

# Chapter

# 3

Ethical issues raised  
by animal research





# Ethical issues raised by animal research

## Introduction

- 3.1 As we have said, the debate about research involving animals ranges broadly over two distinct questions. The first asks whether animal research yields useful knowledge that could not be gained from other sources. The second concerns whether it is morally acceptable for humans to use animals in ways that can cause them harm. These two questions are clearly related: if it were the case that we learn nothing useful and distinctive from research that may harm animals, it would be difficult to see how, on any reasonable view, it could be morally justified. The question of scientific justification is therefore fundamental to the question of moral justification and we explore it in detail in Chapters 5–10.
- 3.2 However, a positive answer to the scientific question does not settle the moral question, for it may be the case that an experiment that yields useful and relevant information is not ethically acceptable. We need therefore to consider from first principles the arguments in support of, and against, research involving animals. For the purpose of our discussion, we take the principal ethical questions to be the following:
- Provided there are substantial benefits associated with animal research, why should the use of animals require special justification?
  - Can any use of animals by humans be justified? Which specific issues need to be considered in the case of research?
  - What role does the unavailability of alternatives play in the justification of research involving animals?
  - How does the justification of such research relate to the justification of other uses, such as food production?
  - What is the appropriate role of regulation for research involving animals?
- 3.3 For each of these questions, we consider commonly encountered arguments to bring clarity to the debate; to identify agreement where it exists; and to understand what lies behind remaining disagreement. We hope that this approach will be useful in enabling readers to make informed judgements about whether or not specific types of research, as described in Chapters 5–9, can be justified. We would also like to encourage them to reflect upon the assumptions behind their own positions and those of others.

### ***Facts, values and the reflective equilibrium***

- 3.4 Historically, a number of apparently rigid and irreconcilable implicit and explicit ethical positions on animal research have arisen. Often, holders of these views think that their ethical judgement is irrefutably right, while that of others is simply wrong. Consequently, they consider truths about animal research to be self-evident, and suspect those who do not share these views of some sort of ‘moral astigmatism’ or intentional malevolence.
- 3.5 This state of affairs raises complex philosophical issues that are usually debated under the title of *moral epistemology*. The term refers to the study of, among other things, whether and how we can come to know moral truths; what we mean when we make moral judgements; and under what conditions we can change the moral judgements of others.<sup>1</sup> Although this Report is not suited to a detailed exploration of the many subtleties that

<sup>1</sup> See Campbell R (2003) *Stanford Encyclopaedia of Philosophy: Moral epistemology*, available at: <http://plato.stanford.edu/entries/moral-epistemology>. Accessed on: 11 Apr 2005.

characterise this subject, we think it important to draw attention to two fundamental issues relevant to our discussion.

3.6 First, the relationship between facts and values is not straightforward. A reasonable discussion between people of differing opinions requires clarity about whether the exact area of disagreement concerns:

- *knowledge of facts* (disagreement about whether or not a particular animal suffers from being used in a particular kind of research, or about the actual conditions of the research environment);
- the *interpretation of values associated with facts* (agreement that animals involved in a particular experiment experience pain, but disagreement about whether or not causing this pain is morally wrong); and
- *the way that values are derived from facts* (disagreement about whether or not animals are capable of being members of the 'moral community', and if they are, how we might know, see Box 3.1).

3.7 Secondly, even if the source of disagreement is identified, the question arises of what to do if one's own moral judgement is in conflict with new facts, evidence or arguments presented by others. On one view, such disagreement is unavoidable and, in principle, irreconcilable. Since facts are usually interpreted differently within frameworks of different ethical theories or belief systems, it is not surprising that proponents with different viewpoints will differ in their judgements. However, this is only true if ethical frameworks are construed as being unchangeable in principle. On a different view, new circumstances may enjoin us to test and, where necessary, revise our frameworks. This can apply to both proponents of particular ethical theories, as well as to people who have not considered ethical issues raised by animal research in a systematic way, but who nevertheless hold strong views. These processes of revision are sometimes described as striving to achieve a 'reflective equilibrium' which consists:

'... in working back and forth among our considered judgments (some say our 'intuitions') about particular instances or cases [the relationship to judgments about similar cases], the principles or rules that we believe govern them, and the theoretical considerations that we believe bear on accepting these considered judgments, principles, or rules, revising any of these elements wherever necessary in order to achieve an acceptable coherence among them. The method succeeds and we achieve reflective equilibrium when we arrive at an acceptable coherence among these beliefs. An acceptable coherence requires that our beliefs not only be consistent with each other (a weak requirement), but that some of these beliefs provide support or provide a best explanation for others.'<sup>2</sup>

Thus, consideration of the many ways in which animals are used in research may require us not only to simply apply our system of beliefs to this specific matter but, in doing so, to accept the possibility that some parts of our belief system may require revision. Openness towards such a process would lead to more refined ethical theories and belief systems and it could also help identify possible policy reforms to generate practices that are acceptable to those holding a range of moral views.<sup>3</sup>

3.8 In this chapter, we generally do not take a view as to whether or not, and if so on what basis, particular arguments in favour or against the use of animals in research are justified. Rather, we comment on possible weaknesses of specific arguments and return to a more detailed outline of specific positions in Chapters 14 and 15.

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<sup>2</sup> Daniels N (2003) *Stanford Encyclopedia of Philosophy: Reflective equilibrium*, available at: <http://plato.stanford.edu/entries/reflective-equilibrium/#1>. Accessed on: 11 Apr 2005.

<sup>3</sup> See also Thagard P (2000) *Coherence in Thought and Action* (MIT-Press).

### Provided there are substantial benefits associated with animal research, why should the use of animals require special justification?

3.9 The primary reason given for using animals in research is to ensure scientific progress in basic and applied biological and medical science. Few people would deny that science is an important and powerful way of understanding the natural world. Methodical observations of evidence produced in carefully designed experiments have helped us to understand, for example, a great number of physical and chemical principles that govern biological processes. Many scientists argue that research involving animals is crucial in continuing progress.<sup>4</sup> As several respondents to the Consultation observed:

'If it is accepted, as it should be, that prevention of human suffering is a moral obligation, then the use of animals is unavoidable.'

*Dr Chris Jackson*

'Man has the duty to treat sick people as well as save lives of people and animals. In order to do so, he must improve his knowledge of biology, and human and veterinary medicine. That is why man carries out animal research where there are no other appropriate investigational methods.'

*ABPI*

'We do not feel it is ethical to subject humans...to these risks [the prolongation of disease or risk in toxicity testing] when there is a means to reduce them.'

*Genetic Interest Group*

3.10 On the basis of these views it might appear that animal research requires no further justification. But, there are also people who assert that the use for harmful purposes of one species by another, without consent, is fundamentally unethical, regardless of any possible benefits, and that all forms of animal research must therefore be abandoned.<sup>5</sup> Instead, they argue that more effort should be made to find alternative ways of obtaining the required information, for example by undertaking research on human volunteers or on human tissue. Those who disagree assert that there are many significant research questions which can only be answered by using animals and that they are only used when absolutely necessary. They also question whether an abandonment of animal research, and the implied consequences, would be acceptable to all members of society. This situation leads us to two more specific questions. First, how important is the alleviation of human and animal suffering, in view of the fact that it may cause pain, suffering and distress to animals involved in research? Secondly, why should the use of animals in research be acceptable in cases in which it would be unacceptable to use humans? We address these questions next.

#### ***Is there an obligation to alleviate suffering?***

3.11 At the most fundamental level we can question why, in principle, there should be a moral obligation to undertake research to alleviate suffering in either animals or humans. Based on a particular view about the status of responsibilities that arise from things we do as opposed to things we do not do (i.e. 'acts versus omissions'), we could assert that there is no such duty. The argument would be that the strongest moral requirements are *negative*, relating to things which we should *not* do (omissions). Weaker *positive* moral requirements concern obligations in relation to things which we *should* do (acts). So, for example, we could argue that there is a strong obligation not to harm any child, but a far weaker one, possibly even

<sup>4</sup> RDS *Welcome to RDS Online*, available at: <http://www.rds-online.org.uk>. Accessed on: 13 Apr 2005; see also Chapter 1, footnote 5.

<sup>5</sup> BUAV *BUAV Today*, available at: <http://www.buav.org/aboutus/index.html>. Accessed on: 13 Apr 2005.

none, to give personal support to every child. If we apply this argument to the case of medical research undertaken to alleviate human suffering, we could infer that there is a strong obligation not to cause suffering, but a weaker one to alleviate it.

- 3.12 We agree that there is a plausible argument for morally relevant differences between specific kinds of action. While there may often be less forceful reasons for requiring acts in comparison to omissions, it does not, however, follow from this that there is *no* moral obligation to pursue research to alleviate suffering. First, the obligation may merely be less strong. Secondly, it could reasonably be argued that there exists a *prima facie* ethical duty to help alleviate suffering through acts, provided research efforts are in proportion to the extent of suffering to be alleviated. It remains unresolved at this stage as to whether such an obligation automatically sanctions the use of animals. The obligation relates primarily to the principle of alleviation of suffering, rather than to a prescription of specific ways in which suffering is to be relieved. In principle, the obligation might also be fulfilled by research that does not involve the use of animals, provided alternative methods are available.

