

1.2 million years after the initial split between the species. Eventually, only humans mated with the hybrids, and the hybrids disappeared, leaving behind nothing but genetic traces in our chromosomes.

Bhagavan Antle, the liger trainer, keeps pretty busy — his many gigs include working parties and performing at a venerable Miami theme park called Parrot Jungle Island, where he displays a liger and a gigantic “crocosaurus,” a saltwater/Siamese crocodile. This entails a lot of animal shuttling, and Antle invited me to join him on a road trip from Myrtle Beach to Miami, where he would take a liger to a fundraiser at an exotic cat sanctuary and, later, a Super Bowl bash.

We meet at the Myrtle Beach facility, where Antle and his team lead Hercules the liger and two tigers into a trailer with small windows. Antle and I ride in an RV; joining us are three assistants and a diapered nine-month-old orangutan named Apsara, who’s a hybrid, too. (She’s a blend of Bornean and Sumatran orangutans, which are different species.) The infant, which has a comical mess of wild orange hair, rides in a baby sling worn by an assistant. Except for the occasional *meep meep*, you wouldn’t know we’re rolling with an orang.

During the two-day trip to Miami, a truck-and-trailer hauling the big cats is always right behind us. We refuel at crowded truck stops, pull in to strip malls to buy groceries, and even park one night behind a Holiday Inn. No one notices any of the exotic animals until we’re stopped at the agricultural checkpoint at the Florida state line. The officer, a good ol’ boy with slick hair and big sideburns, checks the paperwork and stumbles on the word *liger*. “What’s that?” he asks.

“A mix of lion and tiger,” Antle says.

“Those exist?”

Antle nods and takes out his business card, which shows him sitting with three tigers and Jay Leno. “Jay Leno!” says the officer. “That beats all!”

He waves us on without bothering to peek inside the trailer at one of the rarest creatures in the world. I guess Jay Leno is pretty much his favorite animal.

JOHN COLAPINTO

The Interpreter

FROM *The New Yorker*

ONE MORNING LAST JULY, in the rain forest of northwestern Brazil, Dan Everett, an American linguistics professor, and I stepped from the pontoon of a Cessna floatplane onto the beach bordering the Maici River, a narrow, sharply meandering tributary of the Amazon. On the bank above us were some thirty people — short, dark-skinned men, women, and children — some clutching bows and arrows, others with infants on their hips. The people, members of a hunter-gatherer tribe called the Pirahã, responded to the sight of Everett — a solidly built man of fifty-five with a red beard and the booming voice of a former evangelical minister — with a greeting that sounded like a profusion of exotic songbirds, a melodic chattering scarcely discernible to the uninitiated as human speech. Unrelated to any other extant tongue, and based on just eight consonants and three vowels, Pirahã has one of the simplest sound systems known. Yet it possesses such a complex array of tones, stresses, and syllable lengths that its speakers can dispense with their vowels and consonants altogether and sing, hum, or whistle conversations. It is a language so confounding to nonnatives that until Everett and his wife, Keren, arrived among the Pirahã as Christian missionaries in the 1970s, no outsider had succeeded in mastering it. Everett eventually abandoned Christianity, but he and Keren have spent the past thirty years, on and off, living with the tribe, and in that time they have learned Pirahã as no other Westerners have.

“*Xaói hi gáísai xigáihaihisaoaxái ti xabúhai hiatúhi xigó hóhi,*” Everett said in the tongue’s choppy staccato, introducing me as some-

one who would be “staying for a short time” in the village. The men and women answered in an echoing chorus, “*Xaói hi góó kaisigáhi xapagáiso.*”

Everett turned to me. “They want to know what you’re called in ‘crooked head.’”

“Crooked head” is the tribe’s term for any language that is not Pirahã, and it is a clear pejorative. The Pirahã consider all forms of human discourse other than their own to be laughably inferior, and they are unique among Amazonian peoples in remaining monolingual. They playfully tossed my name back and forth among themselves, altering it slightly with each reiteration, until it became an unrecognizable syllable. They never uttered it again but instead gave me a liling Pirahã name: Kaaxáoi, that of a Pirahã man from a village downriver, whom they thought I resembled. “That’s completely consistent with my main thesis about the tribe,” Everett told me later. “They reject everything from outside their world. They just don’t want it, and it’s been that way since the day the Brazilians first found them in this jungle in the 1700s.”

Everett, who this past fall became the chairman of the Department of Languages, Literature, and Cultures at Illinois State University, has been publishing academic books and papers on the Pirahã (pronounced pee-da-HAN) for more than twenty-five years. But his work remained relatively obscure until early in 2005, when he posted on his website an article titled “Cultural Constraints on Grammar and Cognition in Pirahã,” which was published that fall in the journal *Cultural Anthropology*. The article described the extreme simplicity of the tribe’s living conditions and culture. The Pirahã, Everett wrote, have no numbers, no fixed color terms, no perfect tense, no deep memory, no tradition of art or drawing, and no words for “all,” “each,” “every,” “most,” or “few” — terms of quantification believed by some linguists to be among the common building blocks of human cognition. Everett’s most explosive claim, however, was that Pirahã displays no evidence of recursion, a linguistic operation that consists of inserting one phrase inside another of the same type, as when a speaker combines discrete thoughts (“the man is walking down the street,” “the man is wearing a top hat”) into a single sentence (“The man who is wearing a top hat is walking down the street”). Noam Chomsky, the influential linguistic theorist, has recently revised his theory of univer-

sals grammar, arguing that recursion is the cornerstone of all languages and is possible because of a uniquely human cognitive ability.

Steven Pinker, the Harvard cognitive scientist, calls Everett’s paper “a bomb thrown into the party.” For months, it was the subject of passionate debate on social-science blogs and Listservs. Everett, once a devotee of Chomskyan linguistics, insists not only that Pirahã is a “severe counterexample” to the theory of universal grammar but also that it is not an isolated case. “I think one of the reasons that we haven’t found other groups like this,” Everett said, “is because we’ve been told, basically, that it’s not possible.” Some scholars were taken aback by Everett’s depiction of the Pirahã as a people of seemingly unparalleled linguistic and cultural primitivism. “I have to wonder whether he’s some Borgesian fantasist, or some Margaret Mead being stitched up by the locals,” one reader wrote in an e-mail to the editors of a popular linguistics blog.

I had my own doubts about Everett’s portrayal of the Pirahã shortly after I arrived in the village. We were still unpacking when a Pirahã boy, who appeared to be about eleven years old, ran out from the trees beside the river. Grinning, he showed off a surprisingly accurate replica of the floatplane we had just landed in. Carved from balsa wood, the model was four feet long and had a tapering fuselage, wings, and pontoons, as well as propellers, which were affixed with small pieces of wire so that the boy could spin the blades with his finger. I asked Everett whether the model contradicted his claim that the Pirahã do not make art. Everett barely glanced up. “They make them every time a plane arrives,” he said. “They don’t keep them around when there aren’t any planes. It’s a chain reaction, and someone else will do it, but then eventually it will peter out.” Sure enough, I later saw the model lying broken and dirty in the weeds beside the river. No one made another one during the six days I spent in the village.

