

ANIMAL WELFARE: COPING

Substantial challenges to animal functioning, include those resulting from pathogens, tissue damage, attack or threat of attack by a predator or another individual from the same species, other social competition, complexity of information processing in a situation where an individual receives excessive stimulation, lack of key stimuli such as social contact cues or a teat for a young mammal, lack of overall stimulation, and inability to control interactions with the environment. Hence potentially damaging challenges may come from the environment outside the body, for example, many pathogens or causes of tissue damage, or from within it, for example, anxiety, boredom or frustration which come from the environment of a control system. Systems that respond to or prepare for challenges are coping systems, and *coping means having control of mental and bodily stability.*

Coping attempts may be unsuccessful, in that such control is not achieved, but as soon as there is control, the individual is coping. Systems for attempting to cope with challenge may respond to short-term or long-term problems, or sometimes to both. The responses to challenge may involve activity in parts of the brain and various endocrine, immunological, or other physiological responses, as well as behavior. However, the more that we learn about these responses, the clearer it becomes that these various types of response are interdependent. For example, not only do brain changes regulate bodily coping responses, but adrenal changes have several consequences for brain function, lymphocytes have opioid receptors

and a potential for altering brain activity, heart-rate changes can be used to regulate mental state and hence further responses. It is often combinations of difficulties that make coping difficult. This is true for all species of animals. The methods of coping that are used may help with several problems at once. For example, many emergency responses require more energy than normal to allow the animal to utilize skeletal muscle more efficiently, make the heart pump faster, and reduce response time. Such general physiological methods of trying to cope are usually combined with one or more of a variety of physiological responses that are specific to the effect that the environment is having upon the animal. Hence if it is too cold, the animal may raise its hair, shiver, and reduce blood supply to peripheral parts of the body, but in extreme circumstances, adrenal responses are involved as well.

Coping methods may be behavioral and mental as well as physiological, and vary from very active responses to some hazards to passive responses in which the individual minimizes movement. The initial responses to a situation may be largely automatic, but if these are not effective, other changes may be brought about that affect the mental state of the individual. Some coping systems include feelings as a part of functioning, for example, pain, fear and the various kinds of pleasure, all of which are adaptive. Bad feelings which continue for more than a short period are referred to as suffering. Other high- or low-level brain processes and other aspects of body functioning are also a part of attempts to cope with challenge. In order to understand coping systems in humans and other species, it is necessary to study a wide range of mechanisms including complex brain functioning, as

well as simpler systems. Investigations of how easy or difficult it is for the individual to cope with the environment, and of how great is the impact of positive or negative aspects of the environment on the individual, are investigations of welfare. If, at some particular time, an individual has no problems to deal with, that individual is likely to be in a good state, including good feelings, and indicated by body physiology, brain state, and behavior. However, an individual may face problems in life that are such that it is unable to cope with them. Prolonged failure to cope results in failure to grow, failure to reproduce, or death. The individual is said to be stressed, and welfare is poor. A further possibility is that an individual faces problems but, using its array of coping mechanisms, is able to cope but only with difficulty and usually also with bad feelings. The greater the difficulty in coping, the worse the welfare.

Further Reading

- Broom, D. M., ed. 2001. *Coping with challenge: Welfare in animals including humans*. Berlin: Dahlem University Press.
- Broom, D. M., and A. F. Fraser. 2007. *Domestic animal behaviour and welfare*, 4th ed. Wallingford: CABI.
- Broom, D. M., and K. G. Johnson. 2000. *Stress and animal welfare*. Dordrecht: Kluwer.
- Monat, A., and R. S. Lazarus, eds. 1991. *Stress and coping*, 3rd ed. New York: Columbia University Press.

