

Minds of Their Own

Animals are smarter than you think.

By Virginia Morell

Photograph by Vincent J. Musi

In 1977 Irene Pepperberg, a recent graduate of Harvard University, did something very bold. At a time when animals still were considered automatons, she set out to find what was on another creature's mind by talking to it. She brought a one-year-old African gray parrot she named Alex into her lab to teach him to reproduce the sounds of the English language. "I thought if he learned to communicate, I could ask him questions about how he sees the world."

When Pepperberg began her dialogue with Alex, who died last September at the age of 31, many scientists believed animals were incapable of any thought. They were simply machines, robots programmed to react to stimuli but lacking the ability to think or feel. Any pet owner would disagree. We see the love in our dogs' eyes and know that, of course, Spot has thoughts and emotions. But such claims remain highly controversial. Gut instinct is not science, and it is all too easy to project human thoughts and feelings onto another creature. How, then, does a scientist prove that an animal is capable of thinking—that it is able to acquire information about the world and act on it?

"That's why I started my studies with Alex," Pepperberg said. They were seated—she at her desk, he on top of his cage—in her lab, a windowless room about the size of a boxcar, at Brandeis University. Newspapers lined the floor; baskets of bright toys were stacked on the shelves. They were clearly a team—and because of their work, the notion that animals can think is no longer so fanciful.

Certain skills are considered key signs of higher mental abilities: good memory, a grasp of grammar and symbols, self-awareness, understanding others' motives, imitating others, and being creative. Bit by bit, in ingenious experiments, researchers have documented these talents in other species, gradually chipping away at what we thought made human beings distinctive while offering a glimpse of where our own abilities came from. Scrub jays know that other jays are thieves and that stashed food can spoil; sheep can recognize faces; chimpanzees use a variety of tools to probe termite mounds and even use weapons to hunt small mammals; dolphins can imitate human postures; the archerfish, which stuns insects with a sudden blast of water, can learn how to aim its squirt simply by watching an experienced fish perform the task. And Alex the parrot turned out to be a surprisingly good talker.

31 Thirty years after the Alex studies began, Pepperberg and a changing collection of assistants were
32 still giving him English lessons. The humans, along with two younger parrots, also served as Alex's
33 flock, providing the social input all parrots crave. Like any flock, this one—as small as it was—had its
34 share of drama. Alex dominated his fellow parrots, acted huffy at times around Pepperberg, tolerated
35 the other female humans, and fell to pieces over a male assistant who dropped by for a visit. (“If you
36 were a man,” Pepperberg said, after noting Alex’s aloofness toward me, “he’d be on your shoulder in
37 a second, barfing cashews in your ear.”)

38 Pepperberg bought Alex in a Chicago pet store. She let the store’s assistant pick him out because she
39 didn’t want other scientists saying later that she’d deliberately chosen an especially smart bird for
40 her work. Given that Alex’s brain was the size of a shelled walnut, most researchers thought
41 Pepperberg’s interspecies communication study would be futile.

42 “Some people actually called me crazy for trying this,” she said. “Scientists thought that chimpanzees
43 were better subjects, although, of course, chimps can’t speak.”

44 Chimpanzees, bonobos, and gorillas have been taught to use sign language and symbols to
45 communicate with us, often with impressive results. The bonobo Kanzi, for instance, carries his
46 symbol-communication board with him so he can “talk” to his human researchers, and he has
47 invented combinations of symbols to express his thoughts. Nevertheless, this is not the same thing as
48 having an animal look up at you, open his mouth, and speak.

49 Pepperberg walked to the back of the room, where Alex sat on top of his cage preening his pearl gray
50 feathers. He stopped at her approach and opened his beak.

51 “Want grape,” Alex said.

52 “He hasn’t had his breakfast yet,” Pepperberg explained, “so he’s a little put out.”

53 Alex returned to preening, while an assistant prepared a bowl of grapes, green beans, apple and
54 banana slices, and corn on the cob.

55 Under Pepperberg’s patient tutelage, Alex learned how to use his vocal tract to imitate almost one
56 hundred English words, including the sounds for all of these foods, although he calls an apple a
57 “banerry.”

58 “Apples taste a little bit like bananas to him, and they look a little bit like cherries, so Alex made up
59 that word for them,” Pepperberg said.

