Thomas Aquinas Meets Nim Chimpsky:[1] On the Debate about Human Nature and the Nature of Other Animals

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Are human beings really different from the other animals? On the whole people throughout most of history have thought so, both common folk who ate meat, and the many philosophers who thought that humans were different from other animals because we can think, whereas they cannot. And then in the nineteenth century Darwin arrived on the scene, and the idea that natural selection acting on random variation resulted in some non-human primates producing human offspring that was not all that different than its parents cast a shadow of doubt on the neat line of demarcation between Man and Beast. Later on in the twentieth century the discovery of tool-making by animals and the successful teaching of sign language to apes[2] were perceived by many as other evidence against human uniqueness.

The new trend had a particularly marked effect upon many

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[1] Nim Chimpsky was the name Herbert Terrace gave to the chimpanzee that he used in his language studies. The name was humorously modeled after that of the well-known linguist, Noam Chomsky.

[2] The so-called great apes include gorillas, chimpanzees (*Pan troglodytes*), bonobos (*Pan paniscus*; sometimes called pygmy chimps), and orangutans.

Catholic institutions of higher learning in the U.S. In the first half of the twentieth century natural philosophy was standard fare in Catholic colleges. The rationale for this was that an understanding of philosophy was not only desirable for its own sake, but also as an aid to understanding theology. Typically a "Philosophy of Man" course was offered, and the textbooks used for it most often took the form of a résumé of sorts of what Thomas Aquinas said on the subject. These manuals, however, did not adequately prepare students to respond to the objections to the traditional view of man coming from the Darwinians and from scientists studying primate behavior. These objections, along with the demise of the views that there are certain kinds of non practical knowledge that have great worth, and that philosophy is the handmaiden of theology, combined with mounting skepticism, the fruit of modern philosophy, led to philosophy of man courses being eliminated or made elective by many institutions, while the Thomistic manuals were replaced by books giving a dozen views of the human person, Aquinas becoming one voice among many, if heard at all. Indeed, reading Aquinas was regarded as passé, when students in secular institutions were reading more modern authors like Freud and Skinner.[3]

What are some of the results of the ape studies that led to the apparent downfall of the traditional understanding of man? In one case, two chimps learned to communicate to each other what tool was needed in order to obtain food. The chimps were separated by glass with a window for communication. On one side food would be put in a container that could only be opened with a specific tool. The chimp on that side had to figure out which tool was needed and had to type the symbol (lexigram) for that tool so that the

[3] One of the few books on philosophy of human nature that takes a Thomistic approach, Larry Azar's *Man: Computer, Ape, or Angel* (Hanover, Mass.: The Christopher Publishing House, 1989), is not published by a mainstream publishing house.

chimp on the other side who had access to the tools upon seeing the symbol (lexigram) typed could then hand over the appropriate tool. Once the chimp gained access to the food, it shared some of the food with the other. In the words of the experimenter: "Such a complex inter-twining of symbols, cooperation, and use of objects is usually seen only in man."[4]

Then there is the chimp Sarah who learned what the symbol for the color brown meant, not by having the symbol-token shown to her in the presence of brown-colored objects, but rather by being told via symbol-tokens, in the absence of anything brown, that brown was the color of chocolate (she had already learned the symbols for chocolate and color of). Later when commanded via tokens "Sarah insert brown [in] red dish," she correctly selected and inserted the brown disk from a set of four differently colored disks.[5] This seems to show mental activity beyond simple association.[6]

Aristotle and Aquinas were obviously not aware of cases such as these, nor were they aware of the theory of evolution which seems to lend support to the notion that there is no radical discontinuity between man and beast. Does this mean that the Aristotelian-Thomistic tradition is now at a loss when it comes to answering the question of whether humans differ from other animals? Perhaps this would be the case if one needed to look at scientific evidence in order to determine

[4] E. Sue Savage-Rumbaugh, *Ape Language: From Conditioned Response to Symbol* (New York: Columbia University Press, 1988), 195.

[5] "In another case, she [the chimp Sarah] was successfully taught the word 'brown' through the instruction 'brown color of chocolate' given to her at a time when no chocolate (or any other brown object) was present" (David Premack, *Gavagai or the Future History of the Animal Language Controversy* [Cambridge, Mass.: The MIT Press, 1986], 202). See also Duane M. Rumbaugh, "Language Behavior of Apes," in *Speaking of Apes*, eds. Thomas A. Sebeok and Jean Umiker-Sebeok [New York: Plenum Press, 1980], 246.

[6] It is possible that Sarah simply used process of elimination to associate the unfamiliar token with the only colored disk whose name she had not already learned by conventional methods.

whether humans differ radically from other animals. But is this in fact so? Even Mortimer Adler, one of the rare thinkers in recent times who had sympathy for and some understanding of the Thomistic tradition, was of the opinion that the question of the difference of man was a mixed question, one that can only be answered by putting together scientific knowledge with philosophical insights.[7]

I think, however, that Adler is misled by a hidden ambiguity in the question of whether man is radically different from other animals, and that really there are two questions lurking here, one answerable by philosophy alone, the other requiring scientific inquiry as well. The first question aims at learning whether human being constitutes one of the fundamental divisions of living thing alongside Plant and Animal or whether Humans fall within the division Animal. If the former proves to be the case, then a subsequent question arises: is man the only representative of this division of being, or are there other beings that also belong to this category?

I maintain that just as the general difference between Plant and Animal can be determined without scientific investigation, whereas whether a specific organism is one or the other may require scientific investigation (e.g., is a Venus Fly Trap a plant or an animal?), so too the more general question about the whether there is a difference between Animal and Human is the philosopher's job to answer, whereas questions about specific organisms (e.g., an ape) may require scientific investigation as well. Why I hold this should be clear by the end of this talk.

Do human beings represent a separate fundamental division of living thing,[8] alongside plants (which grow, but do

[7] See Mortimer Adler, *The Difference of Man and the Difference it Makes*, 39, 40.

[8] The question of the difference between humans and animals is sometimes stated in the following ways: Do humans differ from animals in degree or in kind? Are humans radically different from animals? The disadvantage of these formulations is that what they exactly mean needs

not sense) and animals (which sense in addition to growing)? The other alternatives are that human beings are simply an animal that can do better something that some other animals can do, or they are an animal that has an animal-type feature that other animals do not have (like feathers on a bird—granted that it is now thought that some dinosaurs had feathers).

Throughout the history of philosophy, virtually all of the philosophers who maintain that there is a radical difference between human beings and other animals state that the difference lies in our ability to think and the brutes inability to do so.[9] And so I will first investigate what thinking is.[10] Note that answering this question will allow one to readily settle

clarification. E.g., is a bat with its power of echolocation different in degree or in kind from a dog? Is a bird not radically different from a bat? Even the very orderly *De Anima* of Aristotle at a certain point needs clarification: "why does [Aristotle] posit five kinds of potencies of the soul here, when he is accustomed to speak of the soul as three . . . and why does he put five here when above he put four" (*In Aristotelis Librum De Anima Commentarium* [Italy: Marietti, 1959], no. 280. Hereafter cited as *In De Anima*). So for the sake of simplicity I am looking at the fundamental types of soul which account for different modes of activity manifested by living things. Here the principle of division will prove to be: "according as the operation of the soul goes beyond the operation of a corporeal nature; for every corporeal nature is subordinated to the soul and compares to it as matter and instrument" (*Summa Theologiae*, ed. Instituti Studiorum Medievalium Ottaviensis [Ottawa: Commissio Piana, 1953], I 78.1. Hereafter cited as *ST*). See also *Quaestio Disputata de Anima* in *Quaestiones Disputatae* vol. 2, ed. P. Bazzi et al. (Turin: Marietti, 1965), unicus 13: "It is necessary to consider three grades in the actions of the soul. For the action of the soul transcends the action of nature operating in inanimate things; but this happens as to two things: namely, as to the mode of acting, and as to what is done."

[9] Mortimer Adler, *op. cit.*, 54.

[10] Some thinkers consider whether animals "think" in the sense of having conviction involving doubt. It is an interesting question whether only humans are capable of various degrees of conviction, and whether conviction necessarily implies thought in the sense in which we are defining thought. Time, however, does not allow us to consider this sense of thinking.

the question of whether thinking is really different in kind from sensing, or whether it is just another form of it, or a more refined form of some type of it. Put in more concrete terms: Is thinking simply another sense ability, but one unique to humans, like detecting magnetic fields is a form of sensing unique (or at least close to being unique) to certain birds? Or is thinking an activity proceeding from a more developed form of some sense, e.g., allowing the possessor to solve more difficult problems than can individuals with a weaker form of the same faculty, similar to the eagle seeing farther than we see because of some superiority of its eyes? Or is thinking something radically different from sensing?[11]

The history of philosophy bears witness to the difficulty of determining what thinking is. From the Pre-Socratics to our day quite a number of "thinkers" failed to understand what thinking is and distinguish it from sensing, and thus they also conflated the ability to think (i.e., the intellect) with the ability to sense. How are thinking and sensing (and the corresponding abilities, intellect and sense) to be defined and distinguished? As Aristotle pointed out long ago,[12] abilities of the soul are known through their activities, and these are understood in reference to their object. Sight is known from seeing, and seeing is known as perception of color. To understand what intellect is requires looking at thinking. To understand what thinking is requires considering its object.

What is the object of thinking? In the first instance, it is the *universal* natures of things. By contrast, the object of sensing is particular (or individual) things. One does not see or

[11] "Thinking" or at least "thought" is sometimes used to name sense perception, e.g., Mortimer Adler mentions that certain people use the expression "perceptual thought" as opposed to "conceptual thought." (*op. cit.* 91, 136, 137). I question such a usage—why add the word "thought" when speaking about sense perception? I intend to restrict my usage of "thinking" to the formation of concepts by which we have universal knowledge of things.

[12] See Aristotle, *De Anima*, 415a12–23.

hear "cat" in general, but this cat, whereas one's concept of cat applies to (and the name signifying this concept can be said of) every cat that ever was, is, and will be. There are doubtlessly many puzzling and difficult questions about the nature of the universal. However, our vague experience of sensing and thinking assures us both that we sense (e.g.,) particular animals, and that when we think about animals, e.g., that every animal is a living thing (or no animal is a plant), this refers to a certain nature that can be shared by many, and that is why it is best expressed by the singular "every" or "no."

A second difference between the objects of thinking and sensing is this: What one grasps through thinking is the *unchanging* natures of things, e.g., a cat is always an animal. Whereas what one grasps through the senses is subject to change. Muffy is no longer here in the house; Muffy eventually is no more. But "catness" does not cease to be when a cat or even all cats die—and this is what the intellect grasps.

