

*The Scientific Basis for Assessing Suffering in Animals**

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'As far as our feelings are concerned, we are locked within our own skins.' I have always found B. F. Skinner's words to be a particularly succinct and dramatic statement of the problem of attributing feelings to anyone but ourselves. I have also been impressed by the fact that although almost everyone acknowledges that this difficulty exists, we go about our daily lives, and particularly our interactions with other people, as though it did not. We all pay lip service to the idea that subjective feelings are private but respond to the people around us as though experiences of pain and pleasure were as public as the fact that it is raining. Thank goodness that we do. Someone who stuck rigidly to the idea that all subjective experiences were essentially private and that there was not, and never could be, evidence that other people experienced anything at all would be frightening indeed. He or she would be without what is, for most of us, perhaps the most important curb on inflicting damage on another person: the belief that the damage would cause pain or suffering and that it is morally wrong to cause those experiences in other people. This is one of the cornerstones of our ideas about what is right and what is wrong. And yet this suffering we are so concerned to avoid is, if we are strictly logical about it, essentially private, an unpleasant subjective state that only we ourselves can know about, experienced by the particular person who inhabits our own skin.

Much of our behaviour towards other people is thus based on the unverifiable belief that they have subjective experiences at least somewhat like our own. It seems a reasonable belief to hold. There is enough common ground between people, despite their obvious differences of taste and upbringing, that we can attempt to put ourselves in other people's shoes and to empathize with their feelings. The fact that we can then often successfully predict what they will do or say next, and above all the fact that they may tell us that we have been successful in understanding them, suggests that the empathy has not been entirely inaccurate. We can begin to unlock them from their skins. We assume that they suffer and decide, largely on this basis, that it is 'wrong' to do certain things to them and 'right' to do other things.

Then we come to the boundary of our own species. No longer do we have words. No longer do we have the high degree of similarity of anatomy, physiology and behaviour. But that is no reason to assume that they are any more locked inside their skins than are members of our species. Even in the case of other people, understanding feelings is not always easy. Different people find pleasure or lack of it in many different ways. It takes an effort to listen and understand and to see the world from their point of view. With other species, we certainly have additional difficulties, such as the fact that some animals live all their lives submerged in water or in the intestines of bigger animals. But those difficulties are not insuperable – merely greater. We know what most humans like to eat, what makes them comfortable, what is frightening, from our own experience. With other species we may have to make an effort to find out. The purpose of this essay is to set down the sorts of things we should be finding out if we really want to know whether other animals are suffering or not. I shall argue that it is possible to build up a reasonably convincing picture of what animals experience if the right facts about them are accumulated. This is not in any sense to deny the essentially private nature of subjective feelings, nor to make any claims about the nature of mental events. It is simply to say that, just as we think we can understand other people's experiences of pleasure, pain, suffering and happiness, so, in some of the same ways, we may begin to understand the feelings of animals - if, that is, we are prepared to make an effort to study their biology. Of course, we cannot *know* what they are feeling, but then nor can we *know* with other people. That lack of absolute certainty does not stop us from making assumptions about feelings in other people. And, suitably equipped with certain biological facts about the particular species

* In PETER SINGER (ed), *In Defense of Animals*, New York: Basil Blackwell, 1985, pp. 27-40.

we are concerned with, nor should it with other animals either.

A word, first, about what the term 'suffering' actually means. It clearly refers to some kinds of subjective experience which have two distinguishing characteristics. First, they are unpleasant. They are mental states we would rather not experience. Secondly, they carry connotations of being extreme. A mild itch may be unpleasant, but it does not constitute 'suffering' in the way that prolonged, intense electric shocks would do. One of the problems about suffering is that it is not a unique state. We talk about suffering from lack of food, but also about suffering from overeating, as well as from cold, heat, lack of water, lack of exercise, frustration, grief and so on. Each of these states is subjectively different as an experience and has different physiological and behavioural consequences. Suffering from thirst is quite different from suffering from a bereavement, yet the same blanket term 'suffering' is used to cover them both. About the only thing they have in common, in fact, is that they can both be extremely unpleasant, and someone experiencing either of them might feel a desire to be in a different state. For this reason, defining suffering as 'experiencing one of a wide range of extremely unpleasant subjective (mental) states' is about as precise a definition as we are going to be able to devise. If we were dealing with just one sort of experience - that resulting from food deprivation, for example - we would be on much firmer ground. We could study the physiological effects and what the particular species did about it. We could measure hormone levels and brain activity and perhaps come to a precise definition. But no such simplicity exists. Animals in intensive farms have plenty to eat and yet we still worry that they may be suffering from something other than lack of food. Some species may suffer in states that no human has ever dreamed of or experienced. To be on the safe side, we will, for the moment leave the definition deliberately broad, although we will later be in a position to be a bit more precise.

