COGNITIVE ETHOLOGY AND THE TREATMENT OF NON-HUMAN ANIMALS: HOW MATTERS OF MIND INFORM MATTERS OF WELFARE

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Anthropocentric claims about the ways in which non-human animals (hereafter animals) interact in their social and non-social worlds are often used to influence decisions on how animals can or should be used by humans in various sorts of activities. Thus, the treatment of individuals is often tightly linked to how they are perceived with respect to their ability to perform behaviour patterns that suggest that they can think – have beliefs, desires, or make plans and have expectations about the future. Here, I review some basic issues in the comparative study of animal minds and discuss how matters of mind are related to matters of welfare and well-being. Much comparative research still needs to be done before any stipulative claims can be made about how an individual's cognitive abilities can be used to influence decisions about how she or he should be treated. More individuals from diverse species whose lives, sensory worlds, motor abilities and nervous systems are different from those of animals with whom we identify most readily or with whom we are the most familiar, need to be studied. As others, I stress the importance of subjectivity and common sense along with the use of empirical data in making decisions about animal welfare, and that subjective assessments should be viewed in the same critical light as are supposedly objective scientific facts. I also argue that whatever connections there are between an individual's cognitive abilities and what sorts of treatment are permissible can be overridden by that individual's ability to feel pain and to suffer. When we are uncertain, even only slightly, about their ability to experience pain or to suffer, individual animals should be given the benefit of the doubt. There is a great deal of uncertainty about the phylogenetic distribution of pain and suffering.

Keywords: *animal cognition, animal consciousness, animal welfare, cognitive ethology, sentience*

Cognitive ethology and animal welfare: a brief overview

There is a lot of interest in possible connections between the cognitive sciences and ethics (eg Goldman 1993; Johnson 1993). Here I do not consider how the cognitive sciences in general are related to ethical issues. Rather, this paper specifically addresses how cognitive ethology – the study of cognition, consciousness and the workings of the mind of non-human animals (hereafter animals) – can inform discussions about the treatment of animals by

humans – hereafter referred to as animal welfare. (Fraser [1993 p 38] points out that the terms 'animal welfare' and 'animal well-being' are often used interchangeably, and for the purposes of this paper I am using them as such; see Fraser's discussion for details about how these terms can be differentiated.) Cognitive ethological investigations are relevant to animal welfare even if cognition and consciousness are conceptually distinct phenomena: one being able to exist without the other. While there are occasions in which animals, including humans, who are able to be aware of their own and others' behaviour and of their surroundings, are not conscious of their own or others' behaviour or of their surroundings, but yet appear to process information, there are also situations in which certain cognitive abilities such as the attribution of mental states to others are difficult to explain without invoking consciousness (for discussion and examples see Humphrey 1976; Griffin 1984, 1992; Byrne & Whiten 1988; Cheney & Seyfarth 1990, 1992; Dawkins 1993). While others have addressed some similar issues in a more general manner (Lloyd Morgan 1896; Rollin 1981, 1989; Johnson 1983; Midgley 1983; Regan 1983; Sapontzis 1987; Dawkins 1990, 1993; Singer 1990; Bateson 1991; Duncan & Petherick 1991; Gentle 1992; Duncan 1993a,b; Mason & Mendl 1993), more detail concerning the enterprise of cognitive ethology and its reception is presented here.

Despite the close connection between cognitive ethology and animal welfare, following Bentham (1789), the fundamental question that remains 'is not Can they *reason*? nor Can they *talk?* but, Can they *suffer?*' On this account, an individual's ability to experience pain (defined as a heterogeneous category of unpleasant sensory or emotional experiences of which the individual is aware; see Ruse & Adams 1989; Bateson 1991; DeGrazia & Rowan 1991; and Orlans 1993 for further discussion and references), to suffer (to experience unpleasant emotional responses to more than minimal pain or distress; see DeGrazia & Rowan 1991), or to experience anxiety that may threaten one's well-being (DeGrazia & Rowan 1991), provide more compelling reasons to grant her moral status and to treat her with respect than does her ability to perform actions that demand cognitive explanations – (that she has memories of past events, is aware of her surroundings, has the ability to think about things that are absent, or can have beliefs or desires and be able to make future plans). This point needs to be stressed because at least at the moment it seems impossible to come up with any rigorous criteria that lead to the conclusion that specific cognitive abilities are morally relevant, that is that variations in cognitive abilities (or mental complexity, Johnson 1983, p 130) make a difference to how animals should be treated by humans (see also Gompertz 1824).

There are many good reasons for adopting Bentham's position (Singer 1990; Bowd & Shapiro 1993), especially because of the force of subjective assessments of how the behaviour of individuals should influence decisions about their treatment (Bateson 1991; Fraser 1993; Mason & Mendl 1993; Wemelsfelder 1993; see also Broom 1993). Despite the emphasis on sentience rather than on individual cognitive abilities in assessments of welfare, it still is important to learn about animal behaviour and animal cognition, for knowledge in this area will help to inform and motivate analyses of what types of situations, social and otherwise, might lead to pain, suffering, boredom, or frustration and how they may be prevented (Mineka & Cook 1988; Snowdon 1989; Dawkins 1990; Duncan & Poole 1990; Singer 1990; Bateson 1991; Bekoff & Jamieson 1991; Duncan & Petherick 1991; Mason 1991a,b, 1994,

in press; Broom & Johnson 1993; Carlstead *et al* 1993; Fraser 1993; Jensen & Toates 1993; Lawrence & Rushen 1993; Terlouw 1993; Wemelsfelder 1993; Bekoff 1994; Gibbons *et al* 1994; but see McGlone 1993).

