

## Reviews

*On Aggression.* By KONRAD LORENZ. New York: Harcourt, Brace & World, 1966. 306 pages. \$5.75.

Konrad Lorenz has made remarkable contributions to our understanding of animal behavior by his brilliant studies. Since man is an animal, these studies, together with those of other ethologists, carried out on animals living under natural conditions and with the use of highly ingenious experimental procedures, have shed light on our own behavior. To some of us, contributions of these investigators to man's understanding of himself are very important, and Lorenz' recent book, *On Aggression*, is a good illustration of this. Ethologists have upgraded the status of natural history, a part of biology that went through a long decline of intellectual respectability during the first part of this century.

Much of the material in the book is taken from earlier publications of Lorenz, and the book is a synthesis of original work of his own and a number of other investigators. It is not only delightful to read but brings into focus significant ideas about drives of social importance underlying love and hate, dominance and aggression. The book also contains a useful Bibliography.

In a series of fourteen chapters, Lorenz describes experimental observations he has made of aggressive behavior in fish, birds, and mammals. He points out that, "far from being the diabolical and destructive principle that classical psychoanalysis makes aggression out to be, it is really an essential part of the life-preserving organization of instincts" (p. 48). Aggression, as the term is used, refers to aggression between animals of the same species, for example, aggression of a dominant wolf toward less dominant members of the pack, not the attack of a wolf on a deer. In the latter case, predatory attacks are not considered aggressive any more than we consider ourselves aggressive when we cut off the head of a chicken for Sunday dinner. In general, aggression is a core process in the formation of animal societies. For example, dominant males in a herd of baboons act as leaders—a kind of senate—and protect the females and young. They post sentries and have been known to gang up and kill leopards that were attacking members of the herd. The dominance is established by a round robin of ritualistic fights when the animals come to maturity.

Virtually all flocks of birds and aggregates of mammals live under a hierarchical system or peck order in which each animal knows its position, that is, who can peck whom, who leads and who follows, and, especially among birds and primates, who grooms whom. The more powerful leaders have first access to females for breeding purposes and in many species have first access to food. In a pride of lions, the dominant male, while seldom

killing the prey, which is done by the females for him, eats his fill before the females and cubs are permitted to get very much to eat. Wolf packs are also dominated by leaders, but here a high order of sociability prevails in which the aggressive males not only permit but promote the feeding and care of the pups, and the loyalty and devotion of members of the pack to each other is marked. Indeed, Lorenz makes the point, and does so with great effectiveness, that individual devotion of one animal to another, as in lifetime mating in geese and other animals, only comes about with some really aggressive animals. Individual devotion and lifetime mating are not characteristic of the ungulates or animals such as rabbits. They are directly transformed from aggressive behavior, and this can be traced by observing the rituals of mating, which are often of a remarkably complex nature involving threat, pseudo-attacks, and their inhibition. Aggression and love are closely related. Aggressive behavior is necessary for the all-pervasive phenomenon of territoriality of animals.

Most of the fighting among animals is not over mates, as formerly thought, but over pieces of land. While females occasionally fight over males, males seldom fight over females. They fight for dominant status in the pack or herd or flock, or they fight for territory and, by staking out and defending a territory, they establish a food preserve for their needs. Animals regulate the numbers of their group that can occupy a particular range. They either kill or drive out a surplus of individuals when population exceeds the carrying capacity of the range. These animals may establish a new territory or perish. They are the weaker and usually young members. Thus animals control their populations.

When animals, well armed by nature with fighting teeth, claws, and horns, engage in combat for status or for territory, they seldom do each other much damage. The fights are more ritualistic tests of strength. They are accompanied often by sound and fury, but seldom by crippling wounds or by death. This is true of most well-armed animals in which the loser displays certain surrender signals when he is outmatched, and in the face of these signals the winner is unable to press the attack. Thus a defeated wolf will bare its throat to the fangs of its rival. Under such conditions the attack is stopped. The winner does not kill its surrendered rival, which is allowed to beat a retreat. Defeated herons display the back of the head to the sharp beak of their rivals. They could be killed with one thrust, but the thrust is not delivered. The surrender signal establishes the dominance of the winner. It is clear that fights between powerful, well-armed animals, if allowed to go on, would result in killing, and this would be a great disadvantage to the species in its struggle for survival by natural selection. The surrender signals are necessary for the species to survive. Poorly armed species lack such unneeded surrender signals, and the weaker animal flees from its more dominant rival.

