Mammals and the Further Rise of Mind

By Howard Bloom.

History of the Global Brain, Part VI

It's currently popular in evolutionary psychology to believe that the modern mind evolved in the Pleistocene, the hunter-gatherer stage of man's existence. Yet most of what we are, of our personal emotions, our ways of doing things, and the manner in which we transmit and sum them, we share with far more primitive relatives.

Sara Rogenhofer

Memes are one key to the next jump in networking. And memes come in two stripes: implicit, that means those which belong to the animal brain; and explicit, those which depend on hominid neural add-ons, the cranial gizmos responsible for syntactic speech.

Implicit memes - the ones transferred by spiny lobsters, birds, octopi and squid - are housed in a very old part of the brain indeed. Yet they dominate our lives, handling everything from the way we drive to our autopilot greetings, quarrels, reconciliations, unspoken cultural quirks, frustrations, and our joys. Even language is less our monopoly than we think. And the very queen of the brain's humanity, the cerebral cortex, home of that narrative summarizer we call our consciousness, is not entirely human either.

So before we can understand ourselves, we must stick to our task and continue to dissect the past. We are new, but not as startlingly so as we would like to think.

1 Mammal Sociality

Mammals appeared 210 million years ago. Vertebrate paleontologists have closed their eyes to the rise of mammal sociality. They have a good excuse. The fossil record isn't kind to those drawn to a sociological prize. Ancient mammals are almost never found intact and thronged like trilobites. Instead a triumphal dig turns up an isolated bone or two. Perhaps a single shin or tooth. Fleshing out the shape of the creature who left behind these pitiful remains is almost beyond the grasp of the finest explicit human brains. Only Argentina's Jose Bonaparte seems to have found half a dozen early mammals huddled together in a truly ancient burrow. And even this jewel failed to wrench his colleagues from the rut of their routine pursuits.

Way back in 1982, John F. Eisenberg stepped bravely from the paleontological pack and summed up his theories on mammalian collegiality in an article he wrote for the "Oxford Companion to Animal Behavior". Though Eisenberg has abandoned the quest for the origins of social networking since then, he made several important claims which have been echoed by other scientists in more recent years. Among them, that gregariousness between multi-celled eukaryotes must at the latest have begun with the birth of sexuality, some 800,000 years before the first mammal ever appeared. Said Eisenberg, sexuality forces animals of opposite gender to get together. No meeting, no mating.

Eisenberg put forth another proposition. To guarantee that discombobulated creatures do not miss their tryst by a month or two, the beings must communicate and synchronize. Courtship struts and battles set individuals to a public timer much like the clock which orchestrates computer components so they can waltz together. Flaring armored skulls and other signs of mating tournaments appear in abundance among dinosaurs. Brontotheres, behemoths with the horns and bodies of rhinoceroses, continued this Jurassic tradition. But brontotheres were not saurians. They were mammalians. Their armaments clearly showed that they were ticking to a social metronome.

The sexual embrace led to another superorganismic braid, that which bound the generations together. Quoth Eisenberg, parents and their young "can...exchange...stimuli which coordinate their activities." Among mammals, contact between mothers and their brood was cemented by a unique form of food relay. Matriarchs shuttled the nutritional mix we know as milk from a specialized gland into their infants' mouths. This coupled one temporal cohort to the next like a prong and socket. "Lactation," to quote geneticist and evolutionist Timothy Perper, "represents an embodied nexus of sociality." With mammals Lego-

linkage was the name of the game from the moment after birth.

The dairy innovators' tendency to long life and lengthy childhoods stretched the time when young and old were thrown together, encouraging another adaptive advantage - the storage of new data needed by the immature in parental memory. What's more, mammalian communication systems would prove unbeatably flexible. With hard-won ancient lessons and newly minted tricks cartwheeling through the group and across each generation gap, a family or far larger horde could resculpt its lifestyle swiftly, making itself at home in a previously impossible environmental niche.

During the last eons of the dinosaurs, insect eating mammals , still eking out an existence in the shadows of the walking monoliths, already resembled modern shrews and hedgehogs. Then 65 million years ago, environmental catastrophe drove the dinosaurs from their homes and left the last remnants of them to starve in bleak and unfamiliar surroundings, their adaptive capabilities overwhelmed by circumstance. But in socially networked animals with larger brains, catastrophes are creative opportunities. Mammals , freed from hiding in bodies smaller than a dino-snack and in holes and crevasses too narrow for a dino's claws, were challenged to let the full range of their flexibility run free.

2 Conformity Enforcers

The five principles of the complex adaptive system aided the survival of these rodent-like creatures.

