Anim Cogn (2004) 7 : 1–4
DOI 10.1007/s10071-003-0206-7

OBITUARY

James L. Gould

Thinking about thinking: how Donald R. Griffin (1915–2003) remade animal behavior

Published online: 19 December 2003

In January of 1970, I was finishing a grueling round of interviews as a prospective graduate student at Rockefeller University. An inexperienced but enthusiastic convert to ethology, I had just published a paper on the dance-language controversy. As Professor Griffin saw me off into the elevator, he asked "Do you think honey bees know what they are doing?" The doors slid shut on my feeble response, "I hope not."

Nothing in my reading of his hard-nosed papers and elegantly written books on echolocation and bird migration had prepared me for that startling query – frightening because it either meant my future mentor was slipping into an early senility (the most common hypothesis voiced in the 1970s to account for his new interest), or that ethology was ignoring many of the most important questions about animal behavior.

What started Griffin thinking about animal minds? I asked him this several times over the years, and never got the same answer twice. A series of small things must have combined to draw him out: the dams of his beloved beavers (and their ingenuity in outwitting his attempts to maintain them in a swimming pool for study), the persistent pattern of psychologists and ethologists alike of underestimating the capacities of animals, the unexpected flexibility (and concomitant but telling stupidity) of bats in the presence of background noise or ample light, the "cognitive maps" (then hardly discussed) he and others inferred in rats and chimpanzees, a discussion with the Princeton philosopher Robert Nagel, and in particular the provoking negative feedback of his colleagues (to which he responded with stubborn passive aggression).

But the story I choose to believe is the one he told about fiddler crabs. According to this version, Griffin had never given the subject a thought until he met the remarkable scientist (and his future wife) Jocelyn Crane (1909–1998). The week after she graduated from Smith in 1930, Jocelyn had gone to work for the pioneering naturalist William Beebe. Beebe, who invented modern tropical ecology, the study of coral reefs, and discovered at first hand the richness of life in the eternal night 1,000 m deep in the ocean, was just beginning his bathysphere dives when Jocelyn joined him. In time, she was promoted into his position as the Director of the Department of Tropical Research at the New York Zoological Society. By this time she had become the world's expert on fiddler crabs and salticid spiders, had decoded the signaling systems of each, and held three NSF grants simultaneously. (After her retirement, she earned her PhD from New York University's School of Fine Arts. Her thesis topic, appropriately enough, was the use and meaning of gestures in human art.)

As Griffin tells it, he and Jocelyn were watching a beach populated with fiddlers. Each male would take a periodic break from a long series of species-specific waves of its enlarged claw. During these voluntary recesses, they would push each other with the giant claw, and even grab one another in a strange handshake and attempt to lift the other individual from the ground. No male was ever hurt, displaced from his burrow or display spot, or even temporarily disconcerted. Each returned promptly to feeding with the small claw and waving with the other. "Why do they fight?", Griffin asked. "Because they enjoy it", came Jocelyn's immediate answer.

Griffin came fully out of the closet in 1976 with his thin but deeply subversive volume, *The Question of Animal Awareness*. The impact was immediate. Nearly three quarters of a century of behaviorist reaction to the dangers of inferring mental states in animals had rendered even the discussion of awareness highly suspect. Had not the excesses of Romanes, the nature-fakers, and the credulous boosters of Clever Hans warned us away from this fatal misconception? Was not the dominant school of psychology based precisely on the categorical rejection of mind, consciousness, thinking, desire, purpose, and awareness as (to quote Watson) no more than "superstition and magic" passed down from our ignorant and savage ancestors?

J. L. Gould (✉)
Department of Ecology and Evolutionary Biology,
Princeton University,
Princeton, NJ 08544–1003, USA
e-mail: gould@Princeton.edu

Knowing that a preemptive strike is often preferable to counterattack, Fig. 1 in Griffin's 1976 book pokes fun at this objection by plotting an imaginary data set. With that sly and subtle sense of humor that he so often used to disarm opponents, he created a graph which affects to show that as the quality and quantity of evidence about animal thinking declines, the vigor of assertions about the truth of the matter increases – a pattern exactly opposite that of ordinary behavioral science (a line also whimsically plotted, complete with a diminishing-returns bend at the top).