60 Alex could count to six and was learning the sounds for seven and eight.

61 “I’m sure he already knows both numbers,” Pepperberg said. “He’ll probably be able to count to ten,
62 but he’s still learning to say the words. It takes far more time to teach him certain sounds than I ever
63 imagined.”

64 After breakfast, Alex preened again, keeping an eye on the flock. Every so often, he leaned forward
65 and opened his beak: “Ssse... won.”

66 “That’s good, Alex,” Pepperberg said. “Seven. The number is seven.”

67 “Ssse... won! Se... won!”

68 “He’s practicing,” she explained. “That’s how he learns. He’s thinking about how to say that word,
69 how to use his vocal tract to make the correct sound.”

70 It sounded a bit mad, the idea of a bird having lessons to practice, and willingly doing it. But after
71 listening to and watching Alex, it was difficult to argue with Pepperberg’s explanation for his
72 behaviors. She wasn’t handing him treats for the repetitious work or rapping him on the claws to
73 make him say the sounds.

74 “He has to hear the words over and over before he can correctly imitate them,” Pepperberg said, after
75 pronouncing “seven” for Alex a good dozen times in a row. “I’m not trying to see if Alex can learn a
76 human language,” she added. “That’s never been the point. My plan always was to use his imitative
77 skills to get a better understanding of avian cognition.”

78 In other words, because Alex was able to produce a close approximation of the sounds of some
79 English words, Pepperberg could ask him questions about a bird’s basic understanding of the world.
80 She couldn’t ask him what he was thinking about, but she could ask him about his knowledge of
81 numbers, shapes, and colors. To demonstrate, Pepperberg carried Alex on her arm to a tall wooden
82 perch in the middle of the room. She then retrieved a green key and a small green cup from a basket
83 on a shelf. She held up the two items to Alex’s eye.

84 “What’s same?” she asked.

85 Without hesitation, Alex's beak opened: "Co-lor."

86 "What's different?" Pepperberg asked.

87 "Shape," Alex said. His voice had the digitized sound of a cartoon character. Since parrots lack lips
88 (another reason it was difficult for Alex to pronounce some sounds, such as *ba*), the words seemed to
89 come from the air around him, as if a ventriloquist were speaking. But the words—and what can only
90 be called the thoughts—were entirely his.

91 For the next 20 minutes, Alex ran through his tests, distinguishing colors, shapes, sizes, and
92 materials (wool versus wood versus metal). He did some simple arithmetic, such as counting the
93 yellow toy blocks among a pile of mixed hues.

94 And, then, as if to offer final proof of the mind inside his bird's brain, Alex spoke up. "Talk clearly!"
95 he commanded, when one of the younger birds Pepperberg was also teaching mispronounced the
96 word green. "Talk clearly!"

97 "Don't be a smart aleck," Pepperberg said, shaking her head at him. "He knows all this, and he gets
98 bored, so he interrupts the others, or he gives the wrong answer just to be obstinate. At this stage,
99 he's like a teenage son; he's moody, and I'm never sure what he'll do."

100 "Wanna go tree," Alex said in a tiny voice.

101 Alex had lived his entire life in captivity, but he knew that beyond the lab's door, there was a hallway
102 and a tall window framing a leafy elm tree. He liked to see the tree, so Pepperberg put her hand out
103 for him to climb aboard. She walked him down the hall into the tree's green light.

104 "Good boy! Good birdie," Alex said, bobbing on her hand.

105 "Yes, you're a good boy. You're a good birdie." And she kissed his feathered head.

106 He was a good birdie until the end, and Pepperberg was happy to report that when he died he had
107 finally mastered "seven."

108 Many of Alex's cognitive skills, such as his ability to understand the concepts of same and different,
109 are generally ascribed only to higher mammals, particularly primates. But parrots, like great apes

110 (and humans), live a long time in complex societies. And like primates, these birds must keep track
111 of the dynamics of changing relationships and environments.

112 “They need to be able to distinguish colors to know when a fruit is ripe or unripe,” Pepperberg noted.
113 “They need to categorize things—what’s edible, what isn’t—and to know the shapes of predators. And
114 it helps to have a concept of numbers if you need to keep track of your flock, and to know who’s
115 single and who’s paired up. For a long-lived bird, you can’t do all of this with instinct; cognition must
116 be involved.”

117 Being able mentally to divide the world into simple abstract categories would seem a valuable skill
118 for many organisms. Is that ability, then, part of the evolutionary drive that led to human
119 intelligence?

