HUMAN RESPONSE TO PRIMATE DEVIANCE

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Abstract: If it is difficult enough for students of human behaviour to agree on a definition of deviance, it is more so when the subject of discussion is non-human primates. Deviant behaviour among primates is usually equated with "abnormal" behaviour, which impedes Darwinian fitness. Deviance may consist either in passivity and withdrawal or in hyperactive, aggressive behaviour. The classification of particular behaviours as deviant depends on the environment in which the primates live, e.g., caged or free-ranging, and on the perspective and interests of the researchers, e.g., zoo-keepers, veterinarians and researchers who work with either caged or free-ranging animals. Nonetheless, there are certain behaviours which virtually all scholars would classify as deviant or abnormal.

Résumé: S'il est déjà diffficile pour ceux qui étudient le comportement humain à se mettre d'accord pour une définition de la déviance, cela est encore plus problématique lorsque les sujets d'études sont les primates non-humains. Le comportement déviant parmi les primates est habituellement perçu comme étant un comportement «anormal» entravant le développement darwinien. La déviance se manifeste soit par la passivité et le retrait, soit par une hyperactivité agressive. La classification de comportements particuliers comme étant déviants dépend largement de l'environnement dans lequel vivent les primates (en captivité ou en liberté) et de la perspective et des intérêts des chercheurs (gardiens de zoos, vétérinaires et chercheurs travaillant avec des primates en captivité ou en liberté). Néanmoins, il y a certains comportements que presque tous les chercheurs classifient come étant déviants ou anormaux.

Current understanding of the concept of deviance arises from research on the human condition. In order to translate the study of deviance to primate terms, we must take several factors into consideration. In spite of the amount of study already undertaken on humans, we still do not have univer-

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sal definitions of what constitutes deviant behaviour. Among primates, it is difficult to apply the criteria of labelling theory according to which one primate would judge the actions of another. Observers would have to infer such judgments from the behaviour of the respondent. Abnormal behaviour in primates has been defined by Poole as "not promote(ing) the success and survival of the individual or its close relatives (i.e., it does not increase fitness)" (Poole 1988:3). This definition differs markedly from one which would result from labelling theory. In this paper, I have chosen to regard deviant and abnormal behaviour as synonymous. Both refer to those behaviours at the extreme ends of a range of potential behavioural responses to a stimulus. This range, defined on page 41, removes the criterion of fitness from the definition, although under most circumstances extremes of behaviour will not promote fitness as much as those more moderate behaviours at the centre of the range.

Another aspect of the difficulty in utilizing human-derived criteria to judge primate behaviour is that we cannot assume that primates have a moral sense. Since we cannot communicate with them, we cannot assert that they have absolute standards of good and bad to guide their behaviour. Secondly, researchers can only observe the behaviours in question. There is no potential for linguistic feedback or explanation by the subjects as to why they are behaving in a certain way. Nevertheless, there are several approaches which can be used profitably to study deviant behaviours in animals. One could investigate the causes of deviant behaviour, and the impact of such behaviours on an animal's viability in both captive and free-ranging settings. Alternatively, one could list various categories of behaviour as abnormal. The category method is exemplified by Poole (1988) who lists deviant behaviours under the following headings: levels of activity, misdirected activity, feeding peculiarities and aspects of social behaviour.

In this paper, I will focus on two additional aspects of abnormal behaviour in primates. I utilize a statistical approach to defining deviant behaviours, which interprets them as part of the range of possible behaviours available to primates. My approach derives from Darwinian theory which explains variation in morphology and behaviour as an important aspect of a species' adaptive potential. Actions and responses by organisms occur over a range of possible behaviours, and those animals who are the most successful in dealing with particular environmental and social conditions are those which survive the longest and produce the most offspring. Thus to animal behaviour researchers, behaviour is seen as a range of potentially adaptive responses, occurring in a curve, with the most frequent responses making up the central or normative region of the curve (see Table 2). The deviant behaviours examined in this paper are those which occur at either end of the curve. Since these behaviours will usually be ob-

served in only a small minority of animals, or under conditions of environmental or social stress, I am considering them as abnormal. However these abnormal behaviours may or may not be maladaptive depending on particular social and environmental circumstances. It is this situational lability which distinguishes this perspective on behaviours which consist of a range of responses to stimuli from the more commonly held human viewpoint of a dichotomy between normal and non-normal or deviant behaviour. In both individual animals and groups, the same behaviour can vary from normal to deviant and back depending on the level of adaptiveness it provides and the proportion of individuals exhibiting it. This lability of behaviour is a major adaptive strategy among primates.

The second aspect of this paper is an examination of how four groups of people respond to behaviours that they have defined as abnormal in primates. These four groups are veterinarians, zoo keepers, researchers working with caged animals and researchers who study free-ranging animals. These four groups represent significant numbers of people with extensively published opinion on primates, who deal with them on a frequent basis. I have excluded pet owners and animal trainers because their approach to primates tends to humanize them. This tendency would probably influence their interpretation of deviant behaviour in primates. The data reported for these response groups were derived from a combination of sources in the published literature and interview material. In utilizing this two-pronged approach in this paper, I am proposing a model to facilitate the understanding of abnormal behaviour in both captive and free-ranging primates, and am exploring how this model reflects the understanding of deviant behaviour held by the four informant groups. The informant groups were not informed of the model before the study.

When examining behaviour from this perspective, the category of "normative" covers a range of acceptable functioning behaviours. At each end of the range are non-normative or abnormal behaviours which are usually (but not always), maladaptive and occur in a small fraction of the population. Since there are two ends of the range, I would propose that there are two possible types of deviant behaviour, which for convenience I will call "passive" and "active" deviance, such that the range could be diagrammed as: passive fraction/normative majority/active fraction.

An examinination of deviance which employs a graded range of behaviours is more easily accepted in the study of animals than in the human sciences because we are more accustomed to thinking about animal behaviours in terms of Darwinian models of fitness. Studies of human behaviour frequently focus on the responses and judgments of other individuals to the behaviour rather than examining the behaviour itself. If we utilize the idea that we should investigate both ends of a range of behaviours

(graded from passive to active), we can then investigate the concept of "behaviour silence" as a potentially deviant response in addition to the more usually recognized "active deviance." The research in this paper suggests that behaviour passivity as an aspect of deviant behaviour is a useful idea.

Because primates utilize life in the social group as one of their major adaptive strategies, maintaining the social group is a very strong priority in their lives. Group sizes can range from a mated pair to aggregations of several hundred animals: only in a few species, such as the orangutan, are solitary individuals frequently seen. Therefore, it is suggested that deviant behaviours in primates will frequently be those which disrupt the social functioning of the group. One of the major differences between wild and captive situations is that in many captive situations the animal is maintained and responded to as a single individual, even in places such as laboratories where there are a number of animals present. Thus, when dealing with a concept such as deviance in primates, it is necessary to consider the conditions under which the animals are kept. In a previous paper, I commented that many captive conditions were equivalent to prisons or juvenile detention homes, and that the behaviours seen would undoubtedly reflect this (Zeller 1983). However, even in these situations animals exhibit a variety of behaviours, only some of which are classified as abnormal by their keepers.

