superimposed on what he saw in the real world. Draaisma summarized Lullin's account:

1. Draaisma's book provides not only a vivid account of Bonnet's life and work, but fascinating reconstructions of the lives of a dozen other major figures in neurology whose names are now remembered mostly for the syndromes named after them: Georges Gilles de la Tourette, James Parkinson, Alois Alzheimer, Joseph Capgras, and others.

In February 1758, strange objects had begun to float into his field of vision. It started with something that resembled a blue handkerchief, with a small yellow circle in each corner. . . . The handkerchief followed the movement of his eyes: whether he was looking at a wall, his bed, or a tapestry, the handkerchief blocked out all the ordinary objects in his room. Lullin was perfectly lucid and at no time did he believe that there really was a blue handkerchief floating around. . . .

One day in August two granddaughters came to see him. Lullin was sitting in his armchair opposite the mantelpiece, and his visitors were to his right. From the left, two young men appeared. They were wearing magnificent cloaks, red and grey, and their hats were trimmed with silver. "What handsome gentlemen you've brought with you! Why didn't you tell me they were coming?" But the young ladies swore that they saw no one. Like the handkerchief, the images of the two men dissolved within a few moments. They were followed by many more imaginary visitors in the next few weeks, all of them women; they were beautifully coifed and several of them had a small box on their head. . . .

Somewhat later Lullin was standing at the window when he saw a carriage approaching. It came to a halt at his neighbour's house and, as he watched in amazement, the carriage grew bigger and bigger until it was level with the eaves of the house some thirty feet from the ground, with everything perfectly in proportion. . . . Lullin was amazed by the variety of images he saw: one time it was a swarm of specks that suddenly turned into a flight of pigeons, another time a group of dancing butterflies. Once he saw a rotating wheel floating in the air, the kind you saw in dockside cranes. On a stroll through the

> town he stopped to admire an enormous scaffolding, and when he arrived home he saw the same scaffolding standing in the living room, but then in miniature, less than a foot high.

As Lullin found, the hallucinations of CBS would come and go; his lasted for some months and then disappeared for good.

In Rosalie's case, the hallucinations subsided within a few days, as mysteriously as they had appeared. Almost a year later, though, I got another phone call from the nurses, telling me that she was "in a terrible state." Rosalie's first words when she saw me were "All of a sudden, out of a clear blue sky, the Charles Bonnet has come back with a vengeance." She described how a few days before, "figures started to walk around; the room seemed to crowd up. The walls turned into large gates; hundreds of people started to pour in. The women were dolled up, had beautiful green hats, gold-trimmed furs, but the men were terrifying—big, menacing, disreputable, disheveled, their lips moving as if they were talking."

In that moment, the visions seemed absolutely real to Rosalie. She had all but forgotten that she had Charles Bonnet syndrome. She told me, "I was so frightened that I screamed and screamed, 'Get them out of my room, open those gates! Get them out! Then shut the gates!' " She heard a nurse say of her, "She is not in her right mind."

Now, three days later, Rosalie said to me, "I think I know what triggered it again." She went on to say that she had had a highly stressful, exhausting time earlier in the week—a long, hot journey to see a gastrointestinal specialist on Long Island and a nasty fall backwards on the way. She arrived back many

hours later, shocked, dehydrated, in a state of near collapse. She was put to bed and fell into a deep sleep. She awoke the next morning to the terrifying visions of people bursting through the walls of her room, which lasted for thirty-six hours. Then she started to feel somewhat better and recovered her insight into what was happening. At that point, she instructed a young volunteer to track down an account of Charles Bonnet syndrome on the internet and to give copies of this to the nursing home staff, so that they would know what had been going on.

Over the next few days, her visions grew much fainter and ceased altogether when she was talking with others or listening to music. Her hallucinations had become "shyer," she said, and now occurred only in the evening, if she sat quietly. I thought of the passage in *Remembrance of Things Past* where Proust speaks of the church bells of Combray, how their sound seemed muted in the daytime, only to be heard when the hubbub and blare of the day had died down.

Charles Bonnet syndrome was considered rare before 1990—there were only a handful of case histories in the medical literature.[2] I thought this strange, for working in

2. Or so it would seem. Recently I came across a marvelous 1845 report by Truman Abell, a physician who started to lose his sight in his fifty-ninth year and had become totally blind by 1842, four years later. He described this in an article for the *Boston Medical and Surgical Journal.*

"In this situation," he wrote, "I often dreamed of having my sight restored, and of seeing the most beautiful landscapes. At length these landscapes began to appear in miniature *when awake*: small fields, a few feet square, would appear, clothed with green grass, and other vegetables, some in bloom. These would continue two or three minutes, and then disappear." The landscapes were followed by an immense variety of other "illusions"—Abell did not use the word "hallucinations"—provided by "an internal sight."

old-age homes and nursing homes for over thirty years, I had seen a number of blind or purblind patients with complex visual hallucinations of the Charles Bonnet type (just as I had seen a number of deaf or nearly deaf patients with auditory—and most often musical—hallucinations). I wondered whether CBS was actually much commoner than the literature seemed to indicate. Recent studies have confirmed that this is the case, although CBS is still little recognized, even by doctors, and there is much to suggest that many or most cases are overlooked or misdiagnosed. Robert Teunisse and his colleagues, studying a population of nearly six hundred elderly patients with visual problems in Holland, found that almost 15 percent of them had complex hallucinations—of people, animals, or scenes—and as many as 80 percent had simple hallucinations—shapes and colors, sometimes patterns, but not formed images or scenes.

