

*Chimpanzees' Use of Sign Language**

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Washoe was cross-fostered by humans.¹ She was raised as if she were a deaf human child and so acquired the signs of American Sign Language. Her surrogate human family had been the only people she had really known. She had met other humans who occasionally visited and often seen unfamiliar people over the garden fence or going by in cars on the busy residential street that ran next to her home. She never had a pet but she had seen dogs at a distance and did not appear to like them. While on car journeys she would hang out of the window and bang on the car door if she saw one. Dogs were obviously not part of 'our group'; they were different and therefore not to be trusted. Cats fared no better. The occasional cat that might dare to use her back garden as a shortcut was summarily chased out. Bugs were not favourites either. They were to be avoided or, if that was impossible, quickly flicked away. Washoe had accepted the notion of human superiority very readily - almost too readily. Being superior has a very heady quality about it.

When Washoe was five she left most of her human companions behind and moved to a primate institute in Oklahoma. The facility housed about twenty-five chimpanzees, and this was where Washoe was to meet her first chimpanzee: imagine never meeting a member of your own species until you were five. After a plane flight Washoe arrived in a sedated state at her new home. The director of the institute insisted that she be put in a cage in the main building housing the adult chimpanzees. Despite our protests he even took away her blanket, under the pretext that it was time she learned what it was to be a chimpanzee. The director was from the old, but still popular, school of captive treatment that explicitly held that humans had to dominate the animals they owned, and that the best way to do this was to arbitrarily mistreat them.

When Washoe awoke she was in a cage. After some argument, the director had grudgingly allowed one of us to stay, so she had at least one familiar friend with her when she woke. When she began to move, the chimpanzees in the adjoining cages began to bang and scream at her. After she regained her senses her human friend asked in sign language what the chimpanzees were. She called them 'BLACK CATS' and 'BLACK BUGS'. They were not like her and if she felt about them the way she felt about cats and bugs they were not well liked. Washoe had learned our arrogance too well.

However, it wasn't long before Washoe began to accept the other chimpanzees, and herself as one of them. Like Wendy from Peter Pan, she took on the role of mother to all the young ones as well as defender of the picked-upon underdog. She seemed to show genuine compassion for her newly discovered species. During her first year at the institute she was allowed to spend time on a small island that the young chimpanzees enjoyed. The island had been constructed with a steep red clay bank that went into a water moat; there was a three-foot-high electric fence on the island side of the moat. One day a new young chimp had arrived at the institute and the director put the chimp on the island. The chimp became quite distressed and tried to jump across the moat but landed in the middle of it. Washoe's reaction was interesting because this was a new chimp, one whom she hardly knew, but who was obviously in danger. The chimp went under the water and came up again. Washoe then jumped the electric fence and landed on a small grassy bank that extended about a foot from the fence. She held on to the bottom of one of the electric fence posts and stepped into the water, sliding down the steep submerged bank. She extended her hand to the drowning chimp and pulled her back to safety. Washoe had taken a great risk to save the stranger. It was truly a case of altruism on her part. If there was

* In PAOLA CAVALIERI & PETER SINGER (eds.), *The Great Ape Project* (New York: St. Martin's Griffin, 1993), pp. 28-41.

¹ R. A. Gardner and B. T. Gardner, 'A cross-fostering laboratory', in R. A. Gardner, B. T. Gardner and T. E. Van Cantfort (eds), *Teaching Sign Language to Chimpanzees* (State University of New York Press, Albany, 1989), pp. 1-28.

anyone she didn't like it was the arrogant humans who mistreated her friends. In the ten years she spent there she never gave up her self-worth, even though the director would occasionally try to intimidate her when her human friends were absent.

I have often wondered what it would be like to suddenly discover that you are not who you thought you were. Would we be like Washoe and accept it and show compassion and caring for our newly discovered conspecifics? Or would we maintain our earlier arrogance and continue to oppress and refuse to accept our own kind?

It could never happen to an individual human as it did to Washoe, but it has happened to all of us on another level: when Charles Darwin told us that those 'Black Bugs' were really our relatives. In reaction to this rude awakening some humans have clung to the vanity of human arrogance and continued to oppress and abuse their fellow animals. Others have discarded their false vanity and have attempted to remove the arrogance-induced ignorance by getting to know their newly discovered relatives. Some of us have even shown compassion and caring for them.