There is an urgent need for more comparative data on animal cognition in a wide variety of individuals belonging to different taxa, especially those with which we are least familiar and those with which we do not identify. Duncan (1993b, p 8) believes that 'it is only appropriate to consider the welfare of sentient animals such as vertebrates and higher invertebrates ' (but he does not devalue 'lower invertebrates'). However, I propose that we expand our studies to include as many invertebrates as possible because of the possibility of learning about the evolution of sentience and the existence of different types of cognitive skills; we should not be speciesistic cognitivists. Certainly, broad comparative and phylogenetic studies of sentience and cognition would be helpful in our attempts to draw lines and to avoid slippery slopes concerning their presence or absence (or their possible continuity), a matter that Duncan (1993b, p 9) admits 'is still open to debate' at least with respect to sentience (see also Washburn 1908; Johnson 1983; Regan 1983; Singer 1990; Bateson 1991, p 830 and Orlans 1993) despite his placing phylogenetic limits on our concerns about welfare. As Orlans (1993, p 152) points out, there is a lot of uncertainty concerning the phylogenetic distribution of pain and suffering, and there is a trend to include species 'lower on the phylogenetic scale, and this trend appears likely to continue.' Such studies will also be helpful for stressing that the word 'animal' refers to individuals other than only 'mentally normal mammals of a year or more' (Regan 1983, p 78). While Regan fully acknowledges that he is using the word in this limited sense for economy of expression, and he notes that 'important moral constraints also apply to our dealings with other animals . . . ' (p 78), this extremely narrow (but qualified) use of the word 'animal' can divert attention from the diversity of organisms with whom we share this planet and about many of whom we know little or nothing (Burghardt 1992).

Although data on sentience and cognition – the subjective worlds of animals – are open to question because of the impossibility of ever knowing *precisely* what it is like to be another individual (Mason & Mendl 1993), many rejections of the possibility of learning about animal sentience and cognition are based on:

- an ignorance of available empirical data;
- the adoption of double standards that require more rigorous scientific evidence for animal consciousness and animal cognition than are demanded for other scientific endeavours in which imprecision also abounds;
- a rejection of the use of anecdote and anthropomorphic explanations – even their heuristic value, or
- on contentious philosophical issues.

As Dawkins (1990, p 1) notes: 'Let us not mince words: Animal welfare involves the subjective feelings of animals.' Thus, because cognitive ethologists do research that includes the study of subjective feelings in animals, it is important to know what cognitive ethologists do and something about the sources of resistance and support of cognitive ethology before relationships between animal minds and animal welfare can be discussed in an informed manner.

What do cognitive ethologists do?

Current interest in cognitive ethology largely stems from the publication of Griffin (1976). Cognitive ethologists in general i) are interested in comparing thought processes, consciousness, beliefs and rationality in animals; ii) are concerned with claims about the evolution of cognitive processes in animals; iii) emphasize broad rather than narrow taxonomic comparisons; iv) favour observations and experiments in conditions that are as close as possible to the natural environment where selection has occurred, and v) maintain that field studies of animals that include careful observation and experimentation can inform studies of animal cognition, and that cognitive ethology will not have to be brought into the laboratory to make it respectable. The *comparative* aspects of cognitive ethology are very important to consider, and because of these interests, cognitive ethological studies emphasize broad taxonomic comparisons and do not focus on a few select representatives of a limited number of taxa. Cognitive psychologists, in contrast to cognitive ethologists, typically work on related topics in laboratory settings, and do not emphasize comparative or evolutionary aspects of animal cognition. When cognitive psychologists do make cross-species comparisons, they are generally interested in explaining different behaviour patterns in terms of common underlying mechanisms. Ethologists are often more concerned with the diversity of solutions that living organisms have found for common problems.

Given their interest in the evolution of cognition, cognitive ethologists also study mental continuity between humans and other animals. Indeed, Charles Darwin argued strongly for continuity between human and animal mental experiences. Cognitive ethologists note that evolutionary biologists talk about the evolution of hearts, lungs, kidneys and stomachs, and even brains, and they recognize that if brains are associated with minds and thinking, then there is something to be gained by looking at possible continuity between human and non-human animals. They ask: Can we really believe that humans are the only individuals with feelings, beliefs, desires, goals, expectations, or the ability to think about things? Of course, this view does not mean that there is continuity between all taxa, but it does mean that it would be wrong to look at continuity between structure and function in some systems and not in others. As Bateson (1991, p 830) stresses, 'it would be as irresponsible as it would be illogical to suggest that because continuities might not be found, they do not exist.'