Most cases of CBS probably remain at this elementary level

Over the course of several months, his visions increased in complexity. His "silent, but impudent visitors" were sometimes intrusive, with three or four people who would sit on his bed or "come to my bed-side, stoop down over me, and look directly into my eyes." (Often his hallucinatory people seemed to acknowledge him, although CBS hallucinations typically do not interact with their hallucinators.) One night, he reported, "I was threatened to be run over about 10 o'clock by a drove of oxen; but having my presence of mind, I sat quiet, and with much crowding they all passed without touching me."

Sometimes he saw ranks of thousands of people, splendidly dressed, forming columns that disappeared into the distance. At one point he saw "a column at least half a mile wide" of "men on horseback riding towards the west. . . . They continued to pass for several hours."

"What I have here stated," Abell wrote at the end of his detailed account, "must appear incredible to those unacquainted with the history of illusive visions. . . . How far my blindness contributed to produce such a result, I am not able to say. Never before have I been able to realize the ancient comparison of the human mind to a microcosm, or universe in miniature . . . [yet] the whole was confined within the organ of mental vision, and occupied, perhaps, a space of less than the tenth part of an inch square."

of simple patterns or colors. Patients who have simple (and perhaps transient or occasional) hallucinations of this type may not take much notice or remember to report them when they visit a doctor. But some people's geometrical hallucinations are more persistent. One old lady with macular degeneration, learning of my interest in such matters, described how in the first two years of her visual impairment, she saw

> a big blob of light circling around and then vanishing, followed by a colored flag in sharp focus . . . it looked exactly like the British flag. Where it came from, I do not know. . . . For the last few months I have been seeing hexagons, often hexagons in pink. At first there were also tangled lines inside the hexagons, and other little balls of color, yellow, pink, lavender, and blue. Now there are only black hexagons looking for all the world like bathroom tiles.[3]

While most people with CBS are aware that they are hallucinating (often by the very incongruity of their hallucinations), some hallucinations may be plausible and in context, as with the "handsome gentlemen" accompanying Lullin's granddaughters, and these may, at least initially, be taken as real.[4]

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3. A particularly good description of hallucinations in CBS ("I See Purple Flowers Everywhere") is provided by Lylas and Marja Mogk in their excellent book *Macular Degeneration,* written for patients with this condition.

4. The reverse may also occur. Robert Teunisse told me how one of his patients, seeing a man hovering outside his nineteenth-floor apartment, assumed this was another one of his hallucinations. When the man waved at him, he did not wave back. The "hallucination" turned out to be his window washer, considerably miffed at not having his friendly wave returned.

With more complex hallucinations, it is typical to see faces, though they are almost never familiar. David Stewart, in an unpublished memoir, described this:

> I had another hallucination. . . . This time it was faces, the most prominent of which was one of a man who might have been a burly ship captain. It wasn't Popeye, but along those lines. The cap he was wearing was blue with a shiny black visor. His face was grey, the cheeks rather chubby, bright eyes and a decidedly bulbous nose. He was no one I had ever seen before. This was not a caricature, and he seemed very much alive, someone I felt I might like to know. He gazed at me with a benign, unblinking, and altogether incurious expression.

The burly ship captain, Stewart noted, appeared as he was listening to an audiobook biography of George Washington, which included a reference to some sailors. He mentioned, too, that he had one hallucination "which nearly replicated a Brueghel painting I once—and only once—observed in Brussels," and another of a coach he thought might have belonged to Samuel Pepys shortly after he read a biography of Pepys.

While some hallucinatory faces, like Stewart's ship captain, seem coherent and plausible, others may be grossly distorted or composed, sometimes, of fragments—a nose, part of a mouth, an eye, a huge head of hair, all juxtaposed in a seemingly haphazard way.

Sometimes people with CBS may hallucinate letters, lines of print, musical notes, numerals, mathematical symbols, or other types of notation. The overall term "text hallucinations" is used for such visions, although for the most part what is seen cannot be read or played and may indeed be nonsensi-

cal. My correspondent Dorothy S. mentioned this as one of her many CBS hallucinations:

> Then there are the words. They are from no known language, some have no vowels, some have too many: "skeeeekkseegsky." It is hard for me to capture them as they move swiftly from side to side and also advance and retreat. . . . Sometimes I catch a glimpse of part of my name, or a version of it: "Doro" or "Dorthoy."

Sometimes the hallucinated text has an obvious association with experience, as with one man who wrote to me that he would see Hebrew letters all over the walls for about six weeks following Yom Kippur each year. Another man, who was nearly blind from glaucoma, reported that often he saw lines of print in balloons, "like the balloons in comic strips," though he could not decipher the words. Text hallucinations are not uncommon; Dominic ffytche, who has seen hundreds of people with CBS, estimates that about a quarter of them have text hallucinations of one sort or another.