In the wake of the controversy that greeted his paper, Everett encouraged scholars to come to the Amazon and observe the Pirahã for themselves. The first person to take him up on the offer was a forty-three-year-old American evolutionary biologist named Tecumseh Fitch, who in 2002 coauthored an important paper with Chomsky and Marc Hauser, an evolutionary psychologist and biol-

ogist at Harvard, on recursion. Fitch and his cousin Bill, a sommelier based in Paris, were due to arrive by floatplane in the Pirahã village a couple of hours after Everett and I did. As the plane landed on the water, the Pirahã, who had gathered at the river, began to cheer. The two men stepped from the cockpit, Fitch toting a laptop computer into which he had programmed a week's worth of linguistic experiments that he intended to perform on the Pirahã. They were quickly surrounded by curious tribe members. The Fitch cousins, having traveled widely together to remote parts of the world, believed that they knew how to establish an instant rapport with indigenous peoples. They brought their cupped hands to their mouths and blew loon calls back and forth. The Pirahã looked on stone-faced. Then Bill began to make a loud popping sound by snapping a finger of one hand against the opposite palm. The Pirahã remained impassive. The cousins shrugged sheepishly and abandoned their efforts.

"Usually you can hook people really easily by doing these funny little things," Fitch said later. "But the Pirahã kids weren't buying it, and neither were their parents." Everett snorted. "It's not part of their culture," he said. "So they're not interested."

A few weeks earlier, I had called Fitch in Scotland, where he is a professor at the University of St. Andrews. "I'm seeing this as an exploratory fact-finding trip," he told me. "I want to see with my own eyes how much of this stuff that Dan is saying seems to check out."

Everett is known among linguistics experts for orneriness and impatience with academic decorum. He was born into a working-class family in Holtville, a town on the California-Mexico border, where his hard-drinking father, Leonard, worked variously as a bartender, a cowboy, and a mechanic. "I don't think we had a book in the house," Everett said. "To my dad, people who taught at colleges and people who wore ties were 'sissies' — all of them. I suppose some of that is still in me." Everett's chief exposure to intellectual life was through his mother, a waitress, who died of a brain aneurysm when Everett was eleven. She brought home Reader's Digest condensed books and a set of medical encyclopedias, which Everett attempted to memorize. In high school, he saw the movie *My Fair Lady* and thought about becoming a linguist, because, he later wrote, Henry Higgins's work "attracted me intellectually, and because it looked like phoneticians could get rich."

As a teenager, Everett played the guitar in rock bands (his keyboardist later became an early member of Iron Butterfly) and smoked pot and dropped acid, until the summer of 1968, when he met Keren Graham, another student at El Capitan High School in Lakeside. The daughter of Christian missionaries, Keren was brought up among the Satero people in northeastern Brazil. She invited Everett to church and brought him home to meet her family. "They were loving and caring and had all these groovy experiences in the Amazon," Everett said. "They supported me and told me how great I was. This was just not what I was used to." On October 4, 1968, at the age of seventeen, he became a born-again Christian. "I felt that my life had changed completely, that I had stepped from darkness into light — all the expressions you hear." He stopped using drugs, and when he and Keren were eighteen they married. A year later, the first of their three children was born, and they began preparing to become missionaries.

In 1976, after graduating with a degree in foreign missions from the Moody Bible Institute of Chicago, Everett enrolled with Keren in the Summer Institute of Linguistics, known as SIL, an international evangelical organization that seeks to spread God's word by translating the Bible into the languages of preliterate societies. They were sent to Chiapas, Mexico, where Keren stayed in a hut in the jungle with the couple's children — by this time, there were three — while Everett underwent grueling field training. He endured fifty-mile hikes and survived for several days deep in the jungle with only matches, water, a rope, a machete, and a flashlight.

The couple were given lessons in translation techniques, for which Everett proved to have a gift. His friend Peter Gordon, a linguist at Columbia University who has published a paper on the absence of numbers in Pirahã, says that Everett regularly impresses academic audiences with a demonstration in which he picks from among the crowd a speaker of a language that he has never heard. "Within about twenty minutes, he can tell you the basic structure of the language and how its grammar works," Gordon said. "He has incredible breadth of knowledge, is really, really smart, knows stuff inside out." Everett's talents were obvious to the faculty at SIL, who for twenty years had been trying to make progress in Pirahã, with little success. In October 1977, at SIL's invitation, Everett, Keren, and their three small children moved to Brazil, first to the city of Belém to learn Portuguese, and then, a year later, to a Pirahã vil-

lage at the mouth of the Maici River. "At that time, we didn't know that Pirahã was linguistically so hard," Keren told me.

There are about 350 Pirahã spread out in small villages along the Maici and Marmelos rivers. The village that I visited with Everett was typical: seven huts made by propping palm-frond roofs on top of four sticks. The huts had dirt floors and no walls or furniture, except for a raised platform of thin branches to sleep on. These fragile dwellings, in which a family of three or four might live, lined a path that wound through low brush and grass near the riverbank. The people keep few possessions in their huts — pots and pans, a machete, a knife — and make no tools other than scraping implements (used for making arrowheads), loosely woven palm-leaf bags, and wood bows and arrows. Their only ornaments are simple necklaces made from seeds, teeth, feathers, beads, and soda-can pull-tabs, which they often get from traders who barter with the Pirahã for Brazil nuts, wood, and *sorua* (a rubbery sap used to make chewing gum), and which the tribe members wear to ward off evil spirits.

Unlike other hunter-gatherer tribes of the Amazon, the Pirahã have resisted efforts by missionaries and government agencies to teach them farming. They maintain tiny, weed-infested patches of ground a few steps into the forest, where they cultivate scraggy manioc plants. "The stuff that's growing in this village was either planted by somebody else or it's what grows when you spit the seed out," Everett said to me one morning as we walked through the village. Subsisting almost entirely on fish and game, which they catch and hunt daily, the Pirahã have ignored lessons in preserving meats by salting or smoking, and they produce only enough manioc flour to last a few days. (The Kawahiv, another Amazonian tribe that Everett has studied, make enough to last for months.) One of their few concessions to modernity is their dress: the adult men wear T-shirts and shorts that they get from traders; the women wear plain cotton dresses that they sew themselves.

"For the first several years I was here, I was disappointed that I hadn't gone to a 'colorful' group of people," Everett told me. "I thought of the people in the Xingu, who paint themselves and use the lip plates and have the festivals. But then I realized that this is the most intense culture that I could ever have hoped to experi-

ence. This is a culture that's invisible to the naked eye but that is incredibly powerful, the most powerful culture of the Amazon. Nobody has resisted change like this in the history of the Amazon, and maybe of the world."

According to the best guess of archaeologists, the Pirahã arrived in the Amazon between 10,000 and 40,000 years ago, after bands of *Homo sapiens* from Eurasia migrated to the Americas over the Bering Strait. The Pirahã were once part of a larger Indian group called the Mura but had split from the main tribe by the time the Brazilians first encountered the Mura, in 1714. The Mura went on to learn Portuguese and to adopt Brazilian ways, and their language is believed to be extinct. The Pirahã, however, retreated deep into the jungle. In 1921 the anthropologist Curt Nimuendajú spent time among the Pirahã and noted that they showed "little interest in the advantages of civilization" and displayed "almost no signs of permanent contact with civilized people."

SIL first made contact with the Pirahã nearly fifty years ago, when a missionary couple, Arlo and Vi Heinrichs, joined a settlement on the Marmelos. The Heinrichses stayed for six and a half years, struggling to become proficient in the language. The phonemes (the sounds from which words are constructed) were exceedingly difficult, featuring nasal whines and sharp intakes of breath and sounds made by popping or flapping the lips. Individual words were hard to learn, since the Pirahã habitually whittle nouns down to single syllables. Also confounding was the tonal nature of the language: the meanings of words depend on changes in pitch. (The words for "friend" and "enemy" differ only in the pitch of a single syllable.) The Heinrichses' task was further complicated because Pirahã, like a few other Amazonian tongues, has male and female versions: the women use one fewer consonant than the men do.