Data

In order to have a standardized base from which to begin comparing these differing relationships with primates, I adapted Table 1 from material in an article concerned with identifying and naming abnormal behaviours in the chimpanzee (Walsh, Bramblett and Alford 1982). The items in part 1 of Table 1 were indicated in tabular format in that article, whereas those in part 2 were mentioned in the article but not included in the table there. Part 3 of Table 1 lists additional "aberrant" behaviours that were mentioned frequently in other publications dealing with abnormal behaviour (e.g., Poole 1988). Part 4 of Table 1 lists behaviours which are distinguished from those listed in the other sections because they represent the passive end of the behaviour curve. They are gleaned from various sources listed in the references section. The original behaviour list reported in Walsh et al. was developed when they observed behaviours in captive, restrictively reared chimpanzees and compared them with Goodall's (1968) ethogram of wild chimpanzee behaviour. The behaviours in the first two parts of the table were attributed by Walsh et al. to boredom and lack of stimulation in the animals who manipulated themselves and their body secretions as substitutes for more interesting things to do. The behaviours in the third and fourth parts could also be interpreted as responses to boredom. Alternatively,

Table 1
Vocabulary of Abnormal Behaviour in the Chimpanzee (adapted from Walsh, Bramblett and Alfredo 1982)

Behaviour	Lab	Zoo	Vet.	Wild	Total
Key: + = not abnormal; o = no opinion; – = abnormal					
Part 1 – Listed in Walsh					
Clap Hands	–	+	+	+	1
Coprophagy	–	–	+	+	2
Eye poking	–	–	–	–	4
Head shaking	–	–	+	+	2
Head wiping	–	–	+	+	2
Rocking	–	–	+	–	3
Self-mutilate	–	–	–	–	4
Self-slap	–	–	+	–	3
Stick out tongue	–	+	+	o	1
Suck penis	–	–	–	+	3
Suck self	–	–	–	+	3
Drink urine	–	–	–	+	3
Wet head	–	–	+	+	2
Part 2 – Mentioned in Walsh					
Faeces spreading	–	–	+	+	2
Flapping genitals	–	–	–	o	3
Hair pulling	–	+	+	+	1
Hand movements and gaze	–	–	–	–	4
Head banging	–	–	–	+	3
Bizarre posture	–	–	–	o	3
Part 3 – Mentioned in Literature					
Excessive grimacing	–	–	+	o	2
Stereotyped movements	–	–	+	o	2
Pacing – weaving	–	–	–	o	3
Cannibalism	–	–	–	–	4
Maternal abuse	–	–	–	–	4
Hypersexual behaviour	–	–	–	–	4
Hyper-aggressive	–	–	–	–	4
Kill	–	–	–	–	4
Infanticide	–	–	–	–	4
Part 4 – Passive Behaviour					
Neglect of infant	–	–	–	+	3
Rejection of infant	–	–	–	–	4
Refusal to breed	–	+	–	–	3

Table 1 (continued)

Behaviour	Lab	Zoo	Vet.	Wild	Total
Breeding with inappropriate object	–	–	–	–	4
Masturbate	–	–	–	–	4
Depression	–	–	–	–	4
Lethargy	–	–	+	–	3
Anorexia	–	–	–	–	4
Regurgitate	–	+	+	+	1
Refuse to eat	–	–	–	–	4
Not interact	–	–	+	–	3
Self Clasp	–	–	–	–	4
Passivity	–	–	–	–	4
Death – due to depression or anxiety	–	–	–	–	4
Totals	42	37	27	23	

they could be responses to stimuli (such as a new infant) that the animals found too stressful to deal with. As Table 1 indicates, researchers working with laboratory animals categorized all 42 of the behaviours listed as abnormal while those working with free-ranging animals include only 55 percent of them in the abnormal category. Zoo keepers and veterinarians fall between these poles classifying 86 percent and 62 percent, respectively, of the 42 listed behaviours as deviant. The following discussion of each response group will suggest why these differences existed. It is tempting to suggest that those animals observed in the most "natural" setting are least likely to exhibit behaviours which are classified as deviant. I will begin with the group most likely to regard behaviours as deviant (laboratory researchers working with caged animals) and then move progressively to those least likely to consider behaviours as deviant (primatologists studying free-ranging animals).

Research – Caged Animals

Research conducted with animals caged singly or in non-representative groupings (e.g., dyads, peer groups) is usually based on the idea that by removing all other extraneous factors, the system under study will be clearly revealed. Studies of learning sets, discrimination ability, the maternal attachment process and dominance relations are a few examples of studies which have utilized this methodology in the exploring both mental and social phenomena (e.g., Yerkes 1916; Tinklepaugh 1934; Harlow and Harlow 1963). Animals are valued mainly in terms of their approach to the testing situation rather than in terms of their individual characteristics or well-being.

One striking example of this approach occurs early in Yerkes' investigations of mental abilities in monkeys. A particular crab-eating macaque was so inefficient in an experimental study of reactive tendencies that it was called "feeble minded." Yerkes had trouble with this animal, Skirrl, especially after it stepped on a nail in one of the test boxes and refused for weeks to enter it again. Yerkes interpreted the animal's refusal to respond after the accident as evidence of boredom or stupidity.

> Especially in connection with such relapses, Skirrl showed extreme fatigue or ennui and often would refuse to work and simply sit before the open doors yawning. This happened even when he was extremely hungry and evidently eager enough for food. (Yerkes 1916:37)

> On the whole, Skirrl's behaviour in connection with this problem appears to indicate a low order of intelligence. (Yerkes 1916:28)

This result was contrasted with the performance by another monkey, a rhesus macaque named Sobke. "Sobke invariably chose the end boxes. His performance was in every way superior to that of Skirrl" (Yerkes 1916:44). Yet, when, after thousands of trials, Sobke began to refuse to interact with the test material, Yerkes postulated a "change of attitude" as the cause of the behaviour. In fact, a number of research situations are plagued by the phenomenon of "maze fatigue" in which the animals will no longer cooperate in the test. These animals are routinely dropped from studies since they are considered to show abnormalities in the test situation. "I found that Sobke was no longer trying to solve the problem.... His attitude had changed in that he had become indifferent, careless and obviously discouraged with his task" (Yerkes 1916:62).

At this point Yerkes attributed the similar refusal to perform by the two animals to inability on Skirrl's part and discouragement with the task on Sobke's part. However, later in the same publication when discussing another series of tests involving manipulative ability Yerkes says: "Skirrl, on the contrary (compared to Sobke), attended persistently to anything new in the shape of a movable object... whereas Skirrl is by nature a mechanical genius, Sobke has apparently no such disposition" (Yerkes 1916:115). Yerkes concludes this account by saying that "Skirrl's behaviour has importantly modified my conception of genius," yet at no time does he repudiate, question or even refer to the fact that in the same report, referring to experiments conducted on the same two monkeys, during the same summer (1915), he has also categorized Skirrl as "feeble minded" and "of low intelligence." In other words, his perception of the animal was based solely on its response to individual test situations, rather than on a holistic assessment of its overall abilities.