Marjorie J. wrote to me in 1995 about what she called her "musical eyes":

> I am a 77-year-old woman with glaucoma damage to mostly the lower half of my vision. About two months ago, I started to see music, lines, spaces, notes, clefs—in fact written music on everything I looked at, but only where the blindness exists. I ignored it for a while, but when I was visiting the Seattle Art Museum one day and I saw the lines of the explanatory notes as music, I knew I was really having some kind of hallucination.
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> . . . I had been playing the piano and really concentrating

> on music prior to the musical hallucinations . . . it was right before my cataract was removed, and I had to concentrate hard to see the notes. Occasionally I'll see crossword puzzle squares . . . but the music does not go away. I've been told the brain refuses to accept the fact that there is visual loss and fills in—with music in my case.

Arthur S., a surgeon who is also a fine amateur pianist, is losing his vision from macular degeneration. In 2007, he started "seeing" musical notation for the first time. Its appearance was extremely realistic, the staves and clefs boldly printed on a white background, "just like a sheet of real music"—and Arthur wondered for a moment whether some part of his brain was now generating his own original music. But when he looked more closely, he realized that the score was unreadable and unplayable. It was inordinately complicated, with four or six staves, impossibly complex chords with six or more notes on a single stem, and horizontal rows of multiple flats and sharps. It was, he said, "a potpourri of musical notation without any meaning." He would see a page of this pseudo-music for a few seconds, and then it would disappear suddenly, replaced by another, equally nonsensical page. These hallucinations were sometimes intrusive, and might cover a page he was trying to read or a letter he was trying to write.

Though Arthur has been unable to read real musical scores for some years, he wonders, as Marjorie did, whether his lifelong immersion in music and musical scores might have determined the form of his hallucinations.[5]

5. I have heard from at least a dozen people who, like Arthur and Marjorie, hallucinate musical notation; some of them have eye problems, some parkinsonism, some see music when they have a fever or delirium,

He wonders, too, whether his hallucinations might progress. For about a year before he began to see musical notation, Arthur saw something much simpler: a checkerboard pattern. Will his musical notation be followed by even more complex hallucinations, such as people, faces, or landscapes, as his eyesight declines?

There is clearly a wide array, a whole spectrum, of visual disturbances which can occur when vision is lost or compromised, and originally the term "Charles Bonnet syndrome" was reserved for those whose hallucinations were related to eye disease or other ocular problems. But an essentially similar array of disturbances can also occur when the damage lies not in the eye itself but higher up in the visual system, especially the cortical areas involved in visual perception—the occipital lobes and their projections into the temporal and parietal lobes of the brain—as seems to be the case with Zelda.

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some see it hypnopompically when they awaken. All but one are amateur musicians who often spend many hours a day studying scores. This very specialized and repetitive sort of visual study is peculiar to musicians. One may read books for hours a day, but one does not usually study print itself in such an intensive way (unless one is a type designer or proofreader, perhaps).

A page of music is far more complex visually than a page of print. With musical notation, one has not just the notes themselves but a very dense set of information contained in symbols for key signatures, clefs, turns, mordents, accents, rests, holds, trills, etc. It seems likely that intensive study and practice of this complex code somehow imprints it in the brain, and should any tendency to hallucination later develop, these "neural imprints" may predispose to hallucinations of musical notation.

And yet people with no particular training or even interest in music may also have hallucinations of musical notation, as Dominic ffytche has pointed out. In a letter to me, he wrote, "although prolonged exposure to music increases the likelihood of musical eyes, it is not a prerequisite."

Zelda was a historian who came to see me in 2008. She told me how her world of strange visual phenomena had started at a theater six years earlier, when the beige curtain in front of the stage suddenly seemed to be covered in red roses—the roses were three-dimensional, thrusting out of the curtain. When she closed her eyes, she still saw the roses. This hallucination lasted for a few minutes and then vanished. She was perplexed and frightened by this, and she went to consult her ophthalmologist, but he found no impairment of vision and no pathological changes in either eye. She saw her internist and cardiologist, but they could not provide any plausible explanation for this episode—or the countless episodes that followed. Finally she had a PET scan of her brain, which showed reduced blood flow in her occipital and parietal lobes, presumably the cause, or at least a possible cause, of her hallucinations.

Zelda has both simple and complex visual hallucinations. The simple ones may appear when she is reading or writing or watching television. One of her physicians asked her to keep a journal of her visions over a three-week period, and in it, she recorded, "As I write this page, it is becoming more and more covered by a pale green and pink lattice. . . . The garage walls, covered in white cinderblock, continually mutate . . . coming to resemble bricks, or clapboard, or being covered with damask, or flowers of different colors. . . . On the upper part of the walls in the hallway, shapes of animals. They were formed by blue dots."