His strategy, at once annoying and deadly effective, was to point out how much of our own behavior is automatic and unlearned (though we can and do think about it – rather too much for his Yankee reserve); thus we are clearly aware of this inherited repertoire in medias res. If we can think while coughing or even vomiting, who then could assert that there can be no meaningful mental activity during the innate activity of other animals? This was, so far as I know, the first time anyone had put forward this reverse-engineering kind of argument, attacking from the flank a position whose forward defenses had been thought invulnerable. As Marc Bekoff puts it, Griffin "challenged skeptics who offered glib accounts of animal minds to bear the burden of proof, and to offer testable hypotheses and not time-worn dogma." "He awakened us about cognition," Bernd Heinrich remembers; he was "a true champion of biology, [of] all the good stuff that got threatened by...oversimplification."

The next step in his initial foray into this intellectual minefield was to remind us of the biological continuum which evolution produces. Unless humans are a special creation, or have somehow come to differ in kind rather than degree from our fellow inhabitants of planet Earth, it should at least be within the realm of possibility that a continuum of mental experience might also exist. To reject the possibility without empirical examination would be an act of political ideology, religious faith, or uncritical thinking. Thus, the argument went, it is time to open our minds and look at the animals themselves. Griffin's "early courageous book *The Question of Animal Awareness*," Lou Herman recalls, came "at a time when behavioral studies were just emerging from the grip of behaviorism," and finally gave "the stamp of scientific credibility to the study of the animal mind."

In 1976, it was difficult to point to clear evidence of likely or even potential thought among other animals – or at least, so it seemed to those of us who stood then as hardcore skeptics. But just as behaviorism had swept its telling anomalies under the rug for so many decades, ethologists had a long and unexplored list of strange behaviors too disturbing to follow up on or commit to print using a cognitive vocabulary. Griffin depended greatly on the shame-and-awe tactic of painting skeptics as little better than creationists in their a priori rejection of the mental continuum Darwin explicitly postulated.

One of the hints in the existing literature hit especially close to home for me: Karl von Frisch, paragon of skeptical inquiry and advocate of the miniature-robot view of insects, had dropped a delayed-action grenade into his huge tome *The Dance Language and Orientation of Bees*. While describing the step-wise training of foragers to artificial food sources moved ever further away from the hive between bee visits, he wrote that by the time the source is a kilometer away, "it is as though the bees had grasped the movement of the feeding place, for at times they are awaiting one at the next station."

I had observed the same spooky behavior in the course of my thesis experiments, even when gradually training the foragers back toward the hive. What is there in the natural history of normally sedentary flowers to select for a preprogrammed subroutine in the brain of a honey bee for dealing with this contingency? For my own part, I was too busy working on the innate aspects of communication, navigation, and learning in honey bees to worry about what else these nervous creatures with supernumerary legs and crunchy exoskeletons might be capable of. Fortunately, others equally aware of such anomalies were not so distracted.

Griffin's critics were insulted and spitting mad, and his first book was treated to scathing reviews. But then in 1978 he wrote a target article for *Behavioral and Brain Sciences*, and the responses elicited from dozens of scientists and philosophers now had a very different tone. One especially brazen contingent maintained that behaviorists had never rejected mind and consciousness, and had been busy studying them for decades; but in fact, as Ed Wasserman points out, the last serious attempt to pose this question by a psychologist had been in 1905 when Yerkes asked "may we not reasonably believe...that the ant with its complex organization, ...its highly developed...nervous system, its manifold forms of sensory discrimination...and its extremely varied social life, possesses a form of consciousness which is comparable in complexity...with the human?"

Another group said that while these might be legitimate phenomena, working on them was, in practice, as yet impossible. With the exception of a couple of philosophers (who may or may not have been serious), and the ethologists (who knew better), these critics all agreed that this was well-trodden ground, and that the existing labs, using conventional techniques would, in the fullness of time, when the moment was ripe, after due consideration, produce the answer. Business would continue as usual; patience would be rewarded (especially if we could forget what the original question had been). Sara Shettleworth recalls Griffin's way of goading her as a "paralyzed perfectionist."

These and other reactions provided Griffin with much amusing material for subsequent articles, and especially for his masterful 1984 book *Animal Thinking*. Griffin had been reading furiously, and colleagues had also been pointing out suggestive evidence of planning, concept formation, "mind-reading," deceit, and insight in many species. Some of this was from the psychological literature (often merely rephrased), while other examples were from ethological work (looked at in the new way Griffin encouraged). A major subset, however, came from work *The Question of Animal Awareness* and Griffin's tireless proselytizing had directly provoked.