Two areas to which cognitive ethologists also pay a lot of attention are 1) the needs of *individual* organisms in the habitats in which they evolved or in the habitats in which they currently reside and 2) the animals' perceptual worlds, or ümwelts. Thus, just because a great ape can do something that a mouse cannot do does not necessarily mean that the great ape is better or more advanced than the mouse. There are many things that a mouse can do that a great ape cannot do. Whiten and Ham (1992) have noted that there are imitation tasks on which mice perform better than do some monkeys. While there are some who conclude that there must be something wrong with the tests that are used, there are others who conclude that perhaps mice need to be able to do something that monkeys do not need to do. On this view it would, of course, be equally wrong to conclude, using only one test, that mice are more advanced or more intelligent than are great apes. Also, of course, neither mice nor monkeys are better or more intelligent than one another because they display different sorts of cognitive skills. Using notions such as 'intelligence' to influence welfare decisions is an exercise that is fraught with many difficulties (Bekoff 1992).

Cognitive ethology, with its concentration on a broad spectrum of behaviour patterns, provides data on how different animals adapt to their habitats, and it is not at all surprising to find that there are large differences between species in all sorts of behaviour patterns. In addition to the fact that there are large interspecific differences in behaviour, the study of animal cognition, like the study of many other aspects of animal behaviour, indicates that there are significant individual differences even among members of the same species. It should not surprise anyone that cognitive ethologists' interest in individual differences leads many to be wary about the use of cognitive skills for informing the differential treatment of groups – especially species – of animals.

Some different views on animal minds: slayers, sceptics and proponents

The major problems that cognitive ethology faces are those that centre on methods of data collection and analysis, and on the description, interpretation and explanation of behaviour (Bekoff & Jamieson 1990; Jamieson & Bekoff 1993). Criticism is directed towards both the subject matter and the methods of cognitive ethology. At this point in time we must be patient with efforts made in cognitive ethology, because the questions are difficult and they are not amenable to easy answers; imagine if other sciences were dismissed prematurely because of difficulties associated with developing methods for coming to terms with their most difficult concepts.

It is possible to identify three major groups of people, among some of whose members there are blurred distinctions, namely, *slayers, sceptics* and *proponents* (Bekoff & Allen 1994). Categorizing views on cognitive ethology in this way helps to identify common themes, which in turn helps to see to what extent genuine dialogue between critics and defenders is possible; analysis of both criticisms and confusions arising from this dialogue will help improve the science and how its findings are applied to areas including animal welfare.

Slayers, who flatly reject the enterprise of cognitive ethology, often do so without good reasons. They deny any possibility of success in cognitive ethology, frequently by conflating the *difficulty* of doing rigorous cognitive ethological investigations with the *impossibility* of doing so. Slayers also often ignore specific details of work by cognitive ethologists and frequently mount philosophically motivated objections to the possibility of learning anything about animal cognition. They often pick out the most difficult and least accessible phenomena to study (eg consciousness) and then conclude that because we can gain little detailed knowledge about this subject, we cannot do better in other areas. Slayers also appeal to parsimony in explanations of animal behaviour, but they dismiss the possibility that cognitive explanations can be more parsimonious than non-cognitive alternatives.

Sceptics are often difficult to categorize. They are a bit more open-minded than slayers, and there seems to be greater variation among sceptical views of cognitive ethology than among slayers' opinions. Some sceptics recognize some past and present successes in cognitive ethology and remain cautiously optimistic about future successes; in these instances they resemble moderate proponents. Many sceptics appeal to the future of neuroscience and claim that when we know all there is to know about nervous systems, cognitive ethology will be superfluous. Like slayers, sceptics frequently conflate the difficulty of doing rigorous

cognitive ethological investigations with the impossibility of doing so. Sceptics also find folk psychological, anthropomorphic and cognitive explanations to be problematic.

Proponents recognize the utility of cognitive ethological investigations. They note the many successes in cognitive ethological research and they see that cognitive ethological approaches have provided new and interesting data that also can inform and motivate further study. Proponents also accept the cautious use of folk psychological and cognitive explanations to build a systematic explanatory framework in conjunction with empirical studies, and do not find anecdotes or anthropomorphism to be thoroughly off-putting. Some proponents are as extreme in their advocacy of cognitive ethology as some slayers are in their opposition. But most proponents are willing to be critical of cognitive ethological research without dooming the field prematurely.

Some representative quotations from people who have been placed in each group are presented below. Although only snippets from longer text are presented, they are representative of the stated views when they were written. The following examples of some slayers' positions have been chosen specifically because they can have a direct bearing on how animals are perceived and consequently treated.

Heyes, a laboratory psychologist, denies that evidence gained by observing animals in natural settings is particularly relevant to understanding animal minds. She (1987, p 124) writes 'It is perhaps at this moment that the cognitive ethologist decides to hang up his field glasses, become a cognitive psychologist, and have nothing further to do with talk about consciousness or intention.' In her criticisms, Heyes concentrates heavily on laboratory studies (see also Heyes 1993). One possibility that needs to be considered in more detail is that there are events that occur in the wild, that while difficult to study, may help to provide some of the evidence about animal cognition, including mental state attribution, that she claims is lacking.