Mammals like whales and bats, which appeared roughly 55 million years ago, have oodles of conformity enforcers, homogenizers which allow for common language and for the alignment of behavior between individuals. Information transmission among social mammals - whether handled by scent, sound or visual codes - tends to be swift. Rats avoid a strange food until they smell it on the breath of a den-mate. Then, assured by the survival of the poison-tester, they pounce on the previously suspicious morsel. This slavish timidity can save their lives. Squirrels

also pool information, using their tail as a semaphore to signal trouble and to rally their companions. A twitching of this fur-fringed nether flag may mean there's a snake around and bring others running to the rescue. A team of squirrels can track and isolate a snake more effectively than one squirrel on her own. Tail wagging in dogs seems to be a recruitment signal linked to celebration - one of many canine body codes. One wild dog cannot bring down a zebra. But a pack working together can. The striped and panicked prey is defeated not just by a myriad of teeth and claws, but by the operation of collective brainwork, the second-by-second tactical turns which fine tune the hunting tribe.

The urge to follow in the tracks of someone else - a consummate conformity enforcer - also speeds the spread of information among primates . When one baboon emits a warning call, it inspires others nearby to repeat it. So a necessary bit of news ricochets rapidly around the baboon territory.

Among monkeys, pioneering primatologist K. Ronald Hall noted how a bit of rubbish every beast despises can suddenly become popular. If one animal shows an unexpected interest in the detested thing, friends are likely to fall in line and become intrigued as well. 'Tis another instance of that antique conformity enforcer: imitation .

The impulse to follow the crowd turns perception to a herd phenomenon even among baboons. Knowing how addicted baboons are to meat, primatologist Shirley Strum tried to make friends with a troop she called "the Pumphouse gang" by bringing them a carcass. At first, the baboons shied away from the flesh that had arrived in this strange manner. Then one savvy individual tried a bit of the food. After they saw one of their tribe eating the alien offering, the others descended to get their share.

3 Networked Intelligence

As among bacteria and bees, there is solid evidence that individual mammal brainpower is often less important than networked intelligence. K.R.L. Hall points out that on their own, chimps are more intelligent than baboons, even making their own tools. But baboons have been more successful than the brainy junior apes. Baboons have spread over far more territory and have occupied a greater variety of homes. Lone baboons may be rather dumb, but their group creativity is so great that on a continent most of whose exotic creatures are being wiped out, baboons have spread like cockroaches. Their secret is to find the potential bonanza in every new twist introduced by man. In the dry thorn veldt baboons use cattle drinking troughs and handle temperature extremes that go from 80 degrees by day to freezing at night. They live along the banks of the Zambezi and in the southern woodland savannahs. In fact, they're "the most widely distributed non-human primates" in Africa. Why? Despite their skimpy endowment of solo smarts, baboons have something chimps lack - a vastly superior social organization . The average group of chimps is a mere 40 or so. Baboons, on the other hand, hang out in crowds three to six times that size.

Why does a heightened craving to hobnob give baboons an edge over chimps? Predators on the prowl

usually only manage to snatch one member of a pack. So the bigger the assembly, the less chance any single member has of entering the day's menu. This simple fact helps drive many animals into substantial groups. But once the resulting communities have formed, they take on a role we've examined in our previous episodes - as cauldrons of information exchange.

Early mammals are endowed with another of the complex adaptive system's quintet - diversity generators. Baboon social learning is aided by an itchy creator of behavioral twists - curiosity. Some baboons will toy with nearly anything that comes across their path. Says Hall , baboons "push over slabs of rock" yank at telegraph wires, pry their way through the doors and windows of empty huts and cars, and overturn, crack open or "fiddle with and try out" nearly anything in sight. This restless test of oddities helps a baboon find new ways to get the most from almost any environment.

Conformity and diversity work together for the betterment of the larger whole. Like bacterial and honeybee scouts, baboons spread out in small groups during the day. The foolhardily inquisitive among them comb the possibilities of the landscape. Bacteria pool their exploratory discoveries via long-distance chemical communication. But baboons , who are a good deal more mobile, gather at night in sleeping clusters which may include hundreds. These overnight conventions breed data processing. In the morning, the troop's males confer, swap their "ideas" about the direction in which the richest potential new food sources can be found, manage, according to one researcher, to create visions in the minds of their council-mates of the routes and potential rewards to which they imagine those trails will lead, then make group decisions on which way to go next.

Says USC's Jane Goodall Research Center director Dr. Christopher Boehm , "in cases of emergencies (e.g., a river that floods and blocks the most likely direction of travel) this pooling of information can lead to significant conservation of energy for the entire troop. Because such emergency decisions seem to be influenced by males who have extensive experience with the environment, and because each individual's experiences will differ, it is easy enough to imagine that different Hamadryas troops might make different tactical decisions about direction of travel under similarly threatening circumstances - for better or worse."