A third characteristic of the object of thinking is that the nature known exists in the intellect in an *immaterial* manner, in contrast with the object of sense which is a particular that exists as a material entity. That the universal nature existing in the intellect is immaterial can be seen in two somewhat different, but related ways. Consider what makes a material thing the specific material thing that it is. Why is this cat, this cat and not that cat? Why is this patch of white not that patch of white? Most radically it is because of matter: the material out of which this cat is constituted is not the same material as that of out which other cats and all other things are constituted; this patch of white is reflected back from different matter than that. Now if matter is indeed the ultimate cause of the individuality of sensible objects, in order for the intellect to attain to universal knowledge, it must grasp what is commonly shared by all individuals having a given nature, leaving aside the individual features which are in a radical way due to matter. If the intellect did not abstract from matter, its

knowledge would be of the particular, as is the case of sense perception.[13]

There is another way of seeing that what we think about exists in our intellects in an immaterial manner.[14] Think of a dog. Now answer this question: was the dog that you thought of big, medium, or small? Say that it was small. Does that mean for you that a large dog such as a Great Dane is not a dog? Of course not. Then your concept of dog is not identical with the dog that you imagined, when asked to think of a dog. Although your concept of a dog might include proper accidents such as a size-range (say one foot high to four feet high), that size-range as conceptualized does not in any way have a size or dimension. A four-foot thing is plainly bigger than a one-foot thing. A four-foot thing when imagined is bigger than a one-foot thing. But is the notion of four feet a bigger one than that of one foot? The nonsensical character of the question brings out the immateriality of concepts. Quantity is a proper accident of all material substances, and it underlies in one way or the other all the other accidents of material substances, e.g., a quality such as color is found in a surface, action and passion involve contact which again requires a surface, etc. The fact that concepts lack any sort of dimensionality shows them to be entirely separate from matter.

In sum, the one thinking attains to the unchanging universal nature of things, known necessarily in abstraction from matter, whereas the one sensing acquires knowledge of material individuals subject to change.[15] Given that these two

[13] It is not true that if something is an individual, it is material, although this is the case for sensible things. However, if something is material, it is necessarily a "this."

[14] Aristotle gives another argument (the "intus apparens" argument) for the immateriality of the intellect in the *De Anima* (429a20–30). See Aquinas, *In De Anima,* nos. 677–81.

[15] We are speaking of the first and most fundamental act of the intellect, sometimes called simple apprehension (*simplex apprehensio*). This

activities have objects with opposite properties, it cannot be said that one of them is a form of the other; they are plainly two quite distinct types of knowing. The abilities or faculties from which these activities proceed, sense and intellect, are consequently also distinct.

Now doubtless many questions and objections can be brought up concerning the above abbreviated account of the nature of sensing and thinking. Aquinas alone brings up numerous difficulties, the responses to which often involve subtle distinctions. However, most modern authors do not assess the above discussions and find them wanting—they simply ignore them.[16] To mention one of many examples, the author of *Wild Minds: What Animals Really Think* says that the question "do animals think?" is an "unhelpful question because [it is] vague, relying on general concepts that are often defined on the basis of what humans do."[17]

Probably the most common reason why people get led astray and confuse thinking with sensing has to do with the dependence of thinking on imagining. We cannot think without also imagining.[18] Temporary or permanent damage to the imagination resulting from causes such as birth defects, injury, alcohol, or fatigue hinders us or prevents us entirely from thinking. Included among the images accompanying thought are not only visual representations, but representations of things perceived by other senses as well, and especially words (one's "internal dialogue voice" is produced by one's

act serves as the basis for composition and division (the formation of affirmative and negative propositions), and ultimately also for reasoning in which the mind goes from the known to what was hitherto unknown.

[16] Mortimer Adler back in the 1960s noted that contemporary authors ignore Aquinas's reasoning regarding the immateriality of the intellect (*op. cit.*, 220).

[17] Marc D. Hauser, *Wild Minds: What Animals Really Think* (New York: Henry Holt and Company LLC, 2000), xviii.

[18] Aristotle was the first to insist upon the dependency of thought upon imagination. See *De Anima*, 431a14–19.

imagination). Thus, there is a good deal of overlap between the Aristotelian insight that images are needed for thought and the view of many contemporary philosophers regarding the necessity of language for thought. Aristotle, however, unlike a number of these thinkers acknowledges that images other than words suffice for thinking certain thoughts. Moreover, ultimately words do not make sense if the one using them cannot refer back, either directly or indirectly to something imaginable—directly in the case of a material thing such as a frog;[19] indirectly in the case of non-sensible things or attributes, e.g., understanding something to be "immaterial" involves a negation of what is material, which is only understood in reference to some particular material thing which is imaginable.[20]

From the dependency of thought on imagination some people jump to the conclusion that there is no radical difference between the two, that both are brain functions. This is generally due to their prior commitment to materialism,[21] or to a failure to see that a dependency relationship is not necessarily some sort of identity relationship, or to a combination of the two. Some people correctly recognize that imagining is a brain function affected by drugs and damage to certain parts of the head, etc. And they also recognize that thinking depends upon imagining. And so they conclude that thinking too must be a brain function. However, this is like concluding that cooking requires (or is carried on in) a supermarket because cooking depends on getting groceries which requires a supermarket.

[19] See Aquinas *ST* I 84.7 for an explanation of why this is the case.

[20] See Thomas Aquinas *In Librum Boethii de Trinitate*, ed. Decker (Leiden: E.J. Brill, 1959), q. 2, art. 3.

[21] "Taking it for granted that both behavior and conscious thinking result from the functioning of brains or central nervous systems, we may appropriately inquire whether the extensive studies of brain functions have provided any evidence concerning the particular processes that produce conscious thought" (Donald R. Griffin, *op. cit.*, 142).

A dependency relationship does not necessarily entail partial identity between the things so related.[22] So the appropriate parallel in the case of the imagination and intellect is rather: just as a chef retains the ability to cook even when lacking ingredients to actually do so, so too the intellect retains its capacity to think, even when want of an image prevents it from actually doing so. Again, independent arguments show that the intellect is immaterial, and thus that thinking is not a brain function.

The more common and even cruder error occurs when people perhaps start out by having some vague idea that thinking is different from imagining, but end up conflating the two, on the grounds that since the intellect cannot actually think without an image, thinking must simply be a matter of producing images (in which case it would be a brain function). Again, the difference between the universal nature grasped by the intellect and the particularity of images formed by the imagination is something which virtually no one ever mentions, much less insists upon. And this is not surprising behavior on the part of those who have a prior commitment to the thesis material causes afford the only legitimate sort of explanation. For acknowledging the difference between the object of imagination and that of intellect leads ineluctably to entertaining the notion that the intellect may be immaterial, in which case thinking could in no-wise be a brain function. When one believes that thinking is a brain function, it is easy to go from there to attributing thought to animals, especially to those that have large brains and display flexible and adaptive behavior.

Another factor muddying the water such that people have difficulty recognizing the difference between thought and sen-

[22] The same sort of erroneous argument whereby people conclude that the fetus is part of the mother because it depends on the mother seems to be what some of those who conclude that thinking is a brain function have in mind.

sation is the ambiguous language used in their regard. The word "think" is a case in point. When one is asked to think of a dog, one both imagines a particular dog and calls to mind the idea "dog". The word "mind" also has multiple significations. It can be used to name internal senses (imagination, memory, etc.) or the intellect or both together,[23] and "mental process" can name thinking and also imagining/remembering.[24] These analogous words tend to lead astray weak-minded people who take them to have a single meaning. If instead of one name, two different names were used these people would be less likely to overlook the difference between the two sorts of cognitive faculties, namely, that imagination and memory are sense powers that perceive individual things, whereas the intellect grasps universals. It is inevitable that such ambiguities occur in a language because words naming non-sensible things are generally words that are originally used to name sensible things (e.g., "grasp" first names an act of the hand, and was subsequently transferred to name an act of the intellect). In addition, it is inevitable that some people use words carelessly, thus blurring their meaning. For example, James Mark Baldwin notes that: "There is a tendency to apply the term intellect more especially to the capacity for conceptual thinking. . . . We speak freely of 'animal intelligence'; but the phrase 'animal intellect' is unusual." Baldwin then goes on to say: "the restriction to 'conceptual process' is by no means so fixed and definite as to justify us in including it in the definition [of intellect],"[25] in effect recommending that we render a

[23] *New Collegiate Dictionary* (Springfield, Mass.: Merriam-Webster, 1980): "mind 2a: the element or complex of elements in an individual that feels, perceives, thinks, wills, and esp. reasons."

[24] Duane Rumbaugh quotes David Premack as saying: "the mind appears to be a device for forming internal representations. . . ." (*Speaking of Apes*, 247).

[25] James Mark Baldwin quoted in *"Language" and intelligence in monkeys and apes*, eds. Sue Taylor Parker and Kathleen Rita Gibson (New York: Cambridge University Press, 1990), 79.

word that had become useful for expressing something quite specific useless for doing so.[26]

If what we have said is correct, and intellect is different from sensation, then two of the most popular positions regarding the relation of human nature to animal nature have been eliminated. Humans are not simply more intelligent ("smarter") apes in the sense that we have a greater degree of ability when it comes to solving problems. Humans have an entirely different manner of solving problems, namely, through thought, and this makes us intelligent in a completely different manner than other animals. As for those who would differentiate human beings by a feature of our brain endowing us with a unique ability, such as our ability to speak grammatically,[27] they have missed a more fundamental difference which is not coded for by some gene or genes, namely, our ability to form universal concepts. Of course these latter two positions are attractive to materialists. Books elaborating such positions on human nature fill shelf after shelf. But if Aristotle and Aquinas are right, these people are on the wrong track.

So far we have argued that humans are a fundamental division of living thing alongside plants that grow, but lack knowledge, and animals, that have sense knowledge, but not intellectual knowledge. The question now becomes: are humans the only member of this fundamental division, or not?

[26] Another example of the abuse of language is the expressions: "conceptual thought" and "perceptual thought." "Concept" and "thought" are synonyms.

[27] Noam Chomsky is one of the main advocates of the view that "it is not very surprising that there are striking qualitative differences between humans and other species in 'capacity for language,' given the enormous selectional advantages conferred by language—for humans, in a period of human evolution that is recent in evolutionary terms" ("Human Language and Other Semiotic Systems," in *Speaking of Apes*, 439). For Chomsky and others of like mind this special capacity for language has a purely biological explanation (e.g., such as a special center in the human brain); see Ray Jackendoff, *Patterns in the Mind*, c. 4: "Language and the Brain," (New York: Basic Books, 1994).

Interestingly Aquinas, who thinks that this is an appropriate question, offers a number of a priori arguments why humans are the only species in this division. One argument comes from the part of the soul, another from the part of the body and a final one from the intermediary character of human nature.

> [G]ranted that there is not some kind of living thing that has intellect among mortal living things, other than the human species. For since the intellect does not have a corporeal organ, those that possess intellect are not able to be diversified according to the diverse physical make-up (*complexionem*) of organs, as the species of sensitive beings are diversified according to diverse make-ups (*complexiones*), by which they are related in diverse ways to the operations of sensation.[28]

> For if it [an intellectual substance] were united to another body, either it would be united to a mixed body or to a simple body. It cannot however be united to a mixed body, because it is necessary that that body be of the most balanced make-up according to its genus among the other mixed bodies . . . that body which has the most noble form, as an intellectual substance, would have to be of the most temperate mixture. . . . The most balanced constitution is the constitution of the human body. It is necessary, therefore, that if an intellectual substance is united to some mixed body, it be of the same nature as the human body. The form of this being would be of the same nature as the human soul, if it be an intellectual substance. There would not therefore be a difference according to species between this animal and man.[29]

> [T]hat there is only one species of rational animal, while there exist many species of irrational animal, arises from the fact that the rational animal is constituted from this that corporeal nature reaches the highest thing it can attain to,

[28] *In De Anima*, nos. 293, 294.