***Is all research aimed at developing treatment for severe suffering that can only be alleviated through medicines?***

- 3.13 In the UK, approximately one third of all research involving animals is undertaken by the pharmaceutical industry to develop new treatments for a wide range of human diseases (see Chapter 8). Many would argue that, wherever the use of animals is scientifically unavoidable, it is ethically acceptable to use them. Some people may think that animal research is only undertaken to develop new medicines for serious diseases such as cancer or HIV/AIDS. While this is correct in several instances, consideration must also be given to the fact that pharmaceutical companies operate in a highly competitive sector. The need to generate profits may not always lead to the development of interventions that are most needed or reduce the greatest suffering, but may instead encourage the manufacture of those interventions that promise the highest returns. It has been suggested that animals are sometimes used in research where patient need is not clearly defined, for example, in the development of medicines that are thought to differ only marginally from existing products.<sup>6</sup> It is therefore important to ask whether products that are developed always justify the use of animals. One respondent to the Consultation also questioned whether the use of animals in pharmaceutical research was justified in view of the fact that:

‘Many of the known human ailments are caused via humans not leading healthy lifestyles...’  
*Francis H Giles*

- 3.14 The argument that the suffering induced by animal experimentation is always outweighed by the fact that the burden of human disease is reduced by new pharmaceutical interventions can therefore lead to over-simplifications. Human health is affected by a spectrum of different kinds of disease and consequent suffering. The justification of animal research is more difficult when the disease in question could be avoided by appropriate human behaviour. It may be more straightforward where diseases emerge spontaneously and are independent of human behaviour. Thus, generalisations about the necessity of using animals are often unhelpful. In some cases animal suffering is weighed directly against human suffering; in other cases the reluctance of patients to achieve health improvements by changing their behaviour needs to be considered, as well as the pressures on

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<sup>6</sup> However, others claim that incremental improvements in the safety, efficacy, selectivity and utility of medicines are highly beneficial for patients and consumers. See Wertheimer A, Levy R and O'Connor TW (2001) Too many drugs? The clinical and economic value of incremental innovations *Investing in Health: The Social and Economic Benefits of Health Care Innovation* 14: 77–118, Executive Summary available at: [http://www.npcnow.org/resources/PDFs/executivesummary\\_toomanydrugs.pdf](http://www.npcnow.org/resources/PDFs/executivesummary_toomanydrugs.pdf)

<sup>7</sup> Specific issues raised by the fact that not all research has immediate applications are considered in paragraph 3.53.

pharmaceutical companies to maximise commercial revenue.<sup>7</sup> Lastly, as we observed above, pharmaceutical research accounts for approximately one third of animals used. Research is also undertaken in the context of basic research (30%, see Chapter 5) and toxicity testing (16%, see Chapter 9), which require different kinds of justification (paragraph 3.53).

***'Engaging in research is a part of human nature'***

- 3.15 We need to consider one further argument that is relevant to our exploration of the need for the justification of animal research. Some people assert that it is an essential trait of humans to strive for knowledge through methodological enquiry. Hence, independent of the value of the results of research, it could be argued that research activity itself holds significant intrinsic value. For those who hold this view, undertaking research, including that involving animals, can be equated with the value of foraging for apes and nest-building for birds. They might therefore argue that it would be wrong to expect humans to cease undertaking animal research, because it is part of their natural behaviour.
- 3.16 Arguments based on 'naturalness' have considerable currency in the debate about animal research. However, there is disagreement about the usefulness of notions of naturalness (paragraphs 3.24–3.26). It is also questionable whether the alleged natural drive for humans to undertake research and advance knowledge would be irredeemably frustrated if they refrained from using animals. One respondent to the Consultation observed that 'necessity is the mother of invention', and hence it could be argued that if there was a political will not to use animals, human creativity might produce other solutions to achieve the same research goals.
- 3.17 It would appear that arguments about the loss of opportunities in both scientific research and gaining knowledge would only be forceful where, for compelling logical, ethical or pragmatic reasons, there was no possibility to obtain specific information using non-animal methods (see paragraphs 3.63–3.66). For example, it could be contended that it would be neither pragmatically feasible nor ethically permissible to produce inbred strains of humans for genetic knock-out studies (see paragraph 5.20). However, in an ethical discussion we might ask what exactly are the reasons that appear to make it ethically permissible to use mice, but ethically wrong to use humans, for genetic knock-out studies. We therefore now turn to the second question introduced in paragraph 3.10.

***Why should the use of animals in research be acceptable in cases where it would be unacceptable to use humans?***

- 3.18 Several respondents to the Consultation expressed their concerns about the view that convenience or scientific necessity are sometimes seen as sufficient reasons for using animals in research:

'I feel that any living creature should be given the same level of compassion as any other. Thus if it is unacceptable to conduct research on a human being, I feel that it is also unacceptable to conduct said research on any other living creature...'

*Gaynor Armitage*

'We believe that all living things have the same moral status.'

*Claire Hardman and Tom Schoeffler*

'a) Animals are *not* like us. But then the information gleaned from research conducted involving them would not be useful to humans, so

b) Animals are like us. Which makes it ethically wrong to involve them in research.'

*Kate White*

‘When we consider a type of cost that both humans and animals are capable of bearing, such as the experience of suffering, do they count the same? If not, what is the justification for counting animals’ interests less – and how can this be done without begging the question against the growing ranks of people involved in this area who believe that the comparable interests of humans and animals are equally important?’

*Professor David DeGrazia*

3.19 Those who accept the use of animals in research where the use of non-consenting human participants would be unacceptable could seek to develop and set forth a number of arguments supporting their case. For example, they could argue that animals are somehow morally less important than humans; that, when compared to humans, it matters less to animals to be used in research in certain ways; or that, although it would be preferable for animals to be free to live their lives, some research questions are so significant that the use of animals can be justified although this constitutes a wrong. Clearly, these options require us to consider a wide range of issues, ranging from abstract discussions about the moral status of humans and animals to more concrete comparisons of how animals are treated in other contexts. We discuss these in more detail below.

### Can any use of animals by humans be justified? Which specific issues need to be considered in the case of research?

#### *The moral status of different beings*

3.20 It is common to begin reflection on the human use of animals by considering their relative *moral status* or moral importance (see Box 3.1). Within the current debate, we can identify three general positions, as follows.

- According to the first, there is a categorical moral dividing line between humans and animals. Human beings have a moral importance that animals lack. This we can call the *clear-line view*, and it is based on the assumption that there is something special about humans or that all humans possess some morally vital property that all animals lack.
- A second view is that there is not so much a clear dividing line as a continuum or *moral sliding scale*, correlated, perhaps, with a biological sliding scale of neurological complexity. Here, it is argued that there is a hierarchy in which humans are at the top end of moral importance, followed by primates and, for example, rodents such as mice and rats, with zebrafish, fruit flies and single-celled creatures arranged towards the bottom.
- A third view is to emphasise that biological classification is not by itself sufficient to support claims about a categorical moral distinction between human and non-human animals. It could hence be asserted that humans and either all, or at least some, animals, such as those that are sentient, are *moral equals*. Accordingly it could be argued that it is wrong to subject any animal (or any animal that is sentient) to treatment that would be unacceptable in the case of humans.



**Box 3.1: Use of the terms 'moral community', 'moral importance' and 'moral status'**

The discussion of the three different moral views outlined in Box 3.2 introduces the idea that humans and animals could be described as having the same, or differing, *moral status*. This term, as well as other related important terms, requires some explanation.

For the purpose of this discussion we use the term *moral status* or *moral importance* to refer to the circumstance that a being is a member of a *moral community*. Members of a moral community include moral agents and moral subjects. *Moral agents* are beings that are able to behave in a moral way and are liable to moral criticism for any failure to do so. *Moral subjects* are beings whose features should be taken into account in the behaviour of moral agents (see paragraphs 3.31–3.32). Beings differ in their moral status if differences in their entitlement to certain liberties or goods can be justified in a morally valid way.

Moral agents are typically humans. There is some discussion as to whether animals are capable of behaving in moral ways. For example, there is evidence that some animals are capable of altruistic behaviour (see Box 3.2). However, the main discussion in this Report concerns the question of whether animals qualify as moral subjects. In this context it is useful to differentiate between *direct* and *indirect* reasons in support of such a view.

One indirect argument was proposed by Immanuel Kant. Within his philosophical theory, animals deserve the status of a moral subject and should be treated humanely not because they have a right to flourish, or to be protected from harm, but because those people who are cruel to animals are more likely to be cruel to humans\*.

Others, however, put forward direct reasons in favour of viewing animals as moral subjects. They argue that the Kantian approach merely accords *instrumental moral value* to animals: animals are moral subjects because they can be used as an *instrument* for achieving the goal of making humans behave in a more moral way. Instead, critics argue that animals should be recognised as having inherent, or *intrinsic*, moral value. This view may be understood as saying that animals are valuable in themselves, that it matters to animals for their own sake how they are treated and that therefore their specific capacities need to be considered in interactions with them. The usual interpretation is that, as far as possible, animals should be free to live their lives without interference by humans.

In general, all moral agents are also moral subjects, but not all moral subjects are moral agents. Differentiating between moral agents and moral subjects does not necessarily imply that one group is morally more important than another. For example, humans who are severely mentally disabled are usually not capable of being moral agents. But this does not mean, without further argument, that they are morally less (or more) important than those humans who are capable of being moral agents. Nonetheless, it is commonly assumed that animals, if they are seen to qualify as moral subjects, are less important than humans. We consider the reasons behind these perceptions, which are reflected in the practices of most Western societies, in paragraph 3.21 and throughout this chapter.

\* Heath P (Editor and translator) (2001) *Immanuel Kant: Lectures on Ethics* Schneewind JB (Editor) (Cambridge: Cambridge University Press).