Human Arrogance

Why is human arrogance so pervasive and where does it come from? The answer to the first part of the question is easy. Arrogance is pervasive because it appeals to our vanity. We like it when we are told that we have high IQs, good looks and are extra special. What we seldom consider is that implicit in the statement that I have a high IQ is the suggestion that someone else must have a low IQ, and if I have good looks then surely someone else is quite ugly, and if I am extra special then most people must be quite ordinary. If this is so, then everything that is not me is sadly imperfect or downright defective. Once this attitude is established then you have a choice between advancing perfection or imperfection. There is no rational choice but to advance perfection. And what should you exploit in order to advance perfection? Why imperfection of course, those unfortunate individuals who are different from you. In this fashion you will become even more 'perfect' while at the same time removing some of life's imperfections.

Why do humans feel arrogant? It comes from our conception of animal nature. According to the seventeenth-century philosopher Rene Descartes, animals are unthinking, unfeeling machines, so different from us as to be incomparable. How could we not help but become arrogant when Descartes justifies it? If this is true then it is important to ask where our conception of animal nature comes from. The answer is that our conception of animal nature does not come from the non-human animals themselves, but from our preconceived concepts of human nature.² We have not bothered to ask the animals what they are, but instead we tend to define them as not human. If humans have thought, animals don't; if humans have an imagination, animals have none; and so on. Many of us, in our reaction to the implications of Darwin's notion of continuity, try to maintain our false superiority by steadfastly clinging to our ignorance. We use the absence of evidence to claim evidence with regard to sharing any traits that we think are important for our species' uniqueness.

Washoe, among other chimpanzees, has served notice on this studied ignorance spawned by human arrogance. The results of her accomplishments have put many academic feet in many academic mouths. Her accomplishments, along with those of her African cousins, have served as a small flame in the dark halls of human ignorance. It was only when a few humans were humble enough to ask the chimpanzee what their nature was that these discoveries were made. However, these discoveries have not always been well received because of the obvious conclusion that must be faced: namely, that we are no longer demiurges. Just as we are human

² H. Sarles, *After Metaphysics: Toward a Grammar of Interaction and Discourse* (Peter de Rieder Press, Lisse, The Netherlands, 1977), p. 27.

beings, chimpanzees become chimpanzee beings and the importance shifts to the 'beingness'. Human is no longer a special classification but merely an adjective describing our animal nature.

Chimpanzee Mentality

The early days of Project Washoe set the stage for the fascinating discoveries to come later, and the Gardners set the example to follow: a combination of caring that took Washoe on her own terms and very rigorous experimental design.³ Their use of double-blind testing procedures in subject-paced tests, and the careful diaries they kept of Washoe's daily activities, continue to be the highest standard for this area of research. The recent discoveries made with Washoe and her family today continue to add to this impressive record. We will present some of these more recent discoveries in order to shed a little light on our ignorance.

Cultural Transmission

When Washoe acquired her signs, some critics were quick to point out that her sign language was taught to her by humans and that she would not have acquired it without human intervention. They assumed that chimpanzees are incapable of passing information on from generation to generation, especially something as complex as language. In 1979, when Washoe was of child-bearing age, a study was done that would answer this premature criticism.

Washoe became pregnant and we designed a study to see whether she would pass her signs on to her offspring.⁴ Judging from how readily captive chimpanzees imitate human skills, from the ability of wild chimpanzees to acquire tool-making skills from their friends and family, and especially from the fact that wild chimpanzees have demonstrated that they use gestural dialects which differ between chimpanzee communities,⁵ it seemed likely that Washoe's infant would acquire signs from her.

Unfortunately, Washoe's own infant died, so a ten-month-old chimp from Yerkes Regional Primate Center was found to replace her dead infant and help ease her grieving. The infant's name is Loulis and Washoe readily adopted him. In order to control for the possibility that Loulis might acquire his signs from humans, we humans limited our signing in Loulis's presence to seven signs, otherwise we used vocal English to communicate with Washoe and Loulis, which she and he understood very well.