Animals such as rabbits and doves that lack natural effective weapons and also lack surrender signals will, if confined together and unable to escape by flight, often fight to the death. Doves have been known literally to peck each other to death over a period of hours when they were confined together. Such behavior would be quite uncharacteristic of confined hawks or eagles. Of course the talk of "hawks" and "doves" in relation to the Viet-

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nam war should be reversed, since it is the doves that fight their species to the death if confined together, while the hawks appear to have "too much sense" to do so. Man too is a biologically unarmed animal. His terrible weapons are a product of his cerebral cortex, not a direct product of his genes. Today, with people confined together on this planet and brought close by electronic communication and jet travel, we had better act like hawks, not doves, if we are to survive in the nuclear age. As I have pointed out elsewhere, it is possible that man's great cerebral cortex, which has enabled him to invent nuclear weapons and their means for delivery, may turn out to be a phylogenetic tumor unable to control his aggressions and hates arising in his ancient limbic brain.

The only animals that really wage war appear to be man, ants, and rats, where war is defined as an attempt of one large group to destroy or drive away another group. Lorenz' chapter on rats is especially interesting; he discusses observations of the brown rat, made by several scientists who describe intense loyalty among the members of a particular rat pack. Like gangs of dead-end kids, they establish territories within a city and drive off other packs that invade their territories. They are utterly ruthless in destroying strange rats put into a pen inhabited by a pack well known to each other. The pack smell is the identifying factor, as has been demonstrated experimentally. The animals do not identify each other by sight or sound. Any rat that does not have the pack smell is attacked and killed. Aggression within the pack does not involve killing, as it does for outsiders. Intragroup dominance is established by ritualized fighting in which the rats engage in kicking and boxing matches but seldom fall on each other with their teeth. Each pack, which may number several hundred rats, is usually a clan, the result of the mating of two individuals with their offspring, descendants, and relatives. Lorenz points out that "probably natural selection has put a premium on the most highly populated families since the members of a clan evidently assist each other in fights against strangers and thus a smaller clan is at a disadvantage in fights against a larger one. On the small North Sea island of Norderoog, Steiniger found that the ground was divided between a small number of rat clans, separated by a strip of about 50 yards of No-Rats land, where fights were constantly taking place. The front is relatively larger for a small clan than for a big one and the small one is therefore at a disadvantage" (p. 164). Within a rat pack there is a quick system of news functioning by mood transmission and, what is more important, Lorenz points out that there is a conservation and tradition of passing on acquired experience. If a rat discovers poisoned food, it will defecate on it and thus prevent any other rat from eating it. The danger of certain types of bait appears to be transmitted from generation to generation. Lorenz remarks "that the difficulty of effectively combatting the most successful opponent to men, the brown rat, lies chiefly in the fact that the rat operates basically with the same methods as those of man, by traditional transmission of experience and its dissemination within the close community" (p. 161).

Lorenz concludes his book by considering human aggressions and their possible redirections in socially constructive ways—competitions in art, science, commerce, and athletics are mentioned, but all of these have been mentioned before by others. His last chapter is an avowal of optimism. He

remarks that "the expert teaching of biology is the one and only foundation on which really sound opinions about mankind and its response to the universe can be built. Philosophical anthropology of a type neglecting biological fact has done its worst by imbuing humanity with that sort of brain which not only comes before but causes a fall" (p. 298). In conclusion he refers to the fact that in the evolution of vertebrates the bond of personal love and friendship was the epic-making invention produced by natural selection to enable two or more individuals of an aggressive species to live peaceably together and work for a common end. He points out that this bond has operated in too limited a way, preventing aggression only between those who are friends but not preventing hostility between nations and ideologies, which must be controlled if we are to progress or even survive in the nuclear age. He concludes that love and friendship should embrace all humanity. This commandment is certainly not new, and so far it has tragically failed. Lorenz says that our reason is able to understand its necessity but that we have no great urge to obey it. His hope, however, is that in view of present world conditions our reason will extend the bond to embrace our species.