More complex hallucinations—battlements, bridges, viaducts, apartment houses—are especially common when she is being driven in a car (she gave up driving herself after her initial attack, six years ago). Once when she and her husband were driving along a snowy road, she was startled to see bril-

liant green bushes, their leaves glittering with icicles, to either side of the road. Another day, she saw a rather shocking sight:

> As we drove away from the beauty parlor, I saw what looked like a teenage boy on the front hood of our car, leaning on his arms with his feet up in the air. He stayed there for about five minutes. Even when we turned he stayed on the hood of the car. As we pulled into the restaurant parking lot, he ascended into the air, up against the building, and stayed there until I got out of the car.

At another point, she "saw" one of her great-granddaughters, who rose up, moved to the ceiling, and disappeared. She saw three "witchlike" figures, motionless and hideous, with huge hooked noses, protruding chins, and glaring eyes—these also vanished after a few seconds. Zelda said she had no idea that she had so many hallucinations until she starting keeping a journal; many of them, she thought, would otherwise have been forgotten.

She also spoke of many strange visual experiences which were not quite hallucinations in the sense of being totally invented or generated but seemed to be persistences, repetitions, distortions, or elaborations of visual perceptions. (Charles Lullin had a number of such perceptual disorders, and they are not uncommon in people with CBS.) Some of these were relatively simple; thus, when she looked at me on one occasion, my beard seemed to spread until it covered my entire face and head, and then resumed its proper appearance. Occasionally, looking in a mirror, she might see her own hair rising a foot above her head and have to check with her hand to make sure it was in its usual place.

Sometimes her perceptual changes were more disturbing, as when she encountered her mail carrier in the lobby of her apartment building: "As I looked at her, her nose grew until it was a grotesque figure on her face. After a few minutes, as we stood talking, her face came back to normal."

Zelda would often see objects duplicated or multiplied, and this might create odd difficulties. "Making dinner and eating was quite difficult," she said. "I kept seeing several of each piece of food when they didn't exist. This lasted most of dinner."[6] Visual multiplication like this—polyopia—can take even more dramatic form. Once, in a restaurant, Zelda observed a man in a striped shirt paying at the cash register. As she watched, he split into six or seven identical copies of himself, all wearing striped shirts, all making the same gestures—then concertinaed back into a single person. At other times, her polyopia can be quite frightening or dangerous, as when, sitting in the passenger seat of her car, she saw the road ahead of her split into four identical roads. The car seemed to her to proceed up all four roads simultaneously.[7]

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6. I was reminded, when she said this, of a case I had heard of in which as a patient ate cherries from a bowl, they were replaced by hallucinatory cherries, a seemingly endless cornucopia of cherries, until, suddenly, the bowl was totally empty. And of another case, of a man with CBS who was picking blackberries. He picked every one he could see; then, to his delight, he saw four more he had missed—but these turned out to be hallucinations.

7. Something about visual movement or "optic flow" seems to be especially provocative of visual hallucinations in people with CBS or other disorders. I met one elderly psychiatrist with macular degeneration who had experienced only a single episode of CBS hallucinations: he was being driven in a car and began to see, on the edges of the parkway, elaborate eighteenth-century gardens which reminded him of Versailles. He enjoyed the experience and found it much more interesting than the ordinary view of the roadside.

Ivy L., who also has macular degeneration, wrote:

Seeing moving pictures even on television may lead to hallucinatory perseverations. Once, watching a television program that showed people descending from a plane, Zelda began to hallucinate minute replicas of the figures, which continued their descent off the screen and down the wooden cabinet of the television console.

Zelda has dozens of these hallucinations or misperceptions every day, and has had them, almost nonstop, for the past six years. And yet she has managed to maintain a very full life, both domestically and professionally—keeping house, entertaining friends, going out with her husband, and completing a new book.

In 2009, one of Zelda's doctors suggested that she take a medication called quetiapine, which can sometimes diminish the severity of hallucinations. To our amazement and especially hers, she became entirely free from hallucinations for more than two years.

In 2011, however, she had heart surgery, and then, on top of this, she broke a kneecap in a fall. Whether it was due to the anxiety and stress of these medical problems, the unpredictable nature of CBS, or the development of tolerance to her medication, she started to have some hallucinations again.

> As a passenger in cars, I began riding with my eyes closed. Now I often "see" a small, moving travel scene in front of me when my eyes are shut. I "see" open roads and sky, houses, and gardens. I do not "see" any people or vehicles. The scene constantly changes, showing unidentifiable houses in great detail sliding by when the car is in motion. These hallucinations never appear except when I am in a moving car.

(Mrs. L. also reported text hallucinations as part of her CBS, "brief periods when I would 'see' handwriting in huge letters across a large white wall, or the income tax figures imprinted on the drapes. These lasted several years, at intervals.")

Her hallucinations, though, have taken a somewhat more tolerable form. When she is in the car, she said, "I see things, but not people. I see planted fields, flowering, and many forms of medieval buildings. Frequently I see modern buildings change into more historic looking ones. Every experience brings something different."

