Carl Safina, *Beyond Words*. (Prologue and first 30 pages)

Ask now the beasts, and they shall teach thee; and the fowls of the air, and they shall tell thee: Or speak to the earth, and it shall teach thee: and the fishes of the sea shall declare unto thee.
—Job 12:7–8, King James Version

Another big group of dolphins had just surfaced alongside our moving vessel—leaping and splashing and calling mysteriously back and forth in their squeally, whistly way, with many babies swift alongside their mothers. And this time, confined to just the surface of such deep and lovely lives, I was becoming unsatisfied. I wanted to know what they were experiencing, and why to us they feel so compelling and so—*close*. This time I allowed myself to ask them the question that is forbidden fruit: *Who* are you? Science usually steers firmly from questions about the inner lives of animals. Surely they have inner lives of some sort. But like a child who is admonished that what they really want to ask is impolite, a young scientist is taught that the animal mind—if there *is* such—is unknowable. Permissible questions are "it" questions: about where it lives, what it eats, what it does when danger threatens, how it breeds. But *always* forbidden is the one question that might open the door: Who?

There are reasons to avoid so fraught an inquiry. But the reason we least acknowledge is that the barrier between humans and animals is artificial, because humans *are* animals. And now, watching these dolphins, I was tired of being so artificially polite; I wanted more intimacy. I felt time slipping for both of us, and I did not want to risk having to say good-bye and realizing that I'd never really said hello. During the cruise I'd been reading about elephants, and elephant minds were on my own mind as I wondered about the dolphins and watched them pacing fluidly and freely in their ocean realm. When a poacher kills an elephant, he doesn't just kill the elephant who dies. The family may lose the crucial memory of their elder matriarch, who knew where to travel during the very toughest years of drought to reach the food and water that would allow them to continue living. Thus one bullet may, years later, bring more deaths. Watching dolphins while thinking of elephants, what I realized is: when others recognize and depend on certain individuals, when a death makes the difference for individuals who *survive,* when relationships define us, we have traveled across a certain blurry boundary in the history of life on Earth—"it" has become "who."

"Who" animals know *who* they are; they know who their family and friends are. They know their enemies. They make strategic alliances and cope with chronic rivalries. They aspire to higher rank and wait for their chance to challenge the existing order. Their status affects their offspring's prospects. Their life follows the arc of a career. Personal relationships define them. Sound familiar? Of course. "They" includes us. But a vivid, familiar life is not the domain of humans alone.

We look at the world through our own eyes, naturally. But by looking from the inside out, we see an inside-out world. This book takes the perspective of the world outside us—a world in which humans are not the measure of all things, a human race among other races. In our estrangement from nature we have severed our sense of the community of life and lost touch with the experience of other animals. And because everything about life occurs along a sliding scale, understanding the*human* animal becomes easier in context, seeing our human thread woven into the living web among the strands of so many others.

I'd intended to take a bit of a break from my usual writing about conservation issues, to circle back to my first love: simply seeing what animals do, and asking why they do it. I traveled to observe some of

the most protected creatures in the world—elephants of Amboseli in Kenya, wolves of Yellowstone in the United States, and killer whales in the waters of the Pacific Northwest—yet in each place I found the animals feeling human pressures that directly affect what they do, where they go, how long they live, and how their families fare. So in this book we encounter the minds of other animals *and* we listen—to what they need us to hear. The story that tells itself is not just what's at stake but *who* is at stake.

The greatest realization is that all life is one. I was seven years old when my father and I fixed up a small shed in our Brooklyn yard and got some homing pigeons. Watching how they built nests in their cubbyholes, seeing them courting, arguing, caring for their babies, flying off and faithfully returning, how they needed food, water, a home, and one another, I realized that they lived in their apartments just as we lived in ours. Just like us, but in a different way. Over my lifetime, living with, studying, and working with many other animals in their world and ours has only broadened and deepened—and reaffirmed—my impression of our shared life. That's the impression I'll endeavor to share with you in the pages that follow.

Part One
Trumpets of Elephants

Delicate and mighty, awesome and enchanted, commanding the silence ordinarily reserved for mountain peaks, great fires, and the sea.
—Peter Matthiessen, *The Tree Where Man Was Born*

Finally I saw that the very land itself had risen, that the sunbaked land had taken form as something vast and alive and was in motion. The land walked as multitudes, their strides so utterly of the earth that they seemed the source of the very dust. The cloud they raised engulfed us, seeped into every pore, coated our teeth, sifted into our minds. Both flesh and metaphor. That big.

And you could see their heads, like warriors' shields. Their great breaths, gushing in and out, resonant in the halls of their lungs. The skin as they moved, wrinkled with time and wear, batiked with the walk of ages, as if they lived within the creased maps of the lives they'd traveled. Travelers across landscapes, and through timescapes. The skin moving like swishing corduroy, textured and rough but sensitive to the slightest touch. The grind of their cobblestone molars as, sheaf by sheaf and mouthful by mouthful, they acquired the world. All the while uttering the contented purring of mounds of memories.

Their rumbles rolled through the air like distant thunder approaching, vibrating through the undulating ground and the roots of trees, rallying families and friends from the hills and rivers, sending among themselves greetings and recognitions and news of where they had been; sending to us a sign of something coming.

A mind moves a mountainous mass of muscle and bone, the brown eyes light a landscape, and one elephant rumbles in. See her squared brow, trace the tracks of snake-sized blood vessels. Heralded by her own trumpet, applauded by her own clapping ears, she strikes us as timeless and a bit sublime, aware and deliberative, peaceful and nurturing and deadly dangerous as needs arise. Wise only within the confines of her capabilities, like us. Vulnerable. As we all are.

