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## *An Instinct to Acquire an Art*

*As you are reading these words, you are taking part in one of the wonders of the natural world. For you and I belong to a species with a remarkable ability: we can shape events in each other's brains with exquisite precision. I am not referring to telepathy or mind control or the other obsessions of fringe science; even in the depictions of believers these are blunt instruments compared to an ability that is uncontroversially present in every one of us. That ability is language. Simply by making noises with our mouths, we can reliably cause precise new combinations of ideas to arise in each other's minds. The ability comes so naturally that we are apt to forget what a miracle it is. So let me remind you with some simple demonstrations. Asking you only to surrender your imagination to my words for a few moments, I can cause you to think some very specific thoughts:*

When a male octopus spots a female, his normally grayish body suddenly becomes striped. He swims above the female and begins caressing her with seven of his arms. If she allows this, he will quickly reach toward her and slip his eighth arm into her breathing tube. A series of sperm packets moves slowly through a groove in his arm, finally to slip into the mantle cavity of the female.

Cherries jubilee on a white suit? Wine on an altar cloth? Apply club soda immediately. It works beautifully to remove the stains from fabrics.

When Dixie opens the door to Tad, she is stunned, because she thought he was dead. She slams it in his face and then tries to escape. However, when Tad says, "I love you," she lets him in. Tad comforts her, and they become passionate. When Brian interrupts, Dixie tells a stunned Tad that she and Brian were married earlier that day. With much difficulty, Dixie informs Brian that things are nowhere near finished between her and Tad. Then she spills the news that Jamie is Tad's son. "My what?" says a shocked Tad.

Think about what these words have done. I did not simply remind you of octopuses; in the unlikely event that you ever see one develop stripes, you now know what will happen next. Perhaps the next time you are in a supermarket you will look for club soda, one out of the tens of thousands of items available, and then not touch it until months later when a particular substance and a particular object accidentally come together. You now share with millions of other people the secrets of protagonists in a world that is the product of some stranger's imagination, the daytime drama *All My Children*. True, my demonstrations depended on our ability to read and write, and this makes our communication even more impressive by bridging gaps of time, space, and acquaintanceship. But writing is clearly an optional accessory; the real engine of verbal communication is the spoken language we acquire as children.

In any natural history of the human species, language would stand out as the preeminent trait. To be sure, a solitary human is an impressive problem-solver and engineer. But a race of Robinson Crusoes would not give an extraterrestrial observer all that much to remark on. What is truly arresting about our kind is better captured in the story of the Tower of Babel, in which humanity, speaking a single language, came so close to reaching heaven that God himself felt threatened. A common language connects the members of a com-

munity into an information-sharing network with formidable collective powers. Anyone can benefit from the strokes of genius, lucky accidents, and trial-and-error wisdom accumulated by anyone else, present or past. And people can work in teams, their efforts coordinated by negotiated agreements. As a result, *Homo sapiens* is a species, like blue-green algae and earthworms, that has wrought far-reaching changes on the planet. Archeologists have discovered the bones of ten thousand wild horses at the bottom of a cliff in France, the remains of herds stampeded over the clifftop by groups of paleolithic hunters seventeen thousand years ago. These fossils of ancient cooperation and shared ingenuity may shed light on why saber-tooth tigers, mastodons, giant woolly rhinoceroses, and dozens of other large mammals went extinct around the time that modern humans arrived in their habitats. Our ancestors, apparently, killed them off.

Language is so tightly woven into human experience that it is scarcely possible to imagine life without it. Chances are that if you find two or more people together anywhere on earth, they will soon be exchanging words. When there is no one to talk with, people talk to themselves, to their dogs, even to their plants. In our social relations, the race is not to the swift but to the verbal—the spellbinding orator, the silver-tongued seducer, the persuasive child who wins the battle of wills against a brawnier parent. Aphasia, the loss of language following brain injury, is devastating, and in severe cases family members may feel that the whole person is lost forever.

This book is about human language. Unlike most books with "language" in the title, it will not chide you about proper usage, trace the origins of idioms and slang, or divert you with palindromes, anagrams, eponyms, or those precious names for groups of animals like "exaltation of larks." For I will be writing not about the English language or any other language, but about something much more basic: the instinct to learn, speak, and understand language. For the first time in history, there is something to write about it. Some thirty-five years ago a new science was born. Now called "cognitive science," it combines tools from psychology, computer science, linguistics, philosophy, and neurobiology to explain the workings of human intelli-

gence. The science of language, in particular, has seen spectacular advances in the years since. There are many phenomena of language that we are coming to understand nearly as well as we understand how a camera works or what the spleen is for. I hope to communicate these exciting discoveries, some of them as elegant as anything in modern science, but I have another agenda as well.