"We struggled even getting to the place where we felt comfortable with the beginning of a grammar," Arlo Heinrichs told me. It was two years before he attempted to translate a Bible story; he chose the Prodigal Son from the book of Luke. Heinrichs read his halting translation to a Pirahã male. "He kind of nodded and said, in his way, 'That's interesting,'" Heinrichs recalled. "But there was no spiritual understanding — it had no emotional impact. It was just a story." After suffering repeated bouts of malaria, the couple

were reassigned by SIL to administrative jobs in the city of Brasília, and in 1967 they were replaced with Steve Sheldon and his wife, Linda.

Sheldon earned a master's degree in linguistics during the time he spent with the tribe, and he was frustrated that Pirahã refused to conform to expected patterns. As he and his wife complained in workshops with SIL consultants. "We would say, 'It just doesn't seem that there's any way that it does X, Y, or Z,'" Sheldon recalled. "And the standard answer — since this typically doesn't happen in languages — was 'Well, it must be there, just look a little harder.'" Sheldon's anxiety over his slow progress was acute. He began many mornings by getting sick to his stomach. In 1977, after spending ten years with the Pirahã, he was promoted to director of SIL in Brazil and asked the Everetts to take his place in the jungle.

Everett and his wife were welcomed by the villagers, but it was months before they could conduct a simple conversation in Pirahã. "There are very few places in the world where you have to learn a language with no language in common," Everett told me. "It's called a monolingual field situation." He had been trained in the technique by his teacher at SIL, the late Kenneth L. Pike, a legendary field linguist and the chairman of the linguistics department at the University of Michigan. Pike, who created a method of language analysis called tagmemics, taught Everett to start with common nouns. "You find out the word for 'stick,'" Everett said. "Then you try to get the expression for 'two sticks' and for 'one stick drops to the ground,' 'two sticks drop to the ground.' You have to act everything out, to get some basic notion of how the clause structure works — where the subject, verb, and object go."

The process is difficult, as I learned early in my visit with the Pirahã. One morning, while applying bug repellent, I was watched by an older Pirahã man, who asked Everett what I was doing. Eager to communicate with him in sign language, I pressed together the thumb and index finger of my right hand and weaved them through the air while making a buzzing sound with my mouth. Then I brought my fingers to my forearm and slapped the spot where my fingers had alighted. The man looked puzzled and said to Everett, "He hit himself." I tried again — this time making a more insistent buzzing. The man said to Everett, "A plane landed on his arm." When Everett explained to him what I was doing, the

man studied me with a look of pitying contempt, then turned away. Everett laughed. "You were trying to tell him something about your general state — that bugs bother you," he said. "They never talk that way, and they could never understand it. Bugs are a part of life."

"OK," I said. "But I'm surprised he didn't know I was imitating an insect."

"Think of how cultural that is," Everett said. "The movement of your hand. The sound. Even the way we represent animals is cultural."

Everett had to bridge many such cultural gaps in order to gain more than a superficial grasp of the language. "I went into the jungle, helped them make fields, went fishing with them," he said. "You cannot become one of them, but you've got to do as much as you can to feel and absorb the language." The tribe, he maintains, has no collective memory that extends back more than one or two generations and no original creation myths. Marco Antonio Gonçalves, an anthropologist at the Federal University of Rio de Janeiro, spent eighteen months with the Pirahã in the 1980s and wrote a dissertation on the tribe's beliefs. Gonçalves, who spoke limited Pirahã, agrees that the tribe has no creation myths but argues that few Amazonian tribes do. When pressed about what existed before the Pirahã and the forest, Everett says, the tribespeople invariably answer, "It has always been this way."

Everett also learned that the Pirahã have no fixed words for colors and instead use descriptive phrases that change from one moment to the next. "So if you show them a red cup, they're likely to say, 'This looks like blood,'" Everett said. "Or they could say, 'This is like *urucum*' — a local berry that they use to extract a red dye."

By the end of their first year, Dan Everett had a working knowledge of Pirahã. Keren tutored herself by strapping a cassette recorder around her waist and listening to audiotapes while she performed domestic tasks. (The Everetts lived in a thatched hut that was slightly larger and more sophisticated than the huts of the Pirahã; it had walls and a storage room that could be locked.)

During the family's second year in the Amazon, Keren and the Everetts' eldest child, Shannon, contracted malaria, and Keren lapsed into a coma. Everett borrowed a boat from river traders and trekked through the jungle for days to get her to a hospital. As soon

as she was discharged, Everett returned to the village. (Keren recuperated in Belém for several months before joining him.) "Christians who believe in the Bible believe that it is their job to bring others the joy of salvation," Everett said. "Even if they're murdered, beaten to death, imprisoned — that's what you do for God."

Until Everett arrived in the Amazon, his training in linguistics had been limited to field techniques. "I wanted as little formal linguistic theory as I could get by with," he told me. "I wanted the basic linguistic training to do a translation of the New Testament." This changed when SIL lost its contract with the Brazilian government to work in the Amazon. SIL urged the Everetts to enroll as graduate students at the State University of Campinas (UNICAMP), in the state of São Paulo, since the government would give them permission to continue living on tribal lands only if they could show that they were linguists intent on recording an endangered language. At UNICAMP, in the fall of 1978, Everett discovered Chomsky's theories. "For me, it was another conversion experience," he said.

In the late 1950s, when Chomsky, then a young professor at MIT, first began to attract notice, behaviorism dominated the social sciences. According to B. F. Skinner, children learn words and grammar by being praised for correct usage, much as lab animals learn to push a lever that supplies them with food. In 1959, in a demolishing review of Skinner's book *Verbal Behavior*, Chomsky wrote that the ability of children to create grammatical sentences that they have never heard before proves that learning to speak does not depend on imitation, instruction, or rewards. As he put it in his book *Reflections on Language* (1975), "To come to know a human language would be an extraordinary intellectual achievement for a creature not specifically designed to accomplish this task."

Chomsky hypothesized that a specific faculty for language is encoded in the human brain at birth. He described it as a "language organ," which is equipped with an immutable set of rules — a universal grammar — that is shared by all languages, regardless of how different they appear to be. The language organ, Chomsky said, cannot be dissected in the way that a liver or a heart can, but it can be described through detailed analyses of the abstract structures underlying language. "By studying the properties of natural languages, their structure, organization, and use," Chomsky wrote,

"we may hope to gain some understanding of the specific characteristics of human intelligence. We may hope to learn something about human nature."

Beginning in the 1950s, Chomskians at universities around the world engaged in formal analyses of language, breaking sentences down into ever more complex tree diagrams that showed branching noun, verb, and prepositional phrases and also "X-bars," "transformations," "movements," and "deep structures" — Chomsky's terms for some of the elements that constitute the organizing principles of all language. "I'd been doing linguistics at a fairly low level of rigor," Everett said. "As soon as you started reading Chomsky's stuff, and the people most closely associated with Chomsky, you realized this is a totally different level — this is actually something that looks like science." Everett conceived his Ph.D. dissertation at UNICAMP as a strict Chomskyan analysis of Pirahã. Dividing his time between São Paulo and the Pirahã village, where he collected data, Everett completed his thesis in 1983. Written in Portuguese and later published as a book in Brazil, *The Pirahã Language and the Theory of Syntax* was a highly technical discussion replete with Chomskyan tree diagrams. However, Everett says that he was aware that Pirahã contained many linguistic anomalies that he could not fit into Chomsky's paradigm. "I knew I was leaving out a lot of stuff," Everett told me. "But these gaps were unexplainable to me."

The dissertation earned Everett a fellowship from the American Council of Learned Societies and a grant from the National Science Foundation to spend the 1984–85 academic year as a visiting fellow at MIT. Everett occupied an office next to Chomsky's; he found the famed professor brilliant but withering. "Whenever you try out a theory on someone, there's always some question that you hope they won't ask," Everett said. "That was always the first thing Chomsky would ask."