One of her new hallucinations, she said, "is very difficult to describe. It's a performance! The curtain goes up and 'performers' dance out on the stage—but no people. I see black Hebrew letters dressed in ballet dresses of white. They dance to beautiful music, but I don't know where it comes from. They move the upper parts of the letters like arms and dance on the lower parts so gracefully. They come onstage from right to left."

While the hallucinations of CBS are usually described as pleasant, friendly, diverting, even inspiring, they may occasionally take on a very different character. This happened to Rosalie when a neighbor of hers in the nursing home, Spike, died. Spike was a whimsical, laughter-loving Irishman, and he and Rosalie, both in their nineties, had been close friends for years. "He knew all the old songs," Rosalie remarked; they would sing these together and joke and chatter by the hour. When he died suddenly, Rosalie was devastated. She lost her appetite, withdrew from social activities, and spent more time alone in her room. Her hallucinations returned, but instead of the gaily dressed figures she had seen before, she saw five or six tall men standing around her bed, silent and motionless. They were always dressed in dark brown suits and wore dark hats that shadowed their faces. She could not "see" their eyes, but she felt that they were gazing at her—enigmatically, sol-

emnly. She felt that her bed had become a deathbed and that these ominous figures were harbingers of her own death. They seemed overwhelmingly real to her, and although she knew that if she stretched out a hand it would pass right through them, she could not bring herself to do this.

Rosalie continued to have these visions for three weeks, and then she started to emerge from her melancholy. The somber, silent men in brown disappeared, and her hallucinations started taking place chiefly in the dayroom, a place full of music and talk. They would start with a vision of patterns—quadrangles of pink and blue that seemed to cover the floor and then extend up the walls, finally spreading across the ceiling. The colors of these "tiles," she said, put her in mind of a nursery. And, in accordance with this, she now saw little people a few inches high, like elves or fairies, with little green caps, climbing up the sides of her wheelchair. There were children, too, "picking up pieces of paper from the floor" or climbing hallucinatory stairs in one corner of the room. Rosalie found the children "adorable," although their activities seemed pointless and, as she put it, "silly."

The children and the little people lasted for a couple of weeks, and then they, too, vanished, in the mysterious way that such hallucinations tend to. Though Rosalie misses Spike, she has found other friends in the nursing home, and she is back to her usual routines of chatting and listening to audiobooks and Italian operas. She is rarely alone now, and—coincidentally or not—her hallucinations have, for the time being, disappeared.

If some or all sight is preserved, as with Charles Lullin and Zelda, there may be not only visual hallucinations but

various disorders of visual perception: people or objects may appear too large or too small, too near or too far; there may be too little or too much color or depth; misalignment, distortion, or inversion of the image; or problems with motion perception.

If, of course, the person is completely blind, as Rosalie is, then there can only be hallucinations, but these may also show anomalies of color, depth, transparency, motion, scale, and detail. CBS hallucinations are often described as having dazzling, intense color or a fineness and richness of detail far beyond anything one sees with the eyes. There are strong tendencies to repetition and multiplication, so that one may see rows or phalanxes of people, all dressed similarly and making similar motions (some early observers referred to this as "numerosity"). And there is a strong tendency to elaboration: hallucinatory figures often seem to be wearing "exotic dress," rich robes, and strange headgear. Bizarre incongruities often appear, so that a flower may protrude not from someone's hat but from the middle of their face. Hallucinatory figures may be cartoonlike. Faces, in particular, may show grotesque distortions of the teeth or eyes. Some people hallucinate text or music. But by far the commonest hallucinations are the geometrical ones: squares, checkerboards, rhomboids, quadrangles, hexagons, bricks, walls, tiles, tessellations, honeycombs, mosaics. Simplest of all, and perhaps most common, are phosphenes, blobs or clouds of brightness or color, which may or may not differentiate into anything more complex. No single individual has all of these perceptual and hallucinatory phenomena, though some people may have a great range, like Zelda, while others tend to stick to a particular form of hallucination, like Marjorie, with her "musical eyes."

In the last decade or two, Dominic ffytche and his col-

leagues in London have done pioneering research on the neural basis of visual hallucinations. Based on the detailed reports of dozens of subjects, they developed a taxonomy of hallucinations, including categories like figures with hats, children or small people, landscapes, vehicles, grotesque faces, text, and cartoonlike faces. (This taxonomy is described in a 2000 paper by Santhouse et al.)

With this classification in hand, ffytche went on to do detailed brain-imaging studies in which selected patients with different categories of visual hallucinations were asked to signal the beginning and end of their hallucinations while being scanned.

There was, as ffytche et al. wrote in a 1998 paper, "a striking correspondence" between the particular hallucinatory experiences of each patient and the particular portions of the ventral visual pathway in the visual cortex which were activated. Hallucinations of faces, of color, of textures, and of objects, for example, each activated particular areas known to be involved in specific visual functions. When there were colored hallucinations, there was activation of areas in the visual cortex associated with color construction; when there were facial hallucinations of a sketchlike or cartoonlike character, there was activation in the fusiform gyrus. Visions of deformed or dismembered faces or grotesque faces with exaggerated eyes or teeth were associated with heightened activity in the superior temporal sulcus, an area specialized for the representation of eyes, teeth, and other parts of the face. Text hallucinations are associated with abnormal activation in the visual word form area, a highly specialized area in the left hemisphere.