3.21 It could easily be assumed that the justification for using animals for research (and other uses) depends entirely on the question of the relative moral status of humans and animals. Then the defence of animal use would be the same task as showing that only humans have moral status, or that their status is in some way 'higher' than that of animals. But this assumption might be too simplistic. Suppose it was possible to establish that the clear-line view is true and that all humans are more important moral subjects than all animals. Yet, this is not enough to show that animals can properly be sacrificed for human purposes. For it may be that although humans are morally more important than animals, they have a moral duty of *stewardship* to 'lesser' beings, rather than a right to treat them as they please, as implied by one respondent to the Consultation:

'The greater power of humans over other species brings with it a duty of care and compassion, not a licence to abuse.'

*Alan St. John*

Therefore, the permissibility of harmful animal research does not follow by necessity from the assumption that humans have a higher moral status than animals.

3.22 Similar arguments apply with respect to the sliding-scale view: although a hierarchy of importance of different animals seems intuitively plausible to many people, it faces the same challenge of the stewardship argument posed against the clear-line view. Despite its initial attractiveness the usefulness of the hierarchy is also called into question when one wishes to consider the acceptability of different types of research. For example, how should the following four types be ranked:

- i) research involving mice with no, or very minor welfare implications;

- ii) research involving primates with no, or minor, welfare implications;
- iii) research involving mice with substantial welfare implications; and
- iv) research involving primates with substantial welfare implications?

According to the sliding-scale view, the order of acceptability ought to be i, iii, ii, iv. However, for many people, the order i, ii, iii, iv, as presented above, would seem more plausible, suggesting that an unmodified version of this view is less attractive than initially assumed.

- 3.23 With regard to the moral-equality view, it needs to be remembered that even if humans and animals are considered to be moral equals, it does not necessarily follow that harming animals in research should not be carried out. Moral equality is simply the doctrine that humans and animals are moral equals. In principle, this view could allow for the conclusion that harmful experiments should be conducted both on animals and humans.<sup>8</sup> Alternatively, the use of animals might be justified for practical reasons. For example, the reproduction rate of humans can be too slow for some experiments, or obtaining the quantity of a test chemical to dose humans could be impossible. Under these circumstances, it might be more appropriate to experiment on mice and rabbits, even if they are perceived as moral equals. Finally, it could be argued that where research has a negative effect on welfare and animals are less affected than humans, it is preferable to use animals to minimise the overall harm.
- 3.24 In conclusion, consideration of the relative moral status does not settle the question of the permissibility of animal research, or of any other use of animals, in a helpful manner. Although it is attractive to think that the question of justification is merely a matter of deciding whether the clear-line view, the sliding-scale view or the moral-equality view is the most adequate, this strategy may obscure more than it illuminates. Some people agree with this conclusion and refer instead to evolutionary theory as a justification of a relatively unrestricted right to use animals. Drawing on what can be termed *the competitive argument*, they may point out that different species must always compete for survival and that it is natural for any species to put itself first.
- 3.25 This argument is not compelling. The fact that humans have survived by dominating other species does not in itself show that we are morally justified in continuing to act in the same way. Humans have evolved a capacity to reflect upon their own behaviour. Much of this reflection has taken place by means of civilisation and especially education, which have channelled and changed 'natural' behaviour. Attitudes towards many forms of behaviour that were once justified as natural, as, for example, the dominance of men over women, or even the keeping of slaves, have changed substantially in a great number of societies (see also Box 3.4). Moreover, as we have said, if humans do indeed have a higher nature, this could entail duties of protection and stewardship for lesser beings, rather than the right of dominion (see paragraph 3.21).
- 3.26 Hence, it is clear that the competitive argument, which is based on the evolutionary order or the naturalness of certain behaviours, is unpersuasive in justifying ethically why it should be permissible for humans to use animals for research. It is crucial to distinguish between moral and scientific questions. Although, in particular cases, science may support particular moral conclusions, it can never be sufficient in itself to settle a moral question. Any argument for a moral conclusion needs to be based on moral premises or assumptions, although it may also draw on facts, including scientific ones. Understanding the relationship between the moral and the scientific questions is vital to achieving clarity in this discussion (see paragraph 3.6).

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<sup>8</sup> Of course, humans *do* participate in medical research (see paragraphs 8.25–8.28 and box 11.1) but generally it is not harmful and takes place with prior, voluntarily given consent.

***The relationship between moral status and morally relevant features***

3.27 Given that neither discussion about the moral status of animals and humans nor reference to the facts of evolution appears to provide a straightforward answer to the question of the permissibility of animal research, it may seem unclear how the debate could be advanced. In the following paragraphs, we suggest that a promising approach may be to ask what *features* of humans and animals could qualify them as a moral subjects (see Box 3.1), thus imposing constraints or limits on how they may be treated. We do not start from the assumption that there is one ‘master property’ or overriding criterion which determines how beings may be treated. Similarly, for the purpose of this discussion, we do not assume that there are some species that should never be used for any purpose, nor that the acceptability of using species depends on how closely related they are to humans in evolutionary terms. Rather, we explore the possibility that there are five features, at least one or all of which may be applicable to specific animals, albeit to differing degrees, and with subtly distinct moral consequences:

- sentience;
- higher cognitive capacities;
- the capacity to flourish;
- sociability; and
- the possession of a life.

We then turn to the second, and perhaps more difficult step, which concerns the question of deciding how such characteristics should be taken into account in moral decision making (paragraphs 3.51-3.57).

**Sentience**

3.28 An emphasis on sentience is most commonly associated with the utilitarian philosophy of Jeremy Bentham (see Box 3.3). Sentience, for Bentham, was usually understood as the capacity to feel pleasure and pain. Although the ascription of such states is not always straightforward (see paragraph 4.2), it is now uncontested that many animals are capable of feeling pain. Equally, it is uncontested that to cause pain is morally problematic and so needs to be taken into account in moral reasoning. This is the case whether the pain is suffered by a human or by any other sentient being.

3.29 However, some argue that the human experience of pain is in some relevant sense different from that of animals. It may be more intense because of a greater facility of humans to anticipate pain, or because of the disruption to social relationships that humans can suffer, for example if one member of a family suffers chronic pain. This is sometimes seen to lead to the conclusion that it might be more justifiable to use animals rather than non-consenting humans in harmful research. An alternative argument might be that humans are far more able than animals to cope with pain and suffering, especially when they understand the underlying reasons or purposes. This could suggest that beings with less-developed rational capacities are not necessarily suffering less, but more, since they are not in a position to conceptualise pain or suffering as means to ends (see also paragraph 4.17).

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<sup>9</sup> See also Ryder R (2001) *Painism: A modern reality* (London: Open Gate Press).

### Higher cognitive capacities

- 3.30 Besides the ability to feel pain, many animals are also capable of higher cognitive capacities. Some of these appear to have great moral relevance in addition to any possible intensification of pain to which they might lead. They include: knowledge of good and evil (associated with Plato), possession of self-consciousness (Rene Descartes), possession of freedom (Jean Jacques Rousseau) and possession of a rational will, in the sense of being able to act according to self-set rules to achieve certain ends, including acting in a moral manner (Kant).
- 3.31 As we have said, there is a need to distinguish between a *moral agent* and a *moral subject* (see Box 3.1). Some higher cognitive capacities are clearly relevant to *moral agency*, since only a being capable of some of them, such as knowledge of right and wrong, may be a moral agent, subject to moral praise or criticism for its actions. The capacity for moral agency is also relevant with regard to the circumstances under which such beings can be wronged. For example, involving a moral agent who is capable of giving consent to potentially harmful research against his or her will is commonly regarded as violating a fundamental ethical principle.<sup>10</sup> A *moral subject* may lack the capacity for full moral agency, but may have other ways of expressing dissent or consent to certain treatments, for example by seeking to flee (paragraph 3.34).
- 3.32 Higher cognitive capacities, such as the use of language or the ability to act according to plans, can be understood as signs of intelligence. Some would say that these attributes are exclusive to humans. The discussion about whether or not animals possess such characteristics is controversial, not least because it is often closely linked to the question of whether or not an animal qualifies as a moral subject, or even as a moral agent. Some philosophers claim that, independently of any empirical research, it is self-evident that no animals other than humans have morally relevant cognitive capacities.<sup>11</sup> However, research combining philosophical and biological expertise has significantly increased knowledge about the cognitive capacities of the great apes, and other animals including dogs, rodents, birds and fish (see Box 3.2).
- 3.33 Some animals are able to learn complicated tasks, such as making and using tools. There is also evidence that they engage in non-trivial forms of communication and are able to coordinate social behaviour.<sup>12</sup> In animals such as monkeys, chimpanzees and bats, the rules of social interactions have been explored in more detail and have been described as primitive moral systems (see also Box 3.2).<sup>13</sup> Many of these characteristics had previously been thought to apply exclusively to humans, and they were often referred to in support of claims for special moral treatment for humans. Thus, somewhat ironically, some kinds of animal research have undermined claims of the uniqueness of humans and have instead demonstrated that humans and animals share certain morally relevant properties and capacities.

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<sup>10</sup> The ethical consensus is reflected in important international guidance on medical research, such as the World Medical Association's *Declaration of Helsinki*, which developed the principles established in the *Nuremberg Code*.

<sup>11</sup> See references to Caruthers, Allen C (2004) *Animal Consciousness* (Stanford Encyclopedia of Philosophy), available at: <http://plato.stanford.edu/entries/consciousness-animal/>. Accessed on: 18 Apr 2005.