In 1988 Everett was hired by the University of Pittsburgh. By then, Chomsky's system of rules had reached a state of complexity that even Chomsky found too baroque, and he had begun to formulate a simpler model for the principles underlying all languages. Everett faithfully kept abreast of these developments. "Chomsky sent me all the papers that he was working on," he said. "I was like many of the scholars in that I made regular pilgrimages to sit in Chomsky's classes to collect the handouts and to figure out

exactly where the theory was today." At the same time, Everett says that he was increasingly troubled by the idiosyncrasies of Pirahã. "None of it was addressed by Chomskyan linguistics," he told me. "Chomsky's theory only allows you to talk about properties that obtain of tree structures."

In the early 1990s, Everett began to reread the work of linguists who had preceded Chomsky, including that of Edward Sapir, an influential Prussian-born scholar who died in 1939. A student of the anthropologist Franz Boas, Sapir had taught at Yale and studied the languages of dozens of tribes in the Americas. Sapir was fascinated by the role of culture in shaping languages, and although he anticipated Chomsky's preoccupation with linguistic universals, he was more interested in the variations that made each language unique. In his 1921 book, *Language*, Sapir stated that language is an acquired skill, which "varies as all creative effort varies — not as consciously, perhaps, but nonetheless as truly as do the religions, the beliefs, the customs, and the arts of different peoples." Chomsky, however, believed that culture played little role in the study of language and that going to far-flung places to record the arcane babel of near-extinct tongues was a pointless exercise. Chomsky's view had prevailed. Everett began to wonder if this was an entirely good thing.

"When I went back and read the stuff Sapir wrote in the twenties, I just realized, hey, this really is a tradition that we lost," Everett said. "People believe they've actually studied a language when they have given it a Chomskyan formalism. And you may have given us absolutely no insight whatsoever into that language as a separate language."

Everett began to question the first principle of Chomskyan linguistics: that infants could not learn language if the principles of grammar had not been preinstalled in the brain. Babies are bathed in language from the moment they acquire the capacity to hear in the womb, Everett reasoned, and parents and caregivers expend great energy teaching children how to say words and assemble them into sentences — a process that lasts years. Was it really true that language, as Chomsky asserted, simply "grows like any other body organ"? Everett did not deny the existence of a biological endowment for language — humans couldn't talk if they did not possess the requisite neurological architecture to do so. But, con-

vinced that culture plays a far greater role than Chomsky's theory accounted for, he decided that he needed to "take a radical reexamination of my whole approach to the problem."

In 1998, after nine years as chairman of the linguistics department at the University of Pittsburgh, Everett became embroiled in a dispute with the new dean of the arts and sciences faculty. Keren was completing a master's in linguistics at the university and was being paid to work as a teaching assistant in Everett's department. Everett was accused of making improper payments to Keren totaling some \$2,000, and he was subjected to an audit. He was exonerated, but the allegation of misconduct infuriated him. Keren urged him to quit his job so that they could return to the jungle and resume their work as missionaries among the Pirahã.

It had been more than a decade since Everett had done any concerted missionary work — a reflection of his waning religious faith. "As I read more and I got into philosophy and met a lot of friends who weren't Christians, it became difficult for me to sustain the belief structure in the supernatural," he said. But he was inclined to return to the Amazon, partly because he hoped to rekindle his faith and partly because he was disillusioned with the theory that had been the foundation of his intellectual life for two decades. "I couldn't buy Chomsky's world-view any longer," Everett told me, "and I began to feel that academics was a hollow and insignificant way to spend one's life."

In the fall of 1999, Everett quit his job, and on the banks of the Maici River he and Keren built a two-room, eight-meter-by-eight-meter, bug- and snake-proof house from fourteen tons of ironwood that he had shipped in by boat. Everett equipped the house with a gas stove, a generator-driven freezer, a water-filtration system, a TV, and a DVD player. "After twenty years of living like a Pirahã, I'd had it with roughing it," he said. He threw himself into missionary work, translating the book of Luke into Pirahã and reading it to tribe members. His zeal soon dissipated, however. Convinced that the Pirahã assigned no spiritual meaning to the Bible, Everett finally admitted that he did not, either. He declared himself an atheist and spent his time tending house and studying linguistics. In 2000, on a trip to Porto Velho, a town about two hundred miles from the village, he found a month-old e-mail from a colleague at

the University of Manchester, inviting him to spend a year as a research professor at the school. In 2002 Everett was hired to a full-time position, and he and Keren moved to England. Three years later, he and Keren separated; she returned to Brazil, where she divides her time between the Pirahã village and an apartment in Porto Velho. He moved back to the United States in the fall of 2006 to begin a new job at Illinois State. Today Everett says that his three years in the jungle were hardly time wasted. "This new beginning with the Pirahã really was quite liberating," he told me. "Free from Chomskyan constraints, I was able to imagine new relationships between grammar and culture."

It is a matter of some vexation to Everett that the first article on the Pirahã to attract significant attention was written not by him but by his friend (and former colleague at the University of Pittsburgh) Peter Gordon, now at Columbia, who in 2004 published a paper in *Science* on the Pirahã's understanding of numbers. Gordon had visited the tribe with Everett in the early nineties, after Everett told him about the Pirahã's limited "one-two-many" counting system. Other tribes, in Australia, the South Sea Islands, Africa, and the Amazon, have a one-two-many numerical system, but with an important difference: they are able to learn to count in another language. The Pirahã have never been able to do this, despite concerted efforts by the Everetts to teach them to count to ten in Portuguese.

During a two-month stay with the Pirahã in 1992, Gordon ran several experiments with tribe members. In one he sat across from a Pirahã subject and placed in front of himself an array of objects — nuts, AA batteries — and had the Pirahã match the array. The Pirahã could perform the task accurately when the array consisted of two or three items, but their performance with larger groupings was, Gordon later wrote, "remarkably poor." Gordon also showed subjects nuts, placed them in a can, and withdrew them one at a time. Each time he removed a nut, he asked the subject whether there were any left in the can. The Pirahã answered correctly only with quantities of three or fewer. Through these and other tests, Gordon concluded that Everett was right: the people could not perform tasks involving quantities greater than three. Gordon ruled out mass retardation. Though the Pirahã do not allow marriage

outside their tribe, they have long kept their gene pool refreshed by permitting women to sleep with outsiders. "Besides," Gordon said, "if there was some kind of Appalachian inbreeding or retardation going on, you'd see it in hairlines, facial features, motor ability. It bleeds over. They don't show any of that."

Gordon surmised that the Pirahã provided support for a controversial hypothesis advanced early in the last century by Benjamin Lee Whorf, a student of Sapir's. Whorf argued that the words in our vocabulary determine how we think. Since the Pirahã do not have words for numbers above two, Gordon wrote, they have a limited ability to work with quantities greater than that. "It's language affecting thought," Gordon told me. His paper, "Numerical Cognition Without Words: Evidence from Amazonia," was enthusiastically taken up by a coterie of "neo-Whorfian" linguists around the world.

Everett did not share this enthusiasm; in the ten years since he had introduced Gordon to the tribe, he had determined that the Pirahã have no fixed numbers. The word that he had long taken to mean "one" (*hoi*, on a falling tone) is used by the Pirahã to refer, more generally, to "a small size or amount," and the word for "two" (*hoi*, on a rising tone) is often used to mean "a somewhat larger size or amount." Everett says that his earlier confusion arose over what's known as the translation fallacy: the conviction that a word in one language is identical to a word in another, simply because in some instances they overlap in meaning. Gordon had mentioned the elastic boundaries of the words for "one" and "two" in his paper, but in Everett's opinion he had failed to explore the significance of the phenomenon. (Gordon disagrees, and for a brief period the two did not speak.)

