

became scared and rowed ashore and hid behind a log. Soon they heard the sound of paddles in the water and canoes approaching. One of the canoes, with five men in it, paddled ashore and one of the men said: "What do you think? Let us go up-river and make war against the people."

"I cannot go with you," said one of the young men. "My relatives do not know where I have gone. Besides, I might get killed. But he," said he, turning to the other young man, "will go with you." So one of the young men returned to his village, and the other went up-river with the war-party.

They went to a point beyond Kalama, and the people came down to the river to fight them, and they fought. Soon, the young man heard someone say: "This Indian has been wounded."—"Maybe they are ghosts," he thought, because he felt perfectly OK. The war party suggested leaving, and they left, and the young man went back to his village.

There he lit a fire in front of his abode, sat down to await the sunrise, and told his story to the villagers. "I went with a war-party to make war with the people. There was fierce fighting and many were killed, and many were wounded. They said I was wounded, but I did not feel a thing. Maybe they were ghosts."

He had told it all, and when the sun came up, he gave a little cry. Something black came out of his mouth. He fell over. He was dead.

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40 An Adult Eidetiker

Charles F. Stromeyer III

Stromeyer's "Elizabeth" comes closer to having a literally "photographic" memory than any other memorist ever studied. Though Stromeyer reported few tests of her memory in the conventional sense, he does describe several astonishing feats of visual information storage. As reported here, Elizabeth could combine a stereogram presented to her left eye with the image of a corresponding stereogram seen with her right eye the day before; the result was a figure perceived in depth. "Elizabeth" may be unique. In the dozen years since the publication of this paper, no other such eidetiker has been found.

Elizabeth is a young teacher at Harvard, very intelligent, a skilled artist. She has a talent that most painters don't have. At will, she can mentally project an exact image of a picture or scene onto her canvas or onto another surface. This hallucinated image appears to contain all of the detailed texture and color of the original. Once the image is formed, it remains still and Elizabeth can move her eyes about to inspect the details.

Elizabeth (not her actual name) says that she can project a beard onto a beardless face, for example, or leaves onto a barren tree—additions so strong that they can obscure the true image. However, she never confuses eidetic images with reality, and spontaneous imagery rarely bothers her.

Her ability to recall and visualize images is not limited to pictures or scenes. Years after having read a poem in a foreign language, she

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can fetch back an image of the printed page and copy the poem from the bottom line to the top line as fast as she can write. She says that she used her eidetic memory for high-school and undergraduate examinations, but found it less useful in graduate school.

[In a section omitted here, Stromeyer describes the accomplishments of other "eidetikers." His list includes S (Selection 38), the Shass Pollak (Selection 30), and eidetic children like those studied by Jaensch, Haber, and others. It seems to me, however, that these cases should be carefully distinguished. Elizabeth's mental life is nothing like S's; she more closely resembles my own informant MZ (described in Selection 37) in the way she has used her talents. The mental life of the Shass Pollak is unknown; Stratton's report only describes what they could accomplish. As for the eidetic children—for whom the term "eidetic" was originally coined—they are not really memorists at all. After inspecting a picture, such a child may report that she can still see it for a minute or so; then it gradually fades from view. Eidetic children are often no more accurate in describing the picture during this period than control children who must describe it from memory alone. Moreover, they cannot retrieve their images once they have faded.]*

... In our experiments with Elizabeth at Harvard ... we used the computer generated stereograms developed by Bela Julesz of Bell Telephone Laboratories ... Each stereogram consists of a pair of random-dot patterns. When a person looks at these patterns through a stereoscope, which presents one pattern to the right eye and the other pattern to the left eye, he sees a figure emerge in depth. When he looks at the random-dot patterns without the stereoscope, he can see neither figures nor depth.

Using only her right eye, Elizabeth viewed a 10,000-dot pattern for 1 minute. After a 10-second rest, she looked at the other 10,000-dot pattern with her left eye. We asked her to superimpose the eidetic image for the right-eye pattern on the actual left-eye pattern. Without hesitation she reported that she saw the letter T coming toward her.

Next we showed her both patterns through the stereoscope and she said the T was identical to her eidetic image.

Now we inverted the left- and right-eye patterns. When she projected the eidetic image onto the actual pattern, she saw an inverted T behind the surface. The T oscillated in depth, but had sharp outlines.

* [For a thorough review of the phenomenon of eidetic imagery in children, see Haber, R. N. Twenty years of haunting eidetic images: Where's the ghost? Behavioral and Brain Sciences, 1979, 2, 583—594, and commentary in the same issue, 594—629.]

FLOAT

In the next experiment, Elizabeth looked at another random-dot pattern with her right eye. This time she looked at the pattern in 3-minute periods, separated by a minute of rest, until she had looked at it for 12 minutes. Twenty-four hours later she looked at the companion pattern with her left eye and projected the eidetic image of the right-eye pattern onto it. Within 10 seconds she said she saw a square floating above the surface.

These tests provide proof that eidetic imagery exists. Elizabeth had not seen the stereograms before the experiment. It seems impossible that she could memorize the position of 10,000 dots in the brief time we allowed her to look at the patterns. Even if she could, this would not explain the depth she saw. Three-dimensional vision is possible only when each eye sees a different image.

DEPTH

To demonstrate the extremely detailed information contained in the eidetic image, we tested her with a million-dot random pattern. She formed an eidetic image of the pattern and could retain it for up to four hours. We have not yet tested her for longer periods with the million-dot pattern.