The recent illumination of linguistic abilities has revolutionary implications for our understanding of language and its role in human affairs, and for our view of humanity itself. Most educated people already have opinions about language. They know that it is man's most important cultural invention, the quintessential example of his capacity to use symbols, and a biologically unprecedented event irrevocably separating him from other animals. They know that language pervades thought, with different languages causing their speakers to construe reality in different ways. They know that children learn to talk from role models and caregivers. They know that grammatical sophistication used to be nurtured in the schools, but sagging educational standards and the debasements of popular culture have led to a frightening decline in the ability of the average person to construct a grammatical sentence. They also know that English is a zany, logic-defying tongue, in which one drives on a parkway and parks in a driveway, plays at a recital and recites at a play. They know that English spelling takes such wackiness to even greater heights—George Bernard Shaw complained that *fish* could just as sensibly be spelled *ghoti* (*gh* as in *tough*, *o* as in *women*, *ti* as in *nation*)—and that only institutional inertia prevents the adoption of a more rational, spell-it-like-it-sounds system.

In the pages that follow, I will try to convince you that every one of these common opinions is wrong! And they are all wrong for a single reason. Language is not a cultural artifact that we learn the way we learn to tell time or how the federal government works. Instead, it is a distinct piece of the biological makeup of our brains. Language is a complex, specialized skill, which develops in the child spontaneously, without conscious effort or formal instruction, is deployed without awareness of its underlying logic, is qualitatively the same in every

individual, and is distinct from more general abilities to process information or behave intelligently. For these reasons some cognitive scientists have described language as a psychological faculty, a mental organ, a neural system, and a computational module. But I prefer the admittedly quaint term “instinct.” It conveys the idea that people know how to talk in more or less the sense that spiders know how to spin webs. Web-spinning was not invented by some unsung spider genius and does not depend on having had the right education or on having an aptitude for architecture or the construction trades. Rather, spiders spin spider webs because they have spider brains, which give them the urge to spin and the competence to succeed. Although there are differences between webs and words, I will encourage you to see language in this way, for it helps to make sense of the phenomena we will explore.

Thinking of language as an instinct inverts the popular wisdom, especially as it has been passed down in the canon of the humanities and social sciences. Language is no more a cultural invention than is upright posture. It is not a manifestation of a general capacity to use symbols: a three-year-old, we shall see, is a grammatical genius, but is quite incompetent at the visual arts, religious iconography, traffic signs, and the other staples of the semiotics curriculum. Though language is a magnificent ability unique to *Homo sapiens* among living species, it does not call for sequestering the study of humans from the domain of biology, for a magnificent ability unique to a particular living species is far from unique in the animal kingdom. Some kinds of bats home in on flying insects using Doppler sonar. Some kinds of migratory birds navigate thousands of miles by calibrating the positions of the constellations against the time of day and year. In nature's talent show we are simply a species of primate with our own act, a knack for communicating information about who did what to whom by modulating the sounds we make when we exhale.

Once you begin to look at language not as the ineffable essence of human uniqueness but as a biological adaptation to communicate information, it is no longer as tempting to see language as an insidious shaper of thought, and, we shall see, it is not. Moreover, seeing lan-

guage as one of nature's engineering marvels—an organ with “that perfection of structure and co-adaptation which justly excites our admiration,” in Darwin's words—gives us a new respect for your ordinary Joe and the much-maligned English language (or any language). The complexity of language, from the scientist's point of view, is part of our biological birthright; it is not something that parents teach their children or something that must be elaborated in school—as Oscar Wilde said, “Education is an admirable thing, but it is well to remember from time to time that nothing that is worth knowing can be taught.” A preschooler's tacit knowledge of grammar is more sophisticated than the thickest style manual or the most state-of-the-art computer language system, and the same applies to all healthy human beings, even the notorious syntax-fracturing professional athlete and the, you know, like, inarticulate teenage skateboarder. Finally, since language is the product of a well-engineered biological instinct, we shall see that it is not the nutty barrel of monkeys that entertainer-columnists make it out to be. I will try to restore some dignity to the English vernacular, and will even have some nice things to say about its spelling system.

