

RATIONALITY

WHAT IT IS

WHY IT SEEMS SCARCE

WHY IT MATTERS

STEVEN PINKER

VIKING

HOW RATIONAL AN ANIMAL?

Man is a rational animal. So at least we have been told. Throughout a long life I have searched diligently for evidence in favor of this statement. So far, I have not had the good fortune to come across it.

—BERTRAND RUSSELL¹

He that can carp in the most eloquent or acute manner at the weakness of the human mind is held by his fellows as almost divine.

—BARUCH SPINOZA²

Homo sapiens means wise hominin, and in many ways we have earned the specific epithet of our Linnaean binomial. Our species has dated the origin of the universe, plumbed the nature of matter and energy, decoded the secrets of life, unraveled the circuitry of consciousness, and chronicled our history and diversity. We have applied this knowledge to enhance our own flourishing, blunting the scourges that immiserated our ancestors for most of our existence. We have postponed our expected date with death

from thirty years of age to more than seventy (eighty in developed countries), reduced extreme poverty from ninety percent of humanity to less than nine, slashed the rates of death from war twentyfold and from famine a hundredfold.³ Even when the ancient bane of pestilence rose up anew in the twenty-first century, we identified the cause within days, sequenced its genome within weeks, and administered vaccines within a year, keeping its death toll to a fraction of those of historic pandemics.

The cognitive wherewithal to understand the world and bend it to our advantage is not a trophy of Western civilization; it's the patrimony of our species. The San of the Kalahari Desert in southern Africa are one of the world's oldest peoples, and their foraging lifestyle, maintained until recently, offers a glimpse of the ways in which humans spent most of their existence.⁴ Hunter-gatherers don't just chuck spears at passing animals or help themselves to fruit and nuts growing around them.⁵ The tracking scientist Louis Liebenberg, who has worked with the San for decades, has described how they owe their survival to a scientific mindset.⁶ They reason their way from fragmentary data to remote conclusions with an intuitive grasp of logic, critical thinking, statistical reasoning, causal inference, and game theory.

The San engage in persistence hunting, which puts to use our three most conspicuous traits: our two-leggedness, which enables us to run efficiently; our hairlessness, which enables us to dump heat in hot climates; and our big heads, which enable us to be rational. The San deploy this rationality to track the fleeing animals from their hoofprints, effluvia, and other spoor, pursuing them until they keel over from exhaustion and heat stroke.⁷ Sometimes the San track an animal along one of its habitual pathways, or, when a trail goes cold, by searching in widening circles around the last known prints. But often they track them by reasoning.

Hunters distinguish dozens of species by the shapes and spacing of their tracks, aided by their grasp of cause and effect. They may infer that a deeply pointed track comes from an agile springbok, which needs a good grip, whereas a flat-footed track comes from a heavy kudu, which has to support its weight. They can sex the animals from the configuration of their tracks and the relative location of their urine to their hind feet and droppings. They use these categories to make syllogistic deductions: steenbok and duiker can be run down in the rainy season because the wet sand forces open their hooves and stiffens their joints; kudu and eland can be run down in the dry season because they tire easily in loose sand. It's the dry season and the animal that left these tracks is a kudu; therefore, this animal can be run down.

The San don't just pigeonhole animals into categories but make finer-grained logical distinctions. They tell individuals apart within a species by reading their hoofprints, looking for telltale nicks and variations. And they distinguish an individual's permanent traits, like its species and sex, from transient conditions like fatigue, which they infer from signs of hoof-dragging and stopping to rest. Defying the canard that premodern peoples have no concept of time, they estimate the age of an animal from the size and crispness of its hoofprints, and can date its spoor by the freshness of tracks, the wetness of saliva or droppings, the angle of the sun relative to a shady resting place, and the palimpsest of superimposed tracks from other animals. Persistence hunting could not succeed without those logical niceties. A hunter can't track just any gemsbok from among the many that have left tracks, but only the one he has been pursuing to exhaustion.

The San also engage in critical thinking. They know not to trust their first impressions, and appreciate the dangers of seeing what they want to see. Nor will they accept arguments from authority: anyone,

including a young upstart, may shoot down a conjecture or come up with his own until a consensus emerges from the disputation. Though it's mainly the men who hunt, the women are just as knowledgeable at interpreting spoor, and Liebenberg reports that one young woman, !Nasi, "put the men to shame."⁸

The San adjust their credence in a hypothesis according to how diagnostic the evidence is, a matter of conditional probability. A porcupine foot, for instance, has two proximal pads while a honey badger has one, but a padprint may fail to register on hard ground. This means that though the probability that a track will have one padprint given that it was made by a honey badger is high, the inverse probability, that a track was made by a honey badger given that it has one padprint, is lower (since it could also be an incomplete porcupine track). The San do not confuse these conditional probabilities: they know that since two padprints could only have been left by a porcupine, the probability of a porcupine given two padprints is high.

The San also calibrate their credence in a hypothesis according to its prior plausibility. If tracks are ambiguous, they will assume they come from a commonly occurring species; only if the evidence is definitive will they conclude that they come from a rarer one.⁹ As we shall see, this is the essence of Bayesian reasoning.

Another critical faculty exercised by the San is distinguishing causation from correlation. Liebenberg recalls: "One tracker, Boroh//xao, told me that when the [lark] sings, it dries out the soil, making the roots good to eat. Afterwards, !Nate and /Uase told me that Boroh//xao was wrong—it is not the *bird* that dries out the soil, it is the *sun* that dries out the soil. The bird is only *telling* them that the soil will dry out in the coming months and that it is the time of the year when the roots are good to eat."¹⁰

The San use their knowledge of the causal texture of their environ-

ment not just to understand how it is but to imagine how it might be. By playing out scenarios in their mind's eye, they can think several steps ahead of the animals in their world and devise intricate snares to trap them. One end of a springy branch is anchored in the ground and the stick is bent in half; the other is tied to a noose camouflaged with twigs and sand and held in place by a trigger. They place the snares at the openings of barriers they have built around an antelope's resting place, and guide the animal into the deadly spot with a hurdle the antelope must clear. Or they lure an ostrich to a snare by spotting its tracks under a camelthorn tree (whose pods are an ostrich delicacy) and leaving a conspicuous bone that's too big for the ostrich to swallow, which draws its attention to a smaller but still unswallowable bone, which leads to a still smaller bone, the bait in the snare.

Yet for all the deadly effectiveness of the San's technology, they have survived in an unforgiving desert for more than a hundred thousand years without exterminating the animals they depend on. During a drought, they think ahead to what would happen if they killed the last plant or animal of its kind, and they spare the members of the threatened species.¹¹ They tailor their conservation plans to the different vulnerabilities of plants, which cannot migrate but recover quickly when the rains return, and animals, which can survive a drought but build back their numbers slowly. And they enforce these conservation efforts against the constant temptation of poaching (everyone feeling they should exploit the scarce species, because if they don't, everyone else will) with an extension of the norms of reciprocity and collective well-being that govern all their resources. It is unthinkable for a San hunter not to share meat with an empty-handed bandmate, or to exclude a neighboring band driven from their drought-stricken territory, since they know that memories are long and some day fortunes may reverse.