<sup>12</sup> Riede T, Bronson E, Hatzikirou H and Klaus Zuberbühler (2005) Vocal production mechanisms in a non-human primate: morphological data and a model *J Hum Evol* **48**: 85–96.

<sup>13</sup> See Patterson F and Gordon W (1993) The case for the personhood of gorillas, in *The Great Ape Project: Equality beyond humanity*, Cavalieri P and Singer P (Editors) (London: Fourth Estate), pp58–9. However, there is also some scepticism about such claims, see for example Wynne CDL (2004) *Do animals think?* (Princeton and Oxford: Princeton University Press).

**Box 3.2: Cognitive capacities of animals****Communication**

Chimpanzees communicate through vocal sounds, facial expressions, postures and touch. They have an elaborate hierarchical social structure and use a complex communication system. For example, they alert other chimpanzees to the whereabouts of food sources with grunts and barks.\*

**Tool use**

Tufted capuchin monkeys have been observed in the wild using stones to dig in the ground to forage for food and to crack seeds.† In captivity they have been observed carrying probing tools to a fixed apparatus baited with syrup in order to obtain the syrup.‡ Great apes are competent tool users in the wild as well as in captivity. For example, captive chimpanzee mothers have been observed showing their infants how to selectively use tools for tasks such as obtaining honey from a container.§ Other monkeys have been observed washing food, such as potatoes, in the sea, in order to make them more palatable.\*\*

**Intelligence**

Dogs have been shown to know the names of many objects by retrieving them as instructed. For example, a border collie called Rico was shown to be able to associate words with over 200 different items and make hypotheses about the meanings of words. Rico could correctly retrieve a new item from among a selection of eleven items already known, by inferring that the word mentioned did not refer to any of the ten items already known.†† Rats and mice perform tasks that make sensory, motor, motivational and information processing demands. Rodents are able to navigate in mazes or find platforms hidden in coloured water.

**Social behaviour**

Reciprocity is commonly seen within groups of capuchin monkeys and chimpanzees, involving behaviours such as food sharing, grooming and cooperation.‡‡ These activities are not always restricted to family members, but also extend to unrelated animals (non-kin reciprocity), as has been shown in research on bats.]]

In a study which observed capuchin monkeys, monkeys were shown to have a sense of 'justice'. They reacted badly if they saw another monkey receiving more preferred food than they did. The reaction took the form of non-cooperation with the research task, or a

refusal to eat the less-preferred food that they were offered (which was otherwise acceptable if another monkey was also given this food item). The monkeys, however, did not react against the other monkey that was given the preferred food, but rather against the task that they would usually complete.¶

There are also examples of situations when animal behaviour has been interpreted as altruistic towards humans. For example, in 2004 a group of swimmers reported that a pod of dolphins protected them from a great white shark off the coast of New Zealand.¶¶ In 1996 an eight-year-old Western lowland gorilla Binti Jua carried a three-year-old child who had fallen into the animal's enclosure at Brookfield Zoo in Chicago, USA, to zoo keepers and paramedics, warning off another gorilla that was approaching. Other species have been observed showing signs of severe distress following the loss of an infant or parent, such as carrying the body around for several days, withdrawing from their group or appetite loss (see paragraphs 4.13 and 4.32).

\* See, for example, The Jane Goodall Institute *Chimp Calls*, available at: <http://www.janegoodall.org/jane/study-corner/chimpanzees/chimp-calls.asp>. Accessed on: 18 Apr 2005.

† Moura ACdeA and Lee PC (2004) Capuchin stone tool use in Caatinga Dry Forest *Science* **306**: 1909.

‡ Cleveland A, Rocca AM, Wendt EL and Westergaard GC (2004) Transport of tools to food sites in tufted capuchin monkeys (*Cebus apella*) *Anim Cogn* **7**: 193–8.

§ Hirata S and Celli ML (2003) Role of mothers in the acquisition of tool-use behaviours by captive infant chimpanzees *Anim Cogn* **6**: 235–44.

\*\* See De Waal F (2001) *The Ape and the Sushi Master: Cultural reflections of a primatologist* (New York: Basic Books).

†† Kaminski J, Call J and Fischer J (2004) Word learning in a domestic dog: evidence for 'fast mapping' *Science* **304**: 1682–3.

‡‡ See Brosnan SF and de Waal FBM (2002) A proximate perspective on reciprocal altruism *Hum Nat* **13**: 129–52.

]] Wilkinson GS (1990) Food sharing in vampire bats *Sci Am* **262**: 76–82.

¶ Brosnan SF and de Waal FBM (2003) Monkeys reject unequal pay *Nature* **425**: 297–9.

¶¶ BBC News (2004) Dolphins prevent NZ shark attack, available at: <http://news.bbc.co.uk/1/hi/world/asia-pacific/4034383.stm>. Accessed on: 18 Apr 2005.

3.34 Nevertheless, the degree to which animals of different types are capable of expressing higher cognitive capacities remains highly contentious. Clearly, though, it seems that in behavioural terms many animals are capable of demonstrating dissent by attempting to flee. It can therefore be argued that the implications of an animal's inclusion in an experiment that it seeks to evade is something that should be taken into account. At the same time, we should hesitate before drawing the opposite conclusion: that an animal that takes part apparently willingly does so freely. Participation can be achieved through training, which most likely lessens the possible stressfulness of research, but cannot be taken to mean the same as consent given freely from a competent human research participant. For example, an animal may have realised that cooperation with researchers is the only means of leaving a cage or pen, or gaining access to food, and it may 'agree' to take part for these reasons.

- 3.35 It is plausible to associate the ability to exercise higher cognitive capacities with neurological complexity. This is not to say that ‘more-developed’ animals are more important than ‘less-developed’ ones, but that there are more morally questionable ways of mistreating the more-developed animals.
- 3.36 Some object to a view in which moral status is based solely on higher cognitive capacities. This is because it appears that such views fail to offer grounds for refraining from causing unlimited pain or suffering to those beings that lack such capacities. But, as we have said, it cannot be taken for granted that any one of the morally relevant features that we consider here can be taken to be a master property. Rather, there are several reasons for showing moral concern, one of which is capacity to feel pain, which applies to many animals that do not exhibit higher cognitive capacities.

#### Capacity to flourish

- 3.37 A further basis of moral concern, associated with Aristotle, is the idea of animals having a *telos*, a good, or alternatively having interests or species-specific needs. If the animals are able to satisfy these needs, one might say that they *flourish*. This concept enables us to say that things may go well or badly for an animal depending on how specific environmental conditions relate to its usual species-specific development (see paragraphs 4.23–4.26 and 4.41).<sup>14</sup> If this view is not simply to be considered equivalent to those already considered (sentience and higher cognitive capacities), there must be a sense in which animals can flourish or wither independently of these features.
- 3.38 One way in which the concept might theoretically be extended is to focus not only on *avoiding* pain and suffering (which may require primarily consideration of sentience and higher cognitive capacities), but to consider also what environmental *enrichments* can be provided to attend to the species-specific needs. Animals may fail to flourish in laboratory conditions whether or not they experience pain, suffering or premature death.
- 3.39 While it may sometimes be difficult to determine when life is best for an animal, the concept seems to have clear force in relation to identifying circumstances that fundamentally violate the expression of significant biologically determined features of a species. For example, if animals such as dogs, which are a roaming species, are kept in very small and confined pens for prolonged periods of time, they would usually display stereotypic behaviours, which indicate that the animal is stressed. But keeping animals in unnatural environments need not always lead to welfare infringements. The relevant question to ask is not whether the environment is natural or not (in nature too, animals can encounter a number of adverse conditions) but whether it is appropriate with regard to its species-specific capacities and needs. Thus, if animals have been bred in captivity and are provided with a sufficiently complex environment, they may in principle be able to develop their potential in similar ways to animals living in the wild (see paragraph 4.26). In any case, the concept of flourishing can be seen as important as it establishes a more comprehensive idea of animal well-being than just freedom from pain and suffering.
- 3.40 Another extension of the concept of flourishing relates to considerations about the moral value of a *species*. This may be especially relevant to issues raised by selective breeding and the genetic modification of animals. These processes usually aim at altering an aspect of the genotype of a species in a targeted and often unprecedented way. In the context of basic

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<sup>14</sup> By species-specific development we mean behaviours and dispositions that the animal has developed during evolution in order to be able to respond to the range of situations typically encountered in its natural habitat.

research, a great number of experiments are now conducted in which single genes, or combinations of genes, are either introduced or deleted in research animals, and the effects of these actions are then assessed in order to increase understanding about genetic and associated developmental processes (see paragraphs 5.20 and 7.5). A spectrum of views on GM animals was reflected in the responses to the Consultation, for example:

'Animals should under no circumstances be genetically modified. It is going against nature, is dangerous..., and the animals... are often born mutated and are in pain and misery however long their lives.'

*Ms Jenny Williams*

'Genetically manipulating and cloning animals breach the intrinsic value of each animal species and is ethically unacceptable.... Genetic modification is clearly promoting an increase in animal use...'

*The Dr Hadwen Trust for Humane Research*

'GM animals... raise issues of commodification: should we modify animals to make them more economically productive? Discourses of 'natural' and 'unnatural' provide dubious grounds from which to stand within an ethical argument.'

*Dr Richard Twine, UK*

'GM animals have already proven enormously valuable in biomedical research, in many cases facilitating a reduction in the number of animals used in medical research.'