Griffin could now cite new experiments (or reanalyses of older ones) involving concept formation in pigeons and parrots, distraction displays in birds, playback experiments with vervet monkeys, memory of dispersed food caches in birds and chimps, cultural learning in blackbirds, bird and insect tool use, bait fishing by herons, mirror-image recognition by higher apes, and indirect measures of brain activity associated with presumed conscious activity. And the list of articles and books produced in that 8-year interval on the presence, absence, or proper definition of animal minds, thinking, or consciousness is astonishing – especially when compared to the tomb-like silence on the subject that characterized the previous decade.

The sudden interest of philosophers – ever a mixed blessing – was perhaps the least expected side effect. Dan Dennett describes it well: "'What is it like to be a bat?' When a philosopher like Thomas Nagel asks the question, it is typically meant as a metaphysical stumper, an unanswerable question. Donald Griffin set out firmly and reasonably to answer such questions, and showed that if your question is motivated by genuine curiosity, not metaphysical point-scoring, the question can be answered."

Another piece of collateral damage was the impetus Griffin (ever a thoroughgoing carnivore) gave to animal-rights activists. Peter Singer remembers that when he first read *The Question of Animal Awareness*, "I thought that here, at last, was a scientist who was prepared to break away from the then-dominant behaviorist approach to animals, and acknowledge that yes, the evidence suggested that they really were conscious, sentient beings. From one perspective, it's only commonsense, but given where the field was at the time, it was an immense breakthrough, and Griffin has proven to be the pioneer. The consequences have been significant, not only for our understanding of animals, but also in creating, among scientists themselves, a different atmosphere for the discussion of how animals should be treated – in experiments, in farming, and everywhere." Certainly Griffin has had a huge impact on zoos, where more and more animals are given problems to solve and toys to play with – a strategy that has pulled many creatures out of apparently psychotic behavior patterns.

I think the most important contributions of *Animal Thinking* came from its organization and encouragement. *The Question of Animal Awareness* had been an assault on a long-standing and complacent mind-set. As such, it had to attack philosophical questions, including such old chestnuts as "Is man language?" *Animal Thinking* had enough (at least tantalizing) data to be organized into specific behavioral problems: making a living, predators and prey, artifacts and templates, tools and engineering, symbolic communication, and so on. Every psychologist and ethologist could see at a glance where his or her research did, could, or should intersect the animal–mind question, and just what little was known at present. The book was a not-so-subtle prompt which released a flood of directed creativity.

About this time, Griffin became the head of the Harry Frank Guggenheim Foundation, and gleefully abused his position to fund studies that NSF then considered beyond the pale. It was this seed money, for instance, that allowed Robert Seyfarth and Dorothy Cheney to ask how monkeys see their world. And it was not just money he contributed: "As a mentor," Seyfarth and Cheney write, "Griffin was at his best when talking about experiments: thinking them up and figuring out what controls were needed to remove any ambiguities... He was fond of saying that communication – like the vervet monkey vocalizations we studied – offered a 'window on animal minds.' He challenged us to cast aside old prejudices and think seriously about the difficult problem of animal intelligence ..." Ron Schusterman remembers almost the same experience: "Griffin's ideas about animal cognition have revolutionized thinking in ethology, sociobiology, and behavioral ecology. He influenced my thinking about how animals might impose meaning upon their perceptual worlds, and he motivated me to try to come up with laboratory experiments that would reveal the cognitive mechanisms involved in transforming sensory input into meaningful representations."

Griffin's next book, *Animal Minds* (1992) repeats the same goal-oriented organization of his previous summary, but a look at the Bibliography reveals the exponential growth of work on animal cognition. Moreover, the experiments reviewed (frequently originally suggested in one of his earlier summaries) are often formulated as direct tests of cognitive versus behavioristic explanations. Griffin's readers had looked for complex mental capacities – deception, counting, empathy, awareness, "morality," intentionality, aesthetics, insight in problem solving, dreaming, and imagination. In his role as agent provacateur, Griffin had harnessed the creative energies of scores of researchers, inspired new courses (and their texts), and put the skeptics clearly on the defensive. One of the many researchers now at the forefront of the field, Irene Pepperberg, reflects on that mysterious energy he projected: "Donald Griffin was one of the most incredibly alive persons I ever knew...his curiosity and thirst for knowledge, his wide-ranging interests and grasp of facts and concepts were phenomenal. His willingness to take controversial stands in the face of continued criticism is an inspiration to all who dare to think 'outside the box.' He was the closest to a mentor that I ever had."