Another slayer, Wasserman (1993), makes no attempt to discuss critically current literature and comfortably claims that 'Griffin's (1978) call for a cognitive ethology *appears* to be a throwback to a prescientific analysis of behaviour in terms of conscious experience' (p 223; my emphasis). Furthermore, Wasserman concludes that 'There is simply no clear or necessary role for subjective experience to play in behaviour . . . ' (p 223) and that the study of mental experience '*might* not be a fitting topic for scientific inquiry . . . ' (p 223; my emphasis). While there is equivocation in these claims, Wasserman does not tell us about the sources underlying this uncertainty. Nonetheless, cognitive ethology is dismissed as an unsuitable candidate for a viable field of scientific inquiry.

Unlike Heyes, who thinks that animal cognition can at least be studied in the laboratory, some slayers argue against the study of animal cognition on the basis of a philosophical view about the privacy of the mental (eg Williams 1992, p 4). It is ironic that these claims, which can only be defended in non-empirical, philosophical fashion, are produced by critics who would typically regard themselves as hard-nosed empiricists. Cognitive ethologists do empirical work, yet slayers who argue on such philosophical grounds rarely analyse that empirical work to see what it is designed to show, and whether it in fact does show this. Instead, they base their arguments on claims that are as fraught with interpretative difficulty as the cognitive conclusions they wish to deny. This unwillingness to engage in debate about

the actual empirical work of cognitive ethologists gives the impression that many slayers simply barge in, declare victory, and leave without genuinely engaging cognitive ethologists in a dialogue about their work. Thus, Kennedy (1992) is very critical of cognitive ethologists for fostering all sorts of ills, such as being too anthropomorphic without hard data, but he then feels comfortable claiming that there is a genetic basis for anthropomorphism. He writes (p 167) 'In conclusion, I think we can be confident that anthropomorphism will be brought under control, even if it cannot be cured completely. Although it is probably programmed into us genetically as well as being inoculated culturally that does not mean the disease is untreatable.'

Other dismissive tactics used by some slayers involve grounding their criticisms on very narrow bases. For example, Cronin (1992) thinks that Griffin, a 'sentimental softy,' and other cognitive ethologists are only concerned with demonstrating cleverness, and hence consciousness. She writes 'For Mr Griffin, all this [cleverness] suggests consciousness. He's wrong. If such cleverness were enough to demonstrate consciousness, scientists could do the job over coffee and philosophers could have packed up their scholarly apparatus years ago.' Not only is Cronin wrong about slaying the field of cognitive ethology because of the difficulty of dealing with the notion of consciousness, but she is wrong to think that demonstrating cleverness is a simple matter. Cronin also slides from claiming that for Griffin, cleverness *suggests* consciousness, to claiming that his view is that cleverness is ' . . . enough to demonstrate consciousness.'

Cronin also claims that at least chimpanzees are conscious and places herself on a slippery slope. She writes 'Well, I know that I am conscious, I know a mere 500,000 generations separate me from my chimpanzee cousin, and I know that evolutionary innovations don't just spring into existence full-blown – certainly not innovations as truly momentous as our hauntingly elusive private world.' Why did Cronin stop with chimpanzees? After all, if evolutionary innovations do not spring into existence full-blown, where did chimpanzee consciousness come from? Her phylogenetic argument can not be assessed directly; behavioural evidence is needed to help it along (see references above).

With respect to the sorts of explanations that are offered in studies of animal cognition, many slayers and some sceptics favour non-cognitive explanations because they believe them more parsimonious, more accurate and simpler than cognitive alternatives, and less off-putting to others who do not hold the field of cognitive ethology in high esteem (Snowdon 1991; Beer 1992); this is not necessarily the case (Bekoff & Allen 1994). Despite the fact that trimming cognitive descriptions and explanations might be favoured by some of those who dislike cognitive terms, descriptions and explanations of behaviour that do not use cognitive terms, but rather resort to words and phrases that suggest that animals are mere automata (or *animats,* see below), can fuel the fires of those who wish to argue that because animals are automata they can be used in whatever way we please.

As mentioned above, proponents keep an open mind about animal cognition and the utility of comparative and evolutionary cognitive ethological investigations, and they see that their own and others' research can be helped along by taking a cognitive perspective. New areas of research can be opened up and old data can be reconsidered (eg Ristau 1991, p 102). Cognitive ethology conceptually may not be in any worse shape than highly regarded, related

fields such as cognitive psychology. While we are a long way from understanding the natural history of the mind, this should be viewed as a scientific challenge rather than grounds for depression or dismissal (Jamieson & Bekoff 1992b).

Cognitive ethology and animal welfare: how matters of mind can inform matters of welfare

Views on animal cognition clearly influence arguments concerning animal welfare. Interdisciplinary input from at least cognitive (and other types of) ethology, cognitive (and other types of) psychology, evolutionary biology, neurobiology, the veterinary sciences, animal husbandry, philosophy of mind and moral philosophy is essential for the study of animal welfare. Many who were silent in the past are paying more and more attention to ways in which the matters of mind inform matters of welfare (eg Dennett 1991, pp 448-454; Griffin 1992, p 251; many chapters in Cavalieri & Singer 1993). Indeed, Griffin (1992) considers ethics to be one of three major reasons to study animal mentality, the other two being philosophical and scientific. He also claims (p 251) that 'thoughtless cruelty is prevalent in some circles', but unfortunately does not tell us where. Byrne (1991, p 147) goes as far as to claim that 'If explorations of the minds of chimpanzees and other animals do nothing more than inform the debate about the ethics of animal use in research, the work will have been well worthwhile.' Clearly, cognitive ethology can inform questions concerning consciousness, beliefs about and of things (intentional behaviour), self-awareness, self-recognition, the evolution of cognitive skills, the importance of studying the social and the perceptual worlds (ümwelts) of the animals themselves, pain, suffering and the importance of individual characteristics and individual differences in welfare decisions (Bekoff & Jamieson 1991; Bekoff 1993; Dawkins 1993).