[29] *Summa Contra Gentiles*, ed. C. Pera, O.P. et al. (Turin: Marietti, 1961), bk. II, q. 90. Hereafter cited as *SCG*.

> [namely], the nature of spiritual substance which [in turn] attains its lowest [grade]. There is only one highest grade, as well as lowest grade, of one nature. . . .[30]

There is no intrinsic impossibility for another being with an intellect that forms ideas starting from sense experience to be united to a body somewhat different than ours, and to be reproductively isolated from us.[31] Whether one ought to call it another species, in the philosophical sense of species, is another matter (and admittedly a difficult one).

Proceeding on the assumption that one cannot exclude a priori the existence of other human species (or at least human-type beings), one then might ask if there is at least not some criteria based on common experience or on experience close to common experience which would allow one to quickly eliminate the various animals from the category of humankind. It is not common experience to come across any given kind of animal, flies and mice notwithstanding. If we then look at the cumulative experience of mankind, the first thing people observe is that most animals do not look like us, nor do they show any manifest signs of intelligence such as having a civilization with houses and sculptures or speech resembling those of humans. To think to look beyond the deer's blank stare to determine whether intelligence was lurking behind it was not the sort of thing that was likely to occur to a person who was hungry and who lacked leisure. It took awhile before human observations of animals were detached from practical concerns and were made for the sake of understanding the

[30] *Quaestio Disputata de Spiritualibus Creaturis* in *Quaestiones Disputatae*, vol. 2, ed. P. Bazzi et al. (Turin: Marietti, 1965), unicus 8 ad 10. Hereafter cited as *De Sp. Cr.*

[31] Even Aquinas thinks that there is room for doubt whether there might not be another human-type species. In his argument in *De Sp. Cr.* 8 ad 10, after he says that: "There is only one highest grade, as well as lowest grade, of one nature," he adds: "although it could be said that there were many species of rational animal, if one were to posit that the celestial bodies are animate."

animals. But even the more utilitarian observations yielded some knowledge about animal intelligence (taking "intelligence" in the loose sense). Shepherds certainly saw a difference between the behavior of sheep dogs and sheep. I do not know historically when people got the idea to associate intelligence with the brain. Aristotle mistakenly thought the brain was not an organ of sensation, but rather served as a means of cooling the body.[32] By Aquinas's day people were aware that there was some tie between the brain and intelligence. (Aquinas had clear ideas about the nature of this tie in humans, recognizing the brain to be the organ of the imagination, the activity of which faculty is a necessary condition for thought.[33]) At any rate brain size[34] at a certain point in history became generally regarded as *the* chief sign of intelligence.[35] According to this criterion, primates became the main can-

[32] See *Parts of Animals*, 656a17–25; 652b22.

[33] *ST* I 91.3 ad 1: "Also man surpasses all the other animals as to the interior sense powers . . . it was necessary that man have the biggest brain in proportion to his body among all the animals so that the operations of the interior sense powers in him which are necessary for the operation of the intellect would be more readily exercised."

[34] All sorts of nuances have to be added re brain size and intelligence. See R. W. Byrne, "The Evolution of Intelligence," in *Behaviour and Evolution*, eds. P. J. B. Slater and T. R. Halliday (Cambridge: Cambridge University Press, 1994), 223–265.

[35] Maybe prehensile hands (or feet) or the lack thereof was also taken by some as a sign of intelligence, given there is not much use in having practical intelligence (in the strong sense of intelligence) without some means of exercising it. See Aristotle, *Parts of Animals*, trans. A. L. Peck (Cambridge, Mass.: Harvard University Press, 1968), 687a10: "nature like a sensible human being, always assigns an organ to the animal that can use it. . . . We may conclude, then, that, if this is the better way, and if nature always does the best she can in the circumstances, it is not true to say that man is the most intelligent animal because he possesses hands, but he has hands because he is the most intelligent animal. . . . Thus it is to that animal, viz. man, which has the capability for acquiring the greatest number of crafts that nature has given that instrument, viz., the hand, whose range of uses is the most extensive." Michael J. Denton insists upon the necessity of hands for science, given science's

didates for being our confreres, along with cetaceans. More recently people realized through observation and experiment that certain birds are more clever than the popular expression 'bird brain' would have one believe.

How then to test the most likely contenders for humankind? Failure to formulate adequate criteria is another major factor fueling the confusion concerning the difference between the human kingdom and the animal kingdom. Plainly if one does not distinguish thinking from sensing, one is not going to come up with appropriate criteria for whether a being is thinking, and thus is human. Unfortunately, however, even if one does distinguish thinking from sensing in principle, this does not automatically insure that one will elaborate appropriate criteria for testing for thought. The chief reason why people fail to apply their knowledge properly is that they have an inadequate understanding of what the senses, and especially the internal senses, allow an animal to do. Thus some seem unaware that some animals can accomplish goals not only through instinct, but also by using their external senses and other internal senses, while others recognize that animals can learn, but underestimate the sorts of learning which the animals' senses allow for.

Let us look at examples of inadequate criteria stemming from the mistakes just mentioned. Some people who fail to recognize how sense and intellect differ erroneously attribute thought to those animals which are capable of "problem solving." The same sort of mistaken attribution is also made by those who do distinguish intellect from sense, but at the same time hold that all adaptive behavior is *either* due to instinct *or* to intelligence. Thus when animals manifest adaptive behavior which cannot be attributed to instinct, such as solving novel problems, these people are compelled to concede that

dependence on instruments; see *Nature's Destiny: How the Laws of Biology Reveal Purpose in the Universe* (New York: The Free Press, 1998), 254, 255.

animals think (and consequently are not really different from man), or alternately they give forced explanations in which they reduce learned behavior to instinct. Consider, for example, the following passage from Henri Renard's *The Philosophy of Man*:

> In brute animals, therefore, the estimative power, or instinct, is a sort of natural prudence, so that we can note some of the higher animals are able and learn to acquire new behaviors—for example, to avoid danger, and to obtain food in such a prudential manner that they seem to be capable of choosing the proper means to an end. Because of these striking facts, some scientists have maintained that the brute animals, like human beings, possess an intellect, or 'mind', with the same powers of abstraction and reasoning, even though these powers are quite undeveloped in the present stage. This assertion shows a lack of philosophical insight. While an animal can learn particular facts, it can never abstract a principle and apply it to particular cases. This is evident from the fact that through the ages each species of animal has always operated in the same unchanged manner and has learned no new mode of doing.[36]

Renard starts out by noting that some animals can acquire new behaviors, and ends by saying that no species of animal has acquired any new mode of acting, but always operates in the same manner. Scientific observations indicate that not only do individual animals learn new behaviors, but even populations within a species learn new behaviors,[37] e.g., a Japanese

[36] *Philosophy of Man* (Milwaukee: Bruce Publishing Co., 1948), 110. This is a Thomistic work typical of the period.

[37] There is a building body of literature documenting differences in behavior in animal populations which are more readily explained through social learning than through genetics, e.g., some chimp groups fish for wood-boring ants, whereas others groups dip for driver ants, even though both species of ants are found within the range of both groups; see Michael Tomasello, "Cultural transmission in chimpanzee tool use and signaling?" in Parker and Gibson, *"Language" and intelligence in monkeys and apes*, 277. It takes young chimps several years before they acquire

macaque learned to wash sweet potatoes that scientists had put out for the macaques, and this practice gradually spread through this particular population.[38] Thus, invoking instinct as Renard does here is not adequate to dismissing scientists' claims about animal intelligence which are based on the fact that animals do learn. I think that the tendency of certain natural philosophers to skip over learned behavior and focus on instinct is due to a number of reasons.

One reason for the instinct-intelligence dichotomy is the fact that one's own limited observations of animals[39] combined with what is now a fairly extensive amount of scientific literature on animal behavior do indicate that much of animal behavior is instinctive or partly instinctive.[40] Secondly,

adult competence at these tasks (see *op. cit.*, 276, 277). There also is evidence of song traditions in birds; see Paul C. Mundinger, "Animal Cultures and a General Theory of Cultural Evolution," *Ethology and Sociobiology*, 1: 183–223 (1980), and Clive Catchpole, *Vocal communication in birds* (Baltimore: University Park Press, 1979), 65–66.

[38] "About a year after the artificial feeding program started [scientists left sweet potatoes on the beach], a two-year-old female, named Imo by the researchers, carried her sweet potato to the edge of a brook, dipped the potato in the water and washed off the sand particles. Most of the macaques continued to remove the offending sand particles by dry-brushing the potatoes with their hands, but in the ensuing years many of the animals began to wash their potatoes. Gradually potato washing shifted to the nearby sea rather than the brook. The adoption of this new technique was slow. At the end of the first year, only four of the sixty animals followed Imo's example, the younger animals being the first to adopt the new trend. Five years later almost all the younger animals washed their potatoes, while few of the older animals adopted the custom" (Ann J. Premack, *Why Chimps Can Read* [New York: Harper & Row, 1976], 40).

[39] How much does the average person or philosopher know about animals? Do they really have so much contact with animals that they can say one way or the other that animals do or don't always do the same things in the same way?

[40] As the body of observation of animals increased, scientists became aware that some animal behavior is the joint product of instinct and learning. For example, male bower birds instinctively build bowers to attract

the human tendency to oversimplify makes it easy to forget the third option of learning by using the senses.[41] Thirdly, I think that some natural philosophers are occasionally careless due to their reliance on Thomas Aquinas. Aquinas does on occasion simplify (and perhaps oversimplify) matters. For example, when discussing whether animals have immortal souls he says:

> There is not found in the soul of brute animals some operation superior to the operation of the sensitive part; for they neither understand nor reason; which appears from this that all animals of the same species do things in a similar way, as if moved by nature and not operating from art; for every swallow makes its nest in a similar way, and every spider makes its web in a similar way.[42]

females; however, there is a period of learning extending over about two years during which the male bower bird perfects his bower building skills (see Donald R. Griffin, *op. cit.*, 83). While some species of birds such as doves will produce species-specific songs even when reared in isolation (see James L. Gould *Ethology: The Mechanism and Evolution of Behavior* [New York: W. W. Norton & Company, 1982], 268), others must hear this song within a crucial period. Some of the latter will learn the songs of other birds if exposed to them during this period (see John Alcock, *Animal Behavior* [Sunderland, Mass.: Sinauer Associates, Inc., 1998], 47, 48), whereas others pretty much will filter out those of other species, and only learn the song of their own species (see Gould, *ibid.*, 268 and Paul C. Mundinger, "Behaviour-genetic analysis of canary song; interstrain differences in sensory learning, and epigenetic rules," in *Animal Behaviour*, 1995, 50, 1491–1511, and especially 1506).