Shortly after Gordon's article appeared, Everett began outlining a paper correcting what he believed were Gordon's errors. Its scope grew as Everett concluded that the Pirahã's lack of numerals was part of a larger constellation of "gaps." Over the course of three weeks, Everett wrote what would become his *Cultural Anthropology* article, 25,000 words in which he advanced a novel explanation for the many mysteries that had bedeviled him. Inspired by Sapir's cultural approach to language, he hypothesized that the tribe embodies a living-in-the-present ethos so powerful that it has affected every aspect of the people's lives. Committed to an exist-

tence in which only observable experience is real, the Pirahã do not think or speak in abstractions — and thus do not use color terms, quantifiers, numbers, or myths. Everett pointed to the word *xibipio* as a clue to how the Pirahã perceive reality solely according to what exists within the boundaries of their direct experience — which Everett defined as anything that they can see and hear or that someone living has seen and heard. “When someone walks around a bend in the river, the Pirahã say that the person has not simply gone away but *xibipio* — ‘gone out of experience,’” Everett said. “They use the same phrase when a candle flame flickers. The light ‘goes in and out of experience.’”

To Everett, the Pirahã’s unswerving dedication to empirical reality — he called it the “immediacy-of-experience principle” — explained their resistance to Christianity, since the Pirahã had always reacted to stories about Christ by asking, “Have you met this man?” Told that Christ died 2,000 years ago, the Pirahã would react much as they did to my using bug repellent. It explained their failure to build up food stocks, since this required planning for a future that did not yet exist; it explained the failure of the boys’ model airplanes to foster a tradition of sculpture-making, since the models expressed only the momentary burst of excitement that accompanied the sight of an actual plane. It explained the Pirahã’s lack of original stories about how they came into being, since this was a mundrum buried in a past outside the experience of parents and grandparents.

Everett was convinced that the Pirahã’s immediacy-of-experience principle went further still, “extending its tentacles,” as he put it, “deep into their core grammar,” to that feature that Chomsky claimed was present in all languages: recursion. Chomsky and other experts use the term to describe how we construct even the simplest utterances. “The girl jumped on the bed” is composed of a noun phrase (“the girl”), a verb (“jumped”), and a prepositional phrase (“on the bed”). In theory, as Chomsky has stressed, one could continue to insert chunks of language inside other chunks ad infinitum, thereby creating a never-ending sentence (“The man who is wearing a top hat that is slightly crushed around the brim although still perfectly elegant is walking down the street that was recently resurfaced by a crew of construction workers who tended to take coffee breaks that were a little too long while eating a hot dog

that was . . .”). Or one could create sentences of never-ending variety. The capacity to generate unlimited meaning by placing one thought inside another is the crux of Chomsky’s theory — what he calls, quoting the early-nineteenth-century German linguist Wilhelm von Humboldt, “the infinite use of finite means.”

According to Everett, however, the Pirahã do not use recursion to insert phrases one inside another. Instead, they state thoughts in discrete units. When I asked Everett if the Pirahã could say, in their language, “I saw the dog that was down by the river get bitten by a snake,” he said, “No. They would have to say, ‘I saw the dog. The dog was at the beach. A snake bit the dog.’” Everett explained that because the Pirahã accept as real only that which they observe, their speech consists only of direct assertions (“The dog was at the beach”), and he maintains that embedded clauses (“that was down by the river”) are not assertions but supporting, quantifying, or qualifying information — in other words, abstractions.

In his article, Everett argued that recursion is primarily a cognitive, not a linguistic, trait. He cited an influential 1962 article, “The Architecture of Complexity,” by Herbert Simon, a Nobel Prize-winning economist, cognitive psychologist, and computer scientist, who asserted that embedding entities within like entities (in a recursive tree structure of the type central to Chomskyan linguistics) is simply how people naturally organize information. “Microsoft Word is organized by tree structures,” Everett said. “You open up one folder and that splits into two other things, and that splits into two others. That’s a tree structure. Simon argues that this is essential to the way humans organize information and is found in all human intelligence systems. If Simon is correct, there doesn’t need to be any specific linguistic principle for this because it’s just general cognition.” Or, as Everett sometimes likes to put it: “The ability to put thoughts inside other thoughts is just the way humans are, because we’re smarter than other species.” Everett says that the Pirahã have this cognitive trait but that it is absent from their syntax because of cultural constraints.

Some scholars believe that Everett’s claim that the Pirahã do not use recursion is tantamount to calling them stupid. Stephen Levinson, the neo-Whorfian director of the Language and Cognition Group at the Max Planck Institute for Psycholinguistics in the Netherlands, excoriated Everett in print for “having made the

Pirahã sound like the mindless bearers of an almost subhumanly simple culture." Anna Wierzbicka, a linguist at the Australian National University, was also troubled by the paper and told me, "I think from the point of view of — I don't know — human solidarity, human rights, and so on, it's really very important to know that it's a question that many people don't dare to raise, whether we have the same cognitive abilities or not, we humans."

Everett dismissed such criticisms, since he expressly states in the article that the unusual aspects of the Pirahã are not a result of mental deficiency. A Pirahã child removed from the jungle at birth and brought up in any city in the world, he said, would have no trouble learning the local tongue. Moreover, Everett pointed out, the Pirahã are supremely gifted in all the ways necessary to ensure their continued survival in the jungle: they know the usefulness and location of all important plants in their area; they understand the behavior of local animals and how to catch and avoid them; and they can walk into the jungle naked, with no tools or weapons, and walk out three days later with baskets of fruit, nuts, and small game. "They can outsurvive anybody, any other Indian in this region," he said. "They're very intelligent people. It never would occur to me that saying they lack things that Levinson or Wierzbicka predict they should have is calling them mindless idiots."

For Everett, the most important reaction to the article was Chomsky's. In an e-mail to Everett last April, Chomsky rejected Everett's arguments that the Pirahã's lack of recursion is a strong counterexample to his theory of universal grammar, writing, "UG is the true theory of the genetic component that underlies acquisition and use of language." He added that there is "no coherent alternative to UG." Chomsky declined to be interviewed for this article, but he referred me to "Pirahã Exceptionality: A Reassessment," a paper that was coauthored by David Pesetsky, a colleague of Chomsky's at MIT; Andrew Nevins, a linguist at Harvard; and Cilene Rodrigues, a linguist at UNICAMP. In the paper, which was posted last month on the website LingBuzz, a repository of articles on Chomskyan generative grammar, the authors used data from Everett's 1983 Ph.D. dissertation, as well as from a paper he published on Pirahã in 1986, to refute his recent claims about the language's unusual features — including the assertion that the Pirahã do not use recursion. The authors conceded that even in these

early works, Everett had noted the absence of certain recursive structures in Pirahã. (The tribe, Everett wrote in the early eighties, does not embed possessives inside one another, as English speakers do when they say, "Tom's uncle's car's windshield . . ."). Nevertheless, they argued, Everett's early data suggested that the Pirahã's speech did contain recursive operations.

The fact that Everett had collected the data twenty-five years earlier, when he was a devotee of Chomsky's theory, was irrelevant, Pesetsky told me in an e-mail. At any rate, Pesetsky wrote, he and his coauthors detected "no sign of a particularly Chomskyan perspective" in the descriptive portions of Everett's early writings, adding, "For the most part, those works are about facts, and the categorizing of facts."