With respect to discussions of individual characteristics and individual differences (eg Rachels 1990; Bekoff & Gruen 1993), many take the view that research on animal cognition can be used to separate animals according to species membership. They adopt a speciesistic stance in which individual animals are lumped together into the species into which biologists place them, and species membership and not individual characteristics is used to make decisions about their well-being. For example, Mason (1979, pp 292-293) claimed 'On the basis of findings such as those reviewed in this paper, I am persuaded that the apes and man have entered a cognitive domain that sets them apart from all other primates.'

Consider these two general schemes:

HUMANS	HUMANS
OTHER APES	OTHER APES
MONKEYS	MONKEYS
NON-PRIMATES	NON-PRIMATES

We see here two different views, one in which humans are set apart from and above other apes and other animals (left) and one in which humans and other apes are set apart from and above monkeys and other animals (right).

One upshot of species type thinking that permeates discussions of animal cognition, despite a very weak database due to small sample sizes and methods that might not answer the questions at hand, is that there appears to be a change in how human primates, other apes, monkeys, and non-primates are placed along a hypothetical linear scale of cognitive competence. This practice in bad science could have serious consequences for the welfare of the animals involved. First, as Crisp (1990) notes, placing species on a single hierarchical scale is an exercise that is fraught with difficulties; a single 'ladder view' of evolution is a mistaken view of evolution because it cannot take into account animals with uncommon ancestries. Second, there are serious problems in deciding which criteria should be used and how evaluations of these criteria are to be made, even if one was able to argue convincingly for the use of a single scale (Bekoff 1992). To be sure, this view is speciesistic.

In the past, humans occupied a rung on the ladder above, and separate from, other apes; apes and monkeys were often placed together and non-primates were generally placed below primates. Now, how some people view other animals has changed. Thus, humans and other apes are frequently placed together, whereas monkeys are separated from other primates and placed above non-primates.

Why the change? While there may be many reasons for believing that some sort of partitioning of humans and non-humans is warranted, it is possible that the increasing demand for researchers to justify their efforts to funding agencies by noting similarities between the animals who they study and humans is somehow related to how primates are now perceived. Another factor may be a shift in cultural outlook that makes it more acceptable to class humans with at least some non-human primates. Also, non-human primates and human primates are generally perceived as being closer to one another, and lumping them together or placing them nearer to one another on a scale that pushes non-primates off to one side might simply be a more acceptable practice. Of course, this view promotes speciesism. If some people decide that some individuals, because they belong to certain species, are closer to one another than they are to other individuals who belong to other species, based on, for example, cognitive abilities, this decision – well-supported or not – may make a big difference to the way in which they are treated.

There are also other issues that are related to attributions or non-attributions of, for example, consciousness to animals. For example, by wrongly concluding that there are 'higher' and 'lower' species that are, respectively, conscious and unconscious, a view put forth recently by Sacks (1992), the way is paved for unjustified differential treatment. Indeed, the words 'higher' and 'lower' have fallen from grace among most scientists because they are difficult to define, even weakly.

The consideration of species rather than individual characteristics discounts individual variability. As a result, many people believe in and argue for the position that individual characteristics deserve more importance than species-typical features when making welfare decisions (eg Bekoff & Gruen 1993). The large amount of individual variation *within species* cannot be stressed too strongly.

The use of individual characteristics to influence ethical decisions is an important step forward because there simply are insufficient data to make sweeping claims relating cognitive abilities to welfare decisions on any broad species-level scale. As an example, consider the

phenomenon of what some feel comfortable calling 'self-awareness' or 'self-recognition'. Claims that some apes are able to recognize themselves in mirrors, whereas monkeys are not (Gallup 1982; Povinelli 1993) are certainly premature. In fact, only a few individuals have been studied, only a few individual apes have mastered the task set before them, only a few individual monkeys have been tested, and, of great importance, methodological difficulties abound (Rollin 1989; Platt *et al* 1991; Swartz & Evans 1991; Mitchell 1993a,b; Heyes 1994; see also Ruzzante 1992 for discussion of the difficulties of interpreting the results of mirror-image studies in fish). As Heyes (1994) notes, the results of primate mirror experiments may not have been subjected to critical scrutiny because they are consistent with assumptions about the evolution of intelligence (see also Povinelli 1993, p 503 for a discussion of how expectations about the evolution of mental state attribution can inform evolutionary arguments about self-recognition). Heyes 1994, p 917 concludes that 'If similar experiments had been claimed to indicate that clams and toads, or even cats and monkeys, were unique among non-human animals in possessing a self-concept, then they may have been viewed more critically.' The importance of subjective assessments about the theoretical and practical importance of the results of mirror-image tests is once again paramount. *Few would disagree that many more data are needed on a wider variety of animals, and few would disagree that we really need to work out just what are the possible connections between the ability to perform self-directed movements in a mirror and the type of treatment to which an individual should be subjected. The important question is whether or not these differences, even if they exist, are morally relevant differences.* Even if these differences are somehow linked to consciousness, their importance is questionable because there are certainly other measures of consciousness.