[41] While what Adler says is true, it is illustrative of the either instinct or intelligence dichotomy which disregards a third possibility, learning through the senses: "The principle, stated in a way that most directly bears on the difference of man, is as follows: *With respect to any statement about some performance that man and man alone exhibits . . . an apparently similar performance by another species of animal does not constitute an infirmative negative instance if the latter is instinctive or species-predictable, while the human performance is acquired or learned and voluntarily or intentionally exercised, as evidenced by its nonubiquitous distribution and by its wide range of variability within the human species*" (*op. cit.*, 117). It is not uncommon for twentieth century natural philosophers to pass over examining learned behavior on the part of animals in favor of focusing on animals' instinctive behavior.

(There are other passages where Aquinas is much more nuanced, such as when commenting on the opening chapters of the *Metaphysics*.)

How then can non-instinctive problem solving on the part of animals be explained? Reflection on everyday experience shows that problem solving does not necessarily require intelligence. There are many problems that a person or animal can solve without thinking. For instance, tying one's shoes keeps them more securely on one's feet. How do people learn to tie shoes? Certainly not by studying knot theory which falls in the branch of mathematics called topology. Most people probably had someone show them how to do it, and maybe this teacher even held their hands and guided them through it. And then most people engaged in trial and error to repeat the appropriate motions. Eventually they become fully familiar with the pattern and acquired the needed hand-eye skill to execute the steps consistently. One might object that this only explains how people learn to solve problems who have been taught. However, the first person to come up with the idea of the bow, learned how to tie it either through trial and error using his senses, or by using his imagination, or through a combination of the two. A little reflection on everyday experience readily turns up other examples of problems that one solves, not by thinking, but by using one's senses. (One learns how to ride a bicycle by feeling how to pedal and balance, not by studying the principle of the gyroscope.) When people fail to recognize that problems can be solved without thinking, the minute they see an animal that is engaging in a behavior which is flexible and adaptive, they conclude that it must be the product of intelligence (instinct being rejected as an explanation because instinct is relatively inflexible).

[42] *SCG* Bk. II, q. 82.

It is surprising that the Thomistic authors who fall into the instinct-intellect dichotomy do not take a cue from Aristotle's *Metaphysics* (along with Aquinas's commentary) which speaks about some animals being able to learn and having "some small share in experience."[43] Really a Thomist ought to be the first to point out that problem solving can involve different kinds of knowledge. For Aristotle explains fairly clearly the difference between experience (which is a form of sense knowledge) and art (which is a form of intellectual knowledge):

> Now art arises when from many notions gained by experience one universal judgement is formed with regard to like objects. For to have a judgement that when Callias was ill of this disease this did him good, and similarly in the case of Socrates and in many individual cases, is a matter of experience; but to judge that it has done good to all such persons, marked off according to type [*eidos*], when they were ill of this disease, e.g., to phlegmatic or bilious people when burning with fever—this is a matter of art.[44]

There are numerous examples illustrating the difference between experience and art. Very good cooks cook by experience, yet often lack the art of cooking as can be seen from what happens when one asks them for a recipe: a little of this, a little of that instead of the fixed measurements one finds in a recipe book.

The difference between experience and art is made clearer by Aristotle's subsequent comments on why people who have experience are often more successful than those who possess the art without experience. He says this is because action has

[43] *Metaphysics* 980b27, trans. H. Tredennick (Cambridge, Mass.: Harvard University Press, 1980). It seems likely that there is a qualitative difference in the experience of animals and humans insofar as experience in humans has a natural ordering to art.

[44] *Metaphysics* 981a5–13 in *The Basic Works of Aristotle*, ed. Richard McKeon, trans. W. D. Ross (New York: Random House, 1968). I have somewhat modified Ross's translation.

to do with particulars—which of course is what the senses know. The person who only has abstract knowledge of the general rules of an art may well fail to identify the salient individual characteristics of the things to be used here and now, identification of which is crucial for achieving the desired end. For example, one might know in theory that flour can vary in its moisture content, and sometimes one has to adjust the addition of liquid, without being able to recognize this flour being used right now needs more liquid, whereas the experienced person has a *feel* for this.

When one understands that not all human behavior is either a product of instinct or of intelligence, it is easier to avoid the false dichotomy of either instinct or intelligence in the case of animal behavior.

Let us now consider an example illustrating why those who realize how intellect and sense differ, and who know better than to fall into the false dichotomy of either instinct or intelligence, sometimes end up attributing thought to animals. The general reason is that they fail to realize the things to which the senses extend. For example, some of them posit that "insight learning" is a form of learning that could only be exhibited by a being that could think. Insight learning is a subset of problem solving which is defined as solving a problem the first time one encounters it without using trial and error. Some insight learning does require intelligence as, for example, Sir Isaac Newton's sudden insight,[45] triggered by observing the fall of an apple from a tree, that the orbit of the moon around the earth (and orbits of other celestial bodies, in general) could be explained through a combination of inertial movement and gravitational movement. But not all

[45] The example given regarding Newton perhaps does not perfectly fit the definition of insight learning, for it is possible that Newton may have previously tried unsuccessfully to solve the problem of lunar (and planetary) orbit in some other way. Definitely present, however, is the sudden putting together of elements hitherto seen as unrelated to the problem.

insight learning requires intelligence. Consider, for example, the laboratory-raised raven that is placed on a branch and sees for the first time a piece of food suspended from the branch on a string, then ratcheting up the food by pulling on the string and stepping on it repeatedly.[46] The raven achieves its goal by relying, first, on its ability to sense that there is food on the end of the string; and second, on its previous experience of manipulating objects, namely: (1) that pulling on one end of most objects—sticks, worms, whatever it normally picks up—makes the farther end come closer; and (2) that a heavy object must not be released or it will fall down; (3) that both its feet and bill can hold objects. Thus the raven's previous experience serves as an adequate guide to what it should do with the food on the string, and so there is no need for the raven to think—it only has to assemble in its imagination the different elements of what it needs to do (namely, pull, hold; pull, hold).[47]

Too often people do not have a proper appreciation of the senses. Sense is a form of knowledge that allows an animal to do many things, find prey, a mate, avoid predators, etc. Oftentimes animals have better senses than we do, and this can unduly impress people as to their mental capacities. E.g.,

[46] Actually as recounted by Donald R. Griffin, B. Heinrich's ravens first tried to fly by and pull meat off the string, and they also perched themselves on the pole and pulled on the string from time to time, before they finally hit upon ratcheting up the string. (*Animal Minds*, 104, 105) If this is so, the raven case also does not fit the strict definition of "insight learning."

[47] Donald R. Griffin notes that: "Millikan (1984, 1989) doubts that bees and birds 'have inner representations in the same sense that we do.' This wording exemplifies a recent trend to shift from denying that animals experience any significant thoughts to a more modest claim that their thoughts are different from ours" (*op. cit.*, 16). Thoughts, however, are not the only "inner representations" that an organism can have; memories and images in the imagination are two other forms of inner representations.

some authors speak of birds' "navigational intelligence."[48] Yet there is no evidence that the birds have developed theoretical means for orienting themselves (e.g., it is highly unlikely that they use mathematics to do so, as the smarter ones are only known to count up to seven). Evidence indicates that they orient themselves using their senses, which in the case of some birds includes an ability to sense dips in a magnetic field. Just because humans have to devise sophisticated technology to do things that animals do, e.g., detect sonar, does not mean that the animals' performance is not explicable by the superiority of their senses alone.

Ignorance about what the senses allow an animal to do leads to faulty tests for intelligence. When some animals pass these faulty tests, this appears to give credence to the view that there is no hard line between humans and non-human animals.

The ambiguities of language used in regard to criteria for thinking further fuel the confusion concerning whether animals can think. "Problem solving" is a case in point. The activity these words refer to is defined in terms of its end result without reference to the manner in which that result is achieved. The expression gives occasion to some to confuse solving a problem using intellect with solving a problem using the senses alone.

A similar ambiguity arises in calling animals "intelligent." Any adaptive behavior (i.e., one in which means proportioned to the end are adopted) can be called intelligent. However, this does not mean that the being performing that behavior is intelligent in the strict sense of the term.[49] This is most

[48] See Theodore Xenophon Barber, *The Human Nature of Birds* (New York: St. Martin's Press, 1993), 3.

[49] This news piece from the *Long Island Botanical Society* quarterly newsletter (vol. 12, no. 3, 2002, 26) illustrates the usage of a number of ambiguous terms: "Moldy Minds: The journal *Nature* reported on the 'thinking' trait of the slime mold *Physarum polycephalum*. Apparently, it was able to determine the shortest way through a labyrinth to find food. The slime mold was allowed to spread until it filled a maze. Fragments

obvious in instinctive behavior where the animal acts intelligently, but did not figure out the appropriate means to an end by itself.[50] Animals that can learn act intelligently when they have done so, but like the case of the raven mentioned above, this may result not from thinking, but rather from sensing. One can say that animals possess practical intelligence (or are intelligent) in the broad sense of intelligence, insofar as they are able to recognize an appropriate means to a goal. The strict sense of intelligence which requires that they have universal knowledge of this relationship does not apply to them.

Many and perhaps all languages are deficient in words specific to animal behavior that is neither instinctive nor thought out. For example, one says that the cat "chose" to eat the moist food rather than the dry food. The cat certainly could sense the difference in the foods, and was not forced to eat the moist food. Given that there is reason to think that selecting the moist food was not something that the cat thought out, the cat did not really make a choice. We tend to use the word "choose" to describe what the cat did, for want of a better word.[51]

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of oats were then placed at key positions. Sensing the food, the surplus parts of the slime mold withered away until only a single tubular structure was left spanning the shortest of four possible routes. 'This remarkable process of cellular computation implies that cellular materials can show a primitive intelligence,' said the team. . . . While it was heralded as a sign of cognition, the eight hours of time it took left it unqualified for a game of Jeopardy."

[50] Many of the entomologist Jean-Henri Fabre's investigations revealed the blindness of instinct.

[51] One might be misled in thinking that Aristotle attributes thought to animals because he says things such as certain animals are prudent (*phronimos*; see *History of Animals* 611a16), and some more than others (*phronimotera*; see *Metaphysics* 980b23), using the same word that he uses to name the human virtue perfecting practical reason. "Prudence", however, can be taken in the broad sense of goodness in discerning the appropriate means to an end. The knowledge of means to end can be more or less perfect, according as it is according to sense or to reason (see *ST* I-II 62.2), and such knowledge can be more or less perfect within the realm

There are many more faulty criteria which lead people to think that animals can think, criteria that Thomists should recognize as faulty but often do not either due to a failure to apply their knowledge concerning the difference between sense and intellect or to a failure to see how much the senses alone can allow an animal to accomplish. It would be time-consuming to enumerate all of them. However, since the vast majority of the errors[52] people make concern faulty criteria they espouse regarding tool-making and language usage, it is worthwhile to show how Thomistic principles allow one to explain a few of the more popular and deceptive errors made in regard to these two activities.

Tool-making, a subset of problem solving, is often mistaken for necessarily being the product of intelligence. A classic example of tool-making on the part of animals is the chimpanzee's fabrication of a tool used to get termites out of their nests.[53] Let us examine how some chimps make these tools.

