Animal Consciousness as a Test Case of Cognitive Science

Some Theses

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§1 Animal Minds?

In our dealings with animals at least most of us see them as conscious beings. We say "the dog *feels* pain" ascribing sensation. We notice "My cat *wants* to get in the kitchen because *she thinks* there is some cheese left" ascribing beliefs and desires. On the other hand the employment of human categories to animals seems to be problematic. Reflecting on the details of human beliefs, for example, casts serious doubt on whether the cat is able to believe anything at all. These theses try to reflect on methodological issues when investigating animal minds. Developing a theory of animal mentality seems to be a test case of the interdisciplinary research programme in *cognitive science*. From the philosopher`s perspective the most pressing problem is how to talk about animal minds. Can we just employ the vocabulary of human psychology? If not, exploring animal minds contains the non-trivial task of introducing a terminology that allows to see the distinctness of animal minds *and* to see its connection to the human case. Dealing with that problem can by a genuine job for a philosopher of (animal) mind in cognitive science. So the title "animal consciousness" may be a misnomer to start with. Speaking of "animals" without qualification is another misnomer. Within the animal kingdom we should expect quite different cognitive abilities. An ape may do what a monkey can`t, a monkey what a mouse can`t, a mouse what a tuna can`t … up to insects or some phyla where there is no mind at all. So we have to pay attention to this as well.

§2 How To Explore Animal Minds?

Which is the science to study animal minds? There is no single of the empirical sciences that covers all ingredients of a theory of (animal) minds. We need behavioural concepts as well as neurophysiological evidence. We need evolutionary considerations as well as simulation. *Cognitive Science* is defined as such an interdisciplinary research programme (cf. Green et al. 1996). Including philosophy of mind, psychology, neurophysiology, information science, artificial intelligence, and cognitive linguistics the treatment of some topic has to reach a *reflective equilibrium* (cf. Tersman 1993) between our intuitions and a phenomenological approach, philosophical conceptual analysis and various empirical approaches and model building. Reflective equilibrium means in *this* context that we have to reach a *coherent model* which incorporates as much of our intuitions concerning animal consciousness and integrates at the same time the findings of the different co-operating sciences. In doing this none of the approaches is favoured. There can be various trade-offs in case of conflict.

Investigating animal consciousness seems to be especially difficult since one can ask whether our usual concepts of human cognition should be applied to animals or whether our phenomenology can be used at all as a heuristic device. On the other hand the treatment of animal consciousness might be a test case of various trade-offs and checks between, say, philosophical definitions of mental terms as to be applied to animals, neurophysiology, our reflected intuitions and ethological model building based on a computational theory of animal minds. For example the intuitive intentional description of a bug is given up as unwarranted anthropomorphic given that the bugs behaviour can be simulated by a little robot, which certainly is no intentional system. The neurophysiological guideline to look for human like neurophysiological structure excludes non-vertebrates as candidate for awareness but is disregarded with respect to cephalopods since they exhibit intelligent behaviour (e.g. in a maze). Our mental terms as applied to humans and tied to the human phenomenology set the agenda for looking for animal cognitive abilities. There is, however, a first stumbling block on that road:

§3 Starting From A Theory Of Human Consciousness Is A Dead End

Turing recognised that the question „Can machines think?“ will be decided immediately if one were to start from the then existing understanding of the two terms. If “thinking” is defined as a genuine human faculty and “machines” as something like a steam engine the question is answered by definition. Something like that applies here. Consciousness as we know it from the human case has a highly complex structure. Especially it can be argued that consciousness in the human case is identical or unseparatable from self-awareness. Philosophers from the mentalist tradition (Kant, Neo-Kantianism), the phenomenological movement (Husserl, Sartre and others) and some analytical philosophers (like Chisholm or Castaneda) have tried to capture how being conscious involves being aware of being conscious, being immediately aware of oneself (as being conscious), being aware of being the agent of the acts of consciousness, being aware of oneself in distinction to oneself as picked out by some description – and so on. Human consciousness contains an ego (an I) in distinction to the self. The I can be analysed into either different aspects/faculties of the I (like being the–“transcendental”, “not objectifyable”–agent or being the one unifying different mental acts into one consciousness) or the I can be divided into different Is (the “empirical I”, the “transcendental ego”, the “praereflexive cogito”, the “I think” etc.). There are to be kept apart a dozen or so types of mental states with respect to awareness: explicit thought, higher order thought, inner speech, tacit knowledge, explicit higher order thought, self-monitoring – etc. There are to be kept apart at least three instances: the self (a complex of biographical knowledge making up an individual person), the functional I (which although *as a token* coupled to a self contains the operative faculties in awareness which are shared by normal humans), the tacit I (corresponding to the functional I in tacit mental operations).

