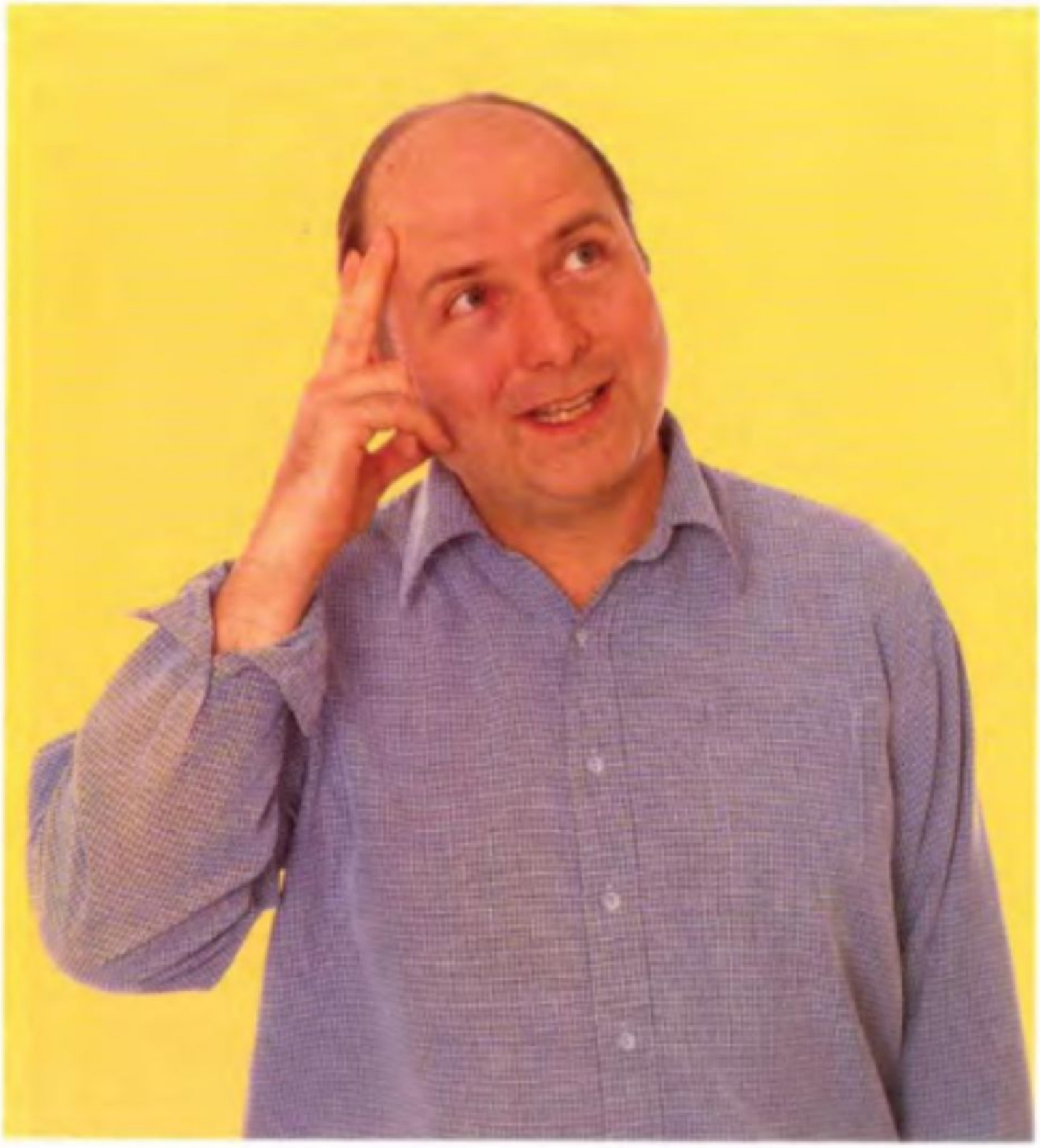

BRAIN TEASE: Danny Hillis applies his mind to the next big thing.

Q & A

Great tinker Danny Hillis on the evolution of intelligent machines.