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of sense as well, animals acting by instinct having less perfect knowledge than those that can learn from experience. The case is similar to that of "wise" in the *Metaphysics*. In the strict sense wisdom is a perfection of the speculative intellect. However, in the broad sense of knowledge even the experience can be regarded as a sort of wisdom, and thus Aristotle says that "the person of art is wiser than men of mere experience" for "in all cases wisdom depends rather upon knowledge [than upon practical success]" (*Metaphysics* 981a25, 26).

[52] Another common area of debate concerns whether animals are self-conscious. Marc D. Hauser has some quite interesting things to say on this issue in his book *Wild Minds*.

[53] "To be successful at termite fishing, a chimpanzee must

1. locate the passageways and scratch a hole to attain access,
2. choose a tool that is appropriately firm, yet supple, [twigs, grass, vines, bark, and fronds]
3. modify the tool so that it is free of leaves and twigs,
4. navigate the tool into the winding passageways to a sufficient depth,
5. wiggle/vibrate the tool so that the termites are attracted to bite it, and
6. extract the tool without dislodging the termites (Teleki, 1974)" (Michael Tomasello, "Cultural transmission in chimpanzee tool use and

The chimp can see where the termites are going in and out, and it sees and feels that its fingers are too big to fit in the passageway of the termite nest and pull the termites out. The chimp can see the diameter of the termite nest hole. It can see twigs lying around that have a smaller diameter than the hole. It remembers it wants to get termites. The chimp can then imagine[54] that one of those twigs will fit in the hole and reach the termites inside. The chimp tries to poke one of those twigs in the hole. It sees and feels that the twig is getting caught because of the leaves attached to it. The chimp removes a leaf, and eventually removes enough leaves so that the twig can be inserted the appropriate distance to extricate termites. The animal has made a tool to solve a problem, but there is no reason to say that it had to think in order to do so. At every step what the animal does can be explained by use of its senses, both external senses such as sight and touch, and internal senses such as imagination and memory. Assuming that the animal thinks is contrary to the principle of parsimony. Other examples of animal tool-making admit of a similar analysis.[55]

signaling?" in *"Language" and intelligence in monkeys and apes*, 276).

[54] Apes appear to have a surprising amount of imagination: "His [the bonobo Kanzi's] favorite pretend game centers around imaginary food. He pretends to eat food that is not really there to feed others imaginary food, to hide such food, to find it, to take it from other individuals. . . ." (Sue Savage-Rumbaugh, *Apes, Language, and the Human Mind* [New York: Oxford University Press, 1998, 59]). "Nim [the chimpanzee] enjoyed pretending to feed his dolls and puppets" (*Nim*, 116).

[55] Perhaps in some cases animals do not use trial and error. Still the animal uses its senses, as can be seen in the classic example of Köhler's ape who at first did not put together two sticks that could be fitted together to make one long stick so that it could get bananas out of its reach. Later when playing with the sticks, it succeeded to put them together, and upon doing so recognized the product as a tool that could solve its banana problem. This recognition involves no more than the memory of the problem and the imagination of the stick as being able to bridge the distance to the bananas. See Wolfgang Köhler *The Mentality of Apes*

As for language: First note that scientific expertise comes into play in devising specific tests to judge the linguistic abilities of animals.[56] For a long time it was thought that chimps had no ability to communicate with humans using symbols because they could not talk. In one early experiment a chimp was taught to say a couple of words. However, eventually those who studied chimp anatomy realized that the chimp's vocal tract was not suitable for producing human-like speech. Thus, later scientists developed means of symbolic communication more suited to the chimps' abilities.[57] (After a certain age humans have a hard time learning a second language, and often do better with the written word than with the spoken word). These means include: (1) a simplified version[58] of American Sign Language taught by molding their hands (some experimenters accompanied ASL with spoken English, others kept silent), (2) magnetized plastic chips of different colors and shapes each of which represented a word; the chips

(Boston: Routledge & Kegan Paul, 1973 rpt. of 1925 edition), 125–130.

[56] The animals used in language projects include chimpanzees, bonobos, gorillas, orangutans, dolphins and parrots.

[57] E. Sue Savage-Rumbaugh, *Ape Language: From Conditioned Response to Symbol* (New York: Columbia University Press, 1988), 6: "Although others have tried to teach apes to talk, their efforts were unsuccessful (Hayes and Hayes 1951; Kellogg and Kellogg 1933). However, these approaches all had one thing in common: they attempted to produce vocal sounds which approximated those of human beings. By contrast, the Gardners reasoned that perhaps the chimpanzee was not anatomically equipped to produce human speech [a fact later confirmed by Lieberman and his colleagues (Lieberman, Crelin, and Klatt 1972) in their comparative studies of the human and chimpanzee vocal tract]." The Gardners later note that "When chimpanzees use their voices, they are usually too excited to engage in casual conversation. Their vocal habits, much more than the design of their vocal apparatus, keep them from learning to speak" (R. Allen Gardner and Beatrix Gardner, *The Structure of Learning: From Sign Stimuli to Sign Language* [Mahwah, N.J.: Lawrence Erlbaum Associates, Publishers, 1998], 296).

[58] See Ray Jackendoff, *Patterns in the Mind* (New York: Basic Books, 1994), 136.

were to be placed on a language board; (3) Lexigrams. Lexigrams are arbitrary symbols for words. The chimp has a keyboard with lexigrams as keys. When the chimp touches a lexigram, the key lights up, and above the keyboard, the image of the lexigram is produced by a projector. In some projects, the lexigram keyboard allowed the chimp to manipulate food vendors and various mechanical devices (e.g., please machine make window open).[59]

As for how the apes were taught: Some experimenters trained the apes by operant conditioning,[60] rewarding their performances with things such as food or watching a movie.[61] Others emphasized emotional rewards like praise and approval coming from people the ape had social bonds with.[62] Gen-

[59] E. Sue Savage-Rumbaugh, *Ape Language: From Conditioned Response to Symbol*, 7, 8.

[60] The Gardners perhaps are exaggerating somewhat about the extent to which researchers in other projects than their own used operant conditioning, but are largely correct in their claim that: "Terrace (1979) in his studies of Nim, Rumbaugh and his associates (see Gill & Rumbaugh, 1977) in their studies of Lana, and Savage-Rumbaugh (1984) in her studies of Sherman and Austin, all insisted on operant rigor in their laboratories. . . ." (*The Structure of Learning*, 302).

[61] See Duane M. Rumbaugh, ed. *Language Learning by a Chimpanzee: The Lana Project* (New York: Academic Press, 1977), 89, 95. See also *Kanzi* 68, 69.

[62] The chimp Washoe was instructed chiefly through social rewards; see Bettyann Kevles, *Thinking Gorillas: Testing and Teaching the Great Ape* (New York: E. P. Dutton, 1980), 132. The Gardners, who worked with Washoe, affirm that: "Members of the human foster family served as testers who could get the chimpanzees to communicate information in signs. They could do this without forcing the animals to beg for food. They responded with social approval, which led forward to more communication. By separating communication from extrinsic reward, they widened the range of communication" (R. Allen Gardner and Beatrix Gardner, *The Structure of Learning*, 342). The chimp Nim was also instructed chiefly through social approval: "I wanted to socialize a chimpanzee so that he would be just as concerned about his status in the eyes of his caretakers as he would about the food and drink they had the power to dispense. By making our feelings and reactions a source of concern

erally apes come to regard positive interactions with teachers as more desirable than food rewards.[63] In one case a bonobo picked up how to use the lexigram keyboard without any sort of reinforcement. The experimenters had been trying to teach Kanzi's mother to use the lexigram keyboard while paying no attention to the young Kanzi, yet the day after his mother was removed and he was exposed to the keyboard he used it more than 120 times the first day in ways indicating he knew what the symbols meant.[64] In another project, a chimp learned signs exclusively from other chimps.[65]

The obvious thing that must be done if one is to determine if apes are capable of using language is to define language. However, I do not want to embark on what may prove to be a difficult task. It is sufficient for my purpose to recognize that there is no language without words, and that there need to be rules according to which words are put together, that is, grammar. Much of early research on apes sought to establish whether apes could form grammatical sentences, whereas later research was more focused on whether apes understood the meaning of words. I will focus on words because they are more fundamental, and also because they are more closely

to Nim, I felt that we could motivate him to use sign language, not just to demand things, but also to describe his feelings and to tell us about his views of people and objects; I wanted to see what combinations of signs Nim would produce without special training, that is, with no more encouragement than the praise that a child receives from its parents" (Herbert S. Terrace, *Nim* [New York: Alfred A. Knopf, Inc., 1979], 31).

[63] See for instance *Ape Language*, 45.

[64] See E. Sue Savage-Rumbaugh, *Kanzi*, 135, 136.

[65] See Roger Fouts, *Next of Kin* (New York: William Morrow and Company, Inc., 1997), 244: "Interestingly, [the chimp] Loulis did not pick up any of the seven signs that we used around him. He learned only from [the chimps] Washoe and Ally. Within eighteen months of his adoption, Loulis was using nearly two dozen signs spontaneously. He was the first nonhuman to learn a human language from another nonhuman." "[B]y the last year of the study, 1985 . . . Loulis had learned fifty-five reliable signs inside his family."

related to thought than grammar is to the extent that grammar involves more the way we imagine things.

Aristotle defines a word as a sound significant by convention; what the word signifies is an idea. This definition can be broadened to include non-vocal signs, such as are used in ASL. Ape researchers often do not bother to define what a word is, but there does seem to be a consensus that usage of signs which can be explained through associative memory is not a genuine language usage. The ability to associate a symbol with a real object via mental images in one's imagination, and on this basis supply the correct symbol when presented with that object (or vice versa), is recognized by most as being just that, association.[66] The researchers are looking for genuine understanding on the part of the apes, but as noted above, they generally do not have a clear idea of what thought is as distinguished from sense knowledge, and this sometimes even when they acknowledge that words express concepts. So they often come up with criteria that are inadequate for identifying genuine language usage.[67] What are some of these criteria?

[66] H. S. Terrace illustrates how the ability to string signs together in a certain sequence may result from conditioning rather than from understanding the meaning of those signs: "If a pigeon performed a sequence ABXC, where X referred to different incentives, it would seem far-fetched to refer to that sequence as 'trainer give grain R-42.' That type of performance is easy to obtain. Pigeons were trained to peck the sequence A → B → C → D, where A, B, C, D were different colors, at levels of accuracy comparable to that reported by Premack in the case of 'four-word sentences' (Straub, Seidenber, Bever, & Terrace 1979). On each trial, A, B, C, and D were presented simultaneously in different physical arrays. We have yet to try to extend this performance to ABXC problems (where X_1 could refer to one type of grain, X_2 to another, and so on). If a pigeon could learn such a sequence (a not unlikely outcome), one wonders what is to be gained by assigning names to each member of that sequence" ("Is Problem Solving Language?," in *Speaking of Apes*, 394).