Human consciousness cannot be separated from self-awareness explained thus. I won`t go into the details here (cf. Bremer MS), but it should be clear from these hints that human consciousness is a very complex structure the explication of which in philosophy employs a fine grained model of (theo-

retical) mental actors or instances. Once you look at this complexity which has to be preserved whatever theory or approach you favour, I take it to be absurd to ascribe this structure to even highly developed mammals.

We cannot put ourselves in a state of mind which corresponds to some kind of consciousness below human consciousness. Whether there is something like that cannot be decided phenomenologically. We should at least assume that there could be something like that to leave the question of animal consciousness open. But methodologically we have to keep in mind two things:

1. a distinction is blurred if we speak unqualified of "consciousness" in this case. There might be a wider concept which contains the human case but still this concept would have to be introduced by a term distinct from "consciousness" which is tied to the human case. Here I start with the term "awareness" trying do denote the faculty to feel something without deciding whether the feeling entity knows that it feels or is an ego knowing itself.
2. it would misfire to list the features of human consciousness (i.e. self-awareness) and then set out to find these in animals. We should start from animal cognition in the diversity of cognitive/mental faculties. Human cognition contains–related to consciousness–faculties like forming beliefs and desires, applying concepts, using language, modelling the action of others etc. If animals have something like these faculties they might have something like consciousness. So it might be more promising to investigate animal cognition from the bottom up then top down (starting with "consciousness").

In general it might turn out a fruitful attempt to start with human cognitive faculty x and see whether animals have *something like x*. From this *something like* way of rendering things a appropriate terminology of (animal) ethology can take off.

§4 Awareness in Vertebrates

Trying to separate awareness in general let`s find evidence for this kind of phenomenal consciousness in animals. We have to consider neurophysiological and psychological evidence, guess about an evolutionary function of awareness and compare the animal behaviour to the human case. Instead of giving a knock-down argument we consider clues (cf. DeGrazia 1996:97-128).

We can give an overview of the evidence and arguments in the following grid:

Type of evidence	Positive evidence	Negative evidence
Neurophysiology (cf. Churchland 1998:40-41, 77, 144, 420-33; DeGrazia 1996:90-91, 105, 135)	- Presence of noiceptors (pathways for pleasure) and morphins - Areas governing pain similar across vertebrates - Structurally similar brain to humans in vertebrates (and CNS) - Sympathetic autonomous nervous systems in vertebrates	No CNS in insects, quite different brain structure in insects and (some) fish.
Ethology	- Adaptivity to novelty - Pain behaviour - Anxiety behaviour (increased arousal, tension, inhibition)	Insects notably lack behaviour which protects injured body parts
Evolutionary	- Pain seems to focus attention to a harmful situation, event - Plasticity is required and might involve a central "theatre" of co-ordinating input	Pain might be absent in insects because there is no selective pressure to protect the individual body because of the short life span.
Psychology	- Pleasure supports learning - Perception can be *focused*	
Computational Model		Information processing need not be, and generally is not conscious
Robotics/AI (cf. Cruse et al. 1998)		Steering behaviour of some insects can be rebuilt in mindless little robots

So the evidence supports the thesis that vertebrates (and cephalopods) at least show some kind of awareness whereas it seems dubious whether insects do.

So whereas in the human case consciousness is equivalent to self-awareness there may be a level of awareness (compared to the human case somewhere below non-articulated explicit awareness) in organisms which have phenomenal states and distinguish themselves (in different degrees) from their environment and their flock. One may speculate to think of this awareness in vertebrates to be somewhat like the right hemisphere thinking in average humans; there has to be something functional similar to an "I think" lacking although the step to an explicit self-awareness. (An exception closer to self-awareness might be the great apes.)

§5 Evolutionary Continuity

One could think that there is a simple evolutionary argument for some kind of animal consciousness once we consider the evolutionary function of consciousness:

1. Consciousness has developed and has been maintained in evolution since it has a function.

2. When we look at our studies of evolutionary development we see that each feature which developed had some precursors in evolution, different in some degrees.
3. Therefore we may assume there to be pre-forms of consciousness in animals.