Donald M. Broom

ANIMAL WELFARE: FREEDOM

Freedom means the possibility to determine actions and to make responses, and has been thought of by many philosophers, including Immanuel Kant, as

necessary for a good life in sentient individuals. However, freedom to seek pleasure without concern for all consequences is wrong, and there are few freedoms or rights which would be accepted as valid under all circumstances. The right to free speech can cause great harm to certain individuals and hence can be morally wrong, as can the right or freedom to drive a car as fast as you wish, to carry a gun, or to select the sex of your offspring. In the same way, social animals are constrained by their relationships with others such that specification of individual freedoms can sometimes be erroneous. The socially competent pig or dog is not free to do as he or she chooses. The safer argument when evaluating what comprises a moral action is to consider the obligations of the actor.

One of the approaches that has been adopted when attempting to ensure that the welfare of animals is good is to list the freedoms that should be provided for. The idea of specifying the freedoms that should be given to animals was put forward in the Brambell Committee Report, which was presented to the Government of the United Kingdom in 1965. The freedoms were defined as freedom from: (1) hunger and thirst; (2) discomfort; (3) pain, injury, or disease; (4) fear and distress; and (5) the freedom to express normal behavior by providing sufficient space, proper facilities, and company of the animal's own kind.

This list of freedoms has been a useful general guideline, but animal welfare science has progressed rapidly since that time and there is now good evidence for the needs of most domestic species. The needs are identified by strength-of-preference studies and research identifying the extent of poor welfare if it is not possible to fulfill the needs. There is now

little point in listing the freedoms, because the species needs are a much more accurate way to decide upon what should be provided to ensure good welfare.

Further Reading

- Broom, D. M. 1988. Needs, freedoms, and the assessment of welfare. *Applied Animal Behaviour Science* 19: 384–386.
- Broom, D. M. 2003. *The evolution of morality and religion*. Cambridge: Cambridge University Press.
- Broom, D. M., and A. F. Fraser. 2007. *Domestic animal behaviour and welfare*, 4th ed. Wallingford: CAB.
- Webster, J. 1995. *Animal welfare: A cool eye towards Eden*. Oxford: Blackwell.

Donald M. Broom

See also Blood Sports; Entertainment and Amusement: Circuses, Rodeos, and Zoos; Fishing as Sport; Hunting, History of Ideas.

Further Reading

- Atyeo, D. 1979. *Blood and guts: Violence in sports*. New York: Paddington Press Ltd.
- Cartmill, M. 1993. *A view to a death in the morning: Hunting and nature through history*. Cambridge: Harvard University Press.
- Elias, N., & Dunning, E. 1986. *Quest for excitement: Sport and leisure in the civilizing process*. Oxford: Basil Blackwell Ltd.
- Franklin, A. 1999. *Animals and modern cultures: A sociology of human-animal relations in modernity*. London: SAGE Publications.
- Fulton, J. 1971. *Bullfighting*. New York: The Dial Press.
- Hummel, R. 1994. *Hunting and fishing for sport: Commerce, controversy, popular culture*. Bowling Green: Bowling Green State University Popular Press.
- Mighetto, L. 1991. *Wild animals and American environmental ethics*. Tucson: University of Arizona Press.
- Thomas, K. 1983. *Man and the natural world: Changing attitudes in England 1500-1800*. London: Allen Lane.
- Toynbee, J.M.C. 1973. *Animals in Roman life and art*. Baltimore: The Johns Hopkins University Press.

Cindy McFadden

STEREOTYPIES IN ANIMALS

A stereotypy is a repeated, relatively invariant sequence of movements that has no obvious function. It is the repetition of the same behavior pattern which makes the stereotypy so obvious to an observer, and the abnormality is also indicated by the distinction from useful repetitive behaviors such as breathing, walking, or flying. Among the most striking abnormal behaviors shown by some animals in zoos and in confined conditions on farms are stereotypies such as route-tracing, bar-

biting, tongue-rolling, or sham-chewing. As an example, a female mink, in a cage 75 x 37.5 cm and 30 cm high on a mink farm, would repeatedly rear up, cling to the cage ceiling with her forepaws, and then crash down on her back.

