their meanings. The message is the information that a signal makes available about its sender and may, like motivation, be inferred from the behavioral contexts in which the signal occurs. Meaning, on the other hand, is what the recipient makes of a signal, inferred from the way it responds. As Smith's own work on tyrranid flycatchers beautifully shows, the same message may affect different individuals in different ways depending on the context: some may ignore it, some approach, some withdraw. Among the diversity of possible responses, the advantageous ones must, in the long run, outweigh the disadvantageous to give the signaling system its function or selective advantage.

Smith's book depends heavily on this viewpoint, although he does discuss some other approaches more briefly. He is clearly a naturalist at heart, as have been most of the best ethologists. But many will find his observational and descriptive approach disappointing at a time when ethology is becoming more quantitative, more experimental, and, at least at the sociobiological end, more theoretical. He doubts the value of experiments because he thinks they are likely to introduce unwanted changes in the situation, making it hard to draw conclusions. One could equally plausibly argue in the opposite direction that, without experiment, no two occurrences are similar enough to enable the messages and meanings of signals to be determined with any degree of certainty. Just how Smith does conduct his analyses is left in some doubt: quantitative approaches are mentioned only briefly, and one might infer that he prefers the understanding that comes from many hours of patient observation to a more numerical and statistical strategy. This is, perhaps, what he means by "an ethological approach," and he has many distinguished precursors who have followed the same line. It works well, except that there are no data as such for others to doubt if they want to. One has to rely on the judgment of the observer. The lack of theoretical perspective is rather more worrying. Smith defines communication, loosely, as the sharing of information between individuals, and seems to view phenomena such as distraction displays and mimicry, signals that deceive, as rather strange exceptions. Yet a clear message that has come from the current wave of advance in evolutionary theory is that animals behave for the good of their genes. There seems little doubt that signals have evolved where they give such advantage to the individuals who produce them, regardless of whether any recipients benefit. This is a point Smith does not seem to accept, for he pays little attention to the possibility of deception in intraspecific communication and in his discussion of the function of signals sometimes invokes advantage to the recipient as an explanation. Perhaps he prefers to play safe on deception, for there is indeed a great deal of theory and rather few data on the subject. But the same could be said for the limited size of display repertoires, a matter on which he places some emphasis. Do we really know enough about the nuances of animal signals to suggest that most species have an upper limit of 40? Even if this were true, it is not easy to swallow the suggestion that a limit may arise because each signal in a larger repertoire would be less usual and thus likely to cause alarm. Pity the poor mockingbird!

These, then, are topics the book does not cover well. What it does do is to provide a useful review of a large number of examples, each one dealt with briefly and fitted into the author's frame of reference. The major concepts around which it hinges are message, meaning, context, and formalization, a term Smith prefers to ritualization because the latter tends to imply genetic change. Within these main areas, the book is concerned with the classification of phenomena, for example with the general classes of messages that many species are known to possess. Such a classification is a bold and difficult enterprise which, at this stage of knowledge, can only be partially successful; perhaps it is not surprising that a chapter called "Further messages" includes a section on "other messages." Such difficulties in classifying the material do not make for easy reading or a coherent theme; as a result the book will be more important as a work of reference than as a text that every budding ethologist should read.

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Social Behavior: A Quantitative Study

Play and Aggression. A Study of Rhesus Monkeys. DONALD SYMONS. Columbia University Press, New York, 1978. x, 246 pp., illus. $20.

The adaptive significance and evolution of developmental processes are of fundamental importance for behavioral ecology and social theory. A quantitative biological study that applies strategic intuitions from social theory to data on the social play-fighting tactics (nonagonistic wrestling and chasing) of free-ranging primates therefore potentially represents an important advance. The present book, a pioneering venture of this type, exploits only a few of the powerful analytic techniques and explanatory concepts of developmental behavioral ecology. Informal but sociobiologically orthodox genetic approaches and qualitative characterizations of skill-development mechanisms take center stage in the analysis while life-history theory, the ecology and evolutionary biology of age-specific feeding and social behavior, Waddington's and Levins's evolutionary analyses of development, and much, much more wait in the wings.

Symons's contribution is specialized but important. His work locates the study of nonhuman primate play behavior well within the framework of evolutionary theory and effectively dispels the erroneous view of play as group-adaptive in a classical sense. Symons administers a thoroughly deserved drubbing to the familiar doctrine that play is a mystical cohesive force, the behavioral glue that bonds individual primates together to form a social superorganism. In so doing he offers an object lesson to those in biology, primatology, anthropology, and developmental psychology who glibly discuss play and social cohesion as if these terms were well defined a priori.

Theoretical population biologists and social scientists may find fewer reasons to praise and more to criticize this work. After all, it represents one user's selective sampling of current social and developmental theory. I might cite a few specific omissions. Animal conflict theory, which is not taken into account, suggests that social play be interpreted in terms of an evolutionarily stable adaptive balance between interindividual competition and cooperation in societies of differentially developing juvenile mammals. A formal network model of the dynamics of a play bout might have been used to organize data on such processes as attempted initiation, refusal, acceptance, repetition, termination, and escalation, which Symons reports on separately, into a single theoretical framework in which defined rate parameter values explained such also separately reported outcomes as partner selectivity, bout durations, and age

and sex differences. Additional two-way analyses of data cross-classified by age and sex might have shed additional light on questions of roles and of maintenance responsibility. Of course, this is not to say that the analyses actually reported do not represent an advance over earlier attempts to quantify the social organization of primate play. For example, Symons's analyses of the age and sex composition of play dyads correctly control for differences in demographic frequencies and for degrees of playfulness that vary with age and sex. Many previous attempts to demonstrate play-partner selectivity in primates have failed to recognize these essential variables.