*The Bioindustry Association*

- 3.41 Genetic modification is a subject of considerable moral debate. Many members of the scientific community would deny that most cases of GM animals are more 'unnatural' than conventionally bred animals, or that the technique compromises the flourishing of animals in new and special ways. They point to the fact that selective breeding of animals dates back to the beginnings of agriculture and domestication, and that it has been used extensively within scientific research; for example, to create inbred strains of genetically identical animals or to sustain scientifically interesting mutations. Practically all conventionally bred animals used in agriculture, research or kept as pets are unnatural in the sense that they represent carefully selected genotypes from within a wide range of genetic variation that exists in the species. Proponents of this view also argue that there is no substantial difference in principle between more traditional forms of genetic selection and genetic modification;<sup>15</sup> that any animal produced through genetic modification could theoretically also have been created by means of selective breeding; and that the main difference is that genetic modification is faster and more precise.
- 3.42 While some of those who do not share this view might agree that arguments for species integrity are not straightforward, they may challenge the suggestion that no new issues are raised by the GM approach. For example, they may assert that the more gradual processes of selective breeding enable researchers to detect possible welfare-related problems at an earlier stage, as such problems may manifest themselves in smaller increments, and can be assessed against known strains of animals. By contrast, the 'sudden' introduction of a distant gene in a new organism by the GM method may lead to unexpected and unpredictable implications for welfare, especially in mutagenesis, 'knock-out' and 'knock-in' studies (see paragraphs 4.57 and 5.20–5.23). Although most researchers consider that the vast majority of such studies do not have any negative consequences for the animals involved, the

<sup>15</sup> The Royal Society (2001) *The use of genetically modified animals* (London: The Royal Society).

evidence so far is inconclusive (see paragraph 4.57). The GM approach may also lead to very considerable increases in fetal mortality, and high levels of 'wastage' of animals that fail to develop the desired mutations (paragraph 5.23).

- 3.43 Alternatively, opponents to the GM approach might agree that the technique does not differ fundamentally from some forms of selective breeding, but consider that it amplifies the problem of deliberately interfering with a species' genotype in ways that can cause harm. If these observations are correct, the moral discussion then becomes focused on the extent to which genetic modification, and other forms of selective breeding, can be conducted without causing harm, as implied by the following response to the Consultation, which focuses on the *consequences*,<sup>16</sup> rather than the *act*, of modification:

'We...consider that it is unlikely that it matters, from the animal's point of view, whether any state of suffering was achieved by genetic manipulation or other means.'  
*AstraZeneca Pharmaceuticals UK*

#### Sociability

- 3.44 Another philosophical tradition, influenced by philosophers such as Karl Marx, Ludwig Wittgenstein and Martin Heidegger, sees sociability as creating a level of moral concern. According to this tradition, being a member of some form of complex community creates moral relations of rights and duties. The basis of such a community might be language or a substantial dependence on others for extensive social, economic or other reasons. But, if this tradition is not to be considered equivalent to the view of higher cognitive capacities discussed above, simply with the additional observation that these capacities develop through complex social interaction such as language use, then it must be sociability itself, rather than socially developed attributes, that generates moral concern.

- 3.45 This approach is plausible in that at least some rights and duties emerge in the context of social cooperation. But the argument can be developed in more than one way. One version has been highlighted in the following response to the Consultation:

'There are...animals which have established links with us and come to share our lives and our fate in historically complex ways – particularly dog, cat and horse. I think these links should be respected, even if the animals themselves have no knowledge of them or of their social and cultural significance. For, in disrespecting these links, we disrespect ourselves.'  
*Roger Scruton*

The view that humans have special responsibilities towards beings that form part of a community with them could also explain why some people have a special affinity for pets and working animals, and perhaps also why the A(SP)A requires special justification for the use of animals such as cats and dogs (see paragraph 13.5).

- 3.46 According to another version of the approach it could also be argued that not only the relationship to humans establishes certain responsibilities, but also relationships that animals have among themselves. This becomes perhaps most clear in considering animals such as primates. Since the species-specific capacities that these animals normally develop also include complex social interactions with other animals, many argue that expression of this behaviour is usually severely restricted in research.<sup>17</sup> Such infringements, it is feared, cannot be alleviated in the same way as physiological pain and suffering, the effects of which may

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<sup>16</sup> Other issues relating to the consequences of producing GM animals arise from the possibility that research animals, such as rodents, fish or insects, may escape and interbreed with wild animals, leading to potentially irreversible changes in the gene pool of the species. These issues are outside the scope of this Report.



be mitigated by pain relieving medicines (for a discussion of issues arising in relation to assessing pain and suffering in animals see Chapter 4). Although proponents of the use of primates would point out that housing of animals in groups or in pairs can allow for acceptable levels of welfare, opponents are often not persuaded. They argue that the cage sizes that can be provided in conventional laboratories will always be inadequate. There are also concerns about how these social animals might potentially experience the death of other research animals with which they have established relationships. Similar arguments could be made with regard to other social animals, such as dogs. It seems plausible that sociability may interact with other features in that, if social dislocation causes distress or suffering or interferes with flourishing to a significant degree, then the overall effect on the animal could be potentially serious.

#### Possession of a life

- 3.47 A perhaps more difficult morally relevant criterion is possession of a life. Is life itself of value? It may seem that if we think that killing is wrong, then we must be committed to the view that life itself is valuable. However, this need not be the case. Some philosophers have argued that life, as such, has no value, as distinct from the experiences that happen within life. Given this view, it is entirely reasonable to treat pain, suffering and other harms within a life with great moral seriousness without attributing a similar level of concern to death. For it can be the case that there are animals that have no sense of themselves as existing in time, although they may have highly developed capacities of sensory experience. In such cases it could be argued that to the animals concerned it matters less whether they exist but more how their moment-to-moment existence is characterised.
- 3.48 This line of thought raises the question of why we treat human life with special consideration and, in particular, why we experiment on animals precisely to find ways of prolonging the lives both of humans and animals. One possible answer, although not necessarily endorsed here, draws on two earlier points. First, most humans, and perhaps some other animals, exhibit self-consciousness and an ability to anticipate, reflect upon and fear their own death. Hence, the *prospect* of death usually has a significant secondary effect on the quality of lived experience. Secondly, humans, and perhaps some other animals, care about each other in the sense that the death of others is often considered a tragedy. Hence, death has special significance for highly social beings. It could therefore be argued that preserving the lives of humans and of relevant other animals should take precedence, with less regard being given to those animals that either lack self-consciousness or do not live in social groups.
- 3.49 A simpler response is to revert to an argument implied above according to which some higher cognitive capacity generates a right to life; most humans and those animals that closely share similar features in this respect have such a right, while other animals do not. Many attempts have been made to provide a philosophical foundation for this view, although none commands wide agreement (see paragraph 3.20 and Box 3.4).

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<sup>17</sup> See Smith JA and Boyd KM (Editors) (2002) *The Boyd Group Papers on The use of Non-Human Primates in Research and Testing* (Leicester: The British Psychological Society), available at: <http://www.boyd-group.demon.co.uk/Prefaceandsummary.pdf>. Accessed on: 18 Apr 2005.

## Summary of the discussion about morally relevant features

3.50 We have suggested that the proper moral treatment of a being depends on the characteristics it possesses, rather than simply on the species to which it belongs.<sup>18</sup> In this regard, we have focused on sentience, higher cognitive capacities, capacity for flourishing, sociability and possession of a life. With the possible exception of the last feature, each provides reasons for moral concern, and hence it can plausibly be argued that animals in possession of one, or several, of these features are moral subjects, and that any treatment infringing on one of the features requires careful justification. The three initially attractive approaches often encountered in arguments about whether or not it is acceptable for humans to use animals for potentially harmful purposes (the *clear-line view*, the *moral sliding-scale view* and the *moral-equality view*) are therefore less helpful.

***The functional role of morally relevant features: absolute constraints or factors to be balanced?***

3.51 We have not yet considered what weight the individual morally relevant features should have in deciding the acceptability of research. To anticipate the discussion, let us consider the capacity to feel pain. There is little disagreement that this provides a clear moral constraint on how a being may be treated. But is it merely one factor to be taken into account, which is to be weighed against others? Or does it create an absolute protection on how the being may be treated, in the form of an inviolable right? These two possibilities are reflective of different philosophical approaches which are summarised in Box 3.3. Someone arguing from a *consequentialist view*, where the moral value of individual actions is based primarily on their outcome, would emphasise the first possibility, and accept a ‘weighing’ of different goods. A proponent of a *rights-based* or *deontological view* might argue in terms of the second possibility, asserting that certain factors establish absolute constraints, which ‘trump’ or ‘outweigh’ other factors (see Box 3.4). We now explore in more detail the three principal options of how to consider the morally relevant features in relation to animal research: the weighing of consequences (consequentialism); the setting of absolute prohibitions (rights-based) or incorporating elements of both in a hybrid approach.

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<sup>18</sup> It could be argued that a focus on morally relevant features would also have implications for the treatment of humans who lack some, or all, of these features. For example, it could follow that embryos, some infants or severely disabled people could be used for research without consent by proxy. However, such inferences are not straightforward and require additional arguments. It could furthermore reasonably be argued that the involvement in research of humans who lack morally relevant features is not acceptable because such a treatment may be perceived as undignified by friends and family members, thus disrupting important social institutions. Trust in healthcare practitioners may also be eroded, and, for example, people might become afraid of hospital treatments, fearing that physicians will not always act in their best interest. Addressing the wider implications of approaches that draw on morally relevant features is beyond the scope of this Report.