Our task, therefore, is to discover methods of finding out whether and in what circumstances animals of species other than our own experience unpleasant emotional states strong enough to warrant the term 'suffering'. It is the very unpleasant nature of these states that forms the core of the problem. This is what we must look for evidence of- not (to stress the point made earlier) that we can expect direct evidence of unpleasant experiences in another being, but we can expect to gather indirect evidence from various sources and put it together to make a reasonably coherent case that an animal is suffering. There are three main sources of such evidence: its physical health, its physiological signs and its behaviour.

Physical Health

The first and most obvious symptom of suffering is an animal's state of physical health. If an animal is injured or diseased, then there are very strong grounds for suspecting that it is suffering. All guidebooks and codes on animal care agree on how important it is to see that an animal is kept healthy and to treat any signs of injury or disease at once. For many species the signs of health (bright eyes, sleek coat or feathers) as well as those of illness (listlessness, loss of appetite, etc.) have been listed and in any case are well known to experienced animal keepers. There may be slight problems sometimes. Mammals that are hibernating or birds that are incubating their eggs may refuse food and show considerable loss of weight. These are normally signs of ill-health but in these particular cases seem to be perfectly natural events from which the animals subsequently emerge well and healthy. This simply illustrates that even the 'obvious' signs of suffering, such as physical ill-health, are not infallible and have to be taken in conjunction with other evidence, a point we will return to later.

Another difficulty with using physical health (or the lack of it) to decide whether or not an animal is suffering is that it is not, of course, the disease or injury itself which constitutes the suffering: it is the accompanying mental state. An animal may be injured in the sense of being physically damaged, yet show no apparent signs of pain. The experiences of other people are very revealing here. Soldiers can be wounded in battle but, at the time, report little or no

pain. Conversely, people complaining of severe and constant pain can sometimes baffle their doctors because they have no signs of tissue damage or abnormality at all. Damage to the body does not always go with the highly unpleasant experiences we call 'suffering from pain'. Physiology is less help than one might expect in trying to decide when injury gives rise to pain. Although many physiologists believe that the mechanisms of pain perception are roughly similar in humans and other mammals, the physiological basis of the perception of pain is not well understood for any species. It is impossible to say with any certainty that whenever such-and-such a physiological event occurs people always report 'That hurts!' It is known that there are small nerve fibres all over the body which respond to painful stimuli, but it is difficult to interpret the messages they carry. The situation is further complicated by the existence of other nerve fibres which come out from the brain and affect the extent to which the messages in the pain fibres are allowed to travel up the spinal cord into the brain. Sometimes the messages get through and sometimes they do not, and this affects the extent to which pain is actually felt.

While pain continues to be a puzzle to physiologists, it would, however, be a mistake to use this an excuse for ignoring the effect which injury often has on animals. Mild pain may be difficult to pin down, but signs of intense pain in both human and non-human animals are unmistakable (they include squealing, struggling, convulsions, etc.). Uncertainty about whether disease, injury or loss of condition do lead to 'suffering' in a few cases should not be used to dismiss this valuable source of evidence about unpleasant mental states in animals. If animals show gross disturbances of health or injuries with symptoms of pain, it is reasonable to say that they suffer. Experiments or other tests conducted with animals which involve deliberately making them ill, inducing deformities or maiming them in some way can therefore be suspected of causing suffering, unless there are good reasons (such as the fact that an animal uses a deformed limb in an apparently normal fashion) for thinking that it is not experiencing anything unpleasant.