[67] Note that ape studies often receive criticisms that can be applied to any sort of animal study. Some of these criticisms are probably legitimate, but are hard to evaluate for someone who did not actually see the ape interacting with the experimenter. For instance, a common criticism directed against such studies is conscious or unconscious cueing on the part of the observer (see *The Clever Hans Phenomenon: Communication with Horses, Whales, Apes, and People*, eds. Thomas A. Sebeok & Robert Rosenthal [New York: New York Academy of Sciences, 1981]). Herbert Terrace realized that only about ten percent of Nim's utterances were spontaneous, and not occasioned by something the trainer had just signed only after watching video footage of Nim (see *Nim* 215–219). Another common flaw is selective data reporting. Nonsense redundancies in ape utterances are sometimes deleted making the animal appear to make more sense than it actually is. For instance, " 'You me you out me,' the actual sequence produced by the animal, was recorded as 'You me.' The signing pattern of the ape, characterized by repetition, intrusion, and irregular word order was 'edited' " (David Premack, *Gavagai*, 32). And while much is made of apparently meaningful combinations (like "water bird" for swan), the more numerous nonsense combinations go unmentioned. For the sake of the argument I am going to assume that the studies I choose to analyze were properly controlled and reported.

Duane Rumbaugh proposed to test whether the chimpanzees could "use them [the lexigrams] to represent things not present, a process basic to semantics in human parlance."[68] This criterion, however, for genuine language usage can be fulfilled in the absence of thought. Memory and imagination suffice for animals to pursue things which are not visible (or audible, etc.). Dogs certainly appear to imagine the near future—they go inside looking for food in their dish apparently expecting to find it there just like they have in the past. (The distant past or future is another matter.) Thus there is nothing particularly amazing that the chimp who has learned to associate a certain chip with a banana, present that chip in hopes of getting a banana—it is not different from the dog that brings its master its leash when it wants to go for a walk.

Another experiment geared to establish whether chimps formulated conceptual categories was to have them separate objects into two different bins, one marked for food and

[68] Duane Rumbaugh, "Reasoning and Language in Chimpanzee", in *Animal Intelligence: Insight into the Animal Mind*, R.J. Hoage and Larry Goldman, eds. (Washington, D.C.: Smithsonian Press, 1986), 61.

another for tools. Yet the chimps' ability to sort the objects into two classes is readily explained by association of the edibility or non-edibility of the object with the symbol for food or tool. In fact, one cannot help noticing that the experimenters themselves do not even claim that the animals categorized the tools on the basis of their being a means to some end,[69] but on the basis of a characteristic easily recognized through sense perception, namely, non-edibility.[70] In the face of an unknown object (that might be a tool or might be something else: a piece of junk, a sculpture, etc.), would the chimp ask unprompted "can that thing be used to accomplish some task?" If it did, perhaps then one might have to concede that it can think. Moreover, as David Premack points out: "It is not possible, as far as I can see, to construct nonlinguistic examples of the asymmetrical relation between superordinate and subordinate classes. The most that can be demonstrated nonlinguistically is that the animal can sort objects at increasingly abstract levels, for example, place apples with apples, fruit with fruit, even food or edibles with food. But does the animal grasp that while food encompasses fruit, fruit does not encompass food? Unfortunately, the grasp of class inclusion is no more demonstrated by higher-level than by lower-level sorting."[71] It is one thing to put apple with apple and fruit with fruit, but it is another to understand that "fruit" is more universal than "apple."

[69] It seems that the concrete sense knowledge of means-to-ends relationships that some animals have (e.g., upon seeing that one means is not working, they will adopt another) is something that they could learn to correlate with an arbitrary symbol using associative memory.

[70] See Duane M. Rumbaugh and E. Sue Savage-Rumbaugh, "Language in Comparative Perspective," in *Animals Learning and Cognition*, ed. N. J. Mackintosh (San Diego: Academic Press, 1994), 318: "Sherman called a *sponge* a food, rather than a tool. This might not have been an error from his perspective, for he literally consumed sponges as he sucked avidly on them when soaked with favorite juices."

[71] *Gavagai*, 112.

Another task given to the chimps was to put the lexigrams for the different objects in question in the different bins. The claim was that "Only if they [the chimps] literally know the meanings of the 17 test lexigrams could they have labeled them correctly as 'food' or 'tool'."[72] Once again, this feat can be more economically explained as a two step associative process. The banana lexigram is associated with a banana; bananas are known to be edible. So the chimp links the banana lexigram with things that are edible, and on that basis puts the lexigram in the appropriate box. Given that many animals can be conditioned to associate one thing with another, it is not surprising that primates can carry the process a step further.[73] Though such a feat is more than one might have expected from an animal, closer examination shows that there is no need to appeal to intelligence to explain it, for associative memory affords an adequate and more parsimonious explanation.

Another often cited 'linguistic' feat is the ability of the parrot Alex to identify things shown it as same or different:

> Alex was shown two objects (which might be either familiar or things he had never seen before) and required to say what was the same or different about them (Pepperberg 1987b,

[72] Duane M. Rumbaugh and E. Sue Savage-Rumbaugh, "Language in Comparative Perspective," in *Animals Learning and Cognition*, 319.

[73] The chimp Ally also performed a two step association. Ally was first trained on spoken English words and their referents, and then to associate English words with ASL signs. In testing he was able to give the correct ASL sign for the original referent. See Jane H. Hill, "Apes and Language," in *Speaking of Apes*, 339. Sarah's performance mentioned in the beginning of the paper is another instance of a two step association. Sarah, when told via symbols that brown is the color of chocolate, associates in her imagination those symbols with chocolate and a feature of chocolate (namely, its color), and on this basis goes on to form a new association, namely, the hitherto unknown symbol with chocolate's color, brown. This process is facilitated by Sarah's previous experience of answering "what color?" questions where she already knew the symbols for the colors of the objects in question.

1988, 1991). They differed in color, shape, or material, and Alex usually gave the correct response—'color', 'shape,' or 'matter' . . . (paper, wood, cork, or rawhide). His responses to 'What's same?' or 'What's different?' were 82–85 percent correct when there were three options—color, shape, or material—so that a chance score would be only 33 percent correct.[74]

How can this feat be explained? The senses certainly can detect that two objects are the same or different in color. Thus, there is no reason to think that by showing a parrot pairs of things the same or different in color one cannot get the bird to eventually associate the words "same" and "different" with the corresponding pairs. Similarly the senses recognize sameness and difference of shape, and a bird could learn to associate these terms to things that it sees does or does not match as to shape. Admittedly it takes more attention on the bird's part for it to identify what is the same or what is different when it is presented with more than one variable at the same time. However, if the original associations are firmly fixed in the bird's memory, it remains the case that it can see (e.g.,) that only one of two objects is wood, whereas both objects are green. Alex's success at this task thus yields to a more economical analysis than one invoking thought. This shows that the test put to Alex is not adequate for distinguishing thinking beings from sensing ones.

If all these tests are inadequate, what would constitute a test whereby one could tell if an organism thinks?[75]

[74] David Griffin, *op. cit.*, 172. David Premack taught the chimp Sarah to use chips to identify whether things were the same or different by essentially associative means (see *Nim*, 16).

[75] One can understand the ape researchers' frustration when they complain that every time their apes succeed in meeting the supposed sure test for true linguistic ability, some one else come up with a new definitive criterion which must be met if the apes' performance is to count as true language usage (see Sue Savage-Rumbaugh, *Apes, Language, and the Human Mind*, 117). Many of the early criteria were in fact insufficient,

1. Grasping universal concepts is ordered to understanding propositions, and beings capable of understanding universal propositions are able to put those propositions together to draw conclusions about things hitherto unknown. If animals grasp universal concepts, then they should also be able to reason. Thus, they should be able to adopt a position on an issue, and give a reason for their position. Yet for all their linguistic training, no ape has ever done so. Apes can learn to associate cause and effect in concrete cases (e.g., which tool is capable of accomplishing what[76]) and in principle could use language to express such a relation. No researcher, however, ever thought it reasonable to try to teach the apes science or philosophy. The apes are incapable of grasping what constitutes an explanation, e.g., how the hypothetico-deductive method works, or that we know in an unqualified sense when "we know the

oftentimes because of a failure to recognize to what extent memory and experience can mimic thought.

[76] See H.S. Terrace, "Is Problem-Solving Language," in *Speaking of Apes*, 390: "the trainer presented the subject with a pair of objects in two different states, for example, a whole apple and a piece of an apple. The task was to place between the two objects the instrument that was responsible for causing it to change from one state to the other. . . . On transfer tests, novel pairs of objects were presented, for example, a sponge marked with a crayon and an unmarked sponge. The choice on this trial might consist of a container of water and a crayon. Sarah, Peony, and Elizabeth performed at typical levels of accuracy on the tests (75 to 95% correct)." See also David Premack, *Gavagai*, 106: ". . . we show apes and young children videotapes in which an individual (an actor) appears to be struggling to obtain food that is inaccessible. The videotapes are accompanied by photographic alternatives depicting different modes of solving the problem, for example, by stepping up onto a chair when food is out of reach on the vertical) or reaching out with a stick (when it is out of reach on the horizontal) and so forth. . . . Sarah, our most talented ape, and children older than about three and a half consistently choose solutions (Premack and Woodruff 1978). Younger children and apes younger than Sarah do not. Rather than solutions, they tend to choose photographs resembling some salient item in the videotape, for example, a yellow bird because it is yellow like the bananas in the videotape."

cause on which the fact depends, as the cause of that fact, and that the fact cannot be other than it is."[77]

2. Certainly if a being could meet criteria one, it could think, and only a being that can think can do so. However, it is perhaps a little much to expect out of ordinary people (whom we know to possess intelligence) to carry on a full-blown scientific or philosophical discussion, i.e., a discussion that is narrowly focused on a question, in which the participants support their statements with reasons. (As any philosophy teacher will tell you, it is hard to get certain students beyond making simple assertions of the "I feel" sort). A better test then from the point of view of neither including animals that do not think nor excluding some of those that do is to see whether animals can carry on what is commonly called a "conversation."[78] (Which is not to deny that a philosophical or scientific discussion is one form of conversation.) The specific sort of conversation that I think provides a good test for intellect is defined by two things: (1) by the interrelated character of the statements made about one subject (broadly construed); (2) by a desire to share and acquire knowledge that is not practical or at least not of use in the near future. A typical conversation runs like this:

A: I saw this crazy woman in the supermarket today. She was stacking coffee cans in the middle of the aisle.
B: Well, how do you know that she didn't work there?
A: Well she was mixing up all different brands in the stack.

[77] Aristotle, *Posterior Analytics*, 71b10–12; adapted from G. R. G. Mure's translation in *The Basic Works of Aristotle*, ed. Richard McKeon (New York: Random House, 1968).

[78] Even very young children put forth a running commentary on some activity that they are engaging in. For example, as E. Sue Savage-Rumbaugh notes: "By the time Laura [a child] was 19 months old, she was uttering phrases such as 'Pretty nestor cup,' 'Laura spill milk,' 'Cold milk,' 'All gone,' 'Mama straw blow,' 'Pour juice,' and 'Laura do,' all in contexts where her only previous utterances had been 'Ba'" (*Ape Language*, 25).

Besides the manager came over to ask her what she thought she was doing.

This conversation could take any number of directions from here. One person might tell another crazy-person story. Or the two might speculate on the causes of the woman's craziness. Or they might start talking about the importance of sensitizing people to the problems of mental illness. Granted sometimes the ties in conversation prove to be more imaginary (stream of conscious) than rational, still people often recognize that they are moving from one topic to another, as one can see from expressions such as "changing the subject" or "went off on a tangent."