Everett, who posted a response to Pesetsky and his coauthors on LingBuzz, says that Chomsky's theory necessarily colored his data gathering and analysis. "Descriptive work' apart from theory does not exist," he told me. "We ask the questions that our theories tell us to ask." In his response on LingBuzz, Everett addressed his critics' arguments point by point and disputed the contention that his early work was more reliable than his current research as a guide to Pirahã. "I would find the opposite troubling — i.e., that a researcher never changed their mind or found errors in their earlier work," he wrote. He added, "There are alternatives to Universal Grammar, and the fact that NPR" — Nevins, Pesetsky, and Rodrigues — "insist on characterizing the issue as though there were no alternatives, although typical, is either ignorant or purposely misleading."

In a comment on Everett's paper published in *Cultural Anthropology*, Michael Tomasello, the director of the Department of Developmental and Comparative Psychology at the Max Planck Institute for Evolutionary Anthropology, in Leipzig, endorsed Everett's conclusions that culture can shape core grammar. Because the Pirahã "talk about different things [than we do], different things get grammaticalized," he wrote, adding that "universal grammar was a good try, and it really was not so implausible at the time it was proposed, but since then we have learned a lot about many different languages, and they simply do not fit one universal cookie cutter."

The Harvard cognitive scientist Steven Pinker, who wrote admir-

ingly about some of Chomsky's ideas in his 1994 bestseller, *The Language Instinct*, told me, "There's a lot of strange stuff going on in the Chomskyan program. He's a guru, he makes pronouncements that his disciples accept on faith and that he doesn't feel compelled to defend in the conventional scientific manner. Some of them become accepted within his circle as God's truth without really being properly evaluated, and, surprisingly for someone who talks about universal grammar, he hasn't actually done the spade-work of seeing how it works in some weird little language that they speak in New Guinea."

Pinker says that his own doubts about the "Chomskyan program" increased in 2002, when Marc Hauser, Chomsky, and Tecumseh Fitch published their paper on recursion in *Science*. The authors wrote that the distinctive feature of the human faculty of language, narrowly defined, is recursion. Dogs, starlings, whales, porpoises, and chimpanzees all use vocally generated sounds to communicate with other members of their species, but none do so recursively, and thus none can produce complex utterances of infinitely varied meaning. "Recursion had always been an important part of Chomsky's theory," Pinker said. "But in Chomsky Mark II, or Mark III, or Mark VII, he all of a sudden said that the only thing unique to language is recursion. It's not just that it's the universal that has to be there; it's the magic ingredient that makes language possible."

In early 2005, Pinker and Ray Jackendoff, a linguistics professor at Tufts University, published a critique of Hauser, Chomsky, and Fitch's paper in the journal *Cognition*. "In my paper with Ray, we argue that if you just magically inject recursion into a chimpanzee you're not going to get a human who can put words together into phrases, label concepts with words, name things that happened decades ago or that may or may not happen decades in the future," Pinker said. "There's more to language than recursion." Pinker and Jackendoff, in a reference to Everett's research, cited Pirahã as an example of a language that has "phonology, morphology, syntax, and sentences" but no recursion. Pinker, however, was quick to tell me that the absence of recursion in one of the more than 6,000 known languages is not enough to disprove Chomsky's ideas. "If you had something that was present in 5,999 of the languages, and someone found one language that didn't have it — well, I think

there may be some anthropologists who would say, "This shows that there's no universals, that anything can happen," he said. "But more likely you'd say, 'Well, what's going on with that weird language?'"

Contemporary linguists have generally avoided speculation about how humans acquired language in the first place. Chomsky himself has long demonstrated a lack of interest in language origins and expressed doubt about Darwinian explanations. "It is perfectly safe to attribute this development to 'natural selection,'" Chomsky has written, "so long as we realize that there is no substance to this assertion, that it amounts to nothing more than a belief that there is some naturalistic explanation for these phenomena." Moreover, Chomsky's theory of universal grammar, which was widely understood to portray language as a complex system that arose fully formed in the brain, discouraged inquiry into how language developed. "This totally slams the door on the question," Brent Berlin, a cognitive anthropologist at the University of Georgia, told me. "It acts as if, in some inexplicable way, almost mysteriously, language is hermetically sealed from the conditions of life of the people who use it to communicate. But this is not some kind of abstract, beautiful, mathematical, symbolic system that is not related to real life."

Berlin believes that Pirahã may provide a snapshot of language at an earlier stage of syntactic development. "That's what Dan's work suggests," Berlin said of Everett's paper. "The plausible scenarios that we can imagine are ones that would suggest that early language looks something like the kind of thing that Pirahã looks like now."

Tecumseh Fitch, a tall, patrician man with long, pointed sideburns and a boyishly enthusiastic manner, owes his unusual first name to his ancestor, the Civil War general William Tecumseh Sherman. Fitch attended Brown University and earned a Ph.D. there. As a biologist with a special interest in animal communication, Fitch discovered that red deer possess a descended larynx, an anatomical feature that scientists had previously believed was unique to human beings and central to the development of speech. (The descended larynx has since been found in koalas, lions, tigers, jaguars, and leopards.) Fitch, eager to understand how humans acquired language, turned to linguistics and was surprised to learn that

Chomsky had written little about the question. But in 1999 Fitch happened to read an interview that Chomsky had given to *Spare Change News*, a newspaper for the homeless in Cambridge. "I read it and all the stuff he said about evolution was almost more than he's ever said in any published thing — and here it is in *Spare Change!*" Fitch said. "And he just made a few points that made me realize what he'd been getting at in a more enigmatic fashion in some of his previous comments." Fitch invited Chomsky to speak to a class that he was coteaching at Harvard on the evolution of language. Afterward they talked for several hours. A few months later, Chomsky agreed to collaborate with Fitch and Hauser on a paper that would attempt to pinpoint the features of language that are unique to humans and that allowed *Homo sapiens* to develop language. The authors compared animal and human communication, eliminating the aspects of vocalization that are shared by both, and concluded that one operation alone distinguished human speech: recursion. In the course of working on the article, Fitch grew sympathetic to Chomsky's ideas and became an articulate defender of the theory of universal grammar.

When Fitch and Everett met in Porto Velho in July, two days before heading into the jungle, they seemed, by tacit agreement, to be avoiding talk of Chomsky. But on the eve of our departure, while we were sitting by the pool at the Hotel Vila Rica, Everett mentioned two professors who, he said, were "among the three most arrogant people I've met."

"Who's the third?" Fitch asked.

"Noam," Everett said.

"No!" Fitch cried. "Given his status in science, Chomsky is the least arrogant man, the humblest great man, I've ever met."

Everett was having none of it. "Noam Chomsky thinks of himself as Aristotle!" he declared. "He has dug a hole for linguistics that it will take decades for the discipline to climb out of!"

The men argued for the next two hours, though by the time they parted for the night civility had been restored, and the détente was still holding when they met in the Pirahã village the next day and agreed to begin experiments the following morning.

At sunrise, a group of some twenty Pirahã gathered outside Everett's house. They were to be paid for their work as experimental subjects — with tobacco, cloth, farina, and machetes. "And, be-

lieve me," Everett said, "that's the only reason they're here. They have no interest in what we're doing. They're hunter-gatherers, and they see us just like fruit trees to gather from."

Fitch went out with Everett into the thick heat, carrying his laptop. The two men, trailed by the Pirahã, followed a narrow path through the low underbrush to Everett's office, a small hut, raised off the ground on four-foot-high stilts, at the edge of the jungle. Fitch placed his computer on the desk and launched a program that he had spent several weeks writing in preparation for this trip.