This task-oriented relationship to primates may also help to explain Harlow's early conclusions that surrogate or peer rearing was an effective way to raise young macaques. This conclusion was based on the success rate that deprivation-raised animals showed in solving discrimination and delayed response tests, when compared to control animals (Hahn 1971). It was not until the animals reached breeding age, but refused to breed, that he realized that the self-clasping, rocking, head-banging and self-destructive behaviours that he observed might be manifestations of severe underlying social dysfunction (Harlow and Harlow 1963). Since that time the Wisconsin laboratories have become increasingly aware of the social deficits engendered by non-social or inadequately social rearing situations, but still persist in using the socially afflicted animals in other types of studies such as learning experiments, or as control animals (Sackett 1968). Sackett clearly states, "The term 'abnormal' will be applied here only with respect to . . . a particular control condition as a reference—and not necessarily as 'normal control' group" (Sackett 1968:305). These two examples, concerning learning abilities and deprivation rearing exemplify the focussed, task-oriented perception of abnormal behaviour seen in many problem-response types of studies.

Laboratory researchers have become more and more aware of the presence and levels of stereotypic repetitive behaviours and maternal inadequacy since colonies have attempted to become self-sufficient in supplying their own animals. Davenport notes (1979) that Yerkes was fortunate in setting up his research establishment entirely with wild born individuals who seem to have been "behaviourally normal." Since the supply of wild animals has diminished, and since most laboratory breeding stock has also served research purposes, the incidence of behaviour abnormalities such as stereotypy and maternal inadequacy has risen rapidly. Both Davenport (1979) and Walsh, Bramblett and Alford (1982) state that the lack of external stimulation is the primary cause for the development of self-stimulating activities. Behaviours with this causation would not be expected in wild animals, or even in naturalistic captive groups with adequate space. Wild caught animals can, however, become extremely disturbed and abusive to themselves, their mates and their offspring (Caine and Reite 1983). This indicates that the effects of a free-ranging upbringing may protect animals against stereotyped behaviour caused by deprivation in rearing conditions but may actually increase levels of social abuse above the rate seen in captive reared animals (probably due to excessive arousal levels).

Most lab researchers realize that many of the animals in their studies exhibit behaviours which they classify as abnormal. But the perception of abnormality as a task-oriented phenomenon affects the types of deviance that are recognized by cage researchers. Maze fatigue, poor performance due to distractibility resulting from deprivation rearing and depression are all re-

garded as interfering with the test situation rather than being regarded as conditions affecting the animal. This argument is supported by Sackett's comment that "questions of behaviour adequacy depend on the test environment" (1968:305). In situations where continued maintenance and successful breeding are of high priority, self-destruction, hyperaggression, inadequate sexuality and poor mothering capabilities are all seen as problems. These encompass behaviours from both ends of the behaviour range. Due partly to this task-oriented viewpoint of primate behaviour, relatively minor unusual activities such as hand clapping and sticking out the tongue were regarded as deviant by this class of researchers. This broadening of the category of abnormal resulted in the highest number of behaviours categorized as deviant in Table 1.

Zoo Keepers

One very noticeable difference between the laboratory researchers and the zoo keepers' and veterinarians' approaches is that the determination of deviant behaviour arises from differing perceptions about the nature of primates. Whereas laboratory researchers are concerned with individual animals as test subjects, zoo keepers concerns are focussed on individuals or groups and those behaviours that foster their well-being, while veterinarians (below) usually compare the behaviour of captive animals to what they would expect of those in the wild.

My informant keepers do recognize that behaviours which they classify as deviant may in fact be normal for the animal. "What we think of as deviant may be normal" (informant). The captive surroundings may cause physiological changes in animals which result in peculiar behaviours. Some factors pertaining to captivity include the quantity and quality of food, lack of exercise, or stress due to a change in their surroundings, such as painting the cage. Whether or not these peculiar behaviours are classified as deviant usually depends on how much damage is inflicted by the animal on itself or others. It should be noted that abnormal behaviours are not always maladaptive when seen in a total perspective, even though death may result from the stimulation of the escape response in the animal who runs into a wall, fence or moat because of fear or harassment (Meyer-Holzapfel 1968).

Zoo-keeper informants emphasized that the primates in their charge (specifically lemurs, baboons and gorillas) constantly emitted very subtle cues which, due to their experience, the keepers could recognize and, in some cases, interpret. The animals are very sensitive to a change in routine and can be upset by seemingly minor factors such as a new keeper or a temporary separation from the group. Some peculiar behaviours were attributed to possible nutritional deficiencies and medical problems, as well as to

psychological or social causes. One case of severe self-mutilation in a lemur was, on autopsy, associated with degenerative brain disease. In two other cases, however, foot gnawing occurred when lemurs were incarcerated in squeeze cages for several weeks of medical treatment, and the behaviour disappeared when they were returned to their social group. Hair pulling and self-picking, leading to mutilation, can be caused by ectodermal parasites, or by poor circulation leading to abnormal sensitivity of the skin. Self mutilation can also be caused in cases of jealousy or anxiety where the animal vents its emotions on itself.

Coprophagy in the lemurs was alleviated by providing the animals with salt. In other species, such as the gorillas, the marked response from the public to the animals' handling or eating faeces seems to serve as a positive social reinforcement. Gorillas are very social animals and, consequently, very aware of the responses of others to their activities. The shocked response of the public to coprophagy may reinforce the behaviour even when there is no dietary cause for it. It is interesting to note that in early lab research with rats it was found to be impossible to create a Vitamin B deficiency in the animals by manipulating their diet as long as they had access to their faeces to eat. It was only when the cages were suspended with drop-through floors that this vitamin deficiency could be maintained (Fox 1968c). This information would suggest that some dietary deficiencies, particularly those related to stress management, may be alleviated by coprophagy.

Animals also direct their abuse towards others as in the case of mothers abusing infants. This may take the standard form of weaning-rejecting including nipping, hitting at, holding down and abandoning the infant. When mothers direct these behaviours towards a six- to nine-month-old monkey or a three- to four-year-old ape during the weaning process, the behaviour is considered to be normal. However, the same behaviours are considered abuse if the mothers use excessive levels of force, or if the infant is not yet of weaning age and will be in jeopardy without its mother's continued attention. Other forms of rejection can be more life threatening. Some female primates do not handle the infant well at birth, either failing to open the sac and clean the infant, or failing to hold it in the nursing position. Some simply ignore it, while others bite or throw the neonate. Even if the female does accept the infant, she may later exhibit peculiar behaviours such as purposefully standing on it for 20 to 30 seconds while it shrieks (informant). This particular behaviour spread from one female baboon to others in one group. It was not thought to be the same as accidentally sitting or lying on the infant, a mistake which the mother would rectify when the infant vocalized. Another case of maternal disregard for an infant was reported by a gorilla keeper (Cole 1990) who said that one female habitually hung her six-month-old infant from the skylight in her cage and let it scream in order to

attract the keeper's attention. The keeper found that ignoring this behaviour was eventually effective in stopping it, in spite of the potential danger to an extremely valuable animal. The keeper also mentioned that this female was very rough with her infant and dragged her around on the floor rather than carry her.