Watch. Simply listen. They will not speak to us, but to one another they say much. Some of it, we hear. The rest is beyond words. I want to listen, to open to the possibilities.

Disproportioned ears flapping. Tough dust-crusted hide. Bizarre protruding teeth the size of human legs astride the world's most phallic nose. Such gargoyle grotesqueness should strike us as hideous. Yet in them we perceive a vast intangible beauty, at times so intense it fells us. We sense much more, much deeper. We can feel that their march across the landscape is*intentional*. We cannot deny; they are going to a place they have *in mind*.

That's where we're headed now.

The Big Question

"It was the worst year of my life," Cynthia Moss is saying over breakfast. "All the elephants over fifty years old died, except Barbara and Deborah. Most over forty died. So it's particularly amazing that Alison, Agatha, and Amelia have survived."

Alison, now fifty-one years old, is right *there,* in that clump of palms—see? Forty years ago, Cynthia Moss arrived in Kenya determined to learn the lives of elephants. The first elephant family she saw she named the "AA" family, and she named one of those elephants Alison. And there she is. Right there, vacuuming up fallen palm fruits. Astonishing.

With much luck and decent rainfall, Alison might survive another decade. And there is Agatha, forty-four years old. And this one coming closer now is Amelia, also forty-four.

Amelia continues approaching, until, rather alarmingly, she is looming so hugely in front of our vehicle that I reflexively lean inward. Cynthia leans out and talks to her in soothing tones. Amelia, practically alongside now, simply towers as she grinds palm fronds, rumbles softly, and blinks.

In the light of this egg-yolk dawn, the landscape seems an eternal ocean of grass rolling toward the base of Africa's greatest mountain, whose blue head is crowned by snow and wreathed in clouds. Through gravity-fed springs, Kilimanjaro acts like a giant water cooler, creating two miles-long marshes that make this place magnetic for wildlife and for pastoralist herders. Amboseli National Park got its name from a Maa word that refers to the ancient shallow lake bed—half the park—that seasonally glitters with the sparkle of wetness. The marshes expand and contract depending on the rains. But if the rains fail, panes of water dry to pans of dust. And then all bets are off. Just four years ago, a drought of extremes shook this place to its core.

Through times lush and calamitous, through these decades, Cynthia and these three elephants have maintained their presence, urging themselves across this landscape. Cynthia helped pioneer the deceptively complex task of simply seeing elephants doing elephant things. Longer than any other human being ever has, Cynthia has watched some of the same individual elephants living their lives.

I was expecting that, after four decades, the famous researcher might be a bit field-weary. But I found in Cynthia Moss a young woman in her early seventies, of bright blue eyes and startling bubbliness. A bit pixieish, actually. A *Newsweek*magazine writer during the 1960s, Cynthia decided, after her first visit to Africa, to chuck New York and all things familiar. She'd fallen in love with Amboseli. It's easy to see why.

Perhaps too easy. The great plain of mirages and heat waves conveys the illusion that Amboseli National Park is big. It is too small. You can easily drive across it in well under an hour. Amboseli is a postcard that Africa once mailed to itself and now keeps in a drawer marked "Parks and Reserves." Kilimanjaro, not even in the same nation, stands across an imaginary line in a place called Tanzania. The mountain and

the elephants know that it is one true country. But the 150-square-mile park serves as a central watering hole for the surrounding three thousand square miles. Amboseli elephants use an area roughly twenty times larger than the park itself. As do cattle- and goat-grazing Maasai people. The only year-round water is here. The outer lands are too dry to water them. The park is too small to feed them.

"To survive the drought," Cynthia is explaining, "different families tried different strategies. Some tried to stay close to the swamp. But they did very badly as it dried. Some went far north, many for the first time in their lives. They did better. Out of fifty-eight families, only one family did not lose anybody." One family lost seven adult females and thirteen youngsters. "Usually if an elephant goes down, the family gathers around and tries to lift it. In the drought, they had no energy. Watching them dying, seeing them on the ground in agony—"

One in four of Amboseli's elephants—four hundred out of a population of sixteen hundred—perished. Nearly every nursing baby died. About 80 percent of the zebras and wildebeests died, nearly all of the Maasai's cattle; even people died.

So when the rain returned, the surviving female elephants bereft of babies all cycled into estrus at about the same time. Result: the biggest baby boom in Cynthia's forty-year history here, about 250 little elephants born in the last two years. This is a sweet spot in time to be born an elephant in Amboseli. Lush vegetation, plenty of grass—and little competition. Water makes elephants. And water makes elephants happy.

Several happy elephants are sloshing through an emerald spring under ample palm shade. It's a little patch of paradise. With their bouncy, rubbery little trunks, the babies seem to transit the outer orbits of innocence.

"Look how fat *that* baby is," I say. The fifteen-month-old looks like a ball of butter. Four adults and three little babies are wallowing in one muddy pool, spraying water over their backs with their trunks, then sprawling on the bank. As a little one melts in pleasure, I notice the muscles around the trunk relaxing, eyes half-closing. An adolescent named Alfre lies down to rest. But three youngsters pile on, stepping on Alfre's ear. *Oomph*. The fun softens to a snooze, with babies lying asleep on their sides, adults standing protectively over them, the adults' bodies touching one another's as they doze. Feel how calm they are, knowing their family is safe here now. It's soothing just to watch.