The other characteristic found in ordinary conversations between intelligent beings is that of not being limited to only what is useful. The "crazy woman" conversation illustrates this. A salesman or friend explaining the advantages and disadvantages of a given product when one needs to buy that product is not carrying on the sort of conversation that provides a good test for intelligence.[79]

What about the chimps then? Interestingly many ape researchers apply the criteria for a conversation proposed above, and a fair number acknowledge that apes are unable to converse.[80] For instance, Duane Rumbaugh has this to say about the chimpanzee Lana's putative conversations:

[79] Even the communication of practical information for the sake of general knowledge which might at some time prove useful at some unforeseen time (e.g., "If you are ever in the market for such-and-such, keep this in mind.") is something not found in the strings of signs animals produce.

[80] The majority of ape researchers agree that apes cannot converse as I have defined converse. See Noam Chomsky, "Human Language and Other Semiotic Systems," in *Speaking of Apes*, 436: "As for language use . . . here, too, such elementary and primitive uses of language as telling a story, requesting information merely to enhance understanding, expressing an opinion or a wish (as distinct from an instrumental request), monologue, casual conversation, and so on, all typical of very young children, seem utterly unrelated to the functions of the ape systems which

> Conversations with Lana have been examined in detail. It seems clear that Lana has been prone to converse whenever she must do so in order to receive something exceptional or whenever something not in accordance with the routine delivery of food and drinks has occurred—in short, when some practical problem arises for her. She has never in conversation commented extensively on this or that as children and adults are inclined when their attention or motivation shifts unpredictably. For Lana, language is an adaptive behavior of considerable instrumental value for achieving specific goals not achieved otherwise. To date, at least, she has not used expressive language to expand her horizons except to ask for the name of something which she then requested by the name given.[81]

As Ray Jackendoff points out, given that the apes mean length of utterance is 1.5–2.2 signs,[82] and the longer strings of signs often contain redundancies (e.g., banana Nim banana Nim[83]), it is not too surprising that they can't carry on a conversation.[84] It is pretty hard to elaborate on something when

appear to be strictly instrumental and thus quite unlike human language, as has been reported by Rumbaugh and Gill (1976b) and others." See also David Premack, *Gavagai*, 31: "Given the visible limitations of the language trained ape, why would anyone bother applying the Bloom et al. discourse analysis to such an animal? Whoever imagined that apes could converse?"

[81] David Rumbaugh, "Language Behavior of Apes," in *Speaking of Apes*, 249, 250.

[82] Nim mean length of utterance (MLU) was 2.0 (see *Nim*, 184), and Koko's was 2.2 according to the graph (see *The Education of Koko*, 85), and 2.7 as stated by Patterson (see *The Education of Koko*, 114). After 7 years of language training Chantek's MLU "remained approximately 2.0 . . . MLU based on gestural inflected modulations was slightly higher" (H. Lyn White Miles "Foundations for reference in a signing orangutan" in *"Language" and intelligence in monkeys and apes*, 518).

[83] *Nim*, 213. Nim's longest utterance was: "give orange me give eat orange me eat orange give me eat orange give me you" (*Nim*, 184).

[84] A number of authors point out that ASL utterances may be longer than the actual number of signs used in them. Roger Fouts notes that:

one can't put enough different words together to be adding new information.[85]

Animals sometimes appear to make spontaneous utterances to teachers expressing some state of affairs, rather than re-

"Like Hebrew and some other spoken languages, ASL does not have the copula, the forms of 'to be' that link a subject and predicate. As a result, 'you are happy' translates into ASL as the more compact YOU HAPPY" (*Next of Kin*, 76). A number of authors mention that human speakers of ASL commonly modulate signs in a way that add complexity to a sentence, without adding length. Patterson notes what seems a plausible modulation of a sign on the part of an ape: "Koko sometimes varies the motion of a sign to indicate a specific actor. When she moves the sip sign away from her mouth toward me, Koko is actually saying 'You sip'" (*The Education of Koko*, 117). Other words in sign language are often understood from the context and/or from cues such as eye movement; this is the case, for example, of subject and indirect object in a command/request such as "more tickle." Taking this into account, one might give 4.0 signs as a generous estimate of the apes Mean Length of Utterance. This is still a rather low number to allow one to elaborate on a point. Even Patterson admits that a MLU of 2.7 is a low figure as compared to children (*The Education of Koko*, 116). (I am not sure what a child's MLU is. To get a *very* rough idea of what an adult MLU is, I picked a paragraph at random in this paper. The MLU was 24. Admittedly this is not your average conversation.)

[85] Some authors do claim that animals can converse. Generally these people have a different definition of conversation than the one I am using here. For example Timothy V. Gill maintains that "conversation is primary a goal-oriented, problem-solving activity," and thus it is not surprising that he is of the view that "Lana had been partner with me in a number of linguistic exchanges that can be called conversations; each was directed toward solving a particular problem that confronted Lana" (*Language Learning by a Chimpanzee*, 174). H. Lyn White Miles claims that Chantek meets the criteria for conversation due to the spontaneity of his utterances and the relatively low rate of interrupting his caretakers (see "Foundations for reference in a signing orangutan in *"Language" and intelligence in monkeys and apes*, 518). However, given that the mean length of Chantek's communications was two it is hard to see how Chantek can elaborate on a subject. Other authors who claim that apes can converse not surprisingly have such minimal requirements for a conversation that even the following exchanges were dubbed conversations:

questing something.[86] Given that their utterances are generally two signs long, and oftentimes the context is not noted, it is hard to gauge whether utterances such as "banana

"Tim presented himself outside Lana's room with another Coke. Lana's first response was the stock sentence Please machine give Coke period, which was correct but not appropriate since the machine had no Coke to vend. Next she said Please Lana drink Coke this room period. Perhaps she intended to say out-of room instead of this room, but she did not. Tim said No. Lana came back with the original composition, ?Lana drink this out-of room period to which Tim responded with a question for clarification ?Drink what period. Lana answered, Lana drink Coke out-of room period. Tim said Yes, the door was opened, the Coke was shared; and Lana's first conversation, one she had both initiated and successfully negotiated, had been recorded" (Duane Rumbaugh, *Language Learning by a Chimpanzee*, 173, 174).

"Student [the chimp, Nim]: Bird there. Teacher: Who there? Student: Bird. (pause; looks in other direction) Bug, flower there. Teacher: Yes, many things see. Student: (rolls over on ground) You tickle me. Teacher: Where? Student: Here (pointing to leg). Teacher: (after tickling) Now you tickle me. Student: (tickles teacher) Me tickle Laura" (*Nim*, 3).

The first "conversation" is obviously aiming at solving an immediate practical problem, whereas the second does not involve development of a single topic. Roger Fouts claimed that his chimps had conversations among themselves. However, what he reports as a conversation are utterances such as "come hug," and "go there." (See *Next of Kin*, 299–303)

[86] What is really more striking is how hard it is to find anything that might be a descriptive statement in the ape literature. Most of the combinations are requests for food, tickling, etc. For example, if one looks at an appendix of Total Spontaneous Utterances Across a Three-month Period [for the chimps Sherman and Austin] what strikes one is the lack of any non-imitative, unambiguously descriptive statements (*Ape Language*, 286–298). Many times the animal's supposed comments on its environment are single words, e.g., "flower" or "coffee" (Fouts recounts that the chimp Dar would sign "coffee" to himself when looking through the window he saw a person drinking coffee [see *Next of Kin*, 303]). The apes do not express an opinion, but simply identify objects. This behavior is most readily explained as a consequence of the habit they have of naming things, something they have grown used to doing to please their

cold"[87] is a descriptive statement or a request or an expression of liking/disliking. One of the few putatively declarative spontaneous utterances I could find in the literature is the orangutan Chantek's utterance: "Jeannie Chantek chase" [signed in the kitchen with Kristine].[88] One might take this to be the start of a conversation; on the other hand, the exchange never goes any further, and the desire for emotionally gratifying sociable contact with a teacher might explain the production of a short enunciative utterance of this sort. The animals plainly associate signing in general with food rewards or positive emotional feedback given by the teacher.[89]

Habit[90] and the desire to play or a combination thereof also provide plausible explanations for some of the signing that apes engage in that does not appear to have an immediate

care-takers. Longer utterances made while alone also seem for the most part to be either identifications of the sort they have been habituated to make or expressions of emotion. See *The Education of Koko*, 149, Table 6: "Examples of Koko's Comments About the State of the Environment. Utterance: Smell stink. Context: Cooked broccoli.// Utterance: Cut tree. Context: As companion cuts celery.// Utterance: Cry Mike cry. Context: To deaf assistant who is sweeping floor; Mike is crying."

[87] This is an utterance of Sherman the chimp, *Ape Language*, 286. The table indicates that this sign combination may be one that had on an earlier occasion been signed by the ape in imitation of the trainer.

[88] H. Lyn White Miles, "Foundations for reference in a signing orangutan," in *"Language" and intelligence in monkeys and apes*, 520–523.

[89] Thus when Terrace notes that "Nim often signed spontaneously, without food or drink rewards, about pictures in order to identify what he saw," this still does not rule out that he did so not to communicate knowledge, but simply to get positive attention from the teacher or out of habit (*Nim*, 209). Savage-Rumbaugh notes that the bonobos who did not have a strong attachment to the experimenters from a very early age did not develop the ability to communicate by using the lexigram keyboard (see *Apes, Language, and the Human Mind*, 210, 211.)

[90] This seems to be a typical case of habit: "When a training task was begun, instead of waiting for the teacher to ask that certain items be given or labeled, the chimpanzees began naming items spontaneously and then showing the named item to the teacher" (Sue Savage-Rumbaugh, *Apes, Language, and the Human Mind*, 326).

utilitarian goal. Apes have been known to sign by themselves: "[Nim] was often observed to sign to himself, for whatever intrinsic pleasure that produced, while flipping through a book or magazine with his back to the teacher."[91] As a general rule when something has become habitual it is done with pleasure. Also given that apes are very playful, signing may provide yet another game for their repertoire.[92]

Thus isolated questions and statements which have no obvious practical goal can be explained through habit, and/or the desire to play, and/or the desire for emotionally gratifying social interaction with the teacher.[93] Since there are no

[91] *Nim*, 209.

[92] See George Mounin, "Language, Communication, Chimpanzees," in *Speaking of Apes*, 175: "Sarah, all alone in her cage (outside any experimental situation), picked up objects or signs and composed utterances on the models of the structures that she had just learned (1971a:810). Can one discern the transition of the main and primary function of her code, social communication, to a secondary use of it, the possibility of developing for oneself the expression of one's own view of the world? Or does this expression only represent play?" Her failure to use language to acquire knowledge for its own sake pretty well eliminates the suggested secondary usage.

