

38 The Mind of a Mnemonist

A. R. Luria

Luria's subject S is the exception to many rules. He violates not only the established norms of memory and perception—S almost never forgot anything at all, and his everyday sensory experiences can only be described as mind-boggling—but also my own generalization that psychology doesn't care about memorists. Alexander Luria, the most distinguished Soviet psychologist of his generation, did eloquent justice to S in the book from which these selections are drawn. (Jerome Bruner wrote the introduction to the English translation in 1968.) S just proved to be too sensational to be ignored; his peculiar mental life has earned him a place in almost every subsequent book on cognitive psychology.

Although he certainly deserves his fame, our concentration on S may have fostered some misconceptions about mnemonists and memorists as a group. They do not invariably have bizarre sensory experiences or difficulty with abstractions. The opposite is more nearly the case. S turns out to be an exception even to generalizations about memorists, though he is no less interesting on that account.

When I began my study of S, it was with much the same degree of curiosity psychologists generally have at the outset of research, hardly with the hope that the experiments would offer anything of particular note. However, the results of the first tests were enough to change my attitude and to leave me, the experimenter, rather than my subject, both embarrassed and perplexed.

I gave S. a series of words, then numbers, then letters, reading them to him slowly or presenting them in written form. He read or listened attentively and then repeated the material exactly as it had been presented. I increased the number of elements in each series, giving him as many as thirty, fifty, or even seventy words or numbers, but this, too, presented no problem for him. He did not need to commit any of the material to memory; if I gave him a series of words or numbers, which I read slowly and distinctly, he would listen attentively, sometimes ask me to stop and enunciate a word more clearly, or, if in doubt whether he had heard a word correctly, would ask me to repeat it. Usually during an experiment he would close his eyes or stare into space, fixing his gaze on one point; when the experiment was over, he would ask that we pause while he went over the material in his mind to see if he had retained it. Thereupon, without another moment's pause, he would reproduce the series that had been read to him.

The experiment indicated that he could reproduce a series in reverse order—from the end to the beginning—just as simply as from start to finish; that he could readily tell me which word followed another in a series, or reproduce the word which happened to precede the one I'd name. He would pause for a minute, as though searching for the word, but immediately after would be able to answer my questions and generally made no mistakes.

It was of no consequence to him whether the series I gave him contained meaningful words or nonsense syllables, numbers or sounds; whether they were presented orally or in writing. All he required was that there be a 3–4 second pause between each element in the series, and he had no difficulty reproducing whatever I gave him.

As the experimenter, I soon found myself in a state verging on utter confusion. An increase in the length of a series led to no noticeable increase in difficulty for S., and I simply had to admit that the capacity of his memory *had no distinct limits*; that I had been unable to perform what one would think was the simplest task a psychologist can do: measure the capacity of an individual's memory. I arranged a second and then a third session with S.; these were followed by a series

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of sessions, some of them days and weeks apart, others separated by a period of several years.

But these later sessions only further complicated my position as experimenter, for it appeared that there was no limit either to the capacity of S.'s memory or to the durability of the traces he retained. Experiments indicated that he had no difficulty reproducing any lengthy series of words whatever, even though these had originally been presented to him a week, a month, a year, or even many years earlier. In fact, some of these experiments designed to test his retention were performed (without his being given any warning) 15 or 16 years after the session in which he had originally recalled the words. Yet invariably they were successful. During these test sessions S. would sit with his eyes closed, pause, then comment: "Yes, yes. . . . This was a series you gave me once when we were in your apartment. . . . You were sitting at the table and I in the rocking chair. . . . You were wearing a gray suit and you looked at me like this. . . . Now, then, I can see you saying . . ." And with that he would reel off the series precisely as I had given it to him at the earlier session. If one takes into account that S. had by then become a well-known mnemonist, who had to remember hundreds and thousands of series, the feat seems even more remarkable.

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Our curiosity had been aroused by a small and seemingly unimportant observation. S. had remarked on a number of occasions that if the examiner said something during the experiment—if, for example, he said "yes" to confirm that S. had reproduced the material correctly or "no" to indicate he had made a mistake—a blur would appear on the table and would spread and block off the numbers, so that S. in his mind would be forced to "shift" the table over, away from the blurred section that was covering it. The same thing happened if he heard noise in the auditorium; this was immediately converted into "puffs of steam" or "splashes" which made it more difficult for him to read the table.

This led us to believe that the process by which he retained material did not consist merely of his having preserved spontaneous traces of visual impressions; there were certain additional elements at work. I suggested that S. possessed a marked degree of *synesthesia*. If we can trust S.'s recollections of his early childhood (which we will deal with in a special section later in this account), these synesthetic reactions could be traced back to a very early age. As he described it:

When I was about two or three years old I was taught the words of a Hebrew prayer. I didn't understand them, and what happened was that

the words settled in my mind as puffs of steam or splashes. . . . Even now I see these puffs or splashes when I hear certain sounds.