Many people fantasize that if they won the lottery, they would quit their job and immerse themselves in leisure, play, family, parenthood, occasional thrilling sex; they'd eat when they were hungry and sleep whenever they felt sleepy. Many people, if they won the lottery and got rich quick, would want to live like elephants.

The elephants seem happy. But when elephants seem happy to us, do they really feel happy? My inner scientist wants proof.

"Elephants experience joy," Cynthia says. "It may not be human joy. But it is joy."

Elephants act joyful in the same situations that make us joyful: familiar "friends" and family, lush food and drink. So we assume they feel the way we feel. But beware of assumptions! For centuries, people's assumptions about other animals have ranged from believing that animals cast spells on people to believing that they are aware of nothing and can't even feel pain. Observe what an animal does, scientists advise, but speculation about mental experiences is meaningless, a waste of time.

Speculation about animals' mental experiences happens to be the main quest of this book. The tricky task ahead: to go only where evidence, logic, and science lead. And, to get it right.

Cynthia's free-living colleagues seem wise. They seem youthful, playful. Powerful, majestic. Innocent. All these things, they are. Inoffensive. But of all the animals, they are the ones who can wage sustained resistance to human persecution with deadly force. As we do, they strive to survive and to keep their children safe. I guess I am here because I am ready to learn, ready to ask, How are they like us? What do they teach us about ourselves?

What I don't see coming is: I have the question almost exactly backward.

Cynthia Moss is most at home in her Amboseli field camp. The camp, nestled cozily in a clearing ringed by palms, features a small cook shack and half a dozen large tents, each with a proper bed and a bit of furniture. On a recent morning, tea was late. The researcher who unzipped her tent flap to go and inquire about the tea's progress found a lion dozing on the cook shack's step, and a very awake cook behind the door.

Today the tea is on time, and over toast I have, finally, gotten round to asking Cynthia what I think is the Big Question. "What has a lifetime of watching elephants," I ask, "taught you about humanity?" I glance to make sure my recorder's light is on, then settle back a bit. Forty years of insight; this will be good.

Cynthia Moss, however, gently deflects my question. "I think of them as elephants," she says. "I'm *interested* in them as elephants. Comparing elephants to people—I don't find it helpful. I find it much more interesting trying to understand an animal as itself. How does a bird like a crow, say, with so small a brain, make the amazing decisions it makes? Comparing it to a three-year-old human child—that doesn't interest me."

Cynthia's mild objection to my question comes so unexpectedly that at first I don't fully grasp it. Then I am stunned.

As a lifelong student of animal behavior, I'd long ago concluded that many social animals—certainly birds and mammals—are fundamentally like us. I've come here to see how elephants are "like us." I am *writing this book* about how other animals are "like us." But I'd just gotten a major course correction. It took a few moments—in fact, it took days—but, like an intravenous drip, it seeped in.

Cynthia's enormous little comment implied that humans are not the measure of all things. Cynthia is traveling a higher road.

Cynthia's comment hit Reset, not just on my question but on my thinking. I'd somehow assumed that my quest was to let the animals show how much they are like us. My task now—a much harder task, a much deeper task—would be to endeavor to see *who* animals simply *are*—like us or not.

The elephants we're watching are nimbly pulling grass and brush with their trunks, rhythmically stuffing tufts and wads into their cheeks, their massive molars mightily mashing away. Thorns that can puncture a tire, palm fruits, bundles of grass—it all goes in. I once stroked a captive elephant's tongue. So soft. I don't understand how their tongues and stomachs can handle those thorns.

What I see: elephants, eating. But those words cast, as all words do, the loosest lasso around reality. We are watching "elephants," true, yet I realize with embarrassment that I know nothing about their lives.

But Cynthia does. "When you look at a group of anything—lions, zebras, elephants," Cynthia explains, "you're seeing just two flat dimensions. But once you know them individually, their personalities, who their mother was, who their kids are, it adds new dimensions." One elephant in a family might seem regal, dignified, gentle. Another will strike you as shy. Another as a bully who will be pushy to get food in sparse times; another as reserved; another as "flamboyantly" playful.

"The realization of how complex they are took me about twenty years," Cynthia continues. "Over the period that we were following Echo's family—she was about forty-five years old at the time—I saw that Enid was incredibly loyal to her, Eliot was the playful one, Eudora was flaky, Edwina was unpopular, and so on. And slowly I realized that I'd begun knowing what would happen next. I was taking my cues from Echo herself. I was understanding her leadership—as her family was understanding it!"

I look at the elephants.

Cynthia adds, "It made me realize how totally super aware they are of what we're doing."

Super aware? They seem oblivious.

"Elephants don't *seem* aware of details," Cynthia explains, "until something familiar changes." One day a cameraman working with Cynthia decided that for a different angle, he'd position himself *underneath* the research vehicle. The oncoming elephants, who usually just passed by the vehicle, immediately noticed, stopped, and stared. Why was a human under the car? A male named Mr. Nick snaked his slithering, sniffing trunk under there to investigate. He was not aggressive and did not try to pull the man out; he was just curious. Another day, when the vehicle appeared with a special door designed for filming, elephants came exploring, actually touching the new door with their trunks.