The conception of language as a kind of instinct was first articulated in 1871 by Darwin himself. In *The Descent of Man* he had to contend with language because its confinement to humans seemed to present a challenge to his theory. As in all matters, his observations are uncannily modern:

As . . . one of the founders of the noble science of philology observes, language is an art, like brewing or baking; but writing would have been a better simile. It certainly is not a true instinct, for every language has to be learned. It differs, however, widely from all ordinary arts, for man has an instinctive tendency to speak, as we see in the babble of our young children; while no child has an instinctive tendency to brew, bake, or write. Moreover, no philologist now supposes that any language has been deliberately invented; it has been slowly and unconsciously developed by many steps.

Darwin concluded that language ability is “an instinctive tendency to acquire an art,” a design that is not peculiar to humans but seen in other species such as song-learning birds.

A language instinct may seem jarring to those who think of language as the zenith of the human intellect and who think of instincts as brute impulses that compel furry or feathered zombies to build a dam or up and fly south. But one of Darwin's followers, William James, noted that an instinct possessor need not act as a “fatal automaton.” He argued that we have all the instincts that animals do, and many more besides; our flexible intelligence comes from the interplay of many instincts competing. Indeed, the instinctive nature of human thought is just what makes it so hard for us to see that it is an instinct:

It takes . . . a mind debauched by learning to carry the process of making the natural seem strange, so far as to ask for the *why* of any instinctive human act. To the metaphysician alone can such questions occur as: Why do we smile, when pleased, and not scowl? Why are we unable to talk to a crowd as we talk to a single friend? Why does a particular maiden turn our wits so upside-down? The common man can only say, “*Of course* we smile, *of course* our heart palpitates at the sight of the crowd, *of course* we love the maiden, that beautiful soul clad in that perfect form, so palpably and flagrantly made for all eternity to be loved!”

And so, probably, does each animal feel about the particular things it tends to do in presence of particular objects. . . . To the lion it is the lioness which is made to be loved; to the bear, the she-bear. To the broody hen the notion would probably seem monstrous that there should be a creature in the world to whom a nestful of eggs was not the utterly fascinating and precious and never-to-be-too-much-sat-upon object which it is to her.

Thus we may be sure that, however mysterious some animals' instincts may appear to us, our instincts will appear no less mysterious to them. And we may conclude that, to the

animal which obeys it, every impulse and every step of every instinct shines with its own sufficient light, and seems at the moment the only eternally right and proper thing to do. What voluptuous thrill may not shake a fly, when she at last discovers the one particular leaf, or carrion, or bit of dung, that out of all the world can stimulate her ovipositor to its discharge? Does not the discharge then seem to her the only fitting thing? And need she care or know anything about the future maggot and its food?

I can think of no better statement of my main goal. The workings of language are as far from our awareness as the rationale for egg-laying is from the fly's. Our thoughts come out of our mouths so effortlessly that they often embarrass us, having eluded our mental censors. When we are comprehending sentences, the stream of words is transparent; we see through to the meaning so automatically that we can forget that a movie is in a foreign language and subtitled. We think children pick up their mother tongue by imitating their mothers, but when a child says *Don't giggle me!* or *We holded the baby rabbits*, it cannot be an act of imitation. I want to debauch your mind with learning, to make these natural gifts seem strange, to get you to ask the "why" and "how" of these seemingly homely abilities. Watch an immigrant struggling with a second language or a stroke patient with a first one, or deconstruct a snatch of baby talk, or try to program a computer to understand English, and ordinary speech begins to look different. The effortlessness, the transparency, the automaticity are illusions, masking a system of great richness and beauty.

In this century, the most famous argument that language is like an instinct comes from Noam Chomsky, the linguist who first unmasked the intricacy of the system and perhaps the person most responsible for the modern revolution in language and cognitive science. In the 1950s the social sciences were dominated by behaviorism, the school of thought popularized by John Watson and B. F. Skinner. Mental terms like "know" and "think" were branded as unscientific; "mind" and "innate" were dirty words. Behavior was explained by a

few laws of stimulus-response learning that could be studied with rats pressing bars and dogs salivating to tones. But Chomsky called attention to two fundamental facts about language. First, virtually every sentence that a person utters or understands is a brand-new combination of words, appearing for the first time in the history of the universe. Therefore a language cannot be a repertoire of responses; the brain must contain a recipe or program that can build an unlimited set of sentences out of a finite list of words. That program may be called a mental grammar (not to be confused with pedagogical or stylistic "grammars," which are just guides to the etiquette of written prose). The second fundamental fact is that children develop these complex grammars rapidly and without formal instruction and grow up to give consistent interpretations to novel sentence constructions that they have never before encountered. Therefore, he argued, children must innately be equipped with a plan common to the grammars of all languages, a Universal Grammar, that tells them how to distill the syntactic patterns out of the speech of their parents. Chomsky put it as follows:

It is a curious fact about the intellectual history of the past few centuries that physical and mental development have been approached in quite different ways. No one would take seriously the proposal that the human organism learns through experience to have arms rather than wings, or that the basic structure of particular organs results from accidental experience. Rather, it is taken for granted that the physical structure of the organism is genetically determined, though of course variation along such dimensions as size, rate of development, and so forth will depend in part on external factors. . . .

The development of personality, behavior patterns, and cognitive structures in higher organisms has often been approached in a very different way. It is generally assumed that in these domains, social environment is the dominant factor. The structures of mind that develop over time are taken to be arbitrary and accidental; there is no "human nature" apart from what develops as a specific historical product. . . .

But human cognitive systems, when seriously investigated, prove to be no less marvelous and intricate than the physical structures that develop in the life of the organism. Why, then, should we not study the acquisition of a cognitive structure such as language more or less as we study some complex bodily organ?

At first glance, the proposal may seem absurd, if only because of the great variety of human languages. But a closer consideration dispels these doubts. Even knowing very little of substance about linguistic universals, we can be quite sure that the possible variety of language is sharply limited. . . . The language each person acquires is a rich and complex construction hopelessly underdetermined by the fragmentary evidence available [to the child]. Nevertheless individuals in a speech community have developed essentially the same language. This fact can be explained only on the assumption that these individuals employ highly restrictive principles that guide the construction of grammar.

By performing painstaking technical analyses of the sentences ordinary people accept as part of their mother tongue, Chomsky and other linguists developed theories of the mental grammars underlying people's knowledge of particular languages and of the Universal Grammar underlying the particular grammars. Early on, Chomsky's work encouraged other scientists, among them Eric Lenneberg, George Miller, Roger Brown, Morris Halle, and Alvin Liberman, to open up whole new areas of language study, from child development and speech perception to neurology and genetics. By now, the community of scientists studying the questions he raised numbers in the thousands. Chomsky is currently among the ten most-cited writers in all of the humanities (beating out Hegel and Cicero and trailing only Marx, Lenin, Shakespeare, the Bible, Aristotle, Plato, and Freud) and the only living member of the top ten.

What those citations *say* is another matter. Chomsky gets people exercised. Reactions range from the awe-struck deference ordinarily

reserved for gurus of weird religious cults to the withering invective that academics have developed into a high art. In part this is because Chomsky attacks what is still one of the foundations of twentieth-century intellectual life—the “Standard Social Science Model,” according to which the human psyche is molded by the surrounding culture. But it is also because no thinker can afford to ignore him. As one of his severest critics, the philosopher Hilary Putnam, acknowledges,

When one reads Chomsky, one is struck by a sense of great intellectual power; one knows one is encountering an extraordinary mind. And this is as much a matter of the spell of his powerful personality as it is of his obvious intellectual virtues: originality, scorn for the faddish and the superficial; willingness to revive (and the ability to revive) positions (such as the “doctrine of innate ideas”) that had seemed *passé*; concern with topics, such as the structure of the human mind, that are of central and perennial importance.

The story I will tell in this book has, of course, been deeply influenced by Chomsky. But it is not his story exactly, and I will not tell it as he would. Chomsky has puzzled many readers with his skepticism about whether Darwinian natural selection (as opposed to other evolutionary processes) can explain the origins of the language organ that he argues for; I think it is fruitful to consider language as an evolutionary adaptation, like the eye, its major parts designed to carry out important functions. And Chomsky's arguments about the nature of the language faculty are based on technical analyses of word and sentence structure, often couched in abstruse formalisms. His discussions of flesh-and-blood speakers are perfunctory and highly idealized. Though I happen to agree with many of his arguments, I think that a conclusion about the mind is convincing only if many kinds of evidence converge on it. So the story in this book is highly eclectic, ranging from how DNA builds brains to the pontifications of newspaper language columnists. The best place to begin is to ask why anyone should believe that human language is a part of human biology—an instinct—at all.