After the first eight days that Washoe and Loulis were together he began to imitate his first sign. Ten months is not an early age to learn signing; other signing chimpanzees have acquired their first signs in their fourth and fifth months of life. From our video recordings we found that Washoe was doing some very subtle teaching, in that she would initially orient towards Loulis, then sign COME, then approach him, and then retrieve him. She gradually faded this so that she stopped retrieving him and then she stopped approaching him and finally all she had to do was orient and sign. She also did some active teaching of signs. In one case she actually took his hand and moulded it into the sign for FOOD in an appropriate context. She was also observed to place a small toy chair in front of Loulis and then demonstrate the CHAIR/SIT sign. At fifteen months of age Loulis began to use his first two-sign combinations. What we found

³ R. A. Gardner and B. T. Gardner, 'A test of communication', in R. A. Gardner, B. T. Gardner and T. E. Van Cantfort (eds), *Teaching Sign Language to Chimpanzees* (State University of New York Press, Albany, 1989), pp. 181-97.

⁴ R. S. Fouts, A. Hirsch and D. H. Fouts, 'Cultural transmission of a human language in a chimpanzee mother/infant relationship', in H. E. Fitzgerald, J. A. Mullins and P. Page (eds) *Psychobiological Perspectives: Child Nur-turance Series*, vol. 3 (Plenum Press, New York, 1982), pp. 159-93; R. S. Fouts, D. H. Fouts and T. E. Van Cantfort, 'The infant Loulis learns signs from cross-fostered chimpanzees', in R. A. Gardner, B. T. Gardner and T. E. Van Cantfort (eds), *Teaching Sign Language to Chimpanzees* (State University of New York Press, Albany, 1989), pp. 280-92.

⁵ F. X. Plooij, 'Some basic traits of language in wild chimpanzees', in A. J. Lock (ed.), *Action, Gesture and Symbol: The Emergence of Language* (Academic Press, New York, 1978).

was that Loulis acquired his signs from Washoe and some of them she actively taught him. He used his signs to communicate with his fellow chimpanzees as well as with humans.

The tenacity of human ignorance was demonstrated after the early results of Washoe tutoring Loulis had been presented at the Psychonomics Society meetings in 1979, and even after several scientific articles had been published about Loulis's accomplishments (the first one in 1982). Even the attention of the popular media could not shake some scientists' hold on their ignorance. For example, as late as 1988 B. F. Skinner still felt able to publish the comment: 'No other species has developed the verbal environment we call a language. I doubt that the Gardners have ever seen one chimpanzee show another how to sign.'⁶

Chimpanzee Conversations

The next phase of our research looked at how Loulis used his signs with his mother and the other signing chimpanzees.⁷ When we did this we had moved from Oklahoma, and Washoe and Loulis were joined by three chimpanzees whom the Gardners had cross-fostered on their second sign language project.⁸ Moja joined Washoe and Loulis in 1979, and Dar and Tatu joined them in 1981. With five chimpanzees we were able to examine chimpanzee to chimpanzee sign language conversations. We found that Loulis gradually shifted his signing, as he grew Chimpanzees' Use of Sign Language older, from his adoptive mother Washoe to his new playmate Dar. This is typical of human children as well. What Loulis signed about with Dar was mainly play. They would request tickle and chase games from each other. However, whenever the game became too rough and one of them was hurt they would then sign to Washoe for comfort with HUG/LOVE signs and other solicitations of reassurance. When they fought we even observed Loulis apparently blaming Dar for the commotion. The two boys were screaming and fighting and when Washoe rushed in, as she usually did to stop the fights, Loulis signed to her 'GOOD GOOD ME' and then, screaming, pointed at Dar. Washoe would then discipline Dar. After several months of this Dar apparently caught on to the tactic and would throw himself on the floor when he saw Washoe enter the room and begin to cry and sign a frantic 'COME HUG' to her, whereupon she would comfort Dar. Then she would scold Loulis with a bipedal swagger toward him signing 'GO THERE' to him, pointing to the over-head exit tunnel for the room.