120 Charles Darwin, who attempted to explain how human intelligence developed, extended his theory of
121 evolution to the human brain: Like the rest of our physiology, intelligence must have evolved from
122 simpler organisms, since all animals face the same general challenges of life. They need to find
123 mates, food, and a path through the woods, sea, or sky—tasks that Darwin argued require problem-
124 solving and categorizing abilities. Indeed, Darwin went so far as to suggest that earthworms are
125 cognitive beings because, based on his close observations, they have to make judgments about the
126 kinds of leafy matter they use to block their tunnels. He hadn’t expected to find thinking
127 invertebrates and remarked that the hint of earthworm intelligence “has surprised me more than
128 anything else in regard to worms.”

129 To Darwin, the earthworm discovery demonstrated that degrees of intelligence could be found
130 throughout the animal kingdom. But the Darwinian approach to animal intelligence was cast aside in
131 the early 20th century, when researchers decided that field observations were simply “anecdotes,”
132 usually tainted by anthropomorphism. In an effort to be more rigorous, many embraced
133 behaviorism, which regarded animals as little more than machines, and focused their studies on the
134 laboratory white rat—since one “machine” would behave like any other.

135 But if animals are simply machines, how can the appearance of human intelligence be explained?
136 Without Darwin’s evolutionary perspective, the greater cognitive skills of people did not make sense
137 biologically. Slowly the pendulum has swung away from the animal-as-machine model and back
138 toward Darwin. A whole range of animal studies now suggest that the roots of cognition are deep,
139 widespread, and highly malleable.

140 Just how easily new mental skills can evolve is perhaps best illustrated by dogs. Most owners talk to
141 their dogs and expect them to understand. But this canine talent wasn't fully appreciated until a
142 border collie named Rico appeared on a German TV game show in 2001. Rico knew the names of
143 some 200 toys and acquired the names of new ones with ease.

144 Researchers at the Max Planck Institute for Evolutionary Anthropology in Leipzig heard about Rico
145 and arranged a meeting with him and his owners. That led to a scientific report revealing Rico's
146 uncanny language ability: He could learn and remember words as quickly as a toddler. Other
147 scientists had shown that two-year-old children—who acquire around ten new words a day—have an
148 innate set of principles that guides this task. The ability is seen as one of the key building blocks in
149 language acquisition. The Max Planck scientists suspect that the same principles guide Rico's word
150 learning, and that the technique he uses for learning words is identical to that of humans.

151 To find more examples, the scientists read all the letters from hundreds of people claiming that their
152 dogs had Rico's talent. In fact, only two—both border collies—had comparable skills. One of them—
153 the researchers call her Betsy—has a vocabulary of more than 300 words.

154 “Even our closest relatives, the great apes, can't do what Betsy can do—hear a word only once or
155 twice and know that the acoustic pattern stands for something,” said Juliane Kaminski, a cognitive
156 psychologist who worked with Rico and is now studying Betsy. She and her colleague Sebastian
157 Tempelmann had come to Betsy's home in Vienna to give her a fresh battery of tests. Kaminski
158 petted Betsy, while Tempelmann set up a video camera.

159 “Dogs' understanding of human forms of communication is something new that has evolved,”
160 Kaminski said, “something that's developed in them because of their long association with humans.”
161 Although Kaminski has not yet tested wolves, she doubts they have this language skill. “Maybe these
162 collies are especially good at it because they're working dogs and highly motivated, and in their
163 traditional herding jobs, they must listen very closely to their owners.”

164 Scientists think that dogs were domesticated about 15,000 years ago, a relatively short time in which
165 to evolve language skills. But how similar are these skills to those of humans? For abstract thinking,
166 we employ symbols, letting one thing stand for another. Kaminski and Tempelmann were testing
167 whether dogs can do this too.

168 Betsy's owner—whose pseudonym is Schaefer—summoned Betsy, who obediently stretched out at
169 Schaefer's feet, eyes fixed on her face. Whenever Schaefer spoke, Betsy attentively cocked her head
170 from side to side.

171 Kaminski handed Schaefer a stack of color photographs and asked her to choose one. Each image
172 depicted a dog's toy against a white background—toys Betsy had never seen before. They weren't
173 actual toys; they were only images of toys. Could Betsy connect a two-dimensional picture to a three-
174 dimensional object?