Sometimes the capture and transport of farm animals causes weight loss, injury and physiological deterioration so severe as to lead to death. In such circumstances the case that the animals suffered during the journey becomes very difficult to refute. In fact, the main difficulty with the physical ill-health criterion of suffering lies not so much with the (somewhat remote) possibility that animals may not suffer despite being injured or diseased as with the opposite possibility: that they may appear to be physically healthy and still be undergoing intensely unpleasant mental experiences, perhaps arising from being constantly confined in a small cage. It is this possibility - that not all mental suffering may show itself in gross and obvious disturbance of physical health - that has led people to look for other ways of trying to decide when an animal is suffering.

Physiological Signs

One of the most important of these methods, which has been gaining ground recently because of advances in the technology now available to it, involves monitoring the physiological processes going on inside an animal's body. As already mentioned, some of the things which are done to animals, such as transporting cattle in certain sorts of trucks, do have such traumatic effects that injury and even death may result. But even before such gross signs of suffering set in, it may be possible to detect physiological changes within the animal – changes in hormone level, for example, or in the ammonia content of muscles. Changes take place within the animal even when, on the surface, all still appears to be well. Changes in brain activity, heart rate and body temperature can also be picked up.

'Stress' is the name given to the whole group of physiological changes (which may also include activation of the sympathetic nervous system and enlargement of the adrenal glands) that take place whenever animals are subjected to a wide range of conditions and situations, such as

over-crowding, repeated attacks by a member of their own species and so on. One way of viewing these physiological symptoms of stress is as part of an animal's normal and perfectly adaptive way of responding to conditions which are likely, if they persist, to lead to actual physical damage or death. Thus the heart rates goes up in preparation for an animal's escape from danger, when it will need more oxygen for its muscles in order to do this effectively. The change in heart rate suggested that the animal has recognized possible danger in the form, say, of potential injury caused by the attack of a predator. This leads to a serious difficulty in the interpretation of physiological measurements of stress. It may be perfectly possible to pick up a change in the level of a particular hormone or in heart rate, but what exactly do these changes mean for the animal? There is no justification for concluding that it 'suffers' every time there is a bit more hormone in its blood or its heart rate goes up slightly. On the contrary, these signs may simply indicate that the animal is coping with its environment in an adaptive way. Changes in brain activity may signify nothing more than that the animal is exploring a new object in its environment. We would certainly not want to describe an alert and inquiring animal as 'suffering'. On the other hand, when physiological disturbances become severe (when the adrenal glands are very enlarged, for instance) then they become the precursors of overt disease, and we probably would want to say the animal was suffering.

The problem is to know at precisely what stage physiological changes in the animal stop being part of its usual adaptive response to its environment and start indicating a prolonged or intensely unpleasant state of suffering. The problem lies not so much in detecting the changes as in their interpretation and in relating them to possible mental state. At the moment this remains a major drawback. Physiological measures, although a valuable indication of what is going on beneath the animal's skin, do not tell us everything we want to know about mental states.

Behaviour

A third, and very important, source of information about suffering in animals is their behaviour. Behaviour has the great advantage that it can be studied without interfering with the animal in any way. (Even with today's technology, making physiological measurements may itself impose some sort of hardship on the animal.) Many animals display particular signs which can, with care, be used to infer something about their mental states. Charles Darwin recognized this when he entitled his book about animal communication *The Expression of the Emotions in Man and Animals*. The problem, of course, is to crack the code and to work out which behaviour an animal uses to signal which emotional state.

Various different approaches have been tried. The most direct involves putting an animal in a situation in which it is thought to 'suffer' (usually mildly) and then observing its behaviour. For instance, if we wanted to know how a pig behaved when it was 'suffering from fear' or 'suffering from frustration', we might deliberately expose it briefly to one of its predators (to frighten it) or give it a dish of food covered with glass (to frustrate it). Its behaviour in these circumstances would give some indication of what it does when it is afraid or frustrated. We could then go on to an intensive pig farm and watch the pigs there to see if they showed similar behaviour. If they did, this would give us some grounds for inferring that they too were afraid or frustrated.