Synesthetic reactions of this type occurred whenever S. was asked to listen to *tones*. The same reactions, though somewhat more complicated, occurred with his perception of *voices* and with speech sounds.

The following is the record of experiments that were carried out with S. in the Laboratory on the Physiology of Hearing at the Neurological Institute, Academy of Medical Sciences.

Presented with a tone pitched at 30 cycles per second and having an amplitude of 100 decibels, S. stated that at first he saw a strip 12–15 cm. in width the color of old, tarnished silver. Gradually this strip narrowed and seemed to recede; then it was converted into an object that glistened like steel. Then the tone gradually took on a color one associates with twilight, the sound continuing to dazzle because of the silvery gleam it shed.

Presented with a tone pitched at 50 cycles per second and an amplitude of 100 decibels, S. saw a brown strip against a dark background that had red, tongue-like edges. The sense of taste he experienced was like that of sweet and sour borscht, a sensation that gripped his entire tongue.

Presented with a tone pitched at 100 cycles per second and having an amplitude of 86 decibels, he saw a wide strip that appeared to have a reddish-orange hue in the center; from the center outwards the brightness faded with light gradations so that the edges of the strip appeared pink.

Presented with a tone pitched at 250 cycles per second and having an amplitude of 64 decibels, S. saw a velvet cord with fibers jutting out on all sides. The cord was tinged with a delicate, pleasant pink-orange hue.

Presented with a tone pitched at 500 cycles per second and having an amplitude of 100 decibels, he saw a streak of lightning splitting the heavens in two. When the intensity of the sound was lowered to 74 decibels, he saw a dense orange color which made him feel as though a needle had been thrust into his spine. Gradually this sensation diminished.

Presented with a tone pitched at 2,000 cycles per second and having an amplitude of 113 decibels, S. said: "It looks something like fireworks tinged with a pink-red hue. The strip of color feels rough and unpleasant, and it has an ugly taste—rather like that of a briny pickle. . . . You could hurt your hand on this."

Presented with a tone pitched at 3,000 cycles per second and having an amplitude of 128 decibels, he saw a whisk broom that was of a fiery color, while the rod attached to the whisks seemed to be scattering off into fiery points.

The experiments were repeated during several days and invariably the same stimuli produced identical experiences.

What this meant was that S. was one of a remarkable group of people, among them the composer Scriabin, who have retained in an

especially vivid form a "complex" synesthetic type of sensitivity. In S.'s case every sound he heard immediately produced an experience of light and color and, as we shall see later in this account, a sense of taste and touch as well.

S. also experienced synesthetic reactions when he listened to someone's voice. "What a crumbly, yellow voice you have," he once told L. S. Vygotsky while conversing with him. At a later date he elaborated on the subject of voices as follows:

You know there are people who seem to have many voices, whose voices seem to be an entire composition, a bouquet. The late S. M. Eisenstein had just such a voice: Listening to him, it was as though a flame with fibers protruding from it was advancing right toward me. I got so interested in his voice, I couldn't follow what he was saying . . .

But there are people whose voices change constantly. I frequently have trouble recognizing someone's voice over the phone, and it isn't merely because of a bad connection. It's because the person happens to be someone whose voice changes twenty to thirty times in the course of a day. Other people don't notice this, but I do. (Record of November 1951.)

To this day I can't escape from seeing colors when I hear sounds. What first strikes me is the color of someone's voice. Then it fades off . . . for it does interfere. If, say, a person says something, I see the word; but should another person's voice break in, blurs appear. These creep into the syllables of the words and I can't make out what is being said. (Record of June 1953.)

"Lines," "blurs," and "splashes" would emerge not only when he heard tones, noises, or voices. Every speech sound immediately summoned up for S. a striking visual image, for it had its own distinct form, color, and taste. Vowels appeared to him as simple figures, consonants as splashes, some of them solid configurations, others more scattered—but all of them retained some distinct form.

When S. read through a long series of words, each word would elicit a graphic image. And since the series was fairly long, he had to find some way of distributing these images of his in a mental row or sequence. Most often (and this habit persisted throughout his life), he would "distribute" them along some roadway or street he visualized in his mind. Sometimes this was a street in his home town, which would also include the yard attached to the house he had lived in as a child and which he recalled vividly. On the other hand, he might also select a street in Moscow. Frequently he would take a mental walk along that street—Gorky Street in Moscow—beginning at Mayakovsky Square, and slowly make his way down, "distributing" his images at houses, gates, and store windows. At times, without realizing how it had happened, he would suddenly find himself back in his home town (Torzhok), where he would wind up his trip in the house he had lived

in as a child. The setting he chose for his "mental walks" approximates that of dreams, the difference being that the setting in his walks would immediately vanish once his attention was distracted but would reappear just as suddenly when he was obliged to recall a series he had "recorded" this way.

This technique of converting a series of words into a series of graphic images explains why S. could so readily reproduce a series from start to finish or in reverse order; how he could rapidly name the word that preceded or followed one he'd select from the series. To do this, he would simply begin his walk, either from the beginning or from the end of the street, find the image of the object he had named, and "take a look at" whatever happened to be situated on either side of it. S.'s visual patterns of memory differed from the more commonplace type of figurative memory by virtue of the fact that his images were exceptionally vivid and stable; he was also able to "turn away" from them, as it were, and "return" to them whenever it was necessary.