In one study we recorded over 5,200 instances of chimpanzee to chimpanzee signing.⁹ This signing was analysed into different categories. The majority of signing by the chimpanzees occurred in the three categories of 'play', 'social interaction', and 'reassurance'; these accounted for over 88 per cent of the chimpanzee to chimpanzee conversations. The remaining 12 per cent was spread across the categories of 'feeding', 'grooming', 'signing to self', 'cleaning' and 'discipline'. An interesting aspect of these findings was that they indicated that the chimpanzees used their signs primarily for various types of social interaction. It also showed that food was not a major topic, since it accounted for only about 5 per cent of their conversations. Some critics who wished to discredit the chimpanzee language studies claimed that chimpanzee signing consisted solely of begging for food. (Although this was true of one study, in which the poor chimpanzee was deprived of his food and was required to sign in order to get it.¹⁰)

The previous study was done using humans to observe the chimpanzees and record their behaviour in much the same fashion that Jane Goodall adopts in her observations of wild

⁶ B. F. Skinner, 'Signs and countersigns', *Behavioral and Brain Sciences*, vol. 11, no. 3 (1988) pp. 466-7.

⁷ D. H. Fouts, 'Remote videotaping of a juvenile chimpanzee's sign language interactions within his social group' (unpublished master's thesis, Ellensburg, Washington, USA, Central Washington University, 1984); R. S. Fouts and D. H. Fouts, 'Loulis in conversation with cross-fostered chimpanzees', in R. A. Gardner, B. T. Gardner and T. E. Van Cantfort (eds) *Teaching Sign Language to Chimpanzees* (State University of New York Press, Albany, 1989), pp. 293-307.

⁸ Gardner and Gardner, 'A cross-fostering laboratory'.

⁹ R. S. Fouts, D. H. Fouts and D. Schoenfeld, 'Sign language conversational interactions between chimpanzees', *Sign Language Studies*, vol. 34 (1984) pp. 1-12.

¹⁰ H. Terrace, *Nim* (Knopf, New York, 1979).

chimpanzees. However, in the tradition of careful experimental design that the Gardners began, we wished to control for any possible human intervention, so Debbi Fouts began a study that used remote video recording of the chimpanzees.¹¹ For this procedure, three or four cameras would be placed outside the enclosure in one of the chimpanzees' rooms and then connected by cables through the ceiling to monitors in a completely separate room. In this manner we were able to record the chimpanzees' signing with no human beings present. Debbi began in 1983, taking twenty-minute video samples three times a day for fifteen days. In these fifteen hours she found over 200 instances of chimpanzee to chimpanzee signing. Of course, in some twenty-minute samples there was absolutely none because the chimpanzees were napping during that particular random sample. However, in one of the twenty-minute samples there were twenty-nine chimpanzee to chimpanzee conversations. As with the live observation study, Debbi found that the chimpanzees talked mainly about their social interactions. She also found that when they talked about food it wasn't to obtain food. Instead, they merely talked about it just as we might talk about some of our favourite foods without having to eat or even see them.

For three years Debbi continued to collect fifteen hours of video tape each year, to give a total of forty-five hours. She had several interesting records during this time. For example, Washoe did not seem to like the fact that everyone (all the humans at least) was required to leave the area during the taping. On one occasion after Debbi had positioned the cameras, shooed everyone out and gone back to the video monitoring room she saw on the screen that Washoe was approaching the cameras. Washoe then climbed up on the enclosure fence and looked directly into the camera and signed 'DEB DIRTY DEB'. Washoe uses the DIRTY sign to refer to faeces, soiled items or to humans or chimpanzees that she is displeased with.

Private Thoughts

In our live observation and subsequently in the remote video recording of the chimpanzees, we observed that they talked to themselves. This was not a new observation, since the Gardners had also noted that Washoe would do this when she was young. In fact, her private conversations with herself were truly private, even to the extent that if we tried to eavesdrop she would turn away; and if we continued to try to see what she was signing she would actually get up and move to a more secluded location. She would label pictures of things that she saw in magazines, or merely sign to herself. She would do this while alone in her bedroom, or to make sure she was not bothered sometimes she would take a magazine to the top of a thirty-foot willow tree and sign to herself up there. Later studies we did with the chimpanzees also found private signing. In the study with over 5,200 instances of chimpanzee conversations, 119 of these were private.¹²

When private signing occurs in humans it is considered to be overt thought - the person is thinking aloud. It is one of the few times that an observer can be privy to another person's private thoughts. Many philosophers and other intellectuals have claimed that thought is unique to humans and quite beyond the capacity of the other animals. This claim goes back to Aristotle, can be found in Aquinas and Descartes and has been defended by modern philosophers as well.¹³ The research we are about to describe provides solid empirical evidence of nonhuman animal thought.