**Box 3.3: Three paradigms of normative ethics**

Normative theory is a branch of philosophical ethics which seeks to develop theoretical frameworks that can help to determine whether actions are right or wrong. Three important approaches are consequentialism, deontology and virtue ethics. Some take the view that they are mutually exclusive, and constitute competing frameworks. Others point out that they can be seen as overlapping and complementary, emphasising different aspects of the complex interactions of humans between each other and with the environment.

**Consequentialism**

According to this approach, the moral value of individual human actions, or rules for such actions, is determined primarily by their outcome. Such approaches do not usually put strong emphasis on the inviolable rights of moral agents or moral subjects. One important type of consequentialism is *utilitarianism*, developed most prominently by the British philosophers Jeremy Bentham and John Stuart Mill in the 18th and 19th centuries.\* For utilitarians, the best actions are those that produce most overall happiness or pleasure (see paragraphs 3.52–3.55).

**Deontology**

The name of this theory is derived from the Greek *deon*, which means duty or obligation. In this theory, certain actions are right or wrong independent of their outcome. Instead, their rightness or wrongness is defined by a formal system, which defines certain actions as intrinsically right or wrong. Moral agents have a duty to

respect the principles derived from this system and to act according to it. Rights of other moral agents or subjects can be violated if they are not treated accordingly. Historically, deontology is associated with the work of the German philosopher Immanuel Kant (1724–1804; see paragraphs 3.56–3.57).† A separate form of deontology advocates the concept of animal rights (see Box 3.4).

**Virtue ethics**

According to this approach, first developed by early philosophers such as Aristotle around 2,300 years ago, moral value depends less on the duty to follow rules given by formal systems, or on the duty to maximise beneficial consequences, than on the character of the moral agent. A virtuous moral agent is someone who deliberates and acts in a way which displays virtues such as justice, truthfulness and courage. According to this view, morality is closer to the exercise of a skill than the following of standardised formulae or rules.‡

\* See Sinnott-Armstrong W (2003) *Consequentialism*, available at: <http://plato.stanford.edu/entries/consequentialism/>. Accessed on: 18 Apr 2005.

† See Johnson R (2004) *Kant's Moral Philosophy*, available at: <http://plato.stanford.edu/entries/kant-moral/>. Accessed on: 19 Apr 2005.

‡ See Kraut R (2001) *Aristotle's Ethics*, available at: <http://plato.stanford.edu/entries/aristotle-ethics/>. Accessed on: 18 Apr 2005.

**Consequentialism**

3.52 In any approach that seeks to weigh consequences, a number of more detailed questions need to be considered, to establish whether justification of a particular form of animal research is possible. These are as follows:

i) The value of the goals of research:

Research may be undertaken to achieve various goals, for example to advance basic biological knowledge, or to directly improve medical practice. In evaluating research, it is important to ask: how valuable is the goal and for whom? How speculative might the gain be? (See paragraphs 3.9–3.19 and 5.4).

ii) The degree of harm experienced by animals:

This is dependent on the number of animals used, and their capacity to experience pain, suffering or distress or other adverse effects. The degree of harm relates, where applicable, to conditions during breeding, transport, housing and research-related procedures (paragraphs 4.31–4.59). The question posed is: what harm could animals suffer in pursuit of the research goals?

iii) The availability of alternatives to research involving animals:

Are there non-animal alternatives that could achieve the same research goal? If alternatives are not available, it would appear important to be able to assess the reasons why: are alternatives logically or conceptually unavailable, or are they unavailable because of political, financial, logistical or other practical reasons? (See paragraphs 3.63–3.66 and Chapter 11).

3.53 Before examining consequentialism in more detail, we need to discuss a special issue raised by point i) above, regarding the value of the goal(s) of research. Some people argue that a major distinction should be made between two types of research. They note that there is (a)

research that has the aim of benefiting human health, animals or the environment in a direct and immediate way, for example by assessing the safety of a new medicine or agrochemical such as a pesticide; and (b) basic research, sometimes also called fundamental, 'blue-sky' or curiosity-driven research. The primary aim of the latter is to increase knowledge rather than directly to decrease human suffering, but with the possibility that eventually the research could produce health-related benefits (see Chapter 5). Two general arguments are usually made when considering the value of basic research:

- The first is that it is difficult to assess the value of such research, because the advancement of knowledge can be difficult to predict. Several questions need to be answered, including (a) is knowledge produced simply by completing a research project or by disseminating the results widely, for example by publishing in peer-reviewed journals? (b) what is the likelihood of any useful application arising from knowledge gained in basic research? and (c) if results from a basic research project are viewed as being unlikely to contribute to any practical application, can the research be justified?
- According to the second argument, every scientifically sound research project involving animals is intrinsically valuable, since it contributes to the 'jigsaw puzzle' of scientific knowledge, i.e. to the sum total of scientific knowledge about a subject. Thus, whether or not a specific piece of research contributes directly to medical or other beneficial applications for humans, it will always have some intrinsic worth because of the knowledge gained. On the basis of this argument, it is considered wrong to measure the value of research purely in terms of its immediate benefits.

- 3.54 Consequentialist reasoning requires two steps: first, an identification of the harms and benefits considered relevant to moral justification and, secondly, a calculation of whether the course of action envisaged produces a higher balance of benefit over harm than any alternative feasible option. Note that it is not enough simply to cite speculative benefits. It is necessary to have an estimate of the probability of success (be this the generation of knowledge or the development of a new medicine), which will need to outweigh, in some sense, the estimated harm that the experiment will cause, if an experiment is to be justified on consequentialist grounds. Any such calculation will need to allow a way of comparing distinct costs and benefits in order to calculate what level of health benefit for humans would outweigh, for example, a particular pain experienced by animals involved in research.
- 3.55 One of the most commonly found consequentialist positions is utilitarianism. In its simplest form the approach establishes a social duty to maximise the balance of pleasure over pain (see Box 3.3). Utilitarianism requires careful consideration of the capacity of all beings capable of suffering, and permits animal (or human) suffering, if in sum, it causes more pleasure than pain. Where this is the case, the ends would justify the means. Thus, from the utilitarian view, the capacity for pain and suffering does not constitute an absolute constraint, prohibiting any negative interference. Nor does the approach usually associate inviolable rights with sentience. This is why contemporary utilitarians, such as Peter Singer, do not talk of 'animal rights' but of 'animal liberation'.<sup>19</sup> From the utilitarian viewpoint there is, in principle, no restriction of the goals of research, whether it be health benefits, idle curiosity or sadistic pleasure, as long as the overall sum of pleasure outweighs the overall sum of pain. Within the current debate, this extreme view, though often mentioned and theoretically possible, is probably not held. Most commentators appear to accept at least

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<sup>19</sup> In his highly influential book *Animal Liberation*, Singer focused on cases of research that caused grave suffering to animals and had little discernible benefit. He did not explore in detail the question of whether medical research involving animals can be justified in utilitarian terms. However, this seems likely in at least some cases, provided the overall costs in terms of pain, suffering and distress caused by research are outweighed by the overall benefits in terms of alleviating and preventing pain, suffering and distress. See Singer P (1975) *Animal Liberation* (New York: HarperCollins).

some restrictions on the acceptable goals of research, i.e. there must be some health or scientific benefit. Unlike strict utilitarians, consequentialist defenders of animal research, therefore, accept such restrictions.

### Deontological/rights-based approaches

3.56 Those arguing within a deontological framework assert that at least some uses of humans and animals are absolutely prohibited (see Box 3.3). For example, according to an argument frequently set forth by theorists and campaigning organisations the capacity for sentience is not merely an input into a utilitarian calculus, but the basis of a *right* not to be subjected to pain and suffering, whatever the wider benefits (see paragraph 1.4). According to this view, any sentient being has a right not to be used purely as a means to the ends of others if to do so would cause it pain or suffering (see Box 3.4). Such an approach combines a utilitarian theory of value with deontological (duty-based) constraints on action and would appear to rule out all research involving animals that causes any degree of pain.<sup>20</sup>

#### Box 3.4: Speciesism and animal rights

Some people argue that the way many animals are treated in contemporary Western societies is morally objectionable. They draw an analogy to unjustified discrimination and exploitation in cases of racism and sexism, and argue that making membership of the moral community dependent on specific human traits alone amounts to 'speciesism'. Rejecting this view, they argue that a much wider circle of beings deserve to have their interests considered for their own sake, usually meaning all those beings that are able to suffer.\*

Some of those who share the belief that society's current treatment of animals amounts to speciesism take the view that overcoming this form of discrimination requires that rights are ascribed to all animals. The criterion for whether or not a being deserves rights is frequently seen to depend on whether or not it is 'the subject of a life'. If, the argument runs, it makes sense to say of a being that it is conscious of its own existence, and that its own life is important to itself, it has intrinsic moral value (see Box 3.1). This moral value should then be recognised by the same rights accorded to humans, as, for example, set out in the United Nation's *Universal Declaration on Human Rights*. This raises the question of which animals are capable of being the subject of a life. Some argue that this is the case in animals such as the great apes,<sup>†</sup> but others would draw a much wider circle, including all animals capable of being sentient.

Many people reject the analogy between the humane treatment of animals on the one hand and racism and sexism on the other. They emphasise what might be called a 'psychological truth' which states that in cases where a choice has to be made, protecting the life or welfare of a human is a greater priority than a similar protection for an animal, just as one might also protect a family member rather than a distant stranger. A vital question is whether such preferences for humans in general, or those who are close to us, are strictly speaking immoral, and should be over-ridden by a comprehensive and all-inclusive moral system, or whether they are morally justified, as other philosophers have argued. There are powerful arguments on both sides, and no universally agreed answer. We return in Chapter 14 to the role that this disagreement plays in debates about the ethics of research involving animals.