Trunks are strangely familiar, familiarly strange things. Extremely sensitive and unimaginably strong, they can pick up an egg without breaking it—or kill you with an easy smack. An elephant's trunk terminates in two almost fingery tips, like a hand in a mitten. The way elephants use their trunks helps make them seem familiar, like one-armed people, hiding their hideous nose in plain sight and affecting its transformation. Can we ever get over how strangely wonderful, how wonderfully beautiful? Segmented like the tree trunks of the palms under which they sometimes rest, the trunk is an elephant's Swiss Army knife. Rounded on the outer edge, flattened on the inner, a great mine-sweeping, water-hosing, mud-flinging, dust-deviling, air-testing, food-gathering, friend-greeting, infant-rescuing, baby-reassuring caterpillar of a nose. "It has double hoses for sucking in and spraying out water or dust," wrote Oria Douglas-Hamilton. Journalist Caitrin Nicol adds that a trunk does "what a person would rely on a combination of eyes, nose, hands, and machinery to do." Yoshihito Niimura of the University of Tokyo offers: "Imagine having a nose on the palm of your hand. Every time you touch something, you smell it."

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They're firmly wrapping those wondrous noses around sheaves of grass, and when the soil is reluctant to surrender the clumps, they give a little kick to break them. The food is freed and lifted. Sometimes they shake soil from roots. The eating is slow, relaxed. Often they slightly swing the trunk for a little momentum in pitching the next mouthful into their triangular jaw. Sometimes they pause for a moment, seeming thoughtful. Perhaps they're just stopping to listen, monitoring indicators of their children's well-being, family safety, and possible danger.

I'd love to know how much overlap there is right now between what I am sensing and what the nearest elephant is sensing. Our input channels are similar: sight, scent, sound, touch, taste; what these senses bring to our attention must broadly overlap. We can see the same hyenas, say, as do the elephants and hear the same lions. But we, like most other primates, are very visual; elephants, like most other mammals, have an acute sense of smell. Their hearing is excellent, too.

I'm sure the elephants here are sensing much more than I; this is their home, and they have a history here. I can't tell what's going on in their heads. Nor can I tell what Cynthia's thinking as, quietly and intently, she observes.

The Same Basic Brain

Four rounded babies are following their massive mothers across a broad, sweet-smelling grassland. The adults, striding with deliberate purpose as though keeping an appointment, are nodding toward the wide, wet marsh where about a hundred of their compatriots are mingling. Families commute daily between sleeping areas in brush-thicketed hills and the marshes. For many it's ten miles (fifteen kilometers) round-trip. Between here and there and sun to sun, a lot can happen.

Our job: travel around in the morning, finding them as they're coming in; see who's where. The idea is simple, but there are dozens of families, hundreds of elephants.

"You have to know *everyone*. Yes!," Katito Sayialel is saying. Her lilting accent is as clear and light as this African morning. A native Maasai, tall and capable, Katito has been studying free-living elephants with Cynthia Moss for more than two decades.

How many is "everyone"?

"I can recognize all the adult females. So," Katito considers, "nine hundred to one thousand. Say nine hundred. Yes."

Recognizing hundreds and hundreds of elephants on sight? *How* is this possible? Some she knows by marks: the position of a hole in an ear, for instance. But many, she just glances at. They're that familiar, like your friends are.

When they're all mingling, you can't afford to say, "Wait a minute; who was *that*?" Elephants themselves recognize hundreds of individuals. They live in vast social networks of families and friendships. That's why they're famous for their memory. They certainly recognize Katito.

"When I first arrived here," Katito recalls, "they heard my voice and knew I was a new person. They came to smell me. Now they know me."

Vicki Fishlock is here, too. A blue-eyed Brit in her early thirties, Vicki studied gorillas and elephants in the Republic of the Congo before bringing her doctoral diploma here to work with Cynthia. She's been here for a couple of years and has no plans to go anywhere else if she can help it. Usually Katito takes attendance and rolls on. Vicki stays and watches behavior. Today we're out on a bit of a jaunt; they're kindly orienting me.

Just outside the high "elephant grass," five adults and their four young babies are selecting a shorter and far less abundant grass. It's more work; it must taste better. They haven't read a treatise on the nutritional content of grass. In a sense, their subconscious tells them what to do by rewarding them with pleasure for making the richer choice. It works the same for us—that's why sugar and fat taste so good.

The grazing elephants trail a train of egrets and an orbiting galaxy of swirling swallows. The birds rely on elephants to stir up insects as, like great gray ships, they plow through the grassy sea. Light shifts on their wide, rolling backs like sun on ocean waves. Sounds of ripping, chewing. Flap of ear. Plop of dung. The buzz of flies and swoosh of swatting tails. Soft tom-tom footfalls. And, mostly, the quiet ways of ample beasts. Wordlessly they speak of a time before human breath. They get on with their lives, ignoring us.

"They're not ignoring us," Vicki corrects. "They have an expectation of politeness, and we're fulfilling it. So they're not paying us any mind.

"They weren't always like this to me," she adds. "When I started, they were used to vehicles snapping a few pictures and moving along. They were not wildly happy about me just sitting and watching them for long periods. They expect you to behave a certain way. If you don't, they will let you know that they notice. Not in a threatening way. You might get a head shake and a look like, 'What's *your* problem?' "

Through hummocks and the bush, in our vehicle we amble with them. An elephant named Tecla, walking just a few yards ahead to our right, suddenly turns, trumpets, and generally objects to us. To our left, a young elephant wheels and screams.

"Sorry, sorry, sorry," Katito says to Tecla. She brakes to a stop, turning off the ignition. It appears to me that we have separated this mother from her baby. But Tecla is not the mother. Another female, whose two breasts are full of milk, runs over, cutting just in front of us. *This one* is actually the mother. Basically Tecla was communicating, "The humans are getting between you and your baby; come and *do* something."