Ffytche et al. observed, moreover, a clear distinction between normal visual imagination and actual hallucination—thus,

imagining a colored object, for example, did not activate the V4 area, while a colored hallucination did. Such findings confirm that, not only subjectively but physiologically, hallucinations are unlike imagination and much more like perceptions. Writing of hallucinations in 1760, Bonnet said, "The mind would not be able to tell apart vision from reality." The work of ffytche and his colleagues shows that the brain does not distinguish them, either.

There had never before been direct evidence of such a correlation between the contents of a hallucination and the particular areas of cortex activated. We have long known, from observation of people with specific injuries or strokes, that different aspects of visual perception (color perception, face recognition, movement perception, etc.) depend on highly specialized areas of the brain. Thus, for example, damage to a tiny area of the visual cortex called V4 may knock out color perception but nothing else. Ffytche's work is the first to confirm that hallucinations make use of the same visual areas and pathways as perception itself. (Ffytche has emphasized more recently, in papers on the "hodology" of hallucinations, that attributing hallucinations, or any cerebral function, to specific brain regions has its limitations, and that one must pay equal attention to the connections between these areas.)[8]

8. Such correlations involve sizable regions of the brain; they are at a macro level. Correlations on a micro level, at least for elementary geometric hallucinations, have been proposed by William Burke, a neurophysiologist who has experienced such hallucinations himself, due to macular "holes" in both eyes. He has been able to estimate the visual angles subtended by specific hallucinations and to extrapolate these into cortical distances. He concludes that the separation of his brickwork hallucinations corresponds to the separation of the physiologically active "stripes" in the V2 part of the visual cortex, while the separation of the dots he hallucinates corresponds to that of the "blobs" in the primary

But while there are neurologically determined categories of visual hallucination, there may be personal and cultural determinants, too. No one can have hallucinations of musical notation or numbers or letters, for example, if they have not actually seen these at some point in real life. Thus experience and memory may influence both imagery and hallucination—but with CBS, memories are not hallucinated in full or literal form. When people with CBS hallucinate people or places, they are almost never recognizable people or places, only plausible or invented ones. CBS hallucinations give one the impression that, at some lower level, in the early visual system, there is a categorical dictionary of images or part images—of generic "noses," for example, or "headwear" or "birds," rather than of particular noses or headwear or birds. These are, so to speak, the visual ingredients called upon and used in the recognition and representation of complex scenes—elements or building blocks which are purely visual, without context or correlation with other senses, without emotion or particular associations of place or time. (Some researchers have called them "proto-objects" or "proto-images.") In this way, CBS images seem more raw, more obviously neurological, not personal like those of imagination or recollection.

Hallucinations of text or musical scores are intriguing in this regard, for although they initially look like real music or text, they quickly reveal themselves to be unreadable, in the sense that they have no shape, no tune, no syntax or grammar. Although Arthur S. at first thought he might be able to play

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visual cortex. Burke hypothesizes that with diminished input from his damaged maculas, there is diminished activity in the macular cortex, releasing spontaneous activity in the cortical stripes and blobs that give rise to hallucinations.

his hallucinatory musical scores, he soon realized that he was seeing "a potpourri of musical notation, without any meaning." Similarly, text hallucinations lack meaning; they may, on closer inspection, not even be actual letters but letter-like runes.

We know (from studies by ffytche and his colleagues) that text hallucinations go with hyperactivity in the visual word form area; there are probably analogous (though more widespread) activations with hallucinations of musical notation, though these have yet to be "caught" on fMRI. In the normal process of reading text or scores, what is initially deciphered in the early visual system goes on to higher levels where it acquires syntactical structure and meaning. But in hallucinations of text or scores, caused by anarchical hyperactivity in the early visual system, letters, proto-letters or musical notation appear without the normal constraints of syntax and meaning—providing a window into both the powers and the limitations of the early visual system.

Arthur S. saw musical notation of fanciful elaboration, far more ornate than any real score. CBS hallucinations are often fanciful or fantastical. Why should Rosalie, a blind old woman in the Bronx, see figures in "Eastern dress"? This strong disposition to the exotic, for reasons we do not yet understand, is characteristic of CBS, and it would be fascinating to see whether this varies in different cultures. These strange, sometimes surreal images, of boxes or birds perched atop people's heads or flowers coming out of their cheeks, make one wonder whether what is occurring is a sort of neurological mistake, a simultaneous activation of different brain areas, producing an involuntary, incongruous collision or conflation.

The images of CBS are more stereotyped than those of

dreams and at the same time less intelligible, less meaningful. When Lullin's notebook, lost for a century and a half, resurfaced and was published in a psychology journal in 1902 (just two years after Freud's *Interpretation of Dreams*), some wondered whether the hallucinations of CBS might afford, as Freud felt dreams did, "a royal road" to the unconscious. But attempts at "interpreting" CBS hallucinations in this sense bore no fruit. People with CBS had their own psychodynamics, of course, like everyone else, but it became apparent that little beyond the obvious was to be gained from analyzing their hallucinations. A religious person might hallucinate praying hands, among other things, or a musician might hallucinate musical notation, but these images scarcely yielded insights into the unconscious wishes, needs, or conflicts of the person.