One very important contribution of a more comparative cognitive ethology will be the study of a wide variety of animals, and the use of their cognitive skills to influence welfare decisions. For example, Beck (1978) writes 'even herring gulls are cognitively active . . . If the evolutionary continuum of cognition proves to be so extended, Griffin's reminder of the implications for our care of animals must be amplified: 'cropping' an elephant is distasteful but cropping a thinking elephant is, to me, unthinkable.'

The least that we can ask is that people who espouse positions on how animal cognition informs their views on animal welfare understand the theory and data from which they are drawing their conclusions; unfortunately, this is not always the case (Carruthers 1989, 1992; Harrison 1991; for discussion see Johnson 1991; Jamieson & Bekoff 1992a, and Pluhar 1993a,b). For example, Leahy (1991) believes that one does not have to watch animals in order to learn about them (for review see Singer 1992), and Harrison (1991) claims that pain has no survival value (but see Bateson 1991 and Pluhar 1993a,b).

Despite a very large database demonstrating highly developed cognitive skills in many animals, there are those who claim that little or nothing has come from research on animal cognition. For example, Carruthers (1989, p 262), holds that '[a] conscious, as opposed to a non-conscious mental state is one that is available to conscious thought – where a conscious act of thinking is itself an event that is available to be thought about in turn.' Carruthers' definition is circular, for what is to be defined appears in the definition. He (p 258) also maintains that non-conscious mental states 'do not feel like anything' and have no 'subjective feel,' and are therefore without moral significance, and he also believes that since

'no one would seriously maintain that dogs, cats, sheep, cattle, pigs, or chickens would consciously think things to themselves' (p 265), it follows that the experience of most non-human animals is non-conscious. Because only conscious experience is morally significant and because most animals have only non-conscious experience, it follows that the experience of most animals is without moral significance. Hence, even the most trivial human interest should take precedence over the interests of animals, and we should rid ourselves of our feelings of sympathy for animals.

It is important to realize that Carruthers does believe that many animals may experience pain and pleasure, and have beliefs, desires, and intentions, and yet be entirely non-conscious. But the experiences of animals, including their pains and pleasures 'do not feel like anything.' Carruthers' thoughts border on being incoherent (Jamieson & Bekoff 1992b; Pluhar 1993a,b). For example, he does not show that the experiences he mentions really 'do not feel like anything' and that they have no 'subjective feel' and it is a logical error to infer that there may be organisms all of whose experiences are non-conscious, from the fact that some organisms who have conscious experiences also have non-conscious ones. Furthermore, Carruthers treats affective states – pleasure and pain – in the same way that he treats cognitive states and he assumes without argument that non-conscious experiences are without moral significance. Of course, something can be morally valuable even if it has no interesting relation to consciousness; one only has to think of arguments in environmental ethics.

Carruthers (1989) presents no rational grounds for eradicating our moral sympathies for brutes, and subsequently he has become less strident about his former position. He writes (Carruthers 1992, p 194): 'I shall by-pass the position defended in Chapter 8, that the mental states of animals are non-conscious ones. For this is, at the moment, too highly speculative to serve as a secure basis for moral practice.'

Carruthers does not stand alone. Others are equally dismissive of some important issues in animal welfare (eg Lansdell 1988; Howard 1993). Thus, Lansdell (1988, p 171) claims 'However . . . this elimination of pain for all aniamls (*sic*) . . . can hardly be a reasonable goal.' However, science is not informed only by factual evidence; one's personal views enter into how science is done, which includes how animals are treated. If we are not interested in eliminating *all* pain, then we might not try hard enough to eliminate *some* pain.

The 'not so cognitive' individual

When individual cognitive capacities are used for drawing lines along some arbitrary scale concerning what can and cannot be done to them, granting that an individual is conscious or capable of behaving intentionally and having thoughts about the future (for example) can greatly influence the treatment to which he is subjected. Using the word 'stupid' to refer to domesticated animals (Callicott 1980, p 30) when compared to their wild relatives can certainly influence how one treats an individual. Perhaps, as Szentágothai (1987, p 323) notes: 'There are no 'unintelligent' animals; only careless observations and poorly designed experiments.'

What might be some of the implications of discovering that some animals are 'not all that cognitive' – that they have relatively impoverished cognitive abilities and lives or that they have fewer memories and fewer beliefs about the future? First, we would have to show that

these so-called cognitive 'deficiencies' are morally relevant. Is having a sense of time and being able to foresee one's own death a morally relevant difference between humans and animals (Duncan 1993a, p 7)? Second, it could be argued that although some individuals' cognitive lives are not as rich as those of other 'more cognitive' animals, the limited number of memories and expectations that the former individuals have are each more important to them. Not allowing certain expectations to be realized is a serious intrusion on their lives, perhaps more serious than not allowing some expectations in animals with richer cognitive lives to be realized. As Gruen (1992) has pointed out with respect to death, a person who does not get home to write the play they have been thinking of and the dog who does not get to go for one more run by the river are both having desires thwarted to the same degree, totally.