"Elephants, they are like human beings," offers Katito. "Very intelligent. I like their characters. I like the way they behave and hold their family, the way they protect. Yes."

Like human beings? In some fundamental ways we seem—we *are*—so similar. But I can see Cynthia wagging a finger of caution, reminding me that elephants are not us; they are themselves.

Mother rejoins baby, restoring order. We slowly proceed. When one individual knows another's relationship to a third—as Tecla knows who the baby's mother is—it's called "understanding third-party relationships." Primates understand third-party relationships too, and so do wolves, hyenas, dolphins, birds of the crow family, and at least some parrots. A parrot, say, can act jealous of its keeper's spouse. When the vervet monkeys that are common around camp hear an infant's distress call, they instantly look to the infant's mother. They know exactly who they *and everyone else* are. They understand

precisely who is important to whom. When free-living dolphin mothers want young ones to stop interacting with humans, the mothers sometimes direct a tail slap at the *human* who has the baby's attention, signaling, in effect, "End the game; I need my child's attention." When the dawdling youngsters are interacting with dolphin researcher Denise Herzing's graduate assistants, their mothers occasionally direct these—what could we call them: reprimands?—at *Herzing herself.* This shows that the dolphins understand that Dr. Herzing is the leader of all the humans in the water. For free-living creatures to perceive rank-order in humans—just astonishing.

"What I find most amazing about it," Vicki sums up, "is that we *can* understand each other. We learn the elephants' invisible boundaries. We can sense when it's time to say, 'I don't want to push her.' Words like 'irritated,' 'happy' or 'sad' or 'tense'—they really *do* capture what that elephant is experiencing. We have a shared experience because," she adds with a twinkle, "we've all got the same basic brain."

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I look at these elephants, so relaxed about us that they're passing within a couple of paces of our vehicle. Vicki says, "This is one of the greatest privileges, moving along with elephants who are okay with you being here. These guys all go into Tanzania, where there are poachers everywhere. But here—." Vicki talks to them in soothing tones, saying, "Hello, darling" and "Aren't *you* a sweet girl." Vicki recalls that after the famed Echo's death, her family went away for three months under the leadership of Echo's daughter Enid. "And when they returned, I started saying things like 'Hello, I missed you—' And suddenly Enid's head *swept* up, and she gave this *huge* rumble; her ears were flapping and they all came around, close enough that I could have touched them, and the glands on all their faces were streaming with emotion. That's trust. I felt as though," Vicki says fondly, "I was getting an elephant hug."

Once, I was watching elephants with another scientist in another African reserve. Several adult elephants were resting with their young in the shade of a palm, fanning their ears in the heat. The scientist opined that the elephants we were watching "might simply be moving to and away from heat gradients, without experiencing anything at all." He declared, "I have no way of knowing whether that elephant is any more conscious than this bush."

No way of knowing? For starters, a bush behaves quite differently from an elephant. The bush shows no sign of having a mental experience, of showing emotions, of making decisions, of protecting its offspring. On the other hand, humans and elephants have nearly identical nervous and hormonal systems, senses, milk for our babies; we both show fear and aggression appropriate to the moment. Insisting that an elephant might be no more conscious than a bush isn't a better explanation for the elephants' behavior than concluding that an elephant is aware of what's going on around it. My colleague thought he was being an objective scientist. Quite the opposite; he was forcing himself to ignore the evidence. That's not scientific—at all. Science is about evidence.

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At issue, here, is: Who are we here with? What kinds of minds populate this world?

This is hazardous terrain. We won't assume that other animals are or aren't conscious. We'll look at evidence and go where it leads. It's too easy to assume *wrongly,* then carry those assumptions around for, say, centuries.

In the fifth century b.c.e., the Greek philosopher Protagoras pronounced, “Man is the measure of all things.” In other words, we feel entitled to ask the world, “What good are you?” We assume that we are the world’s standard, that all things should be compared to us. Such an assumption makes us overlook a lot. Abilities said to “make us human”—empathy, communication, grief, toolmaking, and so on—all exist to varying degrees among other minds sharing the world with us. Animals with backbones (fishes, amphibians, reptiles, birds, and mammals) all share the same basic skeleton, organs, nervous systems, hormones, and behaviors. Just as different models of automobiles each have an engine, drive train, four wheels, doors, and seats, we differ mainly in terms of our outside contours and a few internal tweaks. But like naïe car buyers, most people see only animals’ varied exteriors.

We say “humans and animals” as though life falls into just two categories: us and all of them. Yet we’ve trained elephants to haul logs from forests; in laboratories we’ve run rats through mazes to study learning, let pigeons tap targets to teach us Psychology 101; we study flies to learn how our DNA works, give monkeys infectious diseases to develop cures for humans; in our homes and cities, dogs have become the guiding protectors for humans who see only by the light of their four-legged companions’ eyes. Throughout all this intimacy, we maintain a certain insecure insistence that “animals” are not like us—though we are animals. Could any relationship be more fundamentally miscomprehended?

To understand elephants we must delve into topics like consciousness, awareness, intelligence, and emotion. When we do, we realize with dismay that there aren’t standard definitions. The same words mean different things. Philosophers, psychologists, ecologists, and neurologists are the blind men all feeling and describing different parts of the same proverbial elephant. But, silver lining: their lack of agreement frees us to walk out of the academic bar brawls into clearer air and a wider view, and do a little of our own thinking.