Dreams are neurological as well as psychological phenomena, but very unlike CBS hallucinations. Dreamers are wholly enveloped in their dreams, and usually active participants in them, whereas people with CBS retain their normal, critical waking consciousness. CBS hallucinations, even though they are projected into external space, are marked by a lack of interaction; they are always silent and neutral—they rarely convey or evoke any emotion. They are confined to the visual, without sound, smell, or tactile sensation. They are remote, like images on a cinema screen in a theater one has chanced to walk into. The theater is in one's own mind, and yet the hallucinations seem to have little to do with one in any deeply personal sense.

One of the defining characteristics of Charles Bonnet hallucinations is the preservation of insight, the realization that a hallucination is not real. People with CBS are occasion-

ally deceived by a hallucination, especially if it is plausible or contextually appropriate. But such mistakes are quickly realized to be such, and insight is restored. The hallucinations of CBS almost never lead to persistent false ideas or delusions.

The ability to evaluate one's perceptions or hallucinations, however, may be compromised if there are other underlying problems in the brain, especially those which impair the frontal lobes, since the frontal lobes are the seat of judgment and self-evaluation. This may happen transiently, for example, with a stroke or head injury; fever or delirium; various medications, toxins, or metabolic imbalances; dehydration or lack of sleep. In such cases, insight will return as soon as cerebral function returns to normal. But if there is an ongoing dementia, like Alzheimer's or Lewy body disease, there may be less and less ability to recognize hallucinations as such—which, in turn, may lead to frightening delusions and psychoses.

Marlon S., in his late seventies, has progressive glaucoma and some mild dementia. He has been unable to read for the last twenty years, and for the last five years has been virtually blind. He is a devout Christian and still works as a lay minister in prisons, as he has done for the last thirty years. He lives alone in an apartment, but he leads a very active social life. He goes out each day, either with one of his children or with a home attendant, to family occasions or to the senior center, where there may be games, dancing, going out to restaurants, and other activities.

Although he is blind, Marlon seems to inhabit a world that is very visual and sometimes very strange. He tells me that he often "sees" his surroundings—he has lived most of his life in the Bronx, but what he sees is an ugly, desolate version of the Bronx (he describes it as "shabby, old, much older than

me"), and this may give him a feeling of disorientation. He "sees" his apartment, but he can easily get lost or confused. Sometimes, he says, the apartment gets "as big as a Greyhound bus terminal," and at other times it contracts, becoming "as skinny as a railroad apartment." In general, the hallucinated apartment looks dilapidated and chaotic: "My whole house is a wreck, looks like the Third World . . . then it looks regular." (The only time his apartment actually *is* a mess, his daughter told me, is when Marlon, thinking that he is "blockaded" by the furniture, starts rearranging it, pushing things to and fro.)

His hallucinations started about five years ago and were at first benign. "In the beginning," he told me, "I saw a lot of animals." They were followed by hallucinations of children—multitudes of them, just as there would always be multitudes of animals. "All of a sudden," Marlon remembered, "I see all these kids come in, they were walking all around; I thought they were regular kids." The children were silent but "talked with their hands"; they seemed unconscious of him and "did their own thing"—walking around, playing. He was startled when he found that no one else saw them. It was only then that he realized that his "eyes were playing tricks" on him.

Marlon enjoys listening to talk shows, gospel, and jazz on the radio, and when he does so, he may find his sitting room crowded with hallucinatory people who are also listening. Sometimes their mouths move as if they are speaking or singing along with the radio. These visions are not unpleasant, and they seem to provide a sort of hallucinatory comfort. It is a social scene, which he enjoys.[9]

9. I have heard similar descriptions from other people who have both CBS and some dementia. Janet B. likes to listen to audiobooks and sometimes finds herself joined by a hallucinatory group of fellow listeners.

In the last two years, Marlon has also started to see a mysterious man who always wears a brown leather coat, green pants, and a Stetson hat. Marlon has no idea who it is but feels that this man has a special message or meaning, though what the message or meaning is eludes him. He sees this figure at a distance, never close up. The man seems to float through the air rather than walk, and his figure can become enormous, "as tall as a house." Marlon has also spotted a small, sinister trio of men, "like FBI, a long way off. . . . They look real, real ugly and bad." Marlon believes in angels and devils, he tells me, and he feels that these men are evil. He has started to suspect that he is under surveillance by them.

Many people with mild cognitive impairment may be organized and oriented during the daytime—this is the case with Marlon, especially when he is at the senior center or at a church social, actively engaged with other people. But as

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They listen intently but never speak, do not respond to her questions, and seem unaware of her presence. At first, Janet realized that they were hallucinatory, but later, as her dementia advanced, she insisted that they were real. Once when her daughter was visiting and said, "Mom, there's no one here," she got angry and chased her daughter out.