Elizabeth could selectively recall any one of a number of images. In one experiment she formed images of four 10,000-dot patterns presented to her right eye. The next day she viewed a single pattern with her left eye and recalled each of the four eidetic images on request. When the images were superimposed on the left-eye pattern, each created a different figure that was seen in depth.

Since she had claimed that an eidetic image could obscure a real object—for example, that a projected beard could hide a chin—we decided to test whether an eidetic image could suppress an actual pattern.

We devised a stereogram that had two patterns, X and Y, for the left eye and one pattern for the right eye. Elizabeth looked at the pattern X with her left eye until she had formed an eidetic image. Then we presented pattern Y to her left eye and the right-eye pattern to her right eye. After she saw the combined figure in depth, we asked her to call up the eidetic image of the left-eye X pattern. The eidetic X image suppressed the Y pattern before her eye, and she reported seeing a new figure in depth.

TILT

These experiments show that the eidetic image is eye-specific and strong enough to obscure a real object. Furthermore, the image does not change its orientation in space as the head is tilted. For example, Elizabeth tilted her head 90 degrees to one side and viewed an upright painting until she formed an eidetic image of it. When she projected the eidetic image, she claimed it always remained upright. She could easily combine the eidetic image with an actual upright pattern and see the resulting figure in depth.

[An account of another of Elizabeth's feats—combining an image with a presented slide to create colors in an Edwin Land display—is omitted here.]

AFTER-IMAGES

We have conducted a number of other perceptual tests to determine the properties of eidetic images. Some early researchers maintained that the eidetic image produces an effect similar to that of an actual visual stimulus. If this were true, then eidetic images should produce after-images and movement after-effects.

To test for after-images, Elizabeth scanned a green-and-black-grating. She reported no after-image while she formed the eidetic image. But later, when she stared at the projected eidetic image she subsequently saw a magenta-and-blue-striped after-image. The after-image appeared identical to one formed by staring at the actual pattern. However, unlike normal after-images, the eidetic after-image remained constant in size when it was projected to different distances, and it did not move when Elizabeth moved her eyes.

SPIRALS

To test motion after-effect one looks at a rotating-contracting spiral for a few minutes and then stares at the center of a stationary spiral. The stationary spiral will seem to expand. If the original spiral rotates in the opposite direction so that the moving spiral appears to expand, the stationary one will seem to contract.

Elizabeth first formed an eidetic image of a stationary black-and-white spiral. She then stared at a rotating-contracting spiral for two minutes. Immediately afterward she shifted her gaze to a black-velvet surface and called up the eidetic image of the stationary spiral. As she stared at its center, the spiral seemed to expand. The after-effect appeared identical to that produced later when she looked at an actual spiral, and the duration of both effects was the same.

SCAN

To form an eidetic image of a complex pattern, Elizabeth prefers to scrutinize the pattern part by part when shutting her eyes to see if she has a good image of that part. She could not form eidetic images without moving her eyes. She had to scan even the simplest shapes to build up the eidetic image.

Simple images can be recalled rapidly, but complicated patterns often do not appear *in toto*; instead, parts may appear successively until the entire image is recalled. For example, it once took Elizabeth about 10 seconds to recall a 10,000/dot eidetic image. We have recorded her eye movements and alpha rhythm while Elizabeth looked at eidetic images. Whether her eyes are open or shut the alpha rhythm is invariably present when she scans an eidetic image.

BREAKUP

The eidetic images are sharp and finely detailed. Elizabeth formed an image of a fine, high-contrast-stripe grating. Two days later the image was as sharp as the original pattern.

When the eidetic image begins to fade, it does not blur as an after-image does, but dims and breaks apart.

The fact that an eidetic image built up with one eye will combine with a pattern presented to the other eye to form a perception of depth indicates that the eidetic image may be represented quite early in the visual system, before the site of binocular interaction, perhaps beyond the retina in the lateral geniculate nucleus or occipital cortex.

Many intriguing questions remain. Can an eidetiker form an image of a completely imaginary scene? Can eidetic images be altered by removing or introducing new elements? Can one synthesize an image of something not seen before?

MOVIE

Can an eidetic image be formed of a moving scene? Elizabeth claims once to have seen in full detail an eidetic 10-second episode from a Laurel and Hardy movie that she attended the week before.

Obviously, more research is needed. For the past 35 years psychologists have been skeptical about the existence of eidetic imagery. Few modern theories of memory take into account this type of image retention. We have proved that eidetic imagery exists, but we still have much to discover about its nature.

41 An Uncommon Case of Visual Memory

Kent Gummerman and
Cynthia R. Gray

The authors of this selection found their subject, "Nancy," during an extensive search for individuals with eidetic imagery. That search was unsuccessful—Nancy is not an eidetiker, and they found no others. (No one knows why some investigators find substantial numbers of eidetic children and others don't.) But Nancy is no slouch of a memorist; her descriptions of pictures, given from memory, are astonishing in their detail.

In recent years considerable interest has centered on the phenomenon known as eidetic imagery. Briefly, eidetic imagery refers to the ability, usually found in children, to retain a very vivid and faithful image of a scene that was viewed for only a number of seconds. The Eidetiker can "project" his image out into space onto a homogeneous surface, move his eyes over it, and describe it in such detail as to suggest that he is "still seeing it."

Here we wish to describe one individual who came to our attention during the course of our work on eidetic imagery. As we will describe fully elsewhere, we have had no success in locating even a single Eidetiker, let alone in learning something new about the phenomenon. This one individual, however, possesses such an unusual ability to recall visually presented material that it is difficult to resist labeling her an Eidetiker. But we must resist, since she fails to meet

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