

temporal processing. You can't move properly, perceive properly, or predict properly if you can't determine how long events last. Merzenich discovered that when you train people to distinguish very fast vibrations on their skin, lasting only 75 milliseconds, these same people could detect 75-millisecond *sounds* as well. It seemed that *Fast ForWord* was improving the brain's general ability to keep time. Sometimes these improvements spilled over into visual processing as well. Before *Fast ForWord*, when Willy was given a game that asked which items are out of place—a boot up in the tree, or a tin can on the roof—his eyes jumped all over the page. He was trying to see the whole page instead of taking in a little section at a time. At school he skipped lines when he read. After *Fast ForWord* his eyes no longer jumped around the page, and he was able to focus his visual attention.

A number of children who took standardized tests shortly after completing *Fast ForWord* showed improvements not only in language, speaking, and reading, but in math, science, and social studies as well. Perhaps these children were hearing what was going on in class better or were better able to read—but Merzenich thought it might be more complicated.

"You know," he says, "IQ goes up. We used the matrix test, which is a *visual*-based measurement of IQ—and IQ goes up."

The fact that a *visual* component of the IQ went up meant that the IQ improvements were not caused simply because *Fast ForWord* improved the children's ability to read verbal test questions. Their mental processing was being improved in a general way, possibly because their temporal processing was improving. And there were other unexpected benefits. Some children with autism began to make some general progress.

---

The mystery of autism—a human mind that cannot conceive of other minds—is one of the most baffling and poignant in psychiatry

and one of the most severe developmental disorders of childhood. It is called a "pervasive developmental disorder," because so many aspects of development are disturbed: intelligence, perception, socializing skills, language, and emotion.

Most autistic children have an IQ of less than 70. They have major problems connecting socially to others and may, in severe cases, treat people like inanimate objects, neither greeting them nor acknowledging them as human beings. At times it seems that autistics don't have a sense that "other minds" exist in the world. They also have perceptual processing difficulties and are thus often hypersensitive to sound and touch, easily overloaded by stimulation. (That may be one reason autistic children often avoid eye contact: the stimulation from people, especially when coming from many senses at once, is too intense.) Their neural networks appear to be overactive, and many of these children have epilepsy.

Because so many autistic children have language impairments, clinicians began to suggest the *Fast ForWord* program for them. They never anticipated what might happen. Parents of autistic children who did *Fast ForWord* told Merzenich that their children became more connected socially. He began asking, were the children simply being trained to be more attentive listeners? And he was fascinated by the fact that with *Fast ForWord* both the language symptoms and the autistic symptoms seemed to be fading together. Could this mean that the language and autistic problems were different expressions of a common problem?

Two studies of autistic children confirmed what Merzenich had been hearing. One, a language study, showed that *Fast ForWord* quickly moved autistic children from severe language impairment to the normal range. But another pilot study of one hundred autistic children showed that *Fast ForWord* had a significant impact on their autistic symptoms as well. Their attention spans improved. Their sense of humor improved. They became more connected to people. They developed better eye contact, began greeting people