Males are also seen abusing infants, especially during times of social change. One young, adult, male Hamadryas baboon, forced to live in the same enclosure as a mature male and his harem, stole some of the older male's females and formed a new group. This new group leader killed five of his seven offspring over a two-year period. The other, older male in the enclosure was also very rough, battering, biting and throwing infants against rocks or the cage wall. The males do not fight among themselves, but are very aggressive towards the females. The keeper (Vanessa C. Phelan, Hamadryas keeper) commented that some of the infant deaths occurred in the context of the male disciplining or attempting to mate with a female. This high level of aggression is, in all probability, because the enclosure was too small for two groups, even though it was adequate for one group with roughly the same number of individuals. Of course, the overall effect of such behaviour would be to slow the rate of population growth in these cramped surroundings.

Zoo animals may also show breeding abnormalities of either the passive or active type. Because of hand rearing, some animals have become sexually fixated on humans and refuse to breed with conspecifics. Some lack the correct orientation or techniques because of poor rearing conditions, and others do not appear to like their assigned partner. The gorilla keeper said that each of the five females consistently chose a particular one of the two males available, and that the gorilla pair in the Calgary zoo have refused to breed for a long time. In some cases, single, caged animals masturbate or attempt to mate with their food dishes. A few cases of interspecific or intergeneric mating have occurred, occasionally producing offspring (Matsubayashi et al. 1978). Some substitute choices are quite unsuitable such as one chimpanzee who preferred a cat as a sexual partner (Zuckerman 1932) and one of Yerkes' gorillas who showed sexual interest in a dog (Meyer-Holzapfel 1968). Homosexual activity also occurs frequently, and is not usually considered deviant because it appears to be the expression of an affiliative bond (Fischer and Nadler 1978). In heterosexual groups, homosexual matings do not appear to be exclusive and do not interfere with fertility (Fedigan 1982), with certain rare exceptions (de Waal 1982). At the hyperactive end of sexual activity, males may mount females regardless of their state of sexual cyclicity (orangutans), and may cause a great deal of social disruption by repeated mating attempts, as was mentioned above with respect to the hamadryas baboons. Female chimpanzees in captivity fre-

quently cycle and mate during pregnancy, behaviour which is rare in the wild. This behaviour is not physiologically driven, since they are already pregnant, but allows them to engage in more frequent sexual activity which may serve to maintain affiliative bonds with males who are their constant companions (Wallis 1982).

At the passive end of the curve, zoo keepers recognize lethargy, refusal to eat, anorexia, infant rejection and refusal to mate, as problems in animal behaviour which they attempt to remedy. On the hyperactive side they also deal with a wide range of behaviours, from faeces throwing and eating, stereotyped behaviours, rocking and head banging to self-mutilation, hyperactivity and infanticide. They attempt to modify an animal's undesirable behaviour by manipulating environmental and social conditions to arrive at solutions in which the animal will desist from the behaviour. An example of this approach would be the separation of incompatible animals. In some cases of infant rejection or abuse, the keepers resort to hand rearing, especially with rare and valuable animals. However, they usually try to reintroduce the young to members of their species in an effort to overcome the negative social effects of hand rearing. One of the most important features of the zoo keeper-exhibit interaction is the opportunity for long-term, intensive contact and observation, which in many cases allows the keeper to perceive, diagnose and remedy potential problems before they become very severe. On the other hand, exhibition considerations and lack of space may influence the treatment of behaviour abnormalities. The major focus of zoo interest is gradually shifting from the exhibition of animals for public entertainment and education to the breeding of rare animals for conservation and continued exhibition. Therefore, the emphasis on deviance is directed towards behaviours that reduce the animal's social acceptability and exhibit value as well as their reproductive health and well-being. Behaviours such as hyperaggression, self-mutilation, infant abuse, coprophagy, constant regurgitation and masturbation are seen as more of a problem than pacing, self-clasping and stereotyped behaviours, although the outcome for the animal may be equally debilitating.

Veterinarian

The veterinarians' approach in considering whether various behaviours should be considered deviant was flexible. In some cases, the same activities were considered abnormal in one animal but normal in others (Fox 1968a). The criterion used in attributing deviance was the appropriateness of the activity to the stimulus, both in terms of the degree of response as well as in terms of its biological purpose. "Maladaptive behaviour can result from quantitative and qualitative combinations of process which are

themselves intrinsically orderly, determined and normal in origin'' (Sideman 1960, in Ferguson 1968:189).

One example of how a particular behaviour which usually maintains order can lead to behaviour anarchy when it gets out of control, is manifested in dominance-related behaviour. The original dominance studies were carried out on the pecking order of chickens, and later transferred to primates. Chickens maintain a linear dominance hierarchy by being able to peck at all those who are lower in rank than they. If this gets out of control, it can lead to cannibalism because chickens will kill and eat their subordinates instead of just pecking them to maintain rank. This example is used to clarify how dominance relations in primates can also lead to violent behaviour. Normally in primates rank orders maintain peaceful relations between animals because all know their positions. But if group life becomes unbalanced by, for example, a rapid increase in the number of sexually mature females (Samuels and Henrickson 1983) high levels of aggression leading to serious fighting and death can ensue. Exactly this situation was clearly demonstrated in the 1930s by a fiasco which Zuckerman caused when he introduced a large number of female Hamadryas baboons into a group of previously peaceful, celibate males at the Regents Park Zoo. In the violent fighting which followed, all but two of the females were killed; some were torn apart by the rival males trying to hold on to them (Zuckerman 1932). Bernstein also precipitated violent fighting in a group of macaques by removing the high ranking ''control animals'' (Bernstein 1971). These episodes of violence arise from behaviour mechanisms which usually maintain order, but which, under particular circumstances, can occur at much higher than optimal levels and result in social chaos.

Instances of behaviour that is classified as abnormal by other groups such as zoo keepers, may be attributed to medical or nutritional difficulties by veterinarians (Worden 1968). Examples of this include coprophagy (eating faeces), pronounced hair pulling or skin picking which may be caused by parasites or a nervous condition, and maternal abuse possibly due to such factors as sore nipples. Malfunctions of arousal level, usually caused by boredom can also cause abnormal behaviour. Boredom can increase arousal level by increasing the desire for any kind of stimulus, and this can motivate the animal to engage in self-destructive behaviours. Arousal level can be reduced by the introduction of novel items for the animals to interact with. On the other hand, recently captured animals frequently attempt to reduce the amount of incoming stimulus and maintain low arousal levels because they find the state of captivity so stressful. Animals who have been reared in restricted environments can show the same reaction if moved to larger quarters, or given companions, and both groups may respond by engaging in stereotyped monotonous behaviours which may have a calming effect.