175 Schaefer held up a picture of a fuzzy, rainbow-colored Frisbee and urged Betsy to find it. Betsy
176 studied the photograph and Schaefer's face, then ran into the kitchen, where the Frisbee was placed
177 among three other toys and photographs of each toy. Betsy brought either the Frisbee or the
178 photograph of the Frisbee to Schaefer every time.

179 "It wouldn't have been wrong if she'd just brought the photograph," Kaminski said. "But I think
180 Betsy can use a picture, without a name, to find an object. Still, it will take many more tests to prove
181 this."

182 Even then, Kaminski is unsure that other scientists will ever accept her discovery because Betsy's
183 abstract skill, as minor as it may seem to us, may tread all too closely to human thinking.

184 Still, we remain the inventive species. No other animal has built skyscrapers, written sonnets, or
185 made a computer. Yet animal researchers say that creativity, like other forms of intelligence, did not
186 simply spring from nothingness. It, too, has evolved.

187 "People were surprised to discover that chimpanzees make tools," said Alex Kacelnik, a behavioral
188 ecologist at Oxford University, referring to the straws and sticks chimpanzees shape to pull termites
189 from their nests. "But people also thought, 'Well, they share our ancestry—of course they're smart.'
190 Now we're finding these kinds of exceptional behaviors in some species of birds. But we don't have a
191 recently shared ancestry with birds. Their evolutionary history is very different; our last common
192 ancestor with all birds was a reptile that lived over 300 million years ago.

193 "This is not trivial," Kacelnik continued. "It means that evolution can invent similar forms of
194 advanced intelligence more than once—that it's not something reserved only for primates or
195 mammals."

196 Kacelnik and his colleagues are studying one of these smart species, the New Caledonian crow, which
197 lives in the forests of that Pacific island. New Caledonian crows are among the most skilled of tool-
198 making and tool-using birds, forming probes and hooks from sticks and leaf stems to poke into the
199 crowns of the palm trees, where fat grubs hide. Since these birds, like chimpanzees, make and use
200 tools, researchers can look for similarities in the evolutionary processes that shaped their brains.
201 Something about the environments of both species favored the evolution of tool-making neural
202 powers.

203 But is their use of tools rigid and limited, or can they be inventive? Do they have what researchers
204 call mental flexibility? Chimpanzees certainly do. In the wild, a chimpanzee may use four sticks of
205 different sizes to extract the honey from a bee's nest. And in captivity, they can figure out how to
206 position several boxes so they can retrieve a banana hanging from a rope.

207 Answering that question for New Caledonian crows—extremely shy birds—wasn't easy. Even after
208 years of observing them in the wild, researchers couldn't determine if the birds' ability was innate, or
209 if they learned to make and use their tools by watching one another. If it was a genetically inherited
210 skill, could they, like the chimps, use their talent in different, creative ways?

211 To find out, Kacelnik and his students brought 23 crows of varying ages (all but one caught in the
212 wild) to the aviary in his Oxford lab and let them mate. Four hatchlings were raised in captivity, and
213 all were carefully kept away from the adults, so they had no opportunity to be taught about tools. Yet
214 soon after they fledged, all picked up sticks to probe busily into cracks and shaped different materials
215 into tools. "So we know that at least the bases of tool use are inherited," Kacelnik said. "And now the
216 question is, what else can they do with tools?"

217 Plenty. In his office, Kacelnik played a video of a test he'd done with one of the wild-caught crows,
218 Betty, who had died recently from an infection. In the film, Betty flies into a room. She's a glossy-
219 black bird with a crow's bright, inquisitive eyes, and she immediately spies the test before her: a glass
220 tube with a tiny basket lodged in its center. The basket holds a bit of meat. The scientists had placed
221 two pieces of wire in the room. One was bent into a hook, the other was straight. They figured Betty
222 would choose the hook to lift the basket by its handle.

223 But experiments don't always go according to plan. Another crow had stolen the hook before Betty
224 could find it. Betty is undeterred. She looks at the meat in the basket, then spots the straight piece of

225 wire. She picks it up with her beak, pushes one end into a crack in the floor, and uses her beak to
226 bend the other end into a hook. Thus armed, she lifts the basket out of the tube.

227 “This was the first time Betty had ever seen a piece of wire like this,” Kacelnik said. “But she knew
228 she could use it to make a hook and exactly where she needed to bend it to make the size she
229 needed.”