Furthermore, as some have argued, if the memories of some animals are not well-developed so that they live in the present and do not have the ability to know about the passage of time into the future, then their pains have no foreseeable end. Thus, I might know that my canid companion Jethro's pain might end in five seconds, but he cannot know this on this account (see also Duncan & Petherick 1991, p 5021).

Related to this line of reasoning is the observation that many animals, even those for whom we would be hard-pressed to suggest a rich cognitive life (eg a lobster), take what are called self-regarding steps (Hannay 1990, p 154ff); they seem to try to remove themselves from situations that they find aversive, situations they seem not to prefer that resemble situations that normal human beings and other animals do not prefer either. Even if they do not imagine that there is something that is more pleasurable, and even if they are (some might say merely) removing themselves from a situation that is aversive, they seem to be showing some indication of displeasure and possibly pain. Not being able to imagine a brighter or cooler future does not mean that they are not in pain when they are dropped into hot water. They are acting as if they do not like the situation in which they find themselves and they may be trying to remove themselves from it without having a subjective experience of pain or a thought about the future. Mason (1994, pp 57-58) points out that there seems to be no good reason why self-awareness needs to be as a prerequisite for suffering, why 'the (self-aware) feeling 'I am suffering' [should] be considered worse than the (not self-aware) feeling 'Something truly terrible is happening''.

Nonetheless, it is possible that there is a difference between a preference for cool water rather than hot water and having a preference to live. DeGrazia (1991) claims that if a struggle for survival is not accompanied by a particular mental state, then it fails to reveal a preference to live. DeGrazia's claim forces the following issue: we must be sure that there is *not* a particular mental state – perhaps a mental state with which we are unfamiliar – that is associated with a preference shown by an animal who we think is 'not all that cognitive', and we must remember that this remains largely an empirical question. It is possible that some animals experience pain and suffer in ways that we cannot yet imagine, and it would be wrong now to conclude that their responses to various stimuli do not count in welfare decisions – that they are similar to the various tropisms shown by plants (see Lewis 1980 for a discussion of pain that concerns itself with the possibility that others who act nothing like we do when we feel pain nevertheless really do feel pain). As Bateson (1991) points out, it was rare in the past to find people taking seriously the possibility of insect pain, but now

there is a lot of interest in this area (see also Orlans 1993). Despite their shortcomings (Duncan 1992, 1993a; see also Kaufman 1994), it is possible that preference tests that are developed for a broad spectrum of animals would help to shed some light on the phylogenetic distribution of sentience. This is a challenge for the future because when animals do not do what we expect them to do or when they do nothing, it is possible that they are not motivated by the situation that we create – there are as yet unknown factors that influence their behaviour (Rozin 1976; Cheney & Seyfarth 1993).

Now, the minimalist might want to argue that having a more impoverished life might be a morally relevant difference, but she can't have it both ways. If there are fewer memories or mental states, each of which matters more, then we have to be sure that we do not forget this in our moral deliberations. Removing a calf who is to become veal from his mother might be agony for the mother, for her calf is all she has at the moment. She cannot, it seems, anticipate having another calf in the future, but even if she could have this thought, this would not in any way justify removing her present calf. Furthermore, if my companion Jethro's pains are interminable for him, then causing him pain would be more serious than causing pain for someone to whom you could tell that it would only last for five seconds. But, intentionally causing him pain might still be wrong even if he *could* know that it would only last for five seconds.

For those who look to studies of humans in order to find some relevance for these sorts of arguments, there might be some strong connections. Consider humans who Dresser (1993) calls 'missing persons'; those who are seriously demented and mentally disabled. These people have impoverished mental lives, but it is possible that each of their few memories is more important to them than many of the memories of unimpaired humans.

Some conclusions: how can matters of mind inform matters of welfare?

What do we need and what can we learn from cognitive ethologists?

1. Obviously, more data are needed. There are no substitutes for careful observation, description, experimentation and explanation. The use of guidelines provided by Konrad Lorenz and Niko Tinbergen in their own ethological studies can be very useful in the study of cognitive ethology (Jamieson & Bekoff 1993). Broadly comparative studies in applied cognitive ethology will be especially important, and we must look to the animals themselves for help in coming to terms with their points of view (Dawkins 1990). This will mean going beyond animals who look like humans or act like humans, extending our database beyond those species with which we are most familiar, and thinking about the different sensory worlds of animals in which vision is not of great importance. While there are advantages in working with animals who rely strongly on vision, and while 'proving that 'out of smell is out of mind'' (Duncan & Petherick 1991, p 5021), we must expand our studies into the various sensory worlds of animals. Most importantly, we might discover that although visual stimuli are (or seem to us to be) of paramount importance, other sensory modalities are very important as are interactions among them. Of course, we should be careful to note that data that bear on cognitive abilities may have little to do with pain and suffering.

