

THE MAN INSIDE THE MACHINE¹

*The geophysicist who's behind the thinking
man's computer is an electronic explorer who always goes
where the spirit—and earth—moves.*

¹Reference to Sheldon Breiner, founder of Syntelligence, among the first to develop commercial applications of artificial intelligence

*By Dolores Proubasta
July 1984*

SOME PEOPLE THINK 47-YEAR-OLD SHELDON BREINER IS AN ELECTRONICS entrepreneur, and they are right. But in scientific circles he is known as a geophysicist: an authority on magnetic survey reconnaissance and instrumentation. Perhaps the least-known side of what he calls his "triple life" is that of explorer—the world's foremost finder of lost and buried objects. Breiner has discovered ore and oil deposits, remnants of ancient civilizations, sunken anchors and nuclear submarines, avalanche victims, and much more. He'll even launch an enthusiastic search for pedestrian objects. Unfortunately, he isn't always there when his secretary drops a contact lens or his wife misplaces the car keys. He may be advising a foreign government on exploration applications for magnetometers. Or hiking in the Himalayas, pursuing new business in Zambia, or lecturing on applied earth sciences at Stanford.

Since he founded Geometrics in 1969—now one of the leading suppliers of geophysical instruments for oil and mineral exploration—Breiner has become, per the *New York Times*: "One of the wiliest scientist-entrepreneurs in Silicon Valley." His scope, however, is international, for business has taken him to more than 100 countries, and his many avocations often wax peripatetic.

For example, earthquake prediction, an interest he developed while measuring stress-related magnetic effects along the San Andreas Fault, was the subject of his Ph.D. dissertation in 1967. But furthering his knowledge in seismology, he thought, required comparing notes with the pioneers in the field. So in 1974, against all odds, he obtained an invitation from the People's Republic of China, then one of the first offered to an American businessman in decades. Even more remarkably, once there, he was probably the first outsider to visit their electronic manufacturing installations. Breiner, in turn, presented his hosts, the Academy of Sciences, with the first set of satellite pictures of China.

Now, after six trips, he concludes, "We are at the same stage of development in earthquake prediction as the Chinese. The problem is that our theories must be substantiated by the catastrophes themselves. So far, they've successfully predicted two; the endangered towns were evacuated, and thousands of lives were saved. Here, however, panic might be as devastating as the quake itself. Perhaps that's why research for earthquake prediction receives minimal funding in the United States. And since our government seems to operate in a crisis mode, research will only be stepped up in the event of a major disaster."

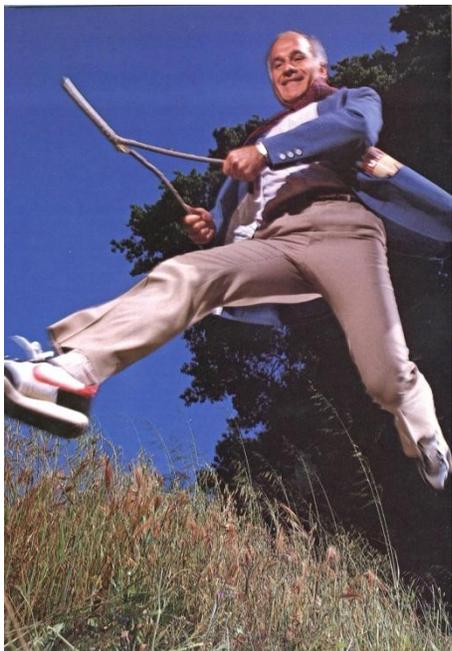
If one happens, the Breiners' neighborhood in Portola Valley may not be the safest place. The Breiners make their home less than 300 yards from the main San Andreas Fault trace and play tennis right on top of it on a court aptly named "Double Fault." But their house, camouflaged by Northern California flora (as befitting Silicon Valley, computer-control-irrigated per each shrub's moisture requirement), is ready for

the worst. Following Breiner's design recommendations, the foundations of the deceptively rustic building are big, concrete, steel-reinforced piers with triangular structures to prevent lateral movement. The main beams of the floor are attached to the concrete foundation on the edge of the house by imposing steel plates, so that the main floor is an integral part of the foundation. The outer, upper corners of the house are reinforced with extra steel sheets, and there are extra nails in the sheer walls.

All these features are to minimize the effects of *elastic rebound*. "At some points along the fault near where we live," Breiner reports, "the fault has been creeping non-stop two inches a year relative to the other side. Around here it hasn't moved since 1906, but when it does happen the greatest movement will take place right at the fault trace. In the first second the land will move and the house will momentarily stand still, which will cause a big jerk on the foundation. Then the structure will want to catch up to the moving earth. But the earth will stop, and the house will keep going. So we'll have a big, single whipping action—one direction, then the other. I'm not concerned about surface waves that come from distant points of the fault or from the fault shear itself. It's the first action that worries me."

Breiner's wife, Mimi, is somewhat less intrigued by the elastic-rebound theory: "It's uncanny how we never have the slightest tremor around here until Sheldon goes on a trip. Then, when I tell him about one happening in his absence, he doesn't believe me until he sees it registered on the seismograph."