230 They gave Betty other tests, each requiring a slightly different solution, such as making a hook out of
231 a flat piece of aluminum rather than a wire. Each time, Betty invented a new tool and solved the
232 problem. “It means she had a mental representation of what it was she wanted to make. Now that,”
233 Kacelnik said, “is a major kind of cognitive sophistication.”

234 This is the larger lesson of animal cognition research: It humbles us. We are not alone in our ability
235 to invent or plan or to contemplate ourselves—or even to plot and lie.

236 Deceptive acts require a complicated form of thinking, since you must be able to attribute intentions
237 to the other person and predict that person’s behavior. One school of thought argues that human
238 intelligence evolved partly because of the pressure of living in a complex society of calculating beings.
239 Chimpanzees, orangutans, gorillas, and bonobos share this capacity with us. In the wild,
240 primatologists have seen apes hide food from the alpha male or have sex behind his back.

241 Birds, too, can cheat. Laboratory studies show that western scrub jays can know another bird’s
242 intentions and act on that knowledge. A jay that has stolen food itself, for example, knows that if
243 another jay watches it hide a nut, there’s a chance the nut will be stolen. So the first jay will return to
244 move the nut when the other jay is gone.

245 “It’s some of the best evidence so far of experience projection in another species,” said Nicky Clayton
246 in her aviary lab at Cambridge University. “I would describe it as, ‘I know that you know where I have
247 hidden my stash of food, and if I were in your shoes I’d steal it, so I’m going to move my stash to a
248 place you don’t know about.’”

249 This study, by Clayton and her colleague Nathan Emery, is the first to show the kind of ecological
250 pressures, such as the need to hide food for winter use, that would lead to the evolution of such
251 mental abilities. Most provocatively, her research demonstrates that some birds possess what is often
252 considered another uniquely human skill: the ability to recall a specific past event. Scrub jays, for

253 example, seem to know how long ago they cached a particular kind of food, and they manage to
254 retrieve it before it spoils.

255 Human cognitive psychologists call this kind of memory “episodic memory” and argue that it can
256 exist only in a species that can mentally travel back in time. Despite Clayton’s studies, some refuse to
257 concede this ability to the jays. “Animals are stuck in time,” explained Sara Shettleworth, a
258 comparative psychologist at the University of Toronto in Canada, meaning that they don’t
259 distinguish among past, present, and future the way humans do. Since animals lack language, she
260 said, they probably also lack “the extra layer of imagination and explanation” that provides the
261 running mental narrative accompanying our actions.

262 Such skepticism is a challenge for Clayton. “We have good evidence that the jays remember the what,
263 where, and when of specific caching events, which is the original definition of episodic memory. But
264 now the goalposts have moved.” It’s a common complaint among animal researchers. Whenever they
265 find a mental skill in a species that is reminiscent of a special human ability, the human cognition
266 scientists change the definition. But the animal researchers may underestimate their power—it is
267 their discoveries that compel the human side to shore up the divide.

268 “Sometimes the human cognitive psychologists can be so fixed on their definitions that they forget
269 how fabulous these animal discoveries are,” said Clive Wynne of the University of Florida, who has
270 studied cognition in pigeons and marsupials. “We’re glimpsing intelligence throughout the animal
271 kingdom, which is what we should expect. It’s a bush, not a single-trunk tree with a line leading only
272 to us.”

273 Some of the branches on that bush have led to such degrees of intelligence that we should blush for
274 ever having thought any animal a mere machine.

275 In the late 1960s a cognitive psychologist named Louis Herman began investigating the cognitive
276 abilities of bottlenose dolphins. Like humans, dolphins are highly social and cosmopolitan, living in
277 subpolar to tropical environments worldwide; they’re highly vocal; and they have special sensory
278 skills, such as echolocation. By the 1980s Herman’s cognitive studies were focused on a group of four
279 young dolphins—Akeakamai, Phoenix, Elele, and Hiapo—at the Kewalo Basin Marine Mammal
280 Laboratory in Hawaii. The dolphins were curious and playful, and they transferred their sociability to
281 Herman and his students.

282 “In our work with the dolphins, we had a guiding philosophy,” Herman says, “that we could bring out
283 the full flower of their intellect, just as educators try to bring out the full potential of a human child.
284 Dolphins have these big, highly complex brains. My thought was, ‘OK, so you have this pretty brain.
285 Let’s see what you can do with it.’”