4 Learning Machines

Another diversity generator - cultural separation - works hand in hand with imitative learning to enrich the knowledge of the tribe. When the Pumphouse gang was in danger of being shot as pests by the inhabitants of a new army barracks who resented having their homes entered, tossed and probed for edibles, rescuers flew the crowd to a distant location. The displaced baboons had no idea of the groceries in the new landscape and of the best way to get at them. But they watched and followed native troops to learn their ways. And young local males looking for new homes gravitated to the exotic band of strangers. One "applicant" for Pumphouse Gang admission dug for salt near a watering hole, something the new arrivals had never seen before. When the immigrants followed this native's example, they added yet another skill to their repertoire. Hall

has said that baboon groups provide "the essential setting for each and every act of learning by the individual...the group is the basic unit for... learning processes." In short, baboons are more successful than the wiley chimpanzees because their troops are better learning machines.

Pre-human mammals not only network their informational breakthroughs across substantial distances, they also spread the tendrils of what they've learned into the future, thus penetrating both space and time. Elephants , for example, pass behavioral memes from one generation to the next. In 1919, the citrus farmers of South Africa's Addo Park wanted to get rid of a herd of 140 elephants who'd been wreaking havoc with their crops. They called in a hunter who shot the elephants painfully, one by one, while their family members watched the dying agonies. After a year, only sixteen to 20 elephants still remained. But they had adapted their lives to the hunter's presence. In a most un-elephant-like manner, they had become nocturnal, hiding in the bush until night fell, and stealing out to feed in utter darkness. The adaptation worked. The hunter eventually gave up. Then, in 1930, the elephants were granted permanent sanctuary. There were no more gunshots, no more attacks by murderous human beings. Yet 45 years later, the elephants retained their reclusive, night-time way of life. The veterans of 1919 had died off, but the group held on to patterns designed to cope with a danger that had long since past. Those patterns leaped the boundary from generation to generation and mind to mind. Implicit memes had shaped communal sensibility as surely as genes sculpt the rippling canyons of the brain.

Advanced brains were, in fact one key to the elephants' multi-generational memory. The other was the bond of motherhood and matriarchy. Elephants, like the humans who would not appear for over 20 million years, possessed a cerebral cortex of substantial size. This is less unusual than it seems. Biological anthropologist Robin Dunbar has shown that the larger the size of a social unit, the larger the cortex of each member. This is even true within a single species. Bats were one of the earliest mammals to evolve. So ancient is their

pedigree that many scientists have referred to them as "living fossils." Like elephants, these flying mammals live long lives (one tagged wild bat in New England survived well over 31 years).
Most mothers nurture just one youngster at a time and do it for a lengthy span. A few bat species live solitary lives. The cerebral cortexes in these flying hermits are very small. Others live in colonies of up to 20 million. The vampire bat hunkers down in a cluster of 200 or so, yet each mother is able to find her own child when she returns at night from a lengthy flight, despite the fact that her son or daughter is hidden like a lost toddler on an overcrowded beach. What's more, before she settles down, sated with her pickings, she will seek out the adult "babysitter" who tended the children while others were away and repay her with a bit of regurgitant. To top it off, if an unrelated neighbor has had slim pickings in its search for blood, a returning mother will disgorge some of her stomach contents to the needy. On a future night the bat who was aided when she was down on her luck will make her way through the bewildering mob to pay back her benefactress by offering her fresh food if she, too, has been starved by snarls of fortune. A cerebral cortex of substantial size makes it possible to pinpoint patrons and trade favors as if in a commodities exchange.
Elephant groups are also highly interlaced. Each troop focuses upon a female elder, relying on her strength and wisdom. Her cerebral cortex is enormous, holding lessons learned 40 years ago and shuttling them down the line to generations newly born.
To knock our homo chauvinism down a peg further, even language is not totally unique to us. Robert Seyfarth and Dorothy Cheney have shown that though monkeys don't gush a steady stream of nouns, verbs and sentences, they do erupt with symbolic sounds which act as words. Most famous are the vervets, whose distinctive chutters and whirs warn of killer birds circling the skies, lethal snakes slithering on the ground, and leopards stalking at eyeball height. Each word must be different, for the response that would allow escape from a cat - going high into a tree - is a surefire way to become an eagle canape. Even more remarkable is the fact that vervets have more than a single term for each of their dangers. Every call has synonyms - different sounds with the same meanings. One more element of human uniqueness anticipated long before we first walked this earth.

Through three diversity generators–curiosity, cultural separation, and novel attempts at behavior (like those of the elephant who first became nocturnal) - early mammals generated implicit "behavioral" memes, improvising tricks which could be passed from one brain to another. Those memes, wafting wordlessly through a group, took advantage of conformity enforcers to shape the behavior of a mass. At least two of the elements of the complex adaptive system were at work in mammals long before the appearance of the first Homo sapiens. We'll soon see how the other three petals of the adaptive pentagram were snapping into place as well. Just as they had among bacteria, networking and the group brain were busy doing their thing in the Age of Mammals 60 million years ago.

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