This method does have rather severe limitations, however. For one thing, the way a pig expresses frustration at not being able to get at food covered with glass may be quite different from the way it expresses frustration at not having any nest material, so we may simply miss out evidence of frustration through being unfamiliar with its various forms of expression. More seriously, even if we had correctly identified the way in which a pig expressed 'frustration' or 'fear', we would still be left with the same problem of calibration that we encountered with other methods such as the measurement of physiological variables. We would still not know, in

other words, *how much* behaviour associated with fear or frustration has to be shown before we are justified in saying that the animal is 'suffering'. A fox temporarily caught in a thicket or unable to get into a henhouse may show agitated movements which are evidence of mild frustration, but we would hardly want to say that it is 'suffering'. But the same animal, confined for long periods of time in a small, bare cage from which there is no way out and performing the same backwards-and-forwards movements over and over again, might justifiably be described as suffering. Somewhere we want to draw the line, but it is difficult, without some further evidence, to know where.

What this method fails to do - indeed, what all the methods we have described so far fail to do - is to come to grips with the really essential issue of what we mean by suffering, to give an indication of how much what is being done to the animal really matters to the animal itself. We may see injury, measure physiological changes or watch behaviour, but what we really want to know is whether the animal is subjectively experiencing a state sufficiently unpleasant to it to deserve the emotive label 'suffering'. Does its injury cause pain? We need, in other words, the animal's opinion of what is being done to it - not just whether it finds it pleasant or unpleasant but *how* unpleasant.

'Asking' the Animals

At first sight it may seem quite impossible even to think of trying to obtain any sensible, scientifically based evidence on this point. We cannot ask animals to tell us in so many words what it feels like to be inside their skins. But even with other human beings words are not always our most powerful source of information. We say things like, 'Actions speak louder than words' or 'He put his money where his mouth is.' The word 'mouthing' actually carries an implicit suspicion of 'mere words'. We are, in fact, particularly impressed by someone who does not just say that he dislikes or disapproves of something but shows it by taking some action and 'voting with his feet'. For all our human reliance on words and the complexity of our languages, we are often more impressed by what other human beings do than by what they say. And the things that impress us most about what they do - making choices between difficult alternatives, moving from one place to another, foregoing a desirable commodity for a later, larger reward - are things that many non-human animals do too.

Other animals besides humans can make choices and express their preferences by moving away from or towards one environment or another. They can be taught to operate a mechanism which in some way changes their environment for better or worse. A rat that repeatedly presses a lever to get food or to gain access to a female is certainly 'telling' us something about the desirability, for him, of these things. The rat which crosses an electric grid to get at a female is telling us even more. A. P. Silverman, in an article published in *Animal Behaviour* in 1978, describes an experiment in which rats and hamsters were certainly making their views plain enough. These animals were being used in an experiment to study the effects of cigarette smoke. They were kept in glass cylinders into which a steady stream of smoke was delivered down a small tube. Many of the animals quickly learned to use their own faeces to bung up the tubes and block the smoke stream. It was not completely clear whether it was the smoke itself or the draught of air that they objected to, but it was quite clear that they disliked what was being done to them. Words here would simply have been superfluous.

This 'asking without words' approach has now been used in a wide variety of situations. It is a direct way of finding out, from the animal's point of view, what it finds pleasant or unpleasant. Choice tests, in which animals are offered two or more alternatives, enable them to 'vote with their feet'. For example, as I have described in an article that appeared in *Animal Behaviour* in 1977, chickens which have been kept in battery cages have shown clearly that they prefer an outside run rather than a cage. These two very different environments were presented to hens at the opposite ends of a corridor from the centre of which they could see both simultaneously.

They were then free to walk into either one. Most of the hens chose to go into the outside run, not the battery cage, the first time they were given the choice. A few of the hens chose the battery cage at first, probably because that was what they were used to - the run was such a novel experience for them that they did not seem to know what it was. But all they needed was a few minutes' experience of the run, and by the second or third time they were faced with the choice, they too chose the run. This seems to be a fairly objective way of saying that the hens liked the experience of being outside in a run more than they liked being in a battery cage.