¹¹ D. H. Fouts, 'Remote videotaping of a juvenile chimpanzee's sign language interactions within his social group'; Fouts and Fouts, 'Loulis in conversation'.

¹² Fouts *et al.*, 'Sign language conversational interactions'.

¹³ Aristotle, *De Anima II*, 3, 414 a (28)-415a (10); T. Aquinas, *Summa contra Gentiles*, Book III, Part II, ch. CXII; R. Descartes, *The Philosophical Works of Descartes*, translated by E. S. Haldane and G. R. T. Ross (Dover, New York, 1955); relevant extracts from these three philosophers are to be found in T. Regan and P. Singer (eds), *Animal Rights and Human Obligations*, 2nd edn (Prentice-Hall, Englewood Cliffs, NJ, 1989), pp. 4-19. For contemporary exponents of the view that animals cannot think, see R. G. Frey, *Interests and Rights: The Case Against Animals* (Clarendon Press, Oxford 1980) and Michael Leahy, *Against Liberation: Putting Animals in Perspective* (Routledge, London, 1991).

Debbi Fouts's forty-five hours of remote video tape had ninety stances of private signing on them. Mark Bodamer, one of our graduate students at the time, analysed these tapes for his master's thesis,¹⁴ using research done with humans as a model. He found that, "humans, the chimpanzees used their private signing for a variety of functions. One major question that came out of Mark's thesis was whether the sample he analysed was biased against private signing because when Debbi recorded the tapes she would choose to record from cameras with two or more chimpanzees in the frame as opposed to single chimpanzees. She did this because she was focusing on chimpanzee to chimpanzee conversations. So after Mark's thesis we did another study, which collected twelve minutes of tape per day, five days a week, for a total of fifty-six weeks. We had fifty-six hours of new tape to analyse, but this time if those recording the session had a choice between recording from a camera with two chimpanzees in the frame as opposed to one that had a single chimpanzee, they were instructed to choose the latter. This procedure increased the number of private signing instances three-fold, to 368 for the 56 hours.

One of the more common categories of signing used by chimpanzees and humans is 'referential signing'. Examples are Washoe naming the picture in the magazine, or Dar signing DOG when he notices a dog running by outside his window. Basically, the individuals are simply commenting on things and events in their environment. They are doing it apparently just for the sake of it - they are not asking for it or begging for something. Some scientists have claimed that chimpanzees do not use referential communication but only sign for rewards. This arrogant position makes the chimpanzees seem more like unthinking machines than the active information-seeking beings they are in reality.

Another category demonstrates another behaviour that chimpanzees are not supposed to have. The claim is that chimpanzees only ask for things in their immediate environment and cannot ask for things not present. In other words, a kind of 'out of sight, out of mind' criticism. An utterance of private signing is categorised as 'informative signing' if the chimpanzees are referring to something not in their present environment. Again this is strong evidence that, just like us, the chimpanzees also think about things that are not present. The chimpanzees used this type of signing in 12 to 14 per cent of the instances in the two studies for a total of fifty-seven instances. This again demonstrates the rich mental life of the chimpanzee.

'Expressive signing' was popular with Washoe. This is a category of signing that is used more commonly by adult humans than by children. It occurs in humans when we become upset or excited by something. It might happen when you accidentally strike your thumb with a hammer or if you notice a police car behind you just as you drive through a red light: even though you are alone you might say something very expressive. My favourite example of this for the chimpanzees was when Washoe was being recorded as she was lying on a bench looking at a magazine. Loulis came running into the room and into the camera frame from an overhead tunnel. He was running very fast and Washoe ignored him. As he ran under the bench where she was lying he reached up and stole her magazine and then ran immediately out of the room using the overhead tunnel again. By the time Washoe got to her feet, Loulis was gone. She then began to walk off and as she did she signed to herself 'DIRTY DIRTY'. As mentioned earlier, Washoe used the DIRTY sign as an insult.