By Mark Williams

DANNY HILLIS pioneered the concepts that enabled massively parallel computers. In 1983, while completing his degree at the Massachusetts Institute of Technology, he cofounded Thinking Machines to market them. Nowadays, listing the companies for which he serves as either a board member or technical adviser would take pages, so we'll just mention the Presidential Information Technology Advisory Committee, the Science and Technology Working Group of the SETI (Search for Extraterrestrial Intelligence) Institute, and the U.S. Securities and Exchange Commission.

Moreover, Mr. Hillis holds more than 40 U.S. patents. Indeed, he has been responsible for such diverse items as disk arrays to store large databases, forgery prevention technologies, a giant clock designed to run 10,000 years, and a computer made from...Tinkertoys?

Well, yes. What's most interesting about Mr. Hillis is that in his world, all the serious stuff fits right alongside that Tinkertoy computer, which has been displayed at the Boston Museum of Science. While in high school, Mr. Hillis's first job was designing computer-oriented toys for Milton Bradley. He's been a Disney fellow and vice president of research and development at Walt Disney Imagineering. Last year Mr. Hillis and Bran Ferren, Disney Imagineering's president of research and development and creative technology, departed to start a new company, Applied Minds. The company's mission is still under wraps, but Mr. Hillis holds the titles of cochairman and chief technology officer.

The idea of parallel computing had been around for years before you made it work. Why was that?

For years, whenever I talked about massively parallel computers, somebody brought up a mathematical proof called Amdahl's law which said they'd only be good for a very specialized set of problems. I knew that couldn't be true, because human brains do many different things. Of course, once parallelism became normal, it destroyed the supercomputer business. That's the problem with starting with a technical idea instead of a business idea. We put ourselves out of business.

So what interests you these days?

What I've always been interested in: making intelligent machines. I used to think we'd do it by engineering. Now I believe we'll evolve them. We're likely to make thinking machines before we understand how the mind works, which is kind of backwards.

You like to quote Chief Seattle's speech in which he told the Europeans that once their conquering ended, they'd run out of story. We've now reached that point, you've claimed, where we literally cannot imagine our future. In an article in Wired's *April 2000 issue, Bill Joy [Sun Microsystems' cofounder and chief scientist] wrote what*

many of us had known that when you graph current trends over the next few decades, we're looking at a radical discontinuity with human history. Are you as worried as he is?

Computers and communications technology in particular are causing a profound change in what humans are. Humanity has only gone through such changes three or four times. When we moved to agriculture was one time. The industrial revolution was another. It's a discontinuity; you can't get to the future by extrapolating the past. That's why Bill Joy's article struck such a chord. People are uneasy because they literally cannot imagine the world their children will live in. But I don't think intelligent machines will happen suddenly. They'll happen gradually. For example, people believed a machine couldn't beat a human at chess, or thought it'd be the end of the world. Then Deep Blue happened, and it didn't matter—people still play chess, though machines are better at it. We'll see lots of steps like that.

How will corporations compete as automation makes their products uniformly reliable and durable?

I can imagine a time when, for example, companies will give away cars and make their money on the ancillary services they provide. I believe it's already the case that the car company doesn't make its money selling you the car. It makes more money if it finances the car for you.

We asked management theorist and consultant Peter Drucker the question we've just asked you. He said that the first thing he tells any client is that they cannot survive as a manufacturing company. They must become knowledge companies based on distribution.

Exactly. One of the things I enjoyed about working for Disney was that it's a pure knowledge-distribution brand. One reason Disney ran into problems with the religious right was that it was doing a better job of providing the stories that gave kids moral structure than religious institutions were. As product differentiation disappears, brand—which is essentially an information device—will become much more important. Also, the company of the future will increasingly be a knowledge-based network. We're building Applied Minds so we'll have very few people inside the company.

While you were at Disney, one of your projects was how virtual characters might be depicted so people would care about them as if they were human. Using software, couldn't you build storytelling and personality into a product? The product itself could tell its story and be responsive.

Yes, I agree. The product of the future will have personality.

You said you wouldn't talk about Applied Minds. But that's like saying, "Don't think about the pink elephant." It's big, and it must relate to work you've done in the past. Are we too near the elephant?

You're getting close. You're on the right track. But that's fine. It's OK to have teasers like that.

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