Symons views rhesus play-fighting as a biological adaptation for development of motor skills that can be used in escalated fights. He cites his own data and others' observations in support of this view as against the commonly held notion that human and nonhuman primate play functions to produce novel and variable behavior patterns. However, recent psychological analyses and computer models of skill development, experimental physiological psychological studies reporting enhanced brain growth and development in enriched environments (in rats, to be sure), and Bruner's and Sutton-Smith's own discussions of the psychology of play all suggest that both positions are in part incorrect, in part caricatures of a single truth as yet only vaguely glimpsed: that play (as distinct from rote practice) can specifically function to develop flexibility or generalization of skill, that the anatomical substrates of this flexibility are to be identified with those brain components that respond to environmental enrichment, and that play may be the chief behavioral mechanism responsible for producing brain growth in an enriched environment.

Symons's rhesus, unlike Jane Goodall's chimpanzees and Paul Leyhausen's cats, are not introduced to us as separate personalities. However, there are hints of a novelist's view in Symons's description of a small but domineering yearling female (identified only as 127—68) who "played very infrequently," whom "other monkeys seemed to avoid," and with whom "other females seemed reluctant to play" (pp. 64–65). An attempt to integrate these intuitively compelling dimensions of individual variation with broadly based biological analysis would represent a truly synthetic approach to primate play. A wealth of literary examinations of behavior succeed where to date biologists have failed in striking the twin chords of individual and group differences, reminding us that some human intuitions about the logic of behavioral and social development remain to be codified.

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Noncapitalist Economies

Peasant Livelihood. Studies in Economic Anthropology and Cultural Ecology. RHODA HALPERIN and JAMES DOW, Eds. St. Martin's, New York, 1977. xii, 332 pp. Cloth, $14.95; paper, $6.95.

Peasant Livelihood is a collection intended by its editors to rehabilitate and advance the work of the economic historian Karl Polanyi by showing how his conception of the economy as "instituted process," capable of manifesting itself within many different institutions (political, social, religious, and so on), can be elaborated and perfected.

Polanyi refused to consider capitalism all of a piece. He thought that money, trade, marketplaces, and factor markets (for example for labor or for capital) had different, often independent, histories and that many of the postulates or implicit premises of allegedly general economic theory were specific to capitalism and, accordingly, culture-bound. Modern capitalism, for Polanyi, meant the engrossment of all institutions by economic forces, epitomized in the self-regulating, price-making market—what his epigones now call the market principle. In precapitalist societies, however, the economic was embedded in social, religious, political forms, unliberated by the dissolution of ancient constraints that had kept land and labor, in particular, off any impersonal, price-making market.

If very few economists ever became interested in Polanyi's ideas, many anthropologists were quickly attracted to them. For one thing, anthropologists always like arguments suggesting that some particular way of looking at things is culture-bound, whether it be neoclassical economics, Freudian psychology, theories of ritual, totemism, or taboo, the use of concepts like "kinship," or the CIA's difficulty in distinguishing between Cuba and Guatemala. For another, Polanyi carefully read and cited such scholars as Malinowski, Thurnwald, and Firth, thus demonstrating not only that nonanthropologists sometimes read anthropological works but also that they can sometimes see possibilities in such materials that anthropologists cannot. These were heady discoveries, then; and Polanyi soon had prolific rooters, including some who have devoted their lives to the adumbration of his ideas.

The economistic ("formalistic") backlash was not long in coming, however. Since 1944, when *The Great Transformation* first appeared, and especially since 1957, when Polanyi's collaborators joined with him to publish *Trade and Market in the Early Empires*, antagonists both anthropological and economic have sprung up in substantial numbers. Although the debate has been ignored by many and deplored by a few, it continues to provide some with a steady psychic income, to take up several lectures in almost any economic anthropology course, and to stimulate publication. While the volume under review is not the result of such controversy, it aspires to figure in it.

Halperin and Dow, its editors, certainly have Polanyi's ideas on their minds, and both cite him and refer frequently to his work. But the contributors seem somewhat less concerned. Though Polanyi is referred to 18 times in the text, an even dozen of these citations occur in the sections by Halperin. She has written the introductory and concluding essays and the prefaces to the three major divisions of the book: on production, on distribution, and on integration. Other three-part schemata turn up here. All economies can be studied, we are told, and "become readily comparable as all can be understood within the categories of the universal matrix" (p. 270). The concept of a universal matrix has nothing to do with Mother Earth. It is, rather, a simple grid, consisting of three "processes" (production, distribution, consumption) and three "dimensions" (physical, cultural, social).

Production, for example, can be seen in all three dimensions in that it requires physical effort, a system of cultural roles to determine appropriate periods for work activity, and so-