Some of the other signs used by the chimpanzees were categorised as 'self-regulatory', 'regulatory', 'attentional', 'interactional', 'instrumental', 'describing own activity', 'question' and 'imaginary'. The 'imaginary' category was expanded upon by another of our students, Mary Lee Abshire, in a study on chimpanzee imagination that included imaginative private signing as well as other imaginative behaviours.¹⁵

¹⁴ M. Bodamer, 'Chimpanzees signing to themselves' (unpublished master's thesis, Ellensburg, Washington, USA, Central Washington University, 1987); M. Bodamer, R. S. Fouts, D. H. Fouts and M. L. Abshire, 'Functional analysis of chimpanzee (*Pan troglodytes*) private signing', submitted to the *Journal of Comparative Psychology* (1993).

¹⁵ M. L. Abshire, 'Imagination in chimpanzees', *Friends of Washoe Newsletter*, vol. 9, no. 4 (1989) pp. 2-10.

Imaginative Chimpanzees

Imagination is another of those special mental behaviours that some people have considered unique to the human species. Some of our species' more impressive accomplishments have been attributed to imagination. For example, we might never have gone to the moon had we not imagined that it could be done. In the private signing study, imagination was defined as an utterance that is 'sung' or is word play, or represents a transformation of real objects or events, whether present or not: we found that 5 per cent of the utterances were imaginary. For example, rhythmic movements of signs or form alliteration of signs would be considered comparable to vocal singing. These were such events as Loulis playing with a block of wood by placing it on his head and then referring to it as a HAT. Another instance was when Moja produced an alliteration by 'rhyming' signs that all used the same initial hand configuration.

Mary Lee Abshire's thesis expanded on this to other behaviours, such as play. She found that chimpanzees, when playing, would treat toys as if they were alive. In other words, imagination involves attributing to situations or things certain properties that they do not actually possess. Using the remote video recording technique, she recorded Dar using a type of imagination referred to as 'animation' when he signed 'PEEKA-BOO' while playing with a teddy bear. Moja displayed a type of imagination referred to as 'substitution' when she began to treat a purse were a shoe. Mary Lee was able to record six instances of imagination in the chimpanzees during fifteen hours of remote video recording. This is impressive when one considers that of the 5,200 observations of chimpanzee signing only about 2 per cent (119) were classified as private signing, and in the private signing studies only 4 to 5 per cent were imagination. In other words, imagination is a relatively rare behaviour compared with all the other things the chimpanzees do, just as it is with our species.

Timely Memories

Memory and a sense of time are two mental abilities that humans have thought absent in our fellow animals. Our favourite example of memory occurred with Washoe. About a year after we moved with Washoe to Oklahoma, the Gardners visited her. It was very hard on the Gardners to give Washoe up and send her away with us to Oklahoma, and it was perhaps because of the emotional pain associated with this that they did not visit Washoe again for another eleven years. By this time we had moved to our present home in Washington State and the chimpanzees from the Gardners' second project, Moja, Tatu and Dar, had joined Washoe and Loulis. Moja had not seen the Gardners for about three years and Dar and Tatu had not seen them for well over a year when they did visit. Loulis was the only chimpanzee who had never met them.

When the Gardners visited we did not tell the chimpanzees they were coming but kept it as a surprise. When they walked in the four chimpanzees who knew them did something very unusual. Normally if a stranger visits, the chimpanzee will begin to display and bang around in an apparent attempt to frighten the stranger away. When their familiar friends come in they usually greet us with pant hoots and Washoe and the others will often sign to us such things as COME HUG and want to touch us. However, when the chimpanzees saw the Gardners, except for Loulis they did neither of these things but sat down and stared at them they were dumbfounded. Loulis stood up and began to sway from side to side and bang the sides of the tunnel he was in, and his hair started to rise as well. When he started to do this Washoe and Dar, who : sitting on either side of him, both grabbed him. Dar covered his mouth with his hand and Washoe took his arm and shoulder and made : down and calm down. Loulis looked just as surprised by this as : were, because as far as we know the other chimpanzees had never treated him this way before.

The next surprise was when Washoe looked at the Gardners and their name signs. She had not

seen them in eleven years, since she seven years old, and she still remembered them and their name signs. Then Washoe signed 'COME MRS G' to Beatrice Gardner and led her into an adjoining room and began to play a game with her that she had not been observed to play since she was a five-year-old in Reno.