Amid other sundry items the Breiners' basement features a veritable seismologic station. It is actually an unpretentious, homemade tilt-meter which registers earthquake magnitudes of seven or more on the Richter scale up to 8,000 miles away, and of five or more anywhere in North America—not an amateur's toy.



But then Breiner is a human seismograph himself. On April 24 he was in a meeting with leading seismologists at Stanford when a quake hit the Bay Area. It was probably a welcome amenity given the bent of those gathered, but Breiner was busy making mental notes of the time between the primary and secondary waves to estimate the distance to the epicenter. And knowing the area well, he even pinpointed the fault on which the episode originated. At the same time, he was guessing the magnitude to be six on the Richter scale from the shaking caused by the secondary waves—always the most damaging. As the quake subsided, he shared his conclusions with the others. Inevitably, someone—the dean of the Stanford School of Earth Sciences in this case—rushed to the phone to get the report from the U.S. Geological Survey as to magnitude and epicenter. He turned to all present and announced, "Sheldon's right on the money."

Photo: MARK HANAUER

(Above, Sheldon Breiner, divining rod in tow)

HIS ADROITNESS AT INTERPRETING THE EARTH'S DYNAMICS IS akin to his ability to "see" beneath it—with the help of magnetometers, that is. Since he feels there isn't a more fascinating vista save the future—than the past, unearthing relics buried for hundreds or thousands of years before a spadeful of dirt is turned has become one of Breiner's favorite avocations. The breadth of his archaeological exploits includes the Greek Settlement of Sybaris in Southern Italy; the second lost city of the Incas in Peru; a 6,000-year-old city in Iran; the San Agustin galleon, sunk four centuries ago in Drake's Bay, north of San Francisco; and what may have been Atlantis, off the Greek island of Santorini, where the largest explosion on earth probably occurred. However, his decisive mark in archaeology was made in Mexico.

In 1968 Yale University asked Breiner to apply his science in San Lorenzo Tenochtitlan, in the state of Veracruz. That region was once home of the Olmec, a civilization that flourished circa 900 B.C. and which some speculate may be the oldest Meso-American culture. The jungle took over and "civilization" is now six hours away, down unnamed tributaries and the Coatzacoalcos River via a precarious boat. "Getting there was half the fun," says Breiner, not surprisingly.

Initially, he chose to traverse the area on horseback rather than walk. "The local saddles were made of wood, and there were no horseshoes to interfere with the magnetometer. In less than an hour, we spotted an anomaly, and by the readings I estimated it to be at a depth of seven-and-a-half feet. We dug it up and found what's said-to-be the finest example of pre-Columbian art—a three-and-a-half-foot high squatting figure, half man, half jaguar—the great Olmec rain god himself."

The archaeologists were as mystified as the local workmen at the ability of Breiner's instruments to see buried objects. One-hundred other monuments, such as ten-ton heads and geometrically perfect spheres, disks, and blocks which gave no clue to their purpose, were discovered in this manner. These artifacts are priceless, as evidenced by a caper in which a group of heavily armed men spirited the rain god away from the dig by helicopter. Mexican authorities recovered it six months later, and it now presides over the Olmec exhibit at the Museo Antropologia e Historia in Mexico City.

SHELDON'S WONDERWORK WITH MAGNETICS HAS TAKEN HIM from the sublime to the utilitarian. Following Robert Kennedy's assassination, Breiner was summoned to Washington to help find a solution for improving security at political rallies and airports. "A member of the Science Advisory Committee knew that as part of my work I had measured the magnetism of most objects, including guns. What I suggested was using several pairs of magnetometers relative to strategic locations of the body as a frisking method. Although it has limitations which obviously I won't divulge, it's superior to any alternative and it was adopted." (It is the contraption which beeps in airports around the world if one carries a keychain, a pocket knife, a money clip or objects a well-meaning passenger wouldn't take on board.)

Lay technology applications such as the airport security system are rewarding to Breiner's solution-oriented nature, as is helping someone search for the Lost Dutchman Mine in Arizona or finding people buried under 100 feet of snow in Colorado. But it doesn't bank roll his gracious way of life—his entrepreneurial ability does. Breiner is a driving force in various Silicon Valley enterprises. Two investment firms specializing in start-up and pre-start-up of high-tech companies are Breiner partnerships. He is a director of two companies supplying the semiconductor industry: one with wafer inspection systems, the other with computer-aided engineering systems. In the petroleum industry, he is co-founder of a firm which provides monitoring and mapping services for hydraulic fracturing, and of an engineering organization which develops instrumentation for measuring total oil content in reservoirs. He is also, of course, a founder of Syntelligence,

a company applying artificial intelligence-based software to disseminate expertise and senior management judgment for major financial institutions.

Should anyone wonder why—aside from pecuniary motives—such entrepreneurial fervor, Breiner's answer is plain: "I love diversity. I couldn't do only *one* thing, professionally or otherwise."