\* Singer P (1975) *Animal Liberation* (New York: HarperCollins); Ryder RD (2000) *Animal Revolution: Changing Attitudes Towards Speciesism* (New York: Berg Publishers); DeGrazia D (1996) *Taking Animals Seriously: Mental Life and Moral Status* (Cambridge: Cambridge University Press).

† See website of the Great Ape Project, available at: <http://www.greatapeproject.org/>. Accessed on: 19 Apr 2005; Cavalieri P and Singer P (Editors) (1993) *The Great Ape Project: Equality Beyond Humanity* (London: Fourth Estate).

3.57 Deciding between the 'weighing' (or utilitarian/consequentialist) view and the 'absolutist' (or rights-based) view may not seem easy. Some progress can be made by the simple observation that not all experiences of pain are the same. If pain is mild and short-term, it could plausibly be justified for the sake of other important benefits; even, arguably, in the case of human exposure to pain without consent. For example, forcing people to remain standing in cramped and highly uncomfortable conditions, in order to make room for the emergency services to gain access to an accident, would appear to be justified. However, if pain is severe and prolonged, with lasting effects, then matters seem quite different. Where to draw the line may be very difficult, but there could be room for a complex view in which different types of pain call for different types of moral response, in which some pains are permitted and others not, involving some weighing and some absolute prohibitions. Such an approach is found in what can be called 'hybrid frameworks', to which we now turn.

<sup>20</sup> However, some observational research, usually of animals in their natural habitat, may be permitted.

### **Hybrid frameworks**

3.58 Hybrid frameworks contain some elements of the consequentialist theory, and some of the deontological approach. Most views in the current debate are of this form, even if there is great disagreement about the details. One prominent example of a hybrid view, although in itself not explicitly a philosophical approach, is the current UK regulatory regime, which we discuss here briefly, both for its own sake and as an illustration of a hybrid view (Chapter 13 addresses regulatory aspects in more detail). The suggestion that the current UK regulations are hybrid may cause some surprise, as it is often assumed that in its use of a cost-benefit assessment current regulations are utilitarian. This is a serious philosophical error, as we shall see.

3.59 The current regulatory framework in the UK requires that any research on vertebrate animals (and the common octopus)<sup>21</sup> which may cause pain, suffering, distress or lasting harm must be licensed (see paragraphs 13.8-13.18). A licence is not required where no harm will be caused or when the research involves only invertebrates (excluding the common octopus). Harmful experiments for the sake of mass entertainment (such as television entertainment) are prohibited by law, and research involving animals for the production of new cosmetic ingredients is also not permitted (see paragraph 13.6).<sup>22</sup> Although not prohibited directly by law, licences for any research involving the great apes (gorillas, chimpanzees, pygmy chimpanzees and orang-utans) are not granted as a matter of current policy. In order for licences for specific research projects to be issued, the law requires that the likely benefits of the research, and the likely costs to the animals, are considered; that ‘the regulated procedures to be used are those which use the minimum number of animals, involve animals with the lowest degree of neurophysiological sensitivity, cause the least pain, suffering, distress or lasting harm, and are most likely to produce satisfactory results’;<sup>23</sup> and that there are no available alternatives to achieving the goals of the experiment without using protected animals (paragraph 13.17).

3.60 Pain and suffering of animals are treated with great seriousness in the current UK legislation. For example, licences may not be granted for research that is ‘likely to cause severe pain or distress that cannot be alleviated’.<sup>24</sup> Where possible, potentially harmful research must be conducted under anaesthetic or with the use of pain relieving medicines. By contrast, animal death, if brought about without pain or suffering, is regarded as a far less serious matter. Animals that are not used in regulated procedures but killed humanely to obtain tissue samples or because they are surplus to requirements are excluded from the controls of the A(SP)A (see 13.26).<sup>25</sup>

3.61 In summary:

- The morally relevant features identified above (sentience, higher cognitive capacities, flourishing, sociability and the value of life) are all considered in the current regulations.

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<sup>21</sup> More precisely, protected animals comprise all vertebrates and members of the common octopus species including fetal, larval or embryonic forms from the mid-gestational or mid-incubation period onwards for mammals, birds and reptiles, or in any other case, from the stage of development when the animals become capable of independent feeding.

<sup>22</sup> Note that animal research for the testing of new household cleaners that differ insignificantly from already-marketed products is not prohibited.

<sup>23</sup> A(SP)A, Section 5, 5(b).

<sup>24</sup> Home Office (2000) *Guidance on the Operation of the A(SP)A 1986* (London: TSO), paragraph 5.42. This refers to Section 10(2A) and Schedule 2A of the A(SP)A which states that ‘All experiments shall be carried out under general or local anaesthesia’. Exceptions exist when anaesthesia use is incompatible with the object of the experiment. In such cases, Schedule 2A (Article 8 of Directive 86/609/EEC) specifies that ‘appropriate legislative and/or administrative measures shall be taken to ensure that no such experiment is carried out unnecessarily’. Schedule 2A was imposed on the A(SP)A by the (Amendment) Regulations 1998.

<sup>25</sup> Schedule 1 of the A(SP)A sets out ‘Appropriate methods of humane killing’.

- The current regulations combine deontological and consequentialist elements:
  - there is a *de facto* ban on the use of specific species, the prohibition of causing some forms of pain and certain types of research;
  - within the ‘permitted’ area, where reasons are weighed and balanced, the regulations are consequentialist but not utilitarian, placing restrictions on the type of goals that may be pursued.
- Licences are thus granted on a case by case basis where weighing of animal suffering in relation to the research goal is one aspect of the cost-benefit assessment, and where other considerations, such as deontological constraints, are taken into account.
- What some people might regard as costs, for example harm to most invertebrates or painless death, are not regulated in the UK.

3.62 We return in Chapter 13 to a more detailed discussion of the regulatory framework in the UK and, in Chapters 14 and 15, to further moral consideration. Here we conclude that there are several ways in which morally relevant features can be taken into account, depending on whether they are considered in the context of a consequentialist, deontological or hybrid framework. We have illustrated this analysis by focusing on the capacity for pain. It might also be possible to combine, for example, deontological frameworks with the morally relevant criterion of higher cognitive capacities, in which case animals that are merely capable of sentience might not qualify as moral subjects. These and other approaches would clearly require further development and justification, which is beyond the scope of this chapter. Our primary aim has been to illustrate the mechanism by which morally relevant features function in different frameworks.

### What role does the unavailability of alternatives play in the justification of research involving animals?

3.63 We have said that one of the important aspects in the ethical evaluation of research involving animals is whether the research goal could be achieved by other means, and, if not, what the reasons might be. One respondent to the Consultation remarked:

“By law in the UK, animals can only be used for research if there is no other way of obtaining the information” ... If research on alternatives is not meaningfully supported by the Government, how is it possible to follow the law? How can an investigator know whether there is an alternative way of obtaining the relevant information if the study of alternatives is so poorly funded?’

*Professor David DéGrazia*

3.64 We discuss the potential of alternatives in more detail in Chapters 11 and 12. For now, we note that this comment raises at least two important issues. First, alternatives are developed primarily by industry, academia and relevant charities. Although the UK Government also provides some funding for the development of alternatives (see Box 11.3), it may be especially important to be clear about its responsibilities concerning the development of alternatives as it is the authority that grants licences for the conduct of animal research, much of which is publicly funded. The Government also contributes significantly to the demand for animal research, for example, through regulatory requirements established by the Health and Safety Executive (HSE), Department of Trade and Industry (DTI) and other departments (see also paragraphs 13.48-13.52).

<sup>26</sup> See Animal Procedures Committee (2003) *Review of Cost-Benefit Assessment in the Use of Animals in Research* (London: Home Office).

- 3.65 Secondly, in undertaking an ethical review of a research proposal in the light of available alternative methods, it can be useful to consider the reasons why other alternative methods are not yet available. Although from a regulatory and practical perspective it may be reasonable to take into account only those options that are currently available, this may be less acceptable for an ethical evaluation. It could be argued that a proposal for which alternative methods exist in principle (but have not yet been sufficiently developed for use because of, for example, financial or other constraints) should be deferred until the alternative method becomes available, in order to allow a comparison. The question of opportunity costs is then raised: how much does it matter that research is delayed? It would seem that the answer to this question would depend primarily on the value of the research goal and the welfare implications for the animal. There is also the more general question about the value of scientific enquiry *per se*, and some people would argue that, in principle, no delays are ever acceptable.
- 3.66 A related question concerning the possibility of delaying research to prevent the use of animals for some types of experiment is raised by the efficiency of alternatives. It may be the case that there are alternatives to specific research procedures, which refine or reduce the use of animals significantly, or replace it altogether, but which imply slower scientific progress. How should such options be balanced in an analysis of the costs incurred for animals and the benefits offered to humans? We examine these questions in Chapters 11, 12, 14 and 15.