Herb Terrace describes Griffin's last full-scale summary of the field (*Animal Minds: Beyond Cognition to Consciousness*, 2001) as "a magisterially balanced treatment of issues raised by animal cognition: the Cartesian view that animals can't think because they don't have language, the behaviorist view that mental events can't be studied scientifically and current debates on the nature and function of consciousness." The book bears the fruit of his original push to find neural correlates of awareness in humans, and then look for them in animals. The increasing temporal and spatial resolution of fMRI tests permit researchers to visualize the use of cognitive maps in humans and rats (the activity is in the hippocampus in each species), localize "ethical" judgements to surprisingly ancient parts of the brain, and generally erase the neural boundaries between humans and nonhumans. Lorenz's view that animals are not robots, but instead highly emotional people, part of

the mental continuum Darwin felt was obvious, has moved from the lunatic fringe to what may be described as the default assumption: the burden of proof has shifted.

By no means is every one convinced, but all are impressed. Gordon Gallup's comment has the kind of skeptical admiration almost universal among the unconverted: "Griffin is to animal cognition as Sigmund Freud was to psychiatry. They were both wrong, but they each ushered in intellectual paradigm shifts that have had major repercussions. "In fact, the 180° reversal of opinion Griffin engineered has come almost too quickly, and some ethologists have begun to wonder whether, after all, many apparently cognitive abilities might be inborn. The very ease and frequency with which animals form concepts, create and use cognitive maps, gauge which alternative behavior to deploy, rotate objects in their mind, remember locations, keep track of kinship, learn many things with far less effort or error than humans, and even use the same special brain areas is truly sobering.

We may be on the brink of discovering that we share more with Clever Hans than is quite comfortable to think. A decade hence, one of Griffin's enduring legacies may well be the critical analysis of the limits and mechanisms of human awareness – a study provoked by these newly revealed cognitive abilities in other animals. As Ed Wasserman (one of the few psychologists still brave enough to call himself a behaviorist) says, "at issue [now] is the scientific merit of the very idea of consciousness – in humans or nonhuman animals."

Nothing is, to me at least, more remarkable about the complete paradigm shift we now call cognitive ethology than that the prime mover was a shy, modest man who was able to endure years of scorn and abuse – indeed, who seemed empowered by it. Gordon Burghardt thinks Griffin was "the ultimate scientist" whose "unflappable nature...went a long way in defeating his critics." Marc Bekoff recalls Griffin as "adventurous, and courageous"; Ed Wasserman reflects that "future students of behavior will admire Griffin's daring to take up the challenge of animal consciousness after decades of inattention and against formidable opposition. "Marc Hauser praises Griffin's "great intellect ...and wonderful sense of modesty in a world that is often unpleasantly competitive"; Herb Terrace describes him as "a hard-headed scientist...with a unique combination of erudition, logic and passion... His attitude was infectious."

His long-time colleague at Rockefeller, Peter Marler sees an even deeper commitment in Griffin's work that helped sustain him, a "dedication to a career in science, not just as a job to be done, but as a higher calling, often immensely exciting and rewarding, yet not to be undertaken lightly. He had an unusual mix of personal modesty, scientific rigor, and unbounded enthusiasm for the process of discovery, that was unique in my experience. He was one of a kind."

It should provide profound inspiration and courage to us all that Don Griffin decided that, whatever the cost to himself, his dedication to free intellectual inquiry and the pursuit of truth was sufficient to sustain him through a period of academic purgatory. But, as Wasserman warns, whether "cognitive ethology will endure without his continued involvement and leadership remains to be seen. "After reading the typically provocative review in this issue by Griffin and Speck (Griffin and Speck 2003), I wonder who among us can step into his shoes and continue ceaselessly to stir the pot?

Reference

Griffin DR, Speck GB (2003) New evidence of animal consciousness. Anim Cogn 7:5–18