Otherwise, he is currently revising a technical book on magnetometers he authored a few years ago, while also writing a novel, just because he enjoys escapist literature. And since the 24-hour imperative apparently excludes Breiner, he volunteers time and expertise to civic organizations ranging from co-founding the Peninsula Open Space Trust to the Resource Center for Women in Palo Alto.

Drawing energy by expending it, Breiner has wrapped up more than one board meeting only to rush off to don the colors of a local soccer team. "Being tired is a state of mind," claims Breiner, who upon returning home from India, recently proved a point by dropping his suitcase, changing clothes, and catching up with a neighbor who minutes before had jokingly waved him to come along for a ten-mile jog.

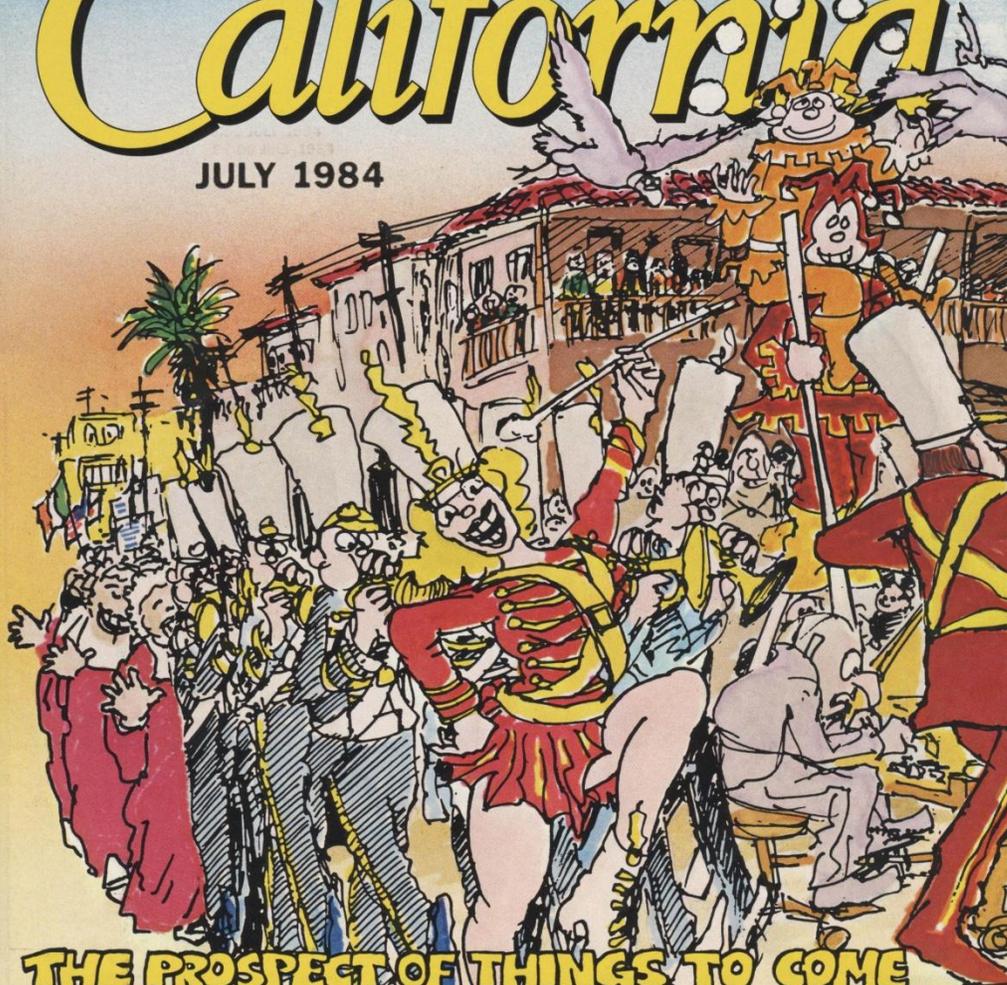
Swashing down the ski slopes of Vail, hiking in the Gobi Desert, or running the Boston Marathon are the calisthenics that temper his mind and body for the more demanding trials of Silicon Valley. Working and playing, he keeps tabs on the limits of his endurance, though he can't find any. Breiner isn't modest, or arrogant, either—he is simply elated at being who he is. In view of the record, who can blame him?

The world according to Sheldon Breiner: frisking magnetometers, elastic rebounds and Olmec rain gods. Says Sheldon, "I love diversity."

How the Hollywood Left Can Be So Right about Nicaragua, by Steve Oney
Feinstein as Vice Prez; The Hottest Machine in Silicon Valley; Best Bay Bars

California

JULY 1984



THE PROSPECT OF THINGS TO COME ON JULY 28, 1984:

10,000 ATHLETES, PLUS
9000 PERFORMERS, INCLUDING 100 TRUMPETERS, 800 BANDSMEN,
1000 CHURCH CHORISTERS, 1800 JAZZ DANCERS, 325 GOSPEL
SINGERS, 100 CHILDREN SINGERS, 84 BABY GRAND PIANO PLAYERS,
150 FLAG BEARERS, 300 JITTERBUG DANCERS, 312 PLACARD BEARERS...



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