Stereotypies can be shown by humans with neurological disorders, by those with some degree of mental illness, and by those in situations where they have little or no control over aspects of their interaction with their environment. People with no illness may show stereotypies when confined in a small cell in prison, or when exposed to situations like waiting for an important interview, or for their wife to give birth.

The causes of stereotypies in nonhuman animals seem to be very similar to those in humans. Frustrated individuals, especially those unable to control their environment for a long period, are the most likely to show the behavior. Individuals treated with particular drugs, especially psychostimulants such as amphetamines and apomorphine, may show stereotypies, but it is not clear what this tells us about the causation of stereotypies. Animals with irritant disease conditions such as sheep scab show rubbing and oral stereotypies. Many stereotypies seem to be related to oral movement or to locomotion, so the control systems for such movements are clearly susceptible to being taken over by whatever causes repetition. The age of the individual and the amount of time in the housing condition can affect the stereotypies shown, for example, horses changing from crib-biting to wind-sucking, or from side-to-side pacing to head-weaving, and confined sows changing from bar-biting to sham-chewing. Movements can also become more complex with age.

In most cases we do not know whether a stereotypy is helping the individual to

cope with the conditions, has helped in the past but is no longer doing so, or has never helped and has always been just a behavioral abnormality. None of the studies that demonstrate a relationship between the extent of occurrence of stereotypies and opioid receptor blocking or opioid receptor density measurement tell us with certainty whether or not stereotypies have any analgesic or calming function, but in all cases the stereotypy indicates that the individual has some difficulty in coping with the conditions, so it is an indicator of poor welfare. Animals that have larger home ranges in natural conditions have been found to be more likely to show stereotypies in zoos. Some stereotypies must indicate worse welfare than others, but any individual showing them has a problem.

Stereotypies are sometimes ignored by those who keep animals, and may be taken to be normal behavior by those people if they see only disturbed animals. For example, zookeepers may see route-tracing by cats or bears, laboratory staff may see twirling around drinkers by rodents, and farmers may see bar-biting or sham-chewing by stall-housed sows without realizing that these indicate that the welfare of the animals is poor. A greater awareness of the importance of stereotypies as indicators of poor welfare is resulting in changes in animal housing. More complex environments that give the individual more control, and hence result in the occurrence of fewer stereotypies, are now being provided in good animal accommodations. These environments also give opportunities for a larger proportion of the full behavioral repertoire to be expressed, and for the patterns of movements in the repertoire to be varied. The consequent reduction in frustra-

tion and increase in the proportion of an individual animal's interactions with an environment that is under its control can improve its welfare.

Further Reading

- Broom, D. M. 1983. Stereotypies as Animal Welfare Indicators. In D. Smidt, ed., *Indicators relevant to farm animal welfare: Current topics in veterinary medicine and animal science* 23: 81-87.
- Broom, D. M., and Fraser, A. F. 2007. *Domestic animal behaviour and welfare*, 4th ed. Wallingford: CAB.
- Broom, D. M., and K. G. Johnson. 2000. *Stress and animal welfare*. Dordrecht: Kluwer.
- Lawrence, A. B., and Rushen, J. eds. 1993. *Stereotypic animal behaviour: Fundamentals and applications to welfare*. Wallingford: CAB International.
- Mason, G. J. 1991. Stereotypies: A critical review. *Animal Behaviour* 41: 1015-1037.
- Mason, G.J., Clubb, R., Latham, N. and Vickery, S. 2007. Why and how should we use environmental enrichment to tackle stereotypic behaviour? *Applied Animal Behaviour Science*, 102: 163-188.

Donald M. Broom

STRESS AND LABORATORY ROUTINES

For almost as long as animals have been used in tests and experiments that harm them, the practice has drawn criticism concerning animal suffering. The focus of that criticism is usually on how the experiments may cause pain, distress, and death to the animal subjects. It doesn't require much imagination to conclude that having a household product dripped repeatedly onto the eye causes pain and stress for a rabbit (Draize test), or that being given cancer is nasty for a mouse.

Often overlooked in the vivisection debate is the animals' experience out-