So let’s start by defining consciousness. The standard we’ll use is: Consciousness is *the thing that feels like something*. That simple definition comes from Christof Koch, who heads the Allen Institute for Brain Science, in Seattle. Cut your leg, that’s physical. If the cut hurts, you’re conscious. The part of you that knows that the cut hurts, that feels and thinks, is your *mind.* Relatedly, the ability to feel sensations is called *sentience*. The sentience of humans, elephants, beetles, clams, jellyfish, and trees ranges on a sliding scale, from complex in people to seemingly none in plants. *Cognition* refers to the capacity to perceive and acquire knowledge and understanding. *Thought* is the process of considering something that’s been perceived. Like everything about living things, thought also happens on a wide-ranging sliding scale; thinking can take the form of a jaguar assessing how to approach a wary peccary from directly behind, an archer aiming at a target, or a person considering a proposal of marriage. Sentience, cognition, and thinking are overlapping processes of conscious minds.

Consciousness is a bit overrated. Heartbeat, breathing, digestion, metabolism, immune responses, healing of cuts and fractures, internal timers, sexual cycling, pregnancy, growth—all function without consciousness. Under general anesthesia we remain very much alive though not conscious. And during sleep our unconscious brains are working hard, cleansing, sorting, rejuvenating. Your body is run by a competent staff that’s been on the job since before the company acquired consciousness. Too bad you can’t personally meet your team.

We might imagine consciousness as the computer screen we see and interact with, one run by software codes that we can’t detect and don’t have a clue about. Most of the brain runs in the dark. As science

author and former *Rolling Stone* magazine editor Tim Ferris wrote, “One’s mind neither controls nor comprehends most of what’s going on in one’s brain.”

Why be conscious at all? Trees and jellyfish do just fine, yet may not experience sensations. Consciousness seems necessary when we must judge things, plan, and make decisions.

How does consciousness—elephant, human, whatever—arise in the mush of our physical cells and the mesh of their electrical and chemical impulses? How does a brain create a mind? No one knows how nerve cells, also called neurons, create consciousness. What we know: consciousness can be affected by brain damage. So consciousness does happen in the brain. As Nobel Prize–winning mind-brain scientist Eric R. Kandel wrote in 2013, “Our mind is a set of operations carried out by our brain.” Consciousness seems to somehow result from, and depend on, neurons networking.

How many networked neurons are needed? No one knows where the most rudimentary consciousness lurks. Jellyfish, probably not conscious; worms, maybe so. With about one million brain cells, honeybees recognize patterns, scents, and colors in flowers and remember their locations. The bees’ “waggle dance” communicates to their fellow hivemates the direction, distance, and richness of nectar they’ve found. Bees “show superb expertise,” says famed neurologist Oliver Sacks. Honeybees will interrupt a colleague’s waggle dance if they’ve experienced trouble at the same flower source, such as a brush with a predator like a spider. Honeybees subjected by researchers to simulated attack show, said researchers, “the same hallmarks of negative emotions that we find in humans.” Even more intriguingly, honeybee brains contain the same “thrill-seeker” hormones that in human brains drive some people to consistently seek novelty. *If* those hormones do deliver some tingle of pleasure or motivation to the bees, it means bees are conscious. Certain highly social wasps can recognize individuals by their faces, something previously believed the sole domain of a few elite mammals. “It is increasingly evident,” says Sacks, “that insects can remember, learn, think, and communicate in quite rich and unexpected ways.”

Can elephants, insects, or any other creature really be *conscious* without the big wrinkly cerebral cortex where human thinking happens? Turns out, yes; even humans can be. A thirty-year-old man named Roger lost about 95 percent of his cortex to a brain infection. Roger can’t remember the decade before the infection, can’t taste or smell, and has great difficulty forming new memories. Yet he knows who he is, recognizes himself in a mirror and in photographs, and generally acts normal around people. He can use humor and can feel embarrassed. All with a brain that does not resemble a human brain.

The common human notion that humans alone experience consciousness is backward. Human senses have evidently dulled during civilization. Many animals are superhumanly alert—just watch these elephants when anything changes—their detection equipment exquisitely tuned for the merest crackle of danger or whiff of opportunity. In 2012, scientists drafting the Cambridge Declaration on Consciousness concluded that “all mammals and birds, and many other creatures, including octopuses,” have nervous systems capable of consciousness. (Octopuses use tools and solve problems as skillfully as do most apes—and they’re *mollusks*.) Science is confirming the obvious: other animals hear, see, and smell with their ears, eyes, and noses; are frightened when they have reason for fright and feel happy when they appear happy.

As Christof Koch writes, “Whatever consciousness is . . . dogs, birds, and legions of other species have it. . . . They, too, experience life.”

My dog Jude was sleeping on the rug, dreaming of running, his wrists flicking, when he let out a long, eerily muffled howl. Chula, my other dog, instantly piqued, trotted over to Jude. Jude startled awake and leapt to his feet barking loudly, just as a person wakes from a night terror with a vivid image and a scream, taking a few moments to get oriented.

Each line we attempt to draw crisply, as between elephants and humans, nature has already blurred with the smudgy brush of deep relation. But what about living things with *no* nervous system? That *is* a dividing line. Isn't it?