When they encounter novel stimuli they may turn upon themselves or others in a frenzy of destructive fear engendered by insupportably high levels of arousal. Therefore, behaviours which would be considered "autistic" in humans may well indicate a state of chronic over arousal in animals (Fox 1968c). Another response of wild animals to sudden capture is severe depression, indicated by refusal to eat, anorexia and hypoactivity. If animals in this state are markedly stimulated they may go completely passive, may attack out of fear or may die of cardiac arrest brought on by their state of extreme stress (Schmidt 1968).

These examples indicate that veterinarians often ascribe medical or psychologically understandable (neurotic) causes to types of behaviour that are frequently classified as deviant. Veterinarians' interests are limited to captive animals and they see their abnormal behaviours as compensation for environmental and social deprivation. In essence, malfunctions in social interaction, dietary factors or levels of stimulation can result in abnormal behaviour in captive animals when compared with their free-ranging conspecifics.

In spite of attributing these behaviours at both the active and passive ends of the behaviour curve (Table 2) to understandable causes, veterinarians suggest treatments to modify such behaviours in cases where they deem the behaviours unacceptable. These treatments reflect the veterinarian's interest in maintaining the animal's health or ability to breed. They treat passive levels of behaviour such as infant neglect, passivity, anorexia and depression by infant removal, management of arousal levels and drugs. Tranquilizers are often prescribed for fearful animals, while animals who are hypersexual or aggressive are sometimes castrated. They may prescribe dietary and medical treatments in an effort to modify behaviours, and genetic culling is frequently recommended in cases of severe heritable disorders (Fraser 1968).

Research – Free Ranging

The free-ranging research category includes both captive primates maintained in large enclosures and wild animals. The major focus of such research is usually social and ecological. These studies investigate how animals utilize their environments in feeding, travelling, predation, tool use, etc., and how they develop and maintain social relations within and between groups. In many cases researchers categorize as deviant those behaviours which interfere with an animal's Darwinian fitness. These would include behaviours which impair viability, breeding success and social relations. Both passive and active types of abnormal behaviours are included under this approach.

Table 2
Range of Behaviour Potential

Hypoactive	Normative Level	Hyperactive
Infant neglect	Normative infant care	Infant abuse
Infant rejection		Infanticide
Refusal to breed	Normative sex	Hypersexual
Breed inappropriate object		Forced sex
	Homosexual mounting	
Depression	Normative activity level	Stereotyped pacing
Lethargy		Pacing
		Rocking
		Headbanging
		Hyperactive
		Killing
Anorexia	Normative food amount	Overeating
Refusal to eat		
Regurgitation		
	Normative food objects	Coprophagy
		Drink urine
No interaction	Normative interaction e.g., groom, sit with	Hyperaggression
Self-clasping		Self-mutilation
Passivity	Normative behaviours	Eye poke
Death		Hair pull
		Suck self
		Bizarre posture
		Hand movement and gaze
		Flapping genitals
		Stick out tongue
		Head wiping
		Suck penis
		Feces spread
		Self-slap

Due to the enhanced visibility of enclosed groups, de Waal (1982) was able to observe some situations in chimpanzees which have not been seen in the wild. Goodall et al. (1979) reported one sterile, cycling female chimpanzee (Gigi) who frequently travelled with males and engaged in "masculine" behaviours (aggressive patterns, displays and boundary patrols), but who also engaged in consort behaviour with males. In contrast, de Waal (1982) noted a female (Puist) who, although cycling regularly and apparently attractive to males, would not mate with them. She masturbated when not in estrus, and mounted other females when they were swollen. She also

joined males around a sexually attractive female, and, if the female refused the advances of a particular male, Puist would support her decision. That it was behaviour rather than inability to mate which caused such unwillingness to breed is demonstrated by the fact that one male eventually succeeded in impregnating Puist and she has become a competent mother (de Waal 1989).

Puist is also noted for her deceitful behaviour. She frequently joins the males in attacking the females, which is uncommon behaviour in a female. Later she may approach the female with her hand out in a gesture of reconciliation, only to grab or bite if the other female allows her to approach close enough (de Waal 1982).

Mating behaviour that contravenes the social rules of the group has also been observed. The younger males are attacked by the highest ranking one if they attempt to mate openly. Often they surreptitiously indicate sexual interest to a female in estrus, and then move out of sight behind a clump of bushes, where the female may later join them. When engaging in such illicit mating, one young female learned to suppress her piercing copulatory call in order not to attract the alpha male's attention, although she still expressed the accompanying facial gesture. She continued to use the call when breeding in the open with high ranking males. Occasionally a lower ranking animal who saw a concealed mating, would rush, barking, up to the alpha male, seize his arm and drag him to the spot where the incident was occurring. A labelling theorist might hypothesize that the chimpanzee informant had a concept of incorrect or deviant behaviour. In terms of human perceptions, the amount of deceit required to successfully complete a clandestine mating brings it into the realm of deviant behaviour.

Manipulative coercion of one animal by another was also seen in the case of two-year-old Jonas who was being weaned by his pregnant mother. He forced another old female to allow him to nurse. If she refused, Jonas screamed until his mother bore down on the old female and, by threatening and barking, intimidated her into allowing Jonas to suckle (de Waal 1982). In de Waal's opinion the mother was behaving most unusually, although, in sociobiological terms, she was enhancing her own fitness. By weaning Jonas early, she could breed again more quickly, meanwhile reducing the other female's fitness by forcing her to continue lactation, thus delaying the onset of sexual receptivity and eventual pregnancy. Thus, as stated above, abnormal behaviours are not always maladaptive. For instance, among humans, even when bank robbery is successful, it is still considered a deviant behaviour. However, the researcher considered the mother's behaviour to be abnormal, and it did threaten the social harmony of the group.

Intermale violence, resulting in the death of one individual, eventually occurred among the chimpanzees that de Waal was studying (de Waal

1989). Direct attack that results in immediate death is uncommon. Usually, when an adult animal dies as the result of aggression, it is after prolonged harassment, and stress effects in the victim are probably a factor in the demise. However, killing of conspecifics has been observed in the wild among chimpanzee groups (Goodall et al., 1979). Wild chimpanzees have long been noted for their aggressive responses to extra-group animals. Goodall et al. (1979) noted a number of cases in which even known animals of another group were killed and strange infants cannibalized. Goodall (1979) also recorded attacks, made by a mother-daughter pair on the infants of other known females, which resulted in the death and consumption of the infants. Goodall indirectly attributed this behaviour to peculiarities in the mother which resulted in very inadequate mothering behaviour, thus perpetuating abnormal behaviours in her daughter (ibid.).