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*God and Golem, Inc.: A Comment on Certain Points Where Cybernetics Impinges on Religion.* By NORBERT WIENER. Cambridge, Mass.: M.I.T. Press, 1964. 99 pages. \$3.95.

Among the various sources of man's anxiety there are two that have been haunting him at least since the time that the Bible was written. One is that sin is somehow intrinsically related to obtaining knowledge, expressed so magnificently in the story of the fall of Adam. The other is that he should come to worship the product of his own hands and his own ingenuity, the sin of idolatry. Both are associated with the enhancement of man's powers over the world and other men. The growth of man's power, developed to allay his anxiety, leads to anxiety. The almost utter real power that has come into the hands of men in modern times through the development of science produces "fear and trembling"; and, in my interpretation, Norbert Wiener, one of the great Faustian figures of our times, who is intimately connected with this new utter power, has here written a book out of his "fear and trembling."

The book is very short. The very fact that it is bound like a book is one of the major features that would make one say it is a book at all. The word "God" appears in the title, yet it hardly appears in the text; and the word is not in the Index. The word "religion" is in the subtitle. Yet only a definition of religion as dealing with "ultimate concern" would justify that. The word "Golem" hints that the book is related to the Jewish mystical tradition, to the audacity of desperation that prompted Rabbi Löw of Prague to create a monster of clay into whose mouth he might insert a piece of parchment with the ineffable name of God to make it come to life. The book is more like a preface to a book than a book itself. Having come to the end of it, one

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is prepared to read the book, to find out how one might resolve the problem of coming to terms with the products of man's audacity that threaten to destroy him. But then the reader is left on his own, except that what follows must have something to do with God. Wiener, a major figure in the development of the Golem of modern times, machines with fabulous self-regulating devices, is reluctant to insert the parchment as was the great rabbi of Prague: "Render unto man the things which are man's and unto the computer the things which are the computer's," he says.

Wiener conceives of himself as a sorcerer, a sorcerer through the use of mathematics. Mathematics comes close to being the ultimate of abstraction, the freeing of relationships from the concrete forms in which they appear. Through it, such fantastic things are possible as the conversion of space into function, into the unbound reaches of what sometimes appears to be limitless flexibility; and then, in the return to the concrete, as the ability to do things with physical reality that would otherwise have been totally impossible, to the "incorporation" of God and Golem, as his title indicates.

His sorcery brings him to musings about machines that can learn and to machines that can reproduce themselves. His musings about the latter are very reminiscent of similar thoughts expressed in Goethe's *Faust* in the part where the homunculus is being created in the laboratory. For, in the same way as Wagner decries "Begetting, as men used to do," so is Wiener's discussion of reproduction equally asexually conceived. No, he does not argue for the indefinite prolongation of life. Yet he muses over it.

This book makes us think of Leo Szilard. After having played a role in connection with the release of nuclear energy and a bomb that went so far beyond credibility that its existence had to be true, Szilard gave himself to activities he thought would lead to world peace. Wiener, who had a great role in the development of fantastic pieces of equipment, issues warnings about the relationship of men and machines. The machine, he tells us, cannot handle vague ideas. Although the machine is eminently obedient, giving man what he asks for, there are always the unanticipated consequences. But it has been endowed with such power that one must think about putting the genie back in the bottle or about that which befell the semi-sophisticated sorcerer's apprentice. (These are images that he uses.)

Wiener is frightened by the Golem and mumbles something about God under his breath, as it were. Can we take comfort in the fact that there is a long history of such audacity, fright, and mumbling and that yet we are here today in greater numbers than ever before? Or were all these only harbingers of the eventual total destruction of man by his Golem? Is it different now that we have created Golemim more powerful than any ever made before, Golemim who, in spite of the fact that they can be programmed to learn, can hardly learn to love their neighbor, and yet can be programmed to destroy each other and us too?

This book was a prize winner in the National Book Award.

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