With no apparent nervous system, plants *make the same chemicals*—such as serotonin, dopamine, and glutamate—that serve as neurotransmitters and help create mood in animals, including humans. And plants have signaling systems that work basically as do animals', though slower. Michael Pollan observes, a bit metaphorically, that "plants speak in a chemical vocabulary we can't directly perceive or comprehend." That's not to say that plants experience sensations, necessarily, but they do some intriguing things. We detect chemicals by smell and taste; plants sense and respond to chemicals in air, soil, and on themselves. Plants' leaves turn to track the sun. Growing roots approaching an obstacle or toxin sometimes alter course *prior* to contact. Plants have reportedly responded to the *recorded* sound of a munching caterpillar by producing defensive chemicals. Plants attacked by insects and herbivores emit "distress" chemicals, causing adjacent leaves and neighboring plants to mount chemical defenses, and alerting insect-killing wasps to move in, blunting the attack. Flowers are plants' way of telling bees and other pollinators that nectar is ready.

But except for insectivorous and sensitive-leaved plants, most plants behave too slowly for the human eye. Gazing across a meadow, Pollan wrote, he "found it difficult to imagine the invisible chemical chatter, including the calls of distress, going on all around—or that these motionless plants were engaged in any kind of 'behavior' at all." Yet Charles Darwin concluded his book *The Power of Movement in Plants* by noting, "It is hardly an exaggeration to say that the tip of the radicle [root] . . . acts like the brain of one of the lower animals . . . receiving impression from the sense organs and directing the several movements." Granted, we are treading into a vast minefield of potential misinterpretation. Like Cynthia Moss with elephants, the late botanist Tim Plowman wasn't interested in comparing plants to people. He appreciated them as plants. "They can eat light," he said. "Isn't that enough?"

My main reason for getting into the weeds here is to realize that, compared to the strangeness of plants and the large differences between plants and animals, an elephant nursing her baby is so like us that she might as well be my sister.

Distinctly Human?

In grassy groves of sunlight, little baby elephants are trying to get the hang of their trunks, then seeking that reassuring nipple.

"Look at how friendly these two families are being," Vicki is saying. "Elin decided to move closer to the water, Eloise agreed, then she waited as the whole group moved up. They've obviously chosen to just spend time together today."

Obviously.

What causes elephant friendships? Certain young ones like the same games and always play together. Certain older individuals are "compatible," Vicki says, in "when they want to eat, when they want to sleep, where they like to go, what kinds of foods they like."

Compatible. Interesting. Difficult enough in humans.

The best answer to the question "Is an elephant conscious?" is that *all* the evidence indicates widespread consciousness. So the interesting question now is "What is consciousness like for other animals?" Consciousness might seem like a no-brainer to most pet lovers, but I can almost hear some people say, "Not so fast." Many researchers and science writers insist that we simply have no way to access the mental experience of animals. I understand where they're coming from. But I think they're mistaken. We now know more than we did.

Animal behavior is a young science. The simple fact that chickens establish a "pecking order" was not formally recognized until the 1920s. Also in the 1920s, Margaret Morse Nice first discovered that songbirds defend territories—and that's one of the most basic reasons they sing. To establish animal behavior as a science, the pioneering behaviorists of the mid-twentieth century, such as Konrad Lorenz, Niko Tinbergen, and Karl von Frisch, had to purge centuries of folklore and superstition (owls presage death, wolves are the devil's familiars) and fables that posed animals as caricatures of human impulses (grasshoppers are lazy, tortoises persistent, foxes tricky).

The new scientists were wonderful observers. They succeeded in stripping metaphorical projections that had built up on many animals like old coats of paint. Their approach: describe just what you see. They had to prove that watching animals could be objective work, and they did. For their studies of honeybee dance-language, fish courtship, and how baby geese "imprint" on the first moving object they see, von Frisch, Tinbergen, and Lorenz shared a Nobel Prize. The three curious naturalists must have felt euphoric.

But there was no scientific way to approach a question such as "What does an elephant feel when she nurses her baby?" There was nothing to go on. No one had watched free-living animals living their real lives. Brain science was in its infancy. So speculation about their feelings could only draw on our own feelings—leading ourselves in circles. The new scientists insisted on observation. Speculation was messy guessing that one had to avoid. We can observe *what* an elephant does. There's no way to know *how* the animal feels. So just observe how many minutes the elephant nurses its offspring. Even the noted elephant communication expert Joyce Poole has explained, "I was trained to view non-human animals as behaving in ways that don't necessarily involve any conscious thinking."

My own initiation into formal training included the classic directive: Do not attribute human mental experiences—thoughts or emotions—to other animals. (Doing so is called "anthropomorphism.") I appreciate that. We shouldn't assume that animals (or, for that matter, lovers, spouses, kids, or parents) "must be" thinking and feeling just as we would if we were them. They're not us.

But it wasn't that the question of animal thoughts and emotions awaited better data; it was that the whole subject became verboten. The observational approach hardened into a rigid mental straitjacket. Professional behaviorists could describe what they saw, period. Description—and *only* description—became "the" science of animal behavior. Wondering what feelings or thoughts might motivate behavioral acts became totally taboo. Radio blackout. You could say, "The elephant positioned herself

between her calf and the hyena." But if you said, "The mother positioned herself to protect her baby from the hyena," *that* was out of bounds; it was anthropomorphic. We can't know the mother's intent. And this was stifling.

In establishing the study of behavior as a science, it had originally been helpful to make "anthropomorphism" a word that raised a red flag. But as lesser intellects followed the Nobel Prize–winning pioneers, "anthropomorphism" became a pirate flag. If the word was hoisted, an attack was imminent. You wouldn't get your work published. And in the academic realm of publish or perish, jobs were at stake.