Norikashi (1982) has observed intra-group cannibalism in Mahale Mountain chimpanzees. One male attacked the female, Ndilo, seized and killed her infant and began eating it. In contrast to the Gombe Stream females, Ndilo did not appear unduly upset and allowed herself to be groomed by the alpha chimpanzee. This high-ranking animal attacked and harassed the males eating the infant, but eventually took a piece of the cleaned-out skin. Another mother with an infant approached the killer male and allowed her own infant to jump onto his back, while she sat in association with them. Ndilo showed a slight estrus swelling from days two to six after the incident, and began cycling again the next month. Two major behaviour anomalies are revealed in this incident. The first is the intra-group killing and eating of a known infant, and the second is the lack of concern shown by the mother and the other adult female who did not take any precautions to protect her own infant. This is in marked contrast to the energetic measures taken by most primate mothers to protect their infants in situations of potential infanticide. Butynski (1982), for instance, noted that one infanticidal male blue monkey did not succeed in killing any infants in 13 attempts, due to defensive behaviours by the mothers and other animals. Fossey (1983) reported at least five cases of infanticide by mountain gorilla males, either during an attack on a group or after a male had taken over a group on the death of the previous leader. Two females were severely wounded attempting to protect their infants from these attacks.

Infanticide is being revealed as a widespread occurrence, as its recent recognition in both Old and New World monkeys and apes attests (Hrdy 1977; Butynski 1982; Clarke 1983; Shopland 1982). Many researchers interpret this behaviour as a reproductive strategy by the males, rather than as a pathological response to high population density and human encroachment. Therefore, it is not often classified as deviant behaviour even though similar behaviour by females would be interpreted as quite abnormal. In one

case of inter-group infant killing among baboons, both mother and infant were severely wounded by the attacking group's females but the mother managed to escape (Shopland 1982). This episode was not interpreted as reproductive strategy, but as a side effect of a clash between two groups. One male from the attacking group rescued the dying infant from the females and juveniles who were harassing it, and carried it until it died.

Strong bonds are evident between mothers and offspring. If a juvenile's mother is killed or dies it often becomes very depressed, lethargic and unwilling to interact (Meyer-Holzapfel 1968; Berman 1982; Fossey 1983; Zeller 1991). In severe cases, especially if the young animal is injured or insecure, it may give up the will to live (Goodall 1971; Fossey 1983). Mothers of infants who die may also become extremely depressed and refuse to interact with the group (Fossey 1983; de Waal 1982).

Unprovoked aggression is frequently perceived as abnormal. Fossey noted one case in which a male gorilla dragged and pounded on the body of a dying female over the course of two days (Fossey 1983). High levels of aggressive attacks may also accompany the addition of new females to a group. Male silverbacks frequently charge, display at and hit newly acquired females until their position in the group is established. The females sometimes parallel this behaviour which is interpreted as an effort to reorganize the group's social relations.

Although the behaviours listed in part 1 of Table 1 were defined as abnormal because they were not noted in the behaviour repertoire of wild chimpanzees, only a few of them are considered deviant by researchers observing free-ranging animals. Fossey noted a number of the behaviours listed in part 1 of Table 1 in wild gorillas. These included urine drinking, coprophagy and hand clapping (in one individual). Cannibalism was not observed but has been inferred by an analysis of gorilla faeces (Fossey, 1982, personal communication). Of all these behaviours listed in part 3 of Table 1, cannibalism is the only one that she appears to consider abnormal. In his study of colony chimpanzees, de Waal (1982) comments on the "lesbian" behaviour shown by Puist. Deceit and manipulative coercion were both interpreted as behaviours which were potentially disruptive of social harmony. Severe depression was seen in females whose infants had died, but, in one case, he was able to alleviate this with a successful adoption by a female chimpanzee who was able to learn to bottle-feed the infant.

A wide range of behaviours has been observed in free-ranging groups at both ends of the behaviour spectrum (Table 2). Such behaviours as cannibalism, maternal passivity, infant abuse, extremes of social manipulation and refusal to breed are recognized as abnormalities of the social process. Other behaviours such as unprovoked aggression, infanticide and homosexual mating are only considered non-adaptive in some contexts, and in others

are interpreted as mechanisms for enhancing reproductive fitness or social stability. Individually oriented behaviours, such as most of the activities listed in part 1 of Table 1, are not frequently seen in wild or naturalistic groups and, if they occur, are not always classed as abnormal. One behaviour that could be classified as individual is depression, but it is in fact a non-response to the social attentions of others (Berman 1982).

Infant Abuse in Non-human Primates

Although infant abuse in non-human primates is seen by all groups as "deviant," it is a useful example with which to clarify the differing orientations towards deviant behaviour among the four informant groups. It is particularly interesting because it is very widespread and is being studied to provide a potential model for the analysis of human abuse problems. It is also revealing in terms of the "passive" "normative" "active" model of deviance being presented in this paper.

There are two poles to the spectrum of child abuse; inadequate care and destructive violence. Both are accepted as abusive by veterinarians who contrast neglect, due to inexperience or state of maternal health, with wounding, killing and occasional cannibalism "which may be due to hormonal disturbance, lack of milk, dietary insufficiency . . . or psychological disturbances" (Fox 1968b:55). Fox also considers that cannibalism can become an habitual behaviour (1968b).

Neglect and violent abuse are both seen in zoo populations and are the source of great concern. Neglect is often regarded as due to inadequate experience, lack of a role model or idiosyncratic unconcern. Violence is usually interpreted as the result of high levels of stress. This can be due to isolation at the time of birth (Nadler 1983), to crowded conditions, to the social upheaval of being introduced to a new group (Erwin 1983) or to the effects of inadequate maternal care, situations which can result in a strong tendency for the animal to abuse its own offspring (Suomi and Ripp 1983). Abusive behaviour is particularly noticeable in the zoo Hamadryas male mentioned above, who is living in stressful conditions and was himself abused as an infant (Field informant: personal communication).

Primate child abuse as a social phenomenon was first recognized after the examination of records in the research laboratories. In the Wisconsin lab, researchers studied patterns of abuse by manipulating variables and comparing test animals with controls, in order to discover possible causes for infant maltreatment. Inadequate mothering behaviour ranged from total unconcern and a failure to nurse to violent, life-threatening treatments of infants. The variables under study in the mother include comparisons of feral versus cage birth (Caine and Reite 1983), primiparity versus multiparity, age, de-

gree of deprivation in the maternal rearing environment, maternal experience of abuse, sex of the infant and maternal state of health. This last variable includes the presence of a depressive response to separation as a juvenile. Depression was found to be predictive of later child abuse in 78 percent of females compared to a 0 percent occurrence in control animals who did not respond with depression to separation from their group as a juvenile (Schapiro and Mitchell 1983). (It must be emphasized that these studies were conducted by searching through records and not by attempting to induce abusive behaviour in mothers.)