[93] The African Gray parrot Alex produces utterances which at first sight give the impression that it is interested in acquiring or imparting knowledge for its own sake. For example, Alex "learned the color 'gray' when he asked a student to tell him the color of his reflection in the mirror. He simultaneously learned the color 'orange' and the name 'carrot' when he asked a student eating a carrot what color it was and what it was called. Henceforth he reliably identifies 'gray' and 'orange,' and he added carrots to the list of vegetables he requests from time to time" (Theodore Xenophon Barber, *The Human Nature of Birds*, 7; Barber is citing Irene Maxine Pepperberg's work). Learning the word "carrot" had an obvious utilitarian goal. Learning the names of colors, and more generally learning vocabulary words without an immediate intention to obtain the things they name, may be of interest to the animal simply because it has the habit of using words, and thus enjoys asking and answering questions, in addition to which any type of linguistic performance is bound to garner it positive feedback from its trainers.

accounts of an animal which on a regular basis[94] engaged in exchanges with teachers consisting of questions[95] that are unambiguously ordered to the acquisition of knowledge for its own sake and statements ordered to augmenting the teacher's knowledge, it is more reasonable to attribute these isolated questions and statements to causes other than an interest in exchanging knowledge for its own sake.[96]

[94] Occasionally I come across a reported exchange that does appear to be in the line of a conversation. However, one inevitably has to read into what the ape is signing to make its "discourse" intelligible. We do the same thing with conversations with young children. Granting that doting parents have a tendency to read into their child's babbling more than is there, still the conviction that young children are at least in some cases really trying to communicate what we take them to be wanting to communicate finds some support in the fact that they do communicate these things when their linguistic abilities grow. As Noam Chomsky comments: "The Gardners argue further that their chimpanzees use symbols in a manner comparable to that of very young children, from which they conclude that the chimpanzees are exhibiting the first stages of 'language development' exactly as children are. Again, the argument is fallacious. As has often been remarked, we know that the children are exhibiting 'incipient human language behavior' only because of the later stages achieved" (*Speaking of Apes*, 437).

[95] A classmate of mine recounted that his parrot asked "what doing?" when he was cleaning its cage, and that the next time he cleaned the cage the parrot said "cleaning cage." Now if the parrot went on to ask him why he was doing this or to thank him for it, then I would have been more convinced that it was seeking knowledge for its own sake.

[96] Some scientists claim that the apes' failure to ask speculative questions is not due to the apes lack of understanding, but is rather due to the apes' lack of interest in the physical environment (aside from things pertaining to survival); the physical environment is something the apes could understand, if only they wanted to. This explanation is implausible. When animals have abilities, these abilities are naturally accompanied by the desire to exercise them, e.g., the raven's wings would be useless to it, if it had no urge to flap them. And thus the animals' lack of interest in their physical environment requires an explanation. One could say that many humans lack such interests. This is not true of most human children (there are some who are by temperament apathetic).

3. A third criterion for thought is the following: If an animal possesses more than sense knowledge, it should be able to use words that name non-sensible things in meaningful sentences, words such as "God," "soul," "integrity," "rights." Find me an animal that can argue for the extension of human rights to animals, and I will be the first to see that they are accorded to it.

I have argued that the confusion about human nature and the nature of others animals is twofold. First there is a problem in recognizing that thinking is different from sensing, and thus that human being is a third major life form, alongside plants and animals. To explain the reason why a third subdivision must be recognized is the philosopher's task. Then there is a problem of seeing what organisms fit in which subdivisions. It is the philosopher's task to discern general criteria by which one can distinguish an animal that only senses, from one that can also think. It is the scientist's task to adapt these criteria to the organisms in question and devise tests specific to their capabilities. A fair number of philosophers within the Thomistic tradition have fallen down on their part of the job by proposing or accepting inadequate general criteria. The main reason for their mistakes lies in a poor understanding of the senses, especially of the internal senses, the end result of which is that they underestimate what an animal can do using its senses alone. Showing that animals' apparently intelligent behavior (taking intelligent in the narrow sense) can be explained in terms of its senses does not, however, entirely

Generally, something has to come along to stifle a child's innate wonder, such as lack of leisure, the difficulty of learning, the pursuit of sense pleasure, etc. Where is the infant apes' natural wonder? Their survival is insured by their human caretakers, so leisure is not an issue. Yes, they can be curious (i.e., show practical interest in things), but none of their "linguistic" performances ever reveal true wonder or even interest in knowledge for its own sake that takes less elevated forms, e.g., in gossip or information concerning current events.

eliminate the possibility that animals can and do think. An even stronger case can be made by also checking whether animals do the things that a thinking being would naturally do. These things include engaging in a conversation about one topic (broadly construed) for the sake of knowledge and using words that name non-sensible realities. Now, the extensive research that has been done on the species of animals most likely to be intelligent in the narrow sense of the term has shown them to be wanting on these scores.[97] Thus, not only do the linguistic and tool-making feats most commonly cited provide no compelling reason to say that animals are intelligent, the absence of behavior natural to intelligent beings gives reason to say that animals are not intelligent. In conclusion then, it is certain that human being represents another subdivision of living thing, and it is virtually certain (barring a discovery in some hitherto unexplored region) that we are the only species in that subdivision—at least on earth.[98]

[97] Once, at the end of a lecture that I gave on the topic of this paper, I was asked "how do I know that an ape looking at itself in the mirror is not asking itself about the meaning of life?" The interlocutor completely overlooked the evidence based on a dozen or so ape studies that while "talking" apes have had plenty of opportunity to pose such questions to their human companions, they stick to questions like "can I have a banana?" In a similar vein, Noam Chomsky observes: "It also seems reasonable to suppose that possession of the language faculty conferred extraordinary selectional advantages, and must be a primary factor in the remarkable biological success of the human species, that is, its proliferation. It would be something of a biological miracle if we were to discover that some other species had a similar capacity but had never thought to put it to use, despite the remarkable advantages it would confer, until instructed by humans to do so—rather as if we were to discover in some remote area a species of bird that had the capacity of flight but had never thought to fly" (*Speaking of Apes*, 433).

[98] There has not been as much research done on dolphin linguistic ability as on that of apes. This sort of research is more difficult to carry on with dolphins than with apes for a number of reasons. One problem is the dolphins' aquatic environment which, among other things, precludes

BIBLIOGRAPHY

Alcock, John. *Animal Behavior* (Sunderland, Mass.: Sinauer Associates, Inc., 1998).

Azar, Larry. *Man: Computer, Ape, or Angel* (Hanover, Mass.: The Christopher Publishing House, 1989).

Barber, Theodore Xenophon. *The Human Nature of Birds* (New York: St. Martin's Press, 1993).

de Waal, Frans. *The Ape and the Sushi Master* (New York: Basic Books, 2001).

Evans, Peter, G. H. *The Natural History of Whales and Dolphins* (New York: Facts on File Publications, c1987).

Fouts, Roger. *Next of Kin.* (New York: William Morrow and Company, Inc., 1997).

Gardner, R. Allen and Gardner, Beatrix. *The Structure of Learning: From Sign Stimuli to Sign Language* (Mahwah, N.J.: Lawrence Erlbaum Associates, Publishers, 1998).

Gould, James L. *Ethology: The Mechanism and Evolution of Behavior* (New York: W. W. Norton & Company, 1982).

Griffin, Donald R. *Animal Minds* (Chicago: University of Chicago Press, c. 1992).

Hauser, Marc D. *Wild Minds: What Animals Really Think* (New York: Henry Holt and Company, LLC, 2000).

Hoage, R. J. and Goldman, Larry, eds. *Animal Intelligence: Insight into the Animal Mind* (Washington, D.C.: Smithsonian Press, 1986).

Jackendoff, Ray. *Patterns in the Mind* (New York: Basic Books, 1994).

Kevles, Bettyann. *Thinking Gorillas: Testing and Teaching the Great Ape* (New York: E. P. Dutton, 1980).

Köhler, Wolfgang. *The Mentality of Apes* (Boston: Routledge & Kegan Paul), 1973 (reprint).

Mackintosh, N.J., ed. *Animal Learning and Cognition* (San Diego: Academic Press, 1994),

Parker, Sue Taylor and Gibson, Kathleen Rita, eds. *"Language" and intelligence in monkeys and apes* (New York: Cambridge University Press, 1990).

Patterson, Francine G. "Ape Language," in *Science*, vol. 211, 2 Jan. 1981, 86, 87.

Patterson, Francine and Linden, Eugene. *The Education of Koko* (New York: Holt, Rinehart and Winston, c. 1981).

Premack, Ann J. *Why Chimps Can Read* (New York: Harper & Row, 1976).

Premack, David. *Gavagai or the Future History of the Animal Language Controversy* (Cambridge, Mass.: The MIT Press, 1986).

Roitblat, Herbert L., Herman, Louis M., Nachtigall, Paul E., eds. *Language and Communication: Comparative Perspectives*

experimenters from raising dolphins like children. Another problem is that dolphins do not have hands, so they cannot use sign language or a manually activated keyboard like chimps use. Appropriate means of communication were eventually devised, such as teaching dolphins to mimic a computer generated whistle that was later related to a particular object (see Peter G. H. Evans, *The Natural History of Whales and Dolphins* (New York: Facts on File Publications, c1987). The field also experienced a set-back when the work of one of the early researchers, John Lilly, was discredited (see *Speaking of Apes*, 422 and Martin Gardner, *Science: Good, Bad and Bogus* [Buffalo, New York: Prometheus Books, 1981], 391). A leader in the field in recent times is Louis M. Herman. Herman taught his dolphins to respond to a wide variety of commands (with some subjects gestures were used,with others underwater whistle-like sounds), and his studies provide evidence that dolphins recognize word order, for example, that of subject-verb-direct object. The dolphins total overall scores on tests in which they were asked things such as to put a ring on a ball (or a ball on a ring) was around 66%. Most of the discussion surrounding Herman's work concern whether his dolphins have learned grammar. For a good second-hand account see Donald R. Griffin, *Animal Minds*, 215, 216.

(Hillsdale, N.J.: Lawrence Erlbaum Associates, Publishers, 1993).

Rumbaugh, Duane M. ed. *Language Learning by a Chimpanzee: The Lana Project* (New York: Academic Press, 1977).

Savage-Rumbaugh, E. Sue. *Ape Language: From Conditioned Response to Symbol* (New York: Columbia University Press, 1988).

Savage-Rumbaugh, E. Sue, and Lewin, Roger. *Kanzi* (New York: John Wiley & Sons, Inc., 1994).

Savage-Rumbaugh, Sue, Shanker, Stuart G., Taylor, Talbot J. *Apes, Language, and the Human Mind* (New York: Oxford University Press, 1998).

Sebeok, Thomas A. and Rosenthal, Robert, eds. *The Clever Hans phenomenon: communication with horses, whales, apes, and people* (New York: New York Academy of Sciences, 1981).

Sebeok, Thomas A. and Umiker-Sebeok, Jean. *Speaking of Apes* (New York: Plenum Press, 1980).

Slater, P.J.B. and Halliday, T.R., eds. *Behaviour and Evolution* (Cambridge: Cambridge University Press, 1994).

Terrace, Herbert S. *Nim* (New York: Alfred A. Knopf, Inc., 1979).

Wrangham, Richard W., McGrew, W.C., de Waal, Frans B.M., Heltne, Paul G., eds. *Chimpanzee Culture* (Cambridge, Mass.: Harvard University Press, 1994).