While this result is perhaps not particularly unexpected, animals' own preferences do sometimes produce surprises. The Brambell Committee, which produced an important report on intensive farming in the UK in 1965, recommended that fine hexagonal wire should not be used for the floors of battery cages on the grounds that it was thought (by well-meaning humans) to be uncomfortable for the hens' feet. When allowed to choose between different floor types, however, the hens actually preferred the fine mesh to the coarser one which had been recommended by the Committee, as B. O. Hughes and A. J. Black reported in *British Poultry Science* in 1973. Other animals that have been 'asked' their opinion of their surroundings are laboratory mice and rats, which have shown preferences for certain sorts of nest box and cage size; and in 1967 B. A. Baldwin and D. L. Ingram published an article in *Physiology and Behaviour* on pigs which indicated preferences for heat levels and lighting regimes by being provided with switches which they could operate with their snouts to regulate heat and light. Sometimes animals' preferences result in an actual saving for the farmer. In *Farm Animal Housing and Welfare*, edited by S. and M. Baxter and J. MacCormack, Stan Curtis reported a study on a group of young pigs which actually turned their heating down at night, below the level that humans thought should be maintained all the time, which resulted in a considerable saving in fuel. Such a happy coincidence between what animals like and what is best for commercial profit does not, however, always occur.

In any case, just because an animal prefers one set of conditions to another does not necessarily mean that it suffers if kept in the less preferred ones. In order to establish the link - that is, to make the connection between preference (or lack of it) and suffering - it is necessary to find out how strong the animal's aversion to the less attractive situation is, or how powerfully it is attracted to preferred conditions. If a male rat will cross a live electric grid to get a female or a hen goes without food in order to obtain somewhere to dustbathe, they are demonstrating that these things are not just 'liked' but are very important to them indeed. Many people would agree that animals suffer if kept without food or if given electric shocks. If the animals tell us that other things are as important as or more important to them than food or the avoidance of shock, then we might want to say that they suffer if deprived of these other things as well.

We have, therefore, to get animals to put a 'price' on their preferences. Now, it is obviously something of a problem to decide how to ask animals how they rate one commodity, such as food, against something that may be quite different, such as the opportunity to dustbathe, wallow in mud or fight a rival. But the problem is not insuperable, and one of the easiest ways to determine this is through what psychologists call 'operant conditioning', which simply means giving an animal the chance to learn that by pressing a lever, say, it gets something it likes, such as a piece of food (a reward), or can avoid something it doesn't like (a punishment). Depending on the animal, what it has to do can vary. Birds often find it easier to peck a disc rather than operate a lever, which a rat would do readily, and fish, of course, would have difficulties with either and would have to be given, say, a hoop to swim through. Once the animal has learned to do whatever has been devised for it, the experimenter can then begin to put up the 'price' by making the animal peck the key or press the lever not just once but many times before it gets anything at all. In the Netherlands J. van Rooijen reports, in an article published in *Applied Animal Ethology* in 1983, that he has used this method to measure the strength of the preference of pigs for earth floors by forcing them to make a larger number of

responses in order to be allowed access to the earth.

When food is being used as the reward, animals usually appear to be prepared to work harder and harder for the same reward, indicating, not surprisingly, that food is very important to them. Other commodities, however, seem to be less important. Male Siamese fighting fish can readily be trained to do things for the reward of being able to see and display at a rival fish of the same species. But if the number of responses the fish has to make for each opportunity to display at a rival is increased, the fish do not work any harder and so obtain a smaller number of views of their rival, according to J. A. Hogan, S. Kleist and C. S. L. Hutchings, whose findings were published in *the Journal of Comparative and Physiological Psychology* in 1970. A similar result has been reported for cocks pecking at keys for food and for the sight of another cock. When the number of pecks required for each presentation (bit of food or sight of a rival) went up, the birds would work much harder for food than to see their rival. Access to a rival seemed in both these examples to be less important to the animals than food.

An Objective Measure of Suffering

There are, then, ways of obtaining measures of how much an animal prefers or dislikes something. Here is the key to discovering the circumstances in which an animal finds things so unpleasant that we want to say that it is suffering. If it will work hard to obtain or to escape from something — as hard as or harder than it will work to obtain food which most people would agree is an essential to health and welfare — then we can begin to compile a list of situations which cause suffering and, indeed, can arrive at a tentative further definition of suffering itself: animals suffer if kept in conditions in which they are without something that they will work hard to obtain, given the opportunity, or in conditions that they will work hard to get away from, also given the opportunity. 'Working hard' can be given precise meaning, as explained earlier, by putting up the 'price' of a commodity and seeing how much it is worth to the animal. We have then the animal's view of its environment.