Suomi and Ripp (1983) also argue that maternal abuse levels are reduced in multiparous mothers, in contrast to the abuse of subsequent children shown by human females. However, in an analysis of the improvements in mothering behaviour shown by "motherless mothers," they found that, although neglect decreased to levels comparable to those of feral animals by the fifth offspring, abuse levels declined by only 10 percent. This is contrary to Nadler's finding that multiparous gorillas show less abuse than primiparous ones, although the frequency of neglect is not affected by parity (Nadler 1983). These two results suggest opposite effects of parity, but they do tend to support the idea that neglect and abuse may arise from different causal sources.

Maple and Warren-Leubecker (1983) have expanded a model which would support this contention, and which was originally proposed by Baldwin and Baldwin in 1978 . This model proposes an inverted "U" pattern in which the ends of the curve represent a low and a high arousal level, respectively, with a moderate centre. At low levels of arousal, the organism is inefficient at performing a task, whereas, during performance at a high level of arousal, behaviour is distracted and degenerates in an overload of systemic distress. This model could account for a wide range of behaviour as dependent on the optimal arousal level of the animal and on the stress level at which it exists. It could explain, for example, why single caging could promote high arousal levels which result in neglect in some animals, while providing extremely low levels of stimulation, which foster destructive attention in others.

Research on free-ranging animals has a much different focus and reveals a lower incidence of maternal abuse than is found in captive situations. In most cases, the offspring of very abusive mothers do not survive. Varying levels of competence in mothering exist, but the opportunity for observational learning and aunt behaviour is a common feature of a social group. One interesting point is that field researchers almost expect free-ranging, primiparous mothers to lose their first infant through incompetence and neglect, while the same behaviour in captive conditions is labelled abuse. When a female dies or is unwilling to care for her infant, another member of

the troop may adopt it. This may be quite successful if the adopter is a lactating female (Fuccillo et al. 1983) or it may result in the infant's death. In one case, a wild rhesus macaque male exhibited the whole range of maternal to abusive behaviour with two orphan infants he adopted on the deaths of their mothers. In each case he began by grooming, carrying and protecting but, as the infants continued to shriek from hunger, he became rougher and less maternal. In the end, he held them down with his foot while he ate, and eventually they died (Taylor et al. 1978). This behaviour parallels that found in some humans who do not intend to hurt an infant but do so to stop it from screaming (Erwin 1983).

Infanticide is the facet of infant abuse which is most commonly discussed in free-ranging populations. Its occurrence as a systemic phenomenon was explored in Hrdy's (1977) work on langurs (*Presbytis entellus*). She indicated that males killed offspring that were not their own when they took over a single male langur group. Since infanticide was not observed in multimale groups who lived in larger ranges, it was initially described as a pathological response to overcrowding and human encroachment (Jay 1965). Hrdy, however, disagreed with the interpretation and explained the phenomenon as a result of the sociobiological reproductive strategy of males maximizing genetic input into the next generation. This interpretation sparked a great deal of controversy concerning the adaptive advantage of killing conspecifics. The recent spate of publications on male infanticide in free-ranging populations had broadened the base of the argument by including New and Old World monkeys as well as apes. Regardless of whether infanticide is interpreted as a side effect of female directed behaviour (Butynski 1982), a response to environmental stress (Jay 1965) or a male reproductive strategy (Hrdy 1977; Clarke 1983), field researchers usually do not consider it in terms of the nature of the infant, or of the quality of the mother's life. In this they hold a very different view from the approach taken in the research on captive animals.

Discussion

The behaviours in part 1 of Table 1 were defined as deviant because they did not occur in the ethogram of wild chimpanzees drawn up by Goodall in 1968 (Walsh et al. 1982). As illustrated in Table 3 (below), the behaviours most consistently labelled deviant by all informants were those involving self-mutilation or active harm to others. Seven active, damaging behaviours and two life-threatening, passive ones were unanimously scored as deviant by the respondents. The second column of behaviours in Table 3 are those which are indicative of mental distress based on a standard of the behaviour of human inmates of mental institutions. Twenty of the 42 behaviours listed

were placed in this category. Of these 20, 16 were considered deviant by either three or all four of the respondent groups. Nine behaviours were classified as those which contravene white North American social norms, such as penis sucking and flapping genitals. Some behaviours which were scored as deviant by less than half of the respondents are those which would be considered as socially innocuous, idiosyncratic behaviours.

Table 3
Categorization of Abnormal Behaviour in Primates

Physical Violence		Mental Distress Similar to Human Patients		Offends White N. American Social Norms		Idiosyncratic Behaviours	
Active							
Self-mutilate	4[a]	Eye poking	4	Flap genitals	3	Wet head	2
Cannibalism	4	Hand movement and gaze	4	Suck penis	3		
Maternal abuse	4			Clap hands	1		
Hyperaggressive	4			Coprophagy	2	Stick out tongue	1
Hypersexual	4	Self-slap	3	Feces spread	2		
Infanticide	4	Suck self	3			Hair pull	1
Kill	4	Urine drink	3				
		Head banging	3				
		Bizarre posture	3				
		Pacing-weaving	3				
		Rocking	3				
		Head shaking	2				
		Head wiping	2				
		Grimacing	2				
		Stereotyped movements	2				
Passive							
Infant reject	4	Anorexia	4	Breed inappropriate object	4		
Death	4	Refuse eat	4				
		Self-clasp	4	Masturbate	4		
		Passivity	4				
		Depression	4	Refuse to breed	3		
				Lethargy	3		
		Infant neglect	3				
		Not interact	3	Regurgitate	1		

a. indicating the number of informant groups who include the behaviour as abnormal

Many behaviours not included on this list were classified as abnormal or deviant by some informants. These include such behaviours as biting, rasp-

berry vocalization, lip flips, deception, manipulative coercion and homosexual mounting. Other rare manifestations of peculiar behaviours, such as stuffing the cheek pouches with rocks, or consistently wetting food before eating were considered as "individual habits" rather than as abnormal. Dian Fossey (1983) characterized hand clapping in this way when she observed it in one young wild gorilla.

Although only 13 of 40 behaviours (Table 2) discussed as abnormal were on the passive side of the behaviour range, these activities are important to our understanding of the nature of deviant behaviour among primates. Behavioural silence can be either the result of low arousal level or, in some cases, a learned response. It can be socially adaptive "to do nothing, under certain circumstances" (Fox 1968a:50) and the response is learned through the process of association and passive inhibition. Inactivity can also be a maladaptive response. Long continued depression, refusal to protect offspring from harm and lack of adequate response to environmental stimuli can all result in life threatening situations. Passivity is also a common response of isolation-reared animals, who may subsequently fail to develop social relationships when placed in a group. At the other end of the curve, poorly socialized or highly stressed animals may exhibit an overactive response to stimuli, resulting in self-mutilation, hypersexuality and violence.