Another discovery we have made with Tatu combines memory with a sense of time. We have had only two examples of this and they were two years and nine months apart. The first one occurred during the Thanksgiving holidays in 1989. We make it a general rule here to celebrate all birthdays and holidays, since these seasonal events serve to break up the deadening routine that captive situations can have. We celebrate every Christmas by decking the halls with edible strings of dried fruits and treats in addition to the traditional tree, which is covered with edible strings of treats and edible ornaments as well. We always get the tree and decorate it on the weekend following the Thursday of Thanksgiving. The tree is placed outside the enclosure of one of the chimpanzee rooms, and as Christmas approaches the edible ornamentation grows and grows. Needless to say, the Christmas tree is a favourite topic of conversation with the chimpanzees, and they refer to it with a sign combination they devised - CANDY TREE. Then on Christmas Day the chimpanzees are given some of the ornaments to eat and, because there are so many, they continue to receive these as a daily treat until New Year's Day.

On the Friday following Thanksgiving in 1989 it began to snow outside, and it was on this occasion that Tatu asked the following question: 'CANDY TREE?' This impressed us a great deal because it could be interpreted that Tatu not only remembered the Christmas tree but also knew that this was the season for it, which is a temporal perception. However, we were also aware that this was but a single observation of this type of behaviour, and it was not until August 1991 that we made a second observation of a similar instance of behaviour.

As mentioned, we also celebrate all the birthdays each year. We have two birthdays right next to each other: Debbi Fouts's birthday is on the first of August and Dar's is on the second. This year we celebrated Debbi's birthday with treats and birthday songs as usual. Later that day, in the afternoon, Tatu asked 'DAR ICE CREAM?' Ice cream is often part of the birthday celebrations, and it appears that Tatu may have been aware of what came after Debbi's birthday.

Cain and Abel Revisited

Chimpanzees are our closest living relatives. In terms of biochemical similarities based on blood research¹⁶ and genetic similarities¹⁷ chimpanzees are actually closer to humans than they are to gorillas, even though all three primates are within 1 per cent of each other.

The similarities of the behaviour of the chimpanzee in the wild to human behaviour are just as striking as are the biochemical and genetic similarities. The work of Jane Goodall¹⁸ and others has shown us that the behaviour of wild chimpanzees is not so different from that of non-technological groups of humans. Indeed, wild chimpanzees live in communities surrounded by traditional boundaries, they hunt, they care for their mothers (even to the extent of mourning themselves to death over their mother's death), they make tools and, perhaps most important of all, they can suffer from emotional as well as physical pain.

In addition to the marked similarities that their culture has to ours, there are also striking cognitive similarities. The Gardners found that chimpanzees have the capacity to acquire human sign language.¹⁹ We have shown in this chapter that chimpanzees can pass this language

¹⁶ M. E. King and A. C. Wilson, 'Evolution at two levels in humans and chimpanzees', *Science*, vol. 188 (1975) pp. 107-16.

¹⁷ R. Lewin, 'DNA reveals surprises in human family tree', *Science*, vol. 226 (1984) pp. 1179-83.

¹⁸ J. Goodall, *The Chimpanzees of Gombe: Patterns of Behavior* (The Belknap Press of Harvard University Press, Cambridge, MA, 1986).

¹⁹ Gardner and Gardner, 'A test of communication'.

on to the next generation, that they can use it spontaneously to converse with each other as well as with humans, that they can use their signs to think with, as evidenced by their private signing, that they have an imagination, that they have good memories and that they may even be able to perceive seasonal time.

This research with the chimpanzee, together with research with other great apes, demonstrates that the difference between apes and humans is one of degree and supports the Darwinian notion of continuity. This position runs counter to the more popular notion that humans are different in kind from other animals. Unfortunately, much of the biomedical research on chimpanzees assumes a kind of schizophrenic position: it justifies the use of chimpanzees as a medical model because of Darwinian continuity, and yet at the same time it claims moral immunity with regard to the physical and mental damage done to the chimpanzees on the basis that humans are different from other animals. As a result, the chimpanzees are treated as if they are unfeeling machines.

Over the past twenty-five years our own research has served to help transcend the popular idea that humans are different in kind from all other animals. We have demonstrated that chimpanzees are aware, that they feel, and that they have very rich mental lives. From now on, we humans have a responsibility to make sure that our relationship with our sibling species, the chimpanzee, as well as with other great apes, is not that of Cain and Abel, but instead follows the more humane tenet of 'love thy brother'.