286 To communicate with the dolphins, Herman and his team invented a hand- and arm-signal
287 language, complete with a simple grammar. For instance, a pumping motion of the closed fists meant
288 “hoop,” and both arms extended overhead (as in jumping jacks) meant “ball.” A “come here” gesture
289 with a single arm told them to “fetch.” Responding to the request “hoop, ball, fetch,” Akeakamai
290 would push the ball to the hoop. But if the word order was changed to “ball, hoop, fetch,” she would
291 carry the hoop to the ball. Over time she could interpret more grammatically complex requests, such
292 as “right, basket, left, Frisbee, in,” asking that she put the Frisbee on her left in the basket on her
293 right. Reversing “left” and “right” in the instruction would reverse Akeakamai’s actions. Akeakamai
294 could complete such requests the first time they were made, showing a deep understanding of the
295 grammar of the language.

296 “They’re a very vocal species,” Herman adds. “Our studies showed that they could imitate arbitrary
297 sounds that we broadcast into their tank, an ability that may be tied to their own need to
298 communicate. I’m not saying they have a dolphin language. But they are capable of understanding
299 the novel instructions that we convey to them in a tutored language; their brains have that ability.

300 “There are many things they could do that people have always doubted about animals. For example,
301 they correctly interpreted, on the very first occasion, gestured instructions given by a person
302 displayed on a TV screen behind an underwater window. They recognized that television images
303 were representations of the real world that could be acted on in the same way as in the real world.”

304 They readily imitated motor behaviors of their instructors too. If a trainer bent backward and lifted a
305 leg, dolphin would turn on its back and lift its tail in the air. Although imitation was once regarded as
306 a simpleminded skill, in recent years cognitive scientists have revealed that it’s extremely difficult,
307 requiring the imitator to form a mental image of the other person’s body and pose, then adjust his
308 own body parts into the same position—actions that imply an awareness of one’s self.

309 “Here’s Elele,” Herman says, showing a film of her following a trainer’s directions. “Surfboard, dorsal
310 fin, touch.” Instantly Elele swam to the board and, leaning to one side, gently laid her dorsal fin on it,

311 an untrained behavior. The trainer stretched her arms straight up, signaling “Hooray!” and Elele
312 leaped into the air, squeaking and clicking with delight.

313 “Elele just loved to be right,” Herman said. “And she loved inventing things. We made up a sign for
314 ‘create,’ which asked a dolphin to create its own behavior.”

315 Dolphins often synchronize their movements in the wild, such as leaping and diving side by side, but
316 scientists don’t know what signal they use to stay so tightly coordinated. Herman thought he might
317 be able to tease out the technique with his pupils. In the film, Akeakamai and Phoenix are asked to
318 create a trick and do it together. The two dolphins swim away from the side of the pool, circle
319 together underwater for about ten seconds, then leap out of the water, spinning clockwise on their
320 long axis and squirting water from their mouths, every maneuver done at the same instant. “None of
321 this was trained,” Herman says, “and it looks to us absolutely mysterious. We don’t know how they
322 do it—or did it.”

323 He never will. Akeakamai and Phoenix and the two others died accidentally four years ago. Through
324 these dolphins, he made some of the most extraordinary breakthroughs ever in understanding
325 another species’ mind—a species that even Herman describes as “alien,” given its aquatic life and the
326 fact that dolphins and primates diverged millions of years ago. “That kind of cognitive convergence
327 suggests there must be some similar pressures selecting for intellect,” Herman said. “We don’t share
328 their biology or ecology. That leaves social similarities—the need to establish relationships and
329 alliances superimposed on a lengthy period of maternal care and longevity—as the likely common
330 driving force.”

331 “I loved our dolphins,” Herman says, “as I’m sure you love your pets. But it was more than that, more
332 than the love you have for a pet. The dolphins were our colleagues. That’s the only word that fits.
333 They were our partners in this research, guiding us into all the capabilities of their minds. When they
334 died, it was like losing our children.”

335 Herman pulled a photograph from his file. In it, he is in the pool with Phoenix, who rests her head on
336 his shoulder. He is smiling and reaching back to embrace her. She is sleek and silvery with
337 appealingly large eyes, and she looks to be smiling too, as dolphins always do. It’s an image of love
338 between two beings. In that pool, at least for that moment, there was clearly a meeting of the minds.

339