### How does the justification of animal research relate to the justification of animals for other uses?

3.67 We have already noted the various ways in which humans interact with animals (paragraph 1.1). Comparing different uses of animals can be helpful in assessing more closely how specific morally relevant criteria, such as those considered above, are valued in practice. Comparisons usually carry with them the implication that the same criteria should be applied in comparable cases, and that similar cases should be evaluated alike. Two tendencies are common in making comparisons:

- ‘Using animals in research is justified because we also use animals in other contexts’

According to this view, a closer look at the way in which animals are used in, for example, food production and sport reveals that a range of negative implications for animal welfare in favour of human benefit are accepted by many people. Accordingly, the view might be taken that the use of approximately 2.7 million animals in research is relatively insignificant when compared to more than 950 million livestock and nearly 500,000 tonnes of fish used annually for food production in the UK (Appendix 1), or when compared to the number of wild birds and mice killed by pet cats, which has been estimated to be 300 million per year.<sup>27</sup> The benefit to humans in using animals as food entails primarily an increased range in dietary variety, while the benefits of animal research can consist in significant developments in scientific progress and human welfare. Hence proponents of this view assert that the latter use should be more acceptable.

- ‘Thinking about animal research poses more questions than it answers’

Here, it is argued that concerns about animal research show that, insofar as other practices involve comparable degrees of pain, suffering and distress, they are in fact not as widely accepted as is sometimes claimed. Discussion about animal research can thus enjoin us to reassess the basis on which we seem to accept other uses of animals: is it

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<sup>27</sup> The estimate by the Mammal Society that 300 million wild animals and birds are killed by domestic cats every year in Britain is based on a survey of the kill or capture records of 964 cats over a five-month period. See The Mammal Society (1998) *Look what the cat's brought in*, available at: <http://www.mammal.org.uk/catkills.htm>. Accessed on: 15 Mar 2005.



reasoned argument? Are other uses accepted because people do not really know how the welfare of animals is affected, or because they adopt an 'out of sight, out of mind' view? Or, for example, because they trust farmers more than scientists to treat animals well? With regard to the quantities of animals used in different contexts, it could be argued that, although the number of research animals is far smaller than the numbers of animals used, for example, in food production, their lives are usually shorter, and that they may experience greater degrees of pain, suffering or distress.

- 3.68 In comparing different uses of animals it is critically important to consider the worthiness of the goal, the suffering of the animals involved and the availability of alternative ways of achieving the goals for which animals are used (see Appendix 1). If well informed, such comparisons can be instructive in ascertaining the basis of justifications given for the use of animals. However, due to the many variables involved, acceptance of one use does not automatically justify other uses. Comparisons are necessary, but are not the only consideration in moral analysis. Each of the uses requires individual consideration and justification. We return to the question of comparing different uses of animals in Chapter 14.

### What is the appropriate role of regulation for research involving animals?

#### *Two views about moral agency*

- 3.69 So far we have concentrated on the circumstances under which it may be acceptable to conduct harmful animal research. Our discussion has also briefly focused on what it means to be a moral agent (see Box 3.1). We now explore this concept in more detail, since it bears on the question of what it is to be a morally responsible scientist, and the role of regulation in generating a morally acceptable environment.
- 3.70 We can contrast two principal views concerning moral agency:
- According to the first, associated with Bentham and Kant, to be a moral agent is a matter of following a set of rules or principles.
  - According to the second, associated with Aristotle, the requirements of moral agency cannot be formulated in terms of a precise set of principles, but rather they involve cultivating a certain set of dispositions of character, usually called virtues. These virtues are required in order to develop excellence in a practice or task (see also Box 3.3).
- 3.71 One motivation for virtue-based theory is that rules or principles will always be simplistic and thus may demand behaviour that is wrong or otherwise inappropriate. Virtue theorists argue that, if people can learn to become experts in making excellent judgements, then this ability is morally superior in comparison to blind obedience to rules, as well as leading to a better moral relationship between, in this case, humans and animals. This argument has significant implications for the appropriateness and nature of regulations. Regulations usually encode a rule-based morality, which might seem to be too inflexible and sometimes even morally counter-productive. It could be argued that the exercise of wise judgement by scientists is morally superior to mere conformity with regulations.

#### *Should regulations be relaxed or tightened to achieve least risk and best moral practice?*

- 3.72 There are several arguments in favour of stringent regulation. One aspect concerns the current social trend towards a perceived need for accountability and transparency in all areas of public life. But, more importantly, when the activities of researchers were much less stringently regulated in the past, some were suspected of questionable attitudes and behaviour. Allegations included maltreatment of animals, lack of awareness of the capacity of animals to suffer and lack of realistic reflection on the likely benefits or probability of success of experiments (see paragraphs 2.12-2.13).

- 3.73 The crucial question now is not how scientists once behaved, but rather how we could reasonably expect them to behave if regulations were less rigorous. The existence of any regulation is justified in terms of reducing risks, and therefore we first have to consider what the consequences of non-regulation, or less-detailed regulation, would be.<sup>28</sup> Accordingly, scientists who consider that they are sufficiently experienced to judge the needs of animal welfare in the planning and conduct of their work might well argue that they now have acquired appropriate virtues. If this is correct, then the risk of making regulations less detailed would be small. Furthermore, consideration of ethical aspects forms part of the training of personal licence holders,<sup>29</sup> and is beginning to be included in college and university education in the life sciences. Some take the view that continuing developments in this area might be considered another good reason for relaxing regulation.
- 3.74 Opponents, however, might argue that scientists have developed virtues to the degree that they have, primarily *because of* the regulations. They assert that a strict regulatory framework encourages scientists to be proactive in seeking out and implementing humane practices. In a less-regulated world, they might let such virtues wane, especially as a scientist's priority is usually to make scientific progress, which may often, but need not necessarily always, coincide with ensuring the highest possible degree of animal welfare.
- 3.75 In this respect, it might be instructive to compare common Western approaches to a particular non-Western approach. Western practice usually focuses on beliefs and their consequences. An example of a different approach is that practised by Australian Aborigines, for whom the emphasis is on people and their relationships.<sup>30</sup> In the Western context, causing pain or suffering to animals is recognised by some as an offence to reason and is addressed by adopting a resolution to minimise harmful consequences, for example by applying Refinement, Reduction and Replacements. In the Aboriginal approach, the subject of any offence is considered to be another being, referred to as an 'I' or 'thou', and a ritual apology can sometimes be offered to an animal killed to provide food or clothing. The object of this process is to inform the spirit of the animal that the act has been done in order to survive. The apology is a quest to reweave a torn religious (literally binding) relationship.
- 3.76 Clearly, for the UK context, the Western approach to the conflict between human and animal interests is more practicable and therefore appears to be the more preferable. But whether the harm to animals can actually be reduced depends not only on the scientific and technological means available, but also on the willingness of humans to recognise that an animal has in some (not necessarily overtly religious) sense an 'I' or 'thou', or is a 'subject of experience', qualifying it as having moral status. This thought adds an important dimension to the common Western approach and can contribute to the motivation of identifying and applying the Three Rs. In terms of the generally agreed need to minimise animal suffering, the classical Western and the non-Western approaches might therefore be considered as being morally complementary.

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<sup>28</sup> Some regulations merely encode pre-existing good practice, such as the policy decision not to grant licences for research involving the great apes, which was implemented some years after the practice had ceased in the UK.

<sup>29</sup> New applicants for personal licences are required to have successfully completed an accredited training programme comprising three or possibly four modules (with 'very limited exemptions'). The first module includes a section entitled *An introduction to ethical aspects of the use of animals in scientific procedures*. New applicants for project licences are required to have successfully completed a further module which includes a section entitled *Ethical aspects of the use of live animals*. See Home Office (1992) *Education and training of personnel under the Animals (Scientific Procedures) Act 1986*, available at: [http://www.homeoffice.gov.uk/docs/training\\_statement1.html](http://www.homeoffice.gov.uk/docs/training_statement1.html). Accessed on: 19 Apr 2005.

<sup>30</sup> Clearly it is not possible to generalise from this example to a general paradigm of 'non-Western practice'. There is a wide spectrum of views, some of which are very close to what has been presented above as a 'Western' view. See, for example, Preece R (1999) *Animals and Nature: Cultural Myths, Cultural Realities* (Vancouver: University of British Columbia Press).

3.77 In summary, regulation may in some cases act as an emotional screen between researchers and animals, encouraging scientists (and others who handle animals) to believe that simply conforming to regulations is to act well. Yet, if the animal is regarded as having moral status, then the researcher should be made aware that to conduct experiments on another being without consent is morally problematic. It can be a matter of grave regret which in turn can prompt measures to reduce the need of using animals in this way rather than just because of regulatory requirements. Some form of regulation is accepted by practically all as *necessary* for good moral practice.<sup>31</sup> But it is important to be aware that it may not be sufficient.

### Summary

3.78 This chapter has aimed to lay out the critical elements of the current moral debate. We have argued that the following questions must be considered:

- i) The debate is not best characterised in terms of the relative moral status of humans and animals but in terms of what features of humans and animals are of moral concern, in the sense of making certain forms of treatment morally problematic.
- ii) Once those features are identified, the question needs to be asked as to how they should be taken into account in moral reasoning. Are they factors to be weighed against others, or do they function as absolute prohibitions?
- iii) Finally, what does it mean to be a moral agent? How should moral agency be considered in the regulatory framework that governs animal research?

In general, we have not attempted to provide answers to these questions at this stage. We invite readers to reflect upon the discussion and examples provided in the following chapters in an unbiased way, and in the light of their own conclusions thus far. We present the conclusions of the Working Party in Chapters 14 and 15.

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<sup>31</sup> In addition to positively influencing moral agency, arguments in favour of regulation would be that it can (a) promote consistency; (b) enhance accountability; (c) act as a counter to commercial pressures; (d) reflect society's collective morality; and (e) promote legitimacy. We return to some of these elements in Chapters 14 and 15, see paragraphs 14.53–14.63, 15.14–15.15 and 15.53.