Even the most informed, logical inferences about other animals' motivations, emotions, and awareness could wreck your professional prospects. The mere *question* could. In the 1970s, a book humbly titled *The Question of Animal Awareness*caused such an uproar that many behaviorists relegated its author, Donald Griffin, to the fringes of the profession. Griffin was no upstart; he'd been famous for decades as the luminary who'd solved the problem of how bats use sonar to navigate. So he was a bit of a genius, actually. But raising the Question was simply too much for many orthodox colleagues. Suggesting that other animals can feel *anything* wasn't just a conversation stopper; it was a career killer. In 1992, readers of the exclusive journal *Science* were warned by one academic writer that studying animal perceptions "isn't a project I'd recommend to anyone without tenure." It was no joke. Seriously.

By banning what was considered anthropomorphic, the behaviorists perpetuated the opposite error. They helped institutionalize the all-too-human notion that only humans are conscious and can feel anything. (The sense that everything revolves around us is called anthropo*centrism.*) Certainly, projecting feelings onto other animals can lead to us misunderstanding their motivations. But denying that they *have* any motivation *guarantees* that we'll misunderstand it.

Not *assuming* that other animals have thoughts and feelings was a good start for a new science. Insisting they did *not* was bad science. Peculiarly, many behaviorists—who are biologists—chose to overlook the core process of biology: each newer thing is a slight tweak on something older. Everything humans do and possess came from somewhere. Before humans could be assembled, evolution needed to have most of the parts in stock, and those parts were developed for earlier models. We inherited them.

Witness, for instance, the journey of jointed legs: from arthropod to quadruped to bipedal people. A frog's upper rear leg bone is a femur, no less than in a chicken, as in a child. Thus we trace a transformation from amphibian to flying bird to triathlete. A creature that sleeps is sleeping, species notwithstanding. One that sneezes is sneezing. Species differ—but are often not very different. Only humans have human minds. But believing that only humans have minds is like believing that because only humans have human skeletons, only humans have skeletons. Of course, we can see elephants' skeletons. We can't see their minds. But we can see their nervous systems, and we observe the workings of minds in the logic and limits of behaviors. From skeletons to brains, the principle is the same, and if we were to assume anything, it might be that minds, too, exist on a sliding scale.

That's not what happened. Professional animal behaviorists inserted a hard divider between the nervous system of the entire animal kingdom and one of its species: humans. Denying the possibility that any other animals have any thoughts or feelings reinforced what we all most want to hear: We are special. We are utterly different. Better. Best. (Talk about projecting!)

For decades, scientists who stepped out of bounds continued to face withering scorn from their colleagues. A few new revolutionaries who were *not* trained behaviorists—Jane Goodall being perhaps the first such pioneer—experienced just that. Goodall recalls that after her first studies of chimpanzees, when she later enrolled as a doctoral student at Cambridge, "It was a bit shocking to be told I'd done everything wrong. Everything. I shouldn't have given them names. I couldn't talk about their personalities, their minds or their feelings. Those are unique to us."

To this day, "anthropo"-phobia remains widespread among behavioral scientists and science writers who ape the outdated hypercaution of the orthodox behaviorists who trained them. We are *not* to attribute to other animals any emotions that humans have, they say to each other—and to their students, who parrot their rigidity and feel professional.

But what is a "human" emotion? When someone says you can't attribute human sensations to animals, they forget that human sensations *are* animal sensations. Inherited sensations, using inherited nervous systems.

Simply deciding that other animals can't have any emotions that humans feel is a cheap way to get a monopoly on all the world's feelings and motivations. People who've systematically watched or known animals realize the absurdity of this. But many others still don't. "The dilemma remains," author Caitrin Nicol noted as I was writing this book, "how to get an accurate understanding of the animals' nature and (if appropriate) emotions, without imposing on them assumptions born of a distinctly human understanding of the world."

But tell me, what "distinctly human understanding" hampers our understanding of other animals' emotions? Is it our sense of pleasure, pain, sexuality, hunger, frustration, self-preservation, defense, parental protection? Ours doesn't *prevent us*from understanding theirs; it helps us. But okay; doesn't that lead us right back to mistaken assumptions? Not if we incorporate all we've learned. Consider romantic love. It is obvious that elephants, with their matriarchal families, wandering males, absence of male-female pair bonds, and no male care of young, don't have romantic love. And because it's so, elephant researchers don't make that mistake. Thus, evidence and logic can be trustworthy guides. In fact, one term for evidence + logic is: "science."

We never seem to doubt that an animal acting hungry feels hungry. What reason is there to disbelieve that an elephant who seems happy is happy? We recognize hunger and thirst while animals are eating and drinking, exhaustion when they tire, but deny them joy and happiness as they're playing with their children and their families. The science of animal behavior has long operated with that bias—and that's unscientific. In science, the simplest interpretation of evidence is often the best. When elephants seem joyous in joyful contexts, joy is the simplest interpretation of the evidence. Their brains are similar to ours, they make the same hormones involved in human emotions—and that's evidence, too. So let's not assume. But let's not bury evidence.

When a dog is scratching the door, some humans would insist that we *cannot know* whether the dog "wants" to go out. (Meanwhile, of course, your dog is thinking, "Hellooo—let me out; I don't want to pee in the house.") Obviously, the dog*wants* to go out. And if you insist on ignoring the evidence, have a mop handy.

Elephants form deep social bonds developed through deep time. Parental care, satisfaction, friendship, compassion, and grief didn't just suddenly appear with the emergence of modern humans. All began their journey in pre-human beings. Our brain's provenance is inseparable from other species' brains in the long cauldron of living time. And thus, so is our mind