2. More concentration is also needed on individual differences in cognitive abilities; sweeping generalizations concerning the 'typical' behaviour of species are often misleading because of great intraspecific variation in behaviour and in the performance of behaviour patterns (eg tool use, McGrew 1992) that are often cited in establishing generalizations about cognition.
3. Help is needed from many different disciplines (Sandoe & Simonsen 1992; Fraser 1993; Mason & Mendl 1993; Mench 1993). In these joint efforts, open minds and pluralism would be useful at this stage of the game. Philosophers need to be clear when they tell us about animal minds and those who carefully study the behaviour of non-humans need to tell philosophers what we know, what we are able to do, and how we do our research. If it is because philosophers do not have the experience with empirical work which would allow them to make realistic suggestions for experimental design, then it would be useful for philosophers to watch ethologists at work. Even then, it may be that ethologists are ill-advised to look to philosophers for crisp and empirically rigorous definitions of consciousness and intentionality (for example), even if some philosophers promise to provide one (C Allen pers comm).
4. Open-mindedness and patience are essential because the questions with which cognitive ethology deals are difficult, and easy answers are not rapidly forthcoming. Furthermore, difficult does not mean impossible.
5. The absence in non-humans of language as we know it does not doom the field of cognitive ethology (Weiskrantz 1988; Bekoff & Jamieson 1991; Dawkins 1993). As Dennett (1991, p 446) notes: 'heterophenomenology [cognitive ethology] without a text is not impossible, just difficult . . .'
6. Careless and premature line-drawing and getting on slippery slopes that could lead to parades of horrors should be discouraged. Once again, as Dennett (1991, p 453) points out, if we start treating '. . . corpses as garbage, it might change the way that we treat near-corpses, those who are still alive but dying.'
7. It needs to be decided if there are morally relevant differences in cognition and, if so, why we think this is the case. As DeGrazia (1991) and Rachels (1990) emphasize, a difference between individuals that justifies one sort of difference in treatment might be irrelevant in justifying another difference in treatment.
8. When uncertain about the possibility of an individual's sentience, we should err on her side. Dennett (1991, pp 451-452) agrees, but is more guarded. He writes:

   'But in the absence of positive grounds for imputing suffering, or positive grounds for suspecting that such positive grounds are for one reason or another systematically concealed, we should conclude that there is no suffering. We need not fear that this austere rule will lead us to slight our fellow creatures. It still provides ample ground for positive conclusions: many, but not all, animals are capable of significant degrees of suffering. A more persuasive case in support of humane treatment can be mounted by acknowledging the vast differences in degrees, than by piously promulgating an unsupportable dogma about the universality and equality of animal pain.'

Some possible problems with this perspective include questions such as: a) What are 'positive grounds for imputing suffering' or for *suspecting* that they are concealed? b) What is a 'significant degree of suffering'? c) How can we measure differences in degrees of suffering and are they morally relevant?

Answers to these and other questions await broad comparative study. Frank discussion of relevant issues should be invited, recognizing fully that there are no simple solutions (Bekoff & Hettinger 1994). While the desire to learn as much as we can about the behaviour of non-humans is laudable, studying animals in the laboratory and in the field intervenes in their lives, no matter how careful we are to tread lightly (Bekoff & Jamieson 1991, 1994; Farnsworth & Rosovsky 1993). Trapping animals, marking animals, doing playback experiments and changing the size and composition of social groups, for example, can be extremely disruptive, and the highest of ethical principles must be adhered to in our efforts. Field researchers are able to study the behavioural effects of the techniques that are used to study wild animals to determine if there are behavioural changes that might influence the validity of the data that are collected (Laurenson & Caro 1994), and their subsequent use or misuse in decisions about how individuals are treated. In some cases it might be impossible to justify the ethical costs of doing what needs to be done, and suitable alternatives will have to be developed or some questions might have to go unanswered for the time being.

Recently, White (1990) claimed that the use of animals is not a moral or ethical issue, not recognizing that he had, indeed, taken a position. Hardy (1990, p 11) has concluded that a detailed exploration of problems associated with animal welfare '. . . must be consigned to those who have independent sources of wealth, no family obligations, and a lamented shortage of concrete worries.' These are views that should be readily dispensed with. Everyone needs to be concerned with the treatment to which non-humans are subjected. We must not only think of the animals when it is convenient for us to do so. While some countries are devoting a lot of effort to applied ethological studies that centre on issues of animal welfare, others, including the United States, seem to be lagging behind (Duncan 1993b; see also Gavaghan 1992). Thinking deeply about the welfare of non-humans is an obligation that all humans must take seriously, and barriers should not be created that deflect attention from these important matters (Serpell 1986; Arluke 1993; Plous 1993). Viewing animals as robotic animats (Meyer & Wilson 1991; Meyer *et al* 1993), while of heuristic importance, must not spill over into our moral deliberations about animal welfare; live animals are certainly not merely animats.

If we forget that humans and other animals are all part of the same world, and if we forget that humans and animals are deeply connected at many levels of interaction, when things go amiss in our interactions with animals, as they surely will, and animals are set apart from and inevitably below humans, it seems certain that we will miss the animals more than the animal survivors will miss us. Certainly we cannot let the animals suffer because of our inability to come to terms with difficult issues. Anecdotes, anthropomorphism, common sense, sympathy and compassion (Fisher 1987), and scientific data all have an important place in our deliberations about the animals for whom we speak; none, taken alone, including science (Tamas 1991 p 354ff; Dupré 1993), can deliver. This is not to be anti-science, for questioning science will make for better and more responsible science (eg Rose 1992), and lessen the chance that mistakes of the past will be revisited.

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