When S. read a passage from a text, each word produced an image. As he put it: "Other people *think* as they read, but I *see* it all." As soon as he began a phrase, images would appear; as he read further, still more images were evoked, and so on.

As we mentioned earlier, if a passage were read to him quickly, one image would collide with another in his mind; images would begin to crowd in upon one another and would become contorted. How then was he to understand anything in this chaos of images? If a text were read slowly, this, too, presented problems for him. Note the difficulties he experienced:

. . . I was read this phrase: "N. was leaning up against a tree. . . ." I saw a slim young man dressed in a dark blue suit (N., you know, is so elegant). He was standing near a big linden tree with grass and woods all around. . . . But then the sentence went on: "and was peering into a shop window." Now how do you like that! It means the scene isn't set in the woods, or in a garden, but he's standing on the street. And I have to start the whole sentence over from the beginning . . . (Record of March 1937.)

Thus, trying to understand a passage, to grasp the information it contains (which other people accomplish by singling out what is most important), became a tortuous procedure for S., a struggle against images that kept rising to the surface in his mind. Images, then, proved an obstacle as well as an aid to learning in that they prevented S. from concentrating on what was essential. Moreover, since these images tended to jam together, producing still more images, he was carried so far adrift that he was forced to go back and rethink the entire passage. Consequently a simple passage—a phrase, for that matter—would turn out to be a Sisyphean task. These vivid, palpable images were not always helpful to S. in understanding a passage; they could just as easily lead him astray.

And this was only the beginning of the problems S. encountered in reading. As he described it:

... It's particularly hard if there are some details in a passage I happen to have read elsewhere. I find then that I start in one place and end up in another—everything gets muddled. Take the time I was reading *The Old World Landowners*. Afanasy Ivanovich went out on the porch. ... Well, of course, it's such a high porch, has such creaking benches. ... But, you know, I'd already come across that same porch before! It's Korobochka's porch, where Chichikov drove up! What's liable to happen with my images is that Afanasy Ivanovich could easily run into Chichikov and Korobochka! ...

... Or take another example. This one has to do with Chichikov's arrival at the hotel. I see the place, a one-story house. You enter and there's the foyer, downstairs a large reception room with a window near the doorway, to the right a table, and in the center of the room a big Russian stove. ... But I've seen this before. The fat Ivan Nikiforovich lives in this very house, and the thin Ivan Ivanovich is here too—in the garden out in front, with the filthy Gapka running about beside him. And so I've ended up with different people from the characters in the novel. (Record of March 1937.)

Thinking in terms of images was fraught with even greater dangers. Inasmuch as S.'s images were particularly vivid and stable, and recurred thousands of times, they soon became the dominant element in his awareness, uncontrollably coming to the surface whenever he touched upon something that was linked to them even in the most general way. These were images of his childhood: of the little house he had lived in in Rezhitsa; of the yard at Chaim Petukh's, where he could see the horses standing in the shed, where everything smelled of oats and manure. This explains why, once he had begun to read or had started one of his mental walks connected with recall, he would suddenly discover that although he had started out at Mayakovsky Square he invariably ended up at Chaim Petukh's house or in one of the public squares in Rezhitsa.

Say I began in Warsaw—I end up in Torzhok in Altermann's house. ... Or I'm reading the Bible. There's a passage in which Saul appears at the house of a certain sorceress. When I started reading this, the witch described in "The Night Before Christmas" appeared to me. And when I read further, I saw the little house in which the story takes place—that is, the image I had of it when I was seven years old: the bagel shop and the storage room in the cellar right next to it. ... Yet it was the Bible I had started to read. ... (Record of September 1936.)

... The things I see when I read aren't real, they don't fit the context. If I'm reading a description of some palace, for some reason the main rooms always turn out to be those in the apartment I lived in as a child. ... Take the time I was reading *Trilby*. When I came to the part where I had to find an attic room, without fail it turned out to be one of my

neighbor's rooms—in that same house of ours. I noticed it didn't fit the context, but all the same my images led me there automatically. This means I have to spend far more time with a passage if I'm to get some control of things, to reconstruct the images I see. This makes for a tremendous amount of conflict and it becomes difficult for me to read. I'm slowed down, my attention is distracted, and I can't get the important ideas in a passage. Even when I read about circumstances that are entirely new to me, if there happens to be a description, say, of a staircase, it turns out to be one in a house I once lived in. I start to follow it and lose the gist of what I'm reading. What happens is that I just can't read, can't study, for it takes up such an enormous amount of my time. ... (Record of December 1935.)

Given such a tendency, cognitive functions can hardly proceed normally. The very thought which occasions an image is soon replaced by another—to which the image itself has led; a point is thus reached at which images begin to guide one's thinking, rather than thought itself being the dominant element.