Under a Darwinian model of fitness, behaviour is the method used by an animal to respond to its environment, including other animals, in such a way as to maximize reproductive fitness. Behaviour differences which may develop between groups of animals have been called traditions (Burton and Bick 1972), and these differences may markedly affect the adaptive success of the group for better or for worse. Examples of these types of responses include patterns of paternal care in some, but not all, groups of Japanese macaques or different intraspecific dietary strategies such as Japanese macaque potato washing, or digging for water among Cape baboons. These behaviours do not have a genetic cause other than the general adaptive potential seen at different levels in monkeys and apes, but they may easily have a genetic effect if they result in one individual or group becoming much more or much less successful than its neighbours. Although these tradition-based behaviours are passed on by learning, they nevertheless may influence the genome of a group by fostering differential survival in much the same way that tractability has been bred into domestic animals (Fox 1968a).

This argument of a genetic effect based on a behaviour cause, constrained by the social nature of the group, is one which has profound consequences for the study of deviance. Avoidance of incest is one example of a behavioural response to social factors which has the genetic effect of reducing homozygosity in the population's gene pool. One interpretation of in-

fanticide in free-ranging primates has been based on the sociobiological theories of genetically based, reproductive strategy. However, if one does not choose to rely on genetic selection as the causal basis for such behaviour, it is possible that the behaviour has a social cause with, possibly, an indirect genetic effect. In other words, the male does not kill infants "in order to" promote his own genetic success, but rather, his genetic success is promoted because he kills infants sired by others. The two statements are not at all the same. In some situations such as that of the Hamadryas group mentioned above, in which males kill or injure their own offspring, obviously a sociobiological interpretation would not apply. "We do not feel that sociobiological theory can easily explain (and/or justify) the occurrence of child abuse" (Schapiro and Mitchell 1983:30).

Butynski, who studied infanticide among blue monkeys (*Cercopithecus mitis*), proposes that, rather than being an effort to manage reproductive outcomes or an effect of population density per se, "the rate of infanticide is a function of competition among males for females" (Butynski 1982:11). This approach differs from that which attributes the presence of infanticide to the stress of overpopulation, and may help to clarify the issue. In the gorilla encounters mentioned above, the ratio of males to females was quite high and attempts to take over troops or steal females were frequent (Fossey 1983). Butynski comments that there is a cost/benefit threshold for infanticidal behaviour which balances the level of intermale competition for females, and thus the need to form strong social bonds with them, with the costs of infanticide weighed in terms of possible damage to self or mate. To this, I would add that there is also a possible social cost if the females refuse to accept such a male, and either leave the group (as seen in gorillas), breed outside the group (as has occurred in langurs) (Hrdy 1977) or drive out the male. In Butynski's study of blue monkeys, each of the two males who attempted infanticide in the six takeovers he observed, remained in the group less than a month. Primate females belonging to groups of langurs, Sykes monkeys, howlers and blue monkeys sometimes respond to male takeovers by engaging in post-conception estrus. This behaviour would help to develop the types of social bonds necessary to maintain the solidity and integrity of the group, as well as indicating social acceptance of the male. As mentioned above, this type of behaviour also occurs in wild gorillas and captive chimpanzees.

Hrdy argues (1977) that females who abuse their young or do not protect them from male aggression are engaging in a reproductive strategy by divesting themselves of a poor genetic investment. On the other hand, limb-disabled and blind young are often extremely well cared for by mothers who make special efforts to assist these defective offspring (Fedigan and Fedigan 1977; Nakamichi 1983; Schapiro and Mitchell 1983). It is possible

that other factors besides the quality of the infant may be influencing females who are careless of their young.

Conclusions

It is evident that each of the four response groups forming the data base has a different perspective and, therefore, interprets deviant behaviour in primates in a different way. Researchers utilizing caged animals tended to focus their interpretations of deviance in a task-oriented fashion. In the situation of infant abuse, the task was to rear their young adequately, and those who had suffered environmental deprivation were unable to do so. That the situation of bare cage or surrogate rearing was considered environmental rather than social is attested by the following statement by Sackett. "[It] seems likely that many 'behavioural abnormalities' are dependent on processes in the environment rather than on permanent anomalies in the animal" (Sackett 1968:305). The zoo keepers recognize medical problems but tend to interpret behavioural abnormalities from a social perspective, citing stressful conditions such as isolation, crowding or social upheaval as the cause of most problems. The veterinarians tend to see abnormality as evidence of "sickness" that can be modified or cured with the appropriate medical or mechanical solution.

These approaches are contrasted with the observational research conducted on free-ranging animals in which the social situation is taken to be of paramount importance. From this perspective, deviance occurs mainly when animals can no longer interact in a stable fashion. The source of the difficulty may range from idiosyncratic behaviour on the part of one animal, such as the Gombe female who committed cannibalism, to widespread social breakdown caused by new arrivals or severe crowding in the habitat.

Nonetheless, all four of these interest groups recognized as abnormal behaviours from both ends of the behaviour spectrum as proposed in the model suggested in this paper (Table 2). Regardless of the cause ascribed, passivity, refusal to breed, to interact, to eat or to rear infants was seen as non-normative behaviour at the low end of the response scale. The other end of the range including hyperactivity, bizarre individual behaviours (rocking, head banging), eating or breeding with inappropriate objects, hypersexuality, infant abuse, killing and cannibalism were also viewed as abnormal behaviours, even though in some cases they could be understood as attempts to cope with difficult situations.

Although this study reveals a wide range of opinions on what causes deviant behaviour, and a wide range of viewpoints from which it is perceived, there is no doubt that it is regarded as a problem by individuals who have many different orientations towards primates. Classification of abnormal

behaviours shows some regularity, in spite of the informant population's widely divergent views on causation. From Table 3 it is evident that the most universally accepted category of deviance was composed of the two extremes of the range of active and passive behaviour, violence, or total lack of response to conspecifics and surroundings. The second most frequently listed category of deviant behaviours were those reminiscent of mentally afflicted humans. The third most inclusive group were culturally unacceptable behaviours which were considered abnormal by about half the informants. At the end of the list came behaviours which could be interpreted as idiosyncratic. It is possible that the potential for classifying deviant behaviour into more or less universally recognized categories may enhance our understanding of the underlying values from which the assessments of deviance are made.

Behavioural differences are developed and maintained in populations because of their individual and social advantages. Some of the behaviours discussed in this paper may appear to contradict the above statement since they are disadvantageous for the individuals who perform them. However, they may represent the animal's best efforts to cope with a stressful situation. Behaviours which influence breeding and reproductive success will have a genetic effect, which may either enhance or reduce the animal's overall fitness. The behaviours which have been classified as abnormal or deviant in this paper included responses which have both types of effect. Individually oriented, abnormal behaviours usually reduce the animals own fitness while socially oriented ones may reduce either the actor's or another animal's reproductive potentialities. The nature of these responses ranges from hypoactive to hyperactive, and completes the range of behaviour as modelled on a Darwinian curve of variation.

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