Fitch's experiments were based on the so-called Chomsky hierarchy, a system for classifying types of grammar, ranked in ascending order of complexity. To test the Pirahã's ability to learn one of the simplest types of grammar, Fitch had written a program in which grammatically correct constructions were represented by a male voice uttering one nonsense syllable (*mi* or *doh* or *ga*, for instance), followed by a female voice uttering a different nonsense syllable (*lee* or *ta* or *gee*). Correct constructions would cause an animated monkey head at the bottom of the computer screen to float to a corner at the top of the screen after briefly disappearing; incorrect constructions (any time one male syllable was followed by another male syllable or more than one female syllable) would make the monkey head float to the opposite corner. Fitch set up a small digital movie camera behind the laptop to film the Pirahã's eye movements. In the few seconds' delay before the monkey head floated to either corner of the screen, Fitch hoped that he would be able to determine, from the direction of the subjects' unconscious glances, if they were learning the grammar. The experiment, using different stimuli, had been conducted with undergraduates and monkeys, all of whom passed the test. Fitch told me that he had little doubt that the Pirahã would pass. "My expectation coming in here is that they're going to act just like my Harvard undergrads," he said. "They're going to do exactly what every other human has done, and they're going to get this basic pattern. The Pirahã are humans — humans can do this."

Fitch called for the first subject.

Everett stepped outside the hut and spoke to a short, muscular man with a bowl-shaped haircut and heavily calloused bare feet. The man entered the hut and sat down at the computer, which promptly crashed. Fitch rebooted. It crashed again.

"It's the humidity," Everett said.

Fitch finally got the computer working, but then the video camera seized up.

"Goddamn Chomskyan," Everett said. "Can't even run an experiment."

Eventually, Fitch got all the equipment running smoothly and started the experiment. It quickly became obvious that the Pirahã man was simply watching the floating monkey head and wasn't responding to the audio cues.

"It didn't look like he was doing premonitory looking," Fitch said. "Maybe ask him to point to where he thinks the monkey is going to go."

"They don't point," Everett said. Nor, he added, do they have words for right and left. Instead, they give directions in absolute terms, telling others to head "upriver" or "downriver," or "to the forest" or "away from the forest." Everett told the man to say whether the monkey was going upriver or downriver. The man said something in reply.

"What did he say?" Fitch asked.

"He said, 'Monkeys go to the jungle.'"

Fitch grimaced in frustration. "Well, he's not guessing with his eyes," he said. "Is there another way he can indicate?"

Everett again told the man to say whether the monkey was going upriver or down. The man made a noise of assent. Fitch resumed the experiment, but the man simply waited until the monkey moved. He followed it with his eyes, laughed admiringly when it came to a stop, then announced whether it had gone upriver or down.

After several minutes of this, Fitch said, on a rising note of panic, "If they fail in the recursion one — it's not recursion; I've got to stop saying that. I mean embedding. Because, I mean, if he can't get *this* —"

"This is typical Pirahã," Everett said soothingly. "This is new stuff, and they don't do new stuff."

"But when they're hunting they must have those skills of visual anticipation," Fitch said.

"Yeah," Everett said dryly. "But this is not a real monkey." He pointed at the grinning animated head bobbing on the screen.

"Fuck!" Fitch said. "If I'd had a joystick for him to *hunt* the mon-

key!" He paced a little, then said, "The crazy thing is that this is already more realistic than the experiments Aslin did with babies."

"Look," Everett said, "the cognitive issue here is the cultural impediment to doing new things. He doesn't know there's a pattern to recognize."

Everett dismissed the man and asked another Pirahã to come into the hut. A young man appeared, wearing a green-and-yellow 2002 Brazilian World Cup shirt, and sat at the computer. Everett told him to say whether the monkey was going to go upriver or downriver.

Fitch ran the experiment. The man smiled and pointed with his chin whenever the monkey head came to rest.

"The other idea," Fitch said, "is if we got a bunch of the kids, and whoever points first gets a lollipop."

"That's got an element of competition that they won't go for," Everett said.

The computer crashed. Convinced that there was a glitch in the software, Fitch picked up the machine and carried it back to the main house to make repairs.

"This is typical of field work in the Amazon, which is why most people don't do it," Everett said. "But the problem here is not cognitive; it's cultural." He gestured toward the Pirahã man at the table. "Just because we're sitting in the same room doesn't mean we're sitting in the same century."

By the next morning, Fitch had debugged his software, but other difficulties persisted. One subject, a man in blue nylon running shorts, ignored instructions to listen to the syllables and asked questions about the monkey head: "Is that rubber?" "Does this monkey have a spouse?" "Is it a man?" Another man fell asleep midtrial (the villagers had been up all night riotously talking and laughing — a common occurrence for a people who do not live by the clock). Meanwhile, efforts to get subjects to focus were hampered by the other tribe members, who had collected outside the hut and held loud conversations that were audible through the screened windows.

Steve Sheldon, Everett's predecessor in the Pirahã village, had told me of the challenges he faced in the late sixties when he did research on behalf of Brent Berlin and Paul Kay (an anthropologist

and linguist at the University of California at Berkeley), who were collecting data about colors from indigenous peoples. Sheldon had concluded that the Pirahã tribe has fixed color terms—a view duly enshrined in Berlin and Kay's book *Basic Color Terms: Their Universality and Evolution* (1969). Only later did Sheldon realize that his data were unreliable. Told to question tribe members in isolation, Sheldon had been unable to do so because the tribe refused to be split up; members had eavesdropped on Sheldon's interviews and collaborated on answers. "Their attitude was 'Who cares what the color is?'" Sheldon told me. "But we'll give him something because that's what he wants." (Today Sheldon endorses Everett's claim that the tribe has no fixed color terms.)

Sheldon said that the Pirahã's obstructionist approach to researchers is a defensive gesture. "They have been made fun of by outsiders because they do things differently," Sheldon told me. "With researchers who don't speak their language, they make fun, giving really bad information, totally wrong information sometimes."

On the third day, Fitch had figured out that he was being hindered by some of the same problems that Sheldon had faced. That morning, he tacked up bedsheets over the window screens and demanded that the tribe remain at a distance from the hut. (Several yards away, Fitch's cousin, Bill, entertained the group by playing Charlie Parker tunes on his iPod.) Immediately, the testing went better. One Pirahã man seemed to make anticipatory eye movements, although it was difficult to tell, because his eyes were hard to make out under the puffy lids, a feature typical of the men's faces. Fitch tried the experiment on a young woman with large, dark irises, but it was not clear that her few correct glances were anything but coincidental. "Lot of random looks," Everett muttered. "It's not obvious that they're getting it either way," Fitch said.

On the fourth day, Fitch seemed to hit pay dirt. The subject was a girl of perhaps sixteen. Focused, alert, and calm, she seemed to grasp the grammar, her eyes moving to the correct corner of the screen in advance of the monkey's head. Fitch was delighted and perhaps relieved; before coming to the Amazon, he had told me that the failure of a Pirahã to perform this task would be tantamount to "discovering a Sasquatch."

Fitch decided to test the girl on a higher level of the Chomsky hi-

erarchy, a "phrase-structure grammar." He had devised a program in which correct constructions consisted of any number of male syllables followed by an equal number of female syllables. Hauser, Chomsky, and Fitch, in their 2002 paper, had stated that a phrase-structure grammar, which makes greater demands on memory and pattern recognition, represents the minimum foundation necessary for human language.

Fitch performed several practice trials with the girl to teach her the grammar. Then he and Everett stepped back to watch. "If this is working," Fitch said, "we could try to get NSF money. This could be big—even for psychology."

At the mention of psychology—a discipline that often emphasizes the influence of environment on behavior and thus is at a remove from Chomsky's views—Everett laughed. "Now he's beginning to see it my way!" he said.

The girl gazed at the screen and listened as the HAL-like computer voices flatly intoned the meaningless syllables. Fitch peered at the camera's viewfinder screen, trying to discern whether the girl's eye movements indicated that she understood the grammar. It was impossible to say. Fitch would have to take the footage back to Scotland, where it would be vetted by an impartial postdoc volunteer, who would "score" the images on a time line carefully synchronized to the soundtrack of the spoken syllables, so that Fitch could say without a doubt whether the subject's eyes had anticipated the monkey head or merely followed it. (Recently Fitch said that the data "look promising," but he declined to elaborate, pending publication of his results.)

