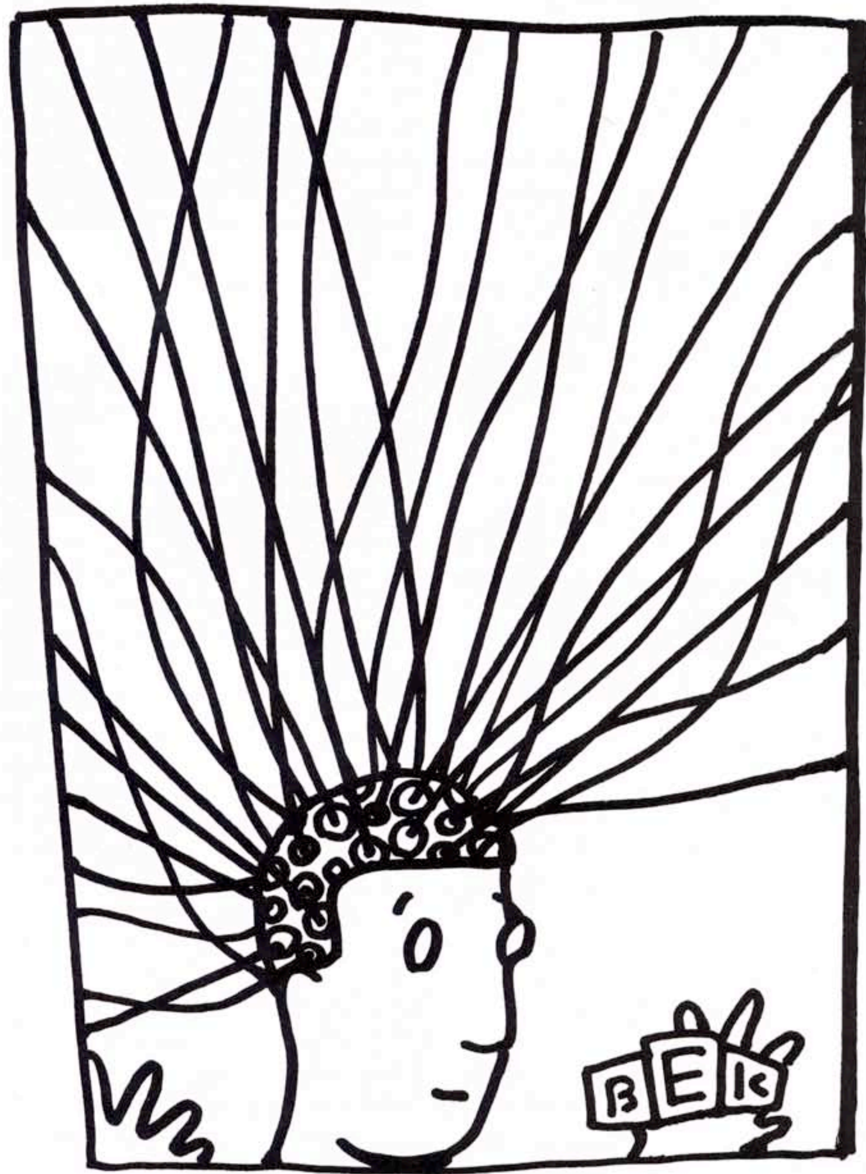
would work. He simply knew that it would.

Mark Jung-Beeman, a cognitive neuroscientist at Northwestern University, has spent the past fifteen years trying to figure out what happens inside the brain when people have an insight. "It's one of those defining features of the human mind, and yet we have no idea how or why it happens," he told me. Insights have often been attributed to divine intervention, but, by mapping the epiphany as a journey between cortical circuits, Jung-Beeman wants to purge the insight experience of its mystery. Jung-Beeman has a tense smile, a receding hairline, and the wiry build of a long-distance runner. He qualified for the 1988 and 1992 Olympic trials in the fifteen hundred metres, although he gave up competitive running after, as he puts it, "everything below the hips started to fall apart." He now subsists on long walks and manic foot tapping. When Jung-Beeman gets excited about an idea—be it the cellular properties of pyramidal neurons or his new treadmill—his speech accelerates, and he starts to draw pictures on whatever paper is nearby. It's as if his mind were sprinting ahead of his mouth.

Jung-Beeman became interested in the nature of insight in the early nineteen-nineties, while researching the right hemisphere of the brain. At the time, he was studying patients who had peculiar patterns of brain damage. "We had a number of patients with impaired right hemispheres," he said. "And the doctors would always say, 'Wow, you're lucky—it got the right hemisphere. That's the minor hemisphere. It doesn't do much, and it doesn't do anything with language.' " But it gradually became clear to Jung-Beeman that these patients did have serious cognitive problems after all, particularly with understanding linguistic nuance, and he began to suspect that the talents of the right hemisphere had been overlooked. If the left hemisphere excelled at denotation—storing the primary meaning of a word—Jung-Beeman suspected that the right hemisphere dealt with connotation, everything that gets left out of a dictionary definition, such as the emotional charge in a sentence or a metaphor. "Language is so complex that the brain has to process it in two different ways at the same time," he said. "It needs to see the forest *and* the trees. The right hemisphere is what helps you see the forest."

It wasn't clear how to pinpoint these nuanced aspects of cognition, because the results of right-hemisphere damage were harder to spot than those of left-hemisphere damage. But in 1993 Jung-Beeman heard a talk by the psychologist Jonathan Schooler on moments of insight. Schooler had demonstrated that it was possible to interfere with insight by making people explain their thought process while trying to solve a puzzle—a phenomenon he called "verbal overshadowing." This made sense to Jung-Beeman, since the act of verbal explanation would naturally shift activity to the left hemisphere, causing people to ignore the more subtle associations coming from the right side of the brain. "That's when I realized that insight could be a really interesting way to look at all these skills the right hemisphere excelled at," he said. "I guess I had an insight about insight."

Jung-Beeman began searching in the right hemisphere for the source of insight in the brain. He decided to compare puzzles solved in moments of insight with those solved by methodical testing of potential solutions, in which people could accurately trace their thought process and had no sense of surprise when the answer came. Unfortunately, all the classic puzzles developed by scientists to study insight *required* insight; if subjects didn't solve them in a sudden "Aha!" moment, they didn't solve them at all. In a popular puzzle known as "the candle problem," for instance, subjects are given a cardboard



BRUCE ERIC KAPLAN

Brain-imaging techniques are revealing how our minds produce insight.