A more complex delusional overlay occurred while she was listening to a favorite show on television. It seemed to Janet that the television crew had decided to use her apartment, and that it was set up with cables and cameras, that the show was actually being filmed at that moment in front of her. Her daughter happened to telephone her during the show, and Janet whispered, "I have to be quiet—they're filming." When her daughter arrived an hour later, Janet insisted that there were still cables all over the floor, adding, "Don't you see that woman?"

Even though Janet was convinced of the reality of these hallucinations, they were entirely visual. People pointed, gestured, mouthed, but made no sound. Nor did she have any sense of personal involvement; she found herself in the midst of strange happenings, yet they seemed to have nothing to do with her. In this way they retained the typical character of CBS hallucinations, even though she insisted that they were real.

evening comes, there may be a "sundowning" syndrome, and fears and confusions start to proliferate.

Generally, in the daytime, Marlon's hallucinatory figures deceive him briefly, for a minute or two, before he realizes they are figments. But late in the day, his insight breaks down, and he feels his threatening visitors as real. At night, when he finds "intruders" in his apartment, he is terrified—even though they seem uninterested in him. Many of them look "like criminals" and wear prison garb; sometimes they are "smoking Pall Malls." One night one of his intruders was carrying a bloodstained knife, and Marlon yelled out, "Get out of here, in the name of the blood of Jesus!" On another occasion one of the apparitions left "under the door," slipping away like a liquid or vapor. Marlon has ascertained that these figures are "like ghosts, not solid," and that his arm will go right through them. Nevertheless, they *seem* quite real. He can laugh about this as we talk, but it is clear that he can be quite terrified and deluded when he is alone with his intruders in the middle of the night.

People with CBS have, at least in part, lost the primary visual world, the world of perception. But they have gained, if only in an inchoate and fitful way, a world of hallucinations, a secondary visual world. The role CBS may play in an individual's life varies enormously, depending on the sort of hallucinations that occur, how often they occur, and whether they are contextually appropriate, or frightening, or comforting, even inspiring. There are, at one extreme, those who may have had only a single hallucinatory experience in their life; others

may have had hallucinations, on and off, for years. Sometimes hallucinations can be distracting—seeing patterns or webs over everything, not knowing whether the food on one's plate is real or hallucinatory. Some hallucinations are manifestly unpleasant, especially those that involve deformed or dismembered faces. A few are dangerous: Zelda, for instance, does not dare drive, since she may see the road suddenly bifurcate or people jumping on the hood of her car.

For the most part, however, the hallucinations of CBS are unthreatening and, once accommodated to, mildly diverting. David Stewart speaks of his hallucinations as being "altogether friendly," and he imagines his eyes saying, "Sorry to have let you down. We recognize that blindness is no fun, so we've organized this small syndrome, a sort of coda to your sighted life. It's not much, but it's the best we can manage."

Charles Lullin, too, enjoyed his hallucinations and would sometimes go into a quiet room for a brief hallucinatory break. "His mind makes merry with the images," Bonnet wrote of his grandfather. "His brain is a theatre where the stage machinery puts on performances which are all the more amazing because they are unexpected."

Sometimes the hallucinations of Charles Bonnet syndrome can inspire. Virginia Hamilton Adair wrote poetry as a young woman, publishing in the *Atlantic Monthly* and the *New Republic*. She continued to write poems during her career as a scholar and professor of English in California, but these, for the most part, remained unpublished. It was not until she was eighty-three and completely blind from glaucoma that she published her first book of poetry, the acclaimed *Ants on the Melon*. Two further collections followed, and in these new poems she made frequent reference to the Charles Bonnet hal-

lucinations that now visited her regularly, the visions given to her by "the angel of hallucinations," as she put it.

Adair and, later, her editor sent me extracts from the journal she kept in the last years of her life. They were full of descriptions she dictated of her hallucinations as they occurred, including this:

> I am maneuvered into a delightfully soft chair. I sink, submerged as usual in shades of night . . . the sea of clouds at my feet clears, revealing a field of grain, and standing about it a small flock of fowl, not two alike, in somber plumage: a miniature peacock, very slender, with its little crest and unfurled tail feathers, some plumper specimens, and a shore bird on long stems, etc. Now it appears that several are wearing shoes, and among them a bird with four feet. One expects more color among a flock of birds, even in the hallucinations of the blind. . . . The birds have turned into little men and women in medieval attire, all strolling away from me. I see only their backs, short tunics, tights or leggings, shawls or kerchiefs. . . . Opening my eyes on the smoke screen of my room I am treated to stabs of sapphire, bags of rubies scattering across the night, a legless vaquero in a checked shirt stuck on the back of a small steer, bucking, the orange velvet head of a bear decapitated, poor thing, by the guard of the Yellowstone Hotel garbage pit. The familiar milkman invaded the scene in his azure cart with the golden horse; he joined us a few days ago out of some forgotten book of nursery rhymes or the back of a Depression cereal box. . . . But the magic lantern show of colored oddities has faded and I am back in black-wall country without form or substance . . . where I landed as the lights went out.