Of course, we have to make one important assumption: that if animals are prepared to work hard in this way, they do experience a mental state which is 'pleasant' if something is rewarding and 'unpleasant' if they are trying to avoid that something. We have, in other words, to make a leap from inside our own skins to the inside of theirs. But this leap is a very bare minimum. It does not assume that other animals find the *same* things pleasant or unpleasant as we do, only that working to obtain or working to avoid something is an indication of the presence of these mental states and that working hard is an indication that they are very pleasant or very unpleasant. Exactly what other animals find very pleasant or very unpleasant is left to experimental tests. In other words, the leap that we have to make from our skins to theirs takes into account the possibility that their suffering or their pleasure may be brought about by events quite different from those that cause them in us. We are not imagining ourselves shut up in a battery cage or dressed up in a bat suit when we try to find out what it is like to be a hen or a bat; we are trying to find out what it is like to *be* them. There is a lot of difference between the two. In the first case we would see animals as just like us, only with fur or feathers. In the second case we acknowledge that their view of the world may be very different from our own, that their requirements and what makes them comfortable or uncomfortable may be nothing like what we ourselves would require. We then have to get down to the business of finding out what their view of the world really is. Operant conditioning may be the key, the window on to their world, but it takes quite a lot of effort to get all the answers we need.

Even then we are not completely home and dry. Preference tests and operant conditioning, though immensely valuable tools, do not provide all the answers. A dog might show very strongly, if 'asked' in this way, that he would rather not go to the vet. One could make out a strong case for saying that he 'suffers' if forced to do so. Cattle, given a free choice, do not

always eat what is good for them and may even poison themselves. It would therefore be a mistake to use these methods in isolation from other measures of suffering. A synthetic approach (one, that is, that takes into account all the measures that we have discussed) is probably the safest bet in the long run. Since each of these measures has something to be said against it, some limits to its usefulness, the safest approach is therefore to make as many different sorts of measurement as we can and then to put them together to see what sort of conglomerate picture we get. For example, suppose some hypothetical animals were kept in small cages, in conditions that were very different from those of their wild ancestors. Suppose people had expressed considerable worry that they were suffering. How might we go about evaluating this claim?

We might look first at the physical health of the animals. If we found them to be very healthy, with bright eyes and sleek, glossy coats and no signs of injury or parasites, we might then want to proceed to other measures. If we noticed that the animal showed a number of unusual behaviour patterns not shown by freer animals of the same species, the next step would be to investigate what caused them to behave in this way. In the first case it might be that the unusual behaviour was solely the result of the animals showing positive reactions to their keepers. We might also find that the animals appeared to 'like' their cages and that they would choose them in preference to other conditions which well-meaning humans thought they would prefer. In such circumstances our verdict might be that although the animals were kept in highly unnatural conditions, they did not, on any criteria, appear to be suffering as a result. On the other hand, the conclusions might be very different even for physically healthy animals. If the animals showed evidence of a high degree of frustration, prolonged over much of their lives, with evidence of a build-up of physiological symptoms that were known to be precursors of disease, we might begin to think they were suffering. If, in addition, they showed every sign of trying to escape from their cages, and indeed did so when given the opportunity, our evidence on this point would become even stronger.

The point of these hypothetical examples is to show how, given different sorts of evidence, different conclusions can be reached about whether or not animals are suffering. We have still not observed their mental states directly. Nor have we escaped altogether from some use of analogy with our own feelings to tell us what a member of another species might be experiencing. In the last analysis, we have to rely on analogy with ourselves to decide that any other being (including another human) experiences anything at all, since our own skin is the only one we have any direct experience of being inside. But analogy with ourselves that relies on seeing animals as just like human beings with fur or feathers is quite different and much more prone to error than analogy which makes full use of our biological knowledge of the animal concerned - the conditions in which it is healthy, what it chooses, its behaviour and its physiology. This second kind of analogy, the piece-by-piece construction of a picture (What does the animal like? What makes it healthy? What are its signs of fear or frustration?), is hard work to construct, as it needs a lot of basic research on each kind of animal with which we might come into contact. But it is the only kind of analogy which, in the end, will give us any real hope of being able to unlock other species from their skins and of beginning to see the world through not just our eyes but theirs as well.