That evening, Everett invited the Pirahã to come to his home to watch a movie: Peter Jackson's remake of *King Kong*. (Everett had discovered that the tribe loves movies that feature animals.) After nightfall, to the grinding sound of the generator, a crowd of thirty or so Pirahã assembled on benches and on the wooden floor of Everett's "Indian room," a screened-off section of his house where he confines the Pirahã, owing to their tendency to spit on the floor. Everett had made popcorn, which he distributed in a large bowl. Then he started the movie, clicking ahead to the scene in which Naomi Watts, reprising Fay Wray's role, is offered as a sacrifice by the tribal people of an unspecified South Seas island. The Pirahã shouted with delight, fear, laughter, and surprise—and when

Kong himself arrived, smashing through the palm trees, pandemonium ensued. Small children, who had been sitting close to the screen, jumped up and scurried into their mothers' laps; the adults laughed and yelled at the screen.

If Fitch's experiments were inconclusive on the subject of whether Chomsky's universal grammar applied to the Pirahã, Jackson's movie left no question about the universality of Hollywood film grammar. As Kong battled raptors and Watts dodged giant insects, the Pirahã offered a running commentary, which Everett translated: "Now he's going to fall!" "He's tired!" "She's running!" "Look. A centipede!" Nor were the Pirahã in any doubt about what was being communicated in the long, lingering looks that passed between gorilla and girl. "She is his spouse," one Pirahã said. Yet in their reaction to the movie Everett also saw proof of his theory about the tribe. "They're not generalizing about the character of giant apes," he pointed out. "They're reacting to the immediate action on the screen with direct assertions about what they see."

In Fitch's final two days of experiments, he failed to find another subject as promising as the sixteen-year-old girl. But he was satisfied with what he had been able to accomplish in six days in the jungle. "I think Dan's is an interesting and valid additional approach to add to the arsenal," Fitch told me after we had flown back to Porto Velho and were sitting beside the pool at the Hotel Vila Rica. "I think you need to look at something as complex as language from lots of different angles, and I think the angle he's arguing is interesting and deserves more work, more research. But as far as the Pirahã disproving universal grammar? I don't think anything I could have seen out there would have convinced me that that was ever anything other than just the wrong way to frame the problem."

On my final night in Brazil, I met Keren Everett in the gloomy lobby of the hotel. At fifty-five, she is an ageless, elfin woman with large dark eyes and waist-length hair pulled back from her face. She is trained in formal linguistics, but her primary interest in the Pirahã remains missionary. In keeping with the tenets of SIL, she does not proselytize or actively attempt to convert them; it is enough, SIL believes, to translate the Bible into the tribal tongue. Keren insists that she does not know the language well yet. "I still haven't cracked it," she said, adding that she thought she was "beginning to feel it for the first time, after twenty-five years."

The key to learning the language is the tribe's singing, Keren said: the way that the group can drop consonants and vowels altogether and communicate purely by variations in pitch, stress, and rhythm — what linguists call "prosody." I was reminded of an evening in the village when I had heard someone singing a clutch of haunting notes on a rising, then falling scale. The voice repeated the pattern over and over, without variation, for more than half an hour. I crept up to the edge of one of the Pirahã huts and saw that it was a woman, winding raw cotton onto a spool and intoning this extraordinary series of notes that sounded like a muted horn. A toddler played at her feet. I asked Everett about this, and he said something vague about how tribe members "sing their dreams." But when I described the scene to Keren she grew animated and explained that this is how the Pirahã teach their children to speak. The toddler was absorbing the lesson in prosody through endless repetition — an example, one might argue, of Edward Sapir's cultural theory of language acquisition at work.

"This language uses prosody much more than any other language I know of," Keren told me. "It's not the kind of thing that you can write and capture and go back to; you have to watch, and you have to feel it. It's like someone singing a song. You want to watch and listen and try to sing along with them. So I started doing that, and I began noticing things that I never transcribed, and things I never picked up when I listened to a tape of them, and part of it was the performance. So at that point I said, 'Put the tape recorders and notebooks away, focus on the person, watch them.' They give a lot of things using prosody that you never would have found otherwise. This has never been documented in any language I know." Aspects of Pirahã that had long confounded Keren became clear, she said. "I realized, Oh! That's what the subject-verb looks like, that's what the pieces of the clause and the time phrase and the object and the other phrases feel like. That was the beginning of a breakthrough for me. I won't say that I've broken it until I can creatively use the verbal structure — and I can't do it yet."

Keren says that Everett's frustration at realizing that they would have to "start all over again" with the language ultimately led to his decision to leave the Amazon in 2002 and return to academia. "He was diligent and he was trying to use his perspective and his training, and I watched the last year that we were together in the village — he just was, like, 'This is it. I'm out of here.' That was the year I

started singing, and he said, 'Damn it if I'm going to learn to sing this language!' And he was out. It's torment. It is tormenting when you have a good mind and you can't crack it. I said, 'I don't care, we're missing something. We've got to look at it from a different perspective.'" Keren shook her head. "Pirahã has just always been out there defying every linguist that's gone out there, because you can't start at the segment level and go on. You're not going to find out anything, because they really can communicate without the syllables."

Later that day, when Everett drove me to the airport in Porto Velho, I told him about my conversation with Keren. He sighed. "Keren has made tremendous progress, and I'm sure she knows more about musical speech than I do at this point," he said. "There's probably several areas of Pirahã where her factual knowledge exceeds mine. But it's not all the prosody. That's the thing." Keren's perspective on Pirahã derives from her missionary impulses, he said. "It would be impossible for her to believe that we know the language, because that would mean that the word of God doesn't work."

Everett pulled into the airport parking lot. It was clear that talking about Keren caused him considerable pain. He did not want our conversation to end on a quarrel with her. He reminded me that his disagreement is with Chomsky.

"A lot of people's view of Chomsky is of the person in the lead on the jungle path," Everett had told me in the Pirahã village. "And if anybody's likely to find the way home it's him. So they want to stay as close behind him as possible. Other people say, 'Fuck that, I'm going to get on the river and take my canoe.'"

CHRISTOPHER J. CONSELICE

The Universe's Invisible Hand

FROM *Scientific American*

WHAT TOOK US SO LONG? Only in 1998 did astronomers discover that we had been missing nearly three-quarters of the contents of the universe, the so-called dark energy—an unknown form of energy that surrounds each of us, tugging at us ever so slightly, holding the fate of the cosmos in its grip, but to which we are almost totally blind. Some researchers, to be sure, had anticipated that such energy existed, but even they will tell you that its detection ranks among the most revolutionary discoveries in twentieth-century cosmology. Not only does dark energy appear to make up the bulk of the universe, but its existence, if it stands the test of time, will probably require the development of new theories of physics.

Scientists are just starting the long process of figuring out what dark energy is and what its implications are. One realization has already sunk in: although dark energy betrayed its existence through its effect on the universe as a whole, it may also shape the evolution of the universe's inhabitants: stars, galaxies, galaxy clusters. Astronomers may have been staring at its handiwork for decades without realizing it.

Ironically, the very pervasiveness of dark energy is what made it so hard to recognize. Dark energy, unlike matter, does not clump in some places more than others; by its very nature, it is spread smoothly everywhere. Whatever the location—be it in your kitchen or in intergalactic space—it has the same density, about 10–26 kilograms per cubic meter, equivalent to a handful of hydrogen atoms. All the dark energy in our solar system amounts to the mass of