Assuming (1) to be right and notwithstanding the problem that consciousness might be the exception to the inductively established rule mentioned in (2) the main problem with this kind of reasoning is that it presupposes that consciousness admits of degrees. But seen from human phenomenology this seems to be straight wrong: consciousness/self-awareness is an all or nothing affair; you might be dizzy or drunk, but you either are conscious or you are not. There is no fading or flickering of consciousness (cf. Chalmers 1995). So if consciousness does not come in degrees, it might jump from an evolutionary mutation without precursors. If there are different *kinds* of consciousness that might be another affair, but they do not differ in degrees.

From an evolutionary perspective we have to find a function for each cognitive trait of an animal. Only because it is adaptive to some problem did the trait survive. If benefits outweigh the costs an attribute will evolve and be incorporated into the living system. Taking the *Darwinistic stance* is to attempt some reverse engineering (cf. Dennett 1995:48-60, 187-228): a trait occurs as a solution to an engineering problem relative to the organism`s environment. An evolutionary process must also subserve the maintenance of the behaviours and structures that evolved. This has several consequence for our problem:

1. The intelligence we see in the behaviour of an animal really is the goodness of fit between some environment *and* the animal`s behaviour. Given a co-operating environment some behaviour may look intelligent to us which is just dump but fits the scene (cf. Budiansky 1998:27-33,125-26). Remember: We are looking at the survivors only.
2. Since evolution has no foresight there are all kinds of side effects some of which might turn out to be beneficial. A side effect can originate with a single species distinguishing it from the rest of its branch in the tree of evolution.
3. Adaptations occur relative to an environment they fit it. Since the environment sets the problems we arrive at constrained cognitive faculties: You are only as smart as you need to be to have enough offspring. Everything else would be wasting energy. So with respect to cognitive faculties assumed in animals we should ask “Does it really need this?”

So if all members of a bird species show some behaviour to lure away predators from their nest this is no sign of clever cunning but a hard-wired adaptation. Some pet behaviour looks intelligent to us since we *are* a most co-operating environment. Even complex behaviours might be analysable as a sequence of mindless steps each of which is fired by its predecessor (e.g. nest building in weaver birds).

There are, of course, evolutionary arguments why some cognitive trait might be possessed by some animal. In distinction to plants which follow isolated features of their environment (e.g. a sunflower ‘moving’ the head with the sun) animal behaviour shows plasticity. Animals possess *tertiary heuristics* (Plotkin 1994), i.e. they have the ability to extract information out of a changing environment. This

has to involve *representations* of some kind. It was required evolutionary to stay alive in a unpredictable environment ("predictable unpredictability"). Pure instincts cannot deal with that. Once behaviour exhibits plasticity there might be a function for awareness as setting priorities between inputs ("Mind the pain first!").

§6 Concepts And Systematic Recognition

In philosophy one might ask first what concepts are. Are they abstract entities, symbols in the mind, patterns of behaviour or what? Does being in possession of a concept mean to have some mental representation, to manipulate some symbols or to show a systematic pattern of behaviour? These are important questions, but more important are the properties philosophers think concepts have. We start here with an elaborated theory of concepts–a clear concept of concept so to say–and then consider whether it makes sense to describe some animal`s discriminatory abilities as possession of concepts. Concepts are:

- *fine grained* ("the older brother" is distinct from "the first son" even if coextensive)
- come in a *system* (given an even moderate holistic account of meaning)
- are *socially acquired and employed* in conditions of fit (at least a lot of concepts)
- some might be causally rooted (given a moderate account of observation language)

If there is an analytic/synthetic distinction concepts can be expressed by analytic statements. If there is not, a concept you have of x is given by the totality of what you (firmly) believe about x. In both cases–although the theory of meaning is different–concepts are meanings of linguistic symbols. In both cases the question of concepts is tied to the question of having beliefs and having language. What concepts you possess is revealed by your verbal behaviour. Since beliefs are conceptually tied to the other propositional attitudes to have a single concept means to show a very complex pattern of behaviour (cf. Davidson 1999).

Animal behaviour can neither be interpreted in a fine grained fashion (the dog doesn`t care about his owner being the older brother or the first son) nor is their employment of a supposed concept rooted in social behaviour patterns. Language would allow for fine grained belief ascription and the use of language shows command of the subjective/objective contrast essential to the concept of a belief or judgement. Unfortunately dogs do not have language (see §8). Having a *system* of beliefs means to keep this system coherent, so it requires the possession of meta-representations and *rationality*–things way beyond the dog`s mind (see §9 and cf. Bennett 1964, Davidson 1982, Shoemaker 1991).

Therefore animals possess no concepts in the sense we speak of human concept possession, especially no theoretical concepts. They possess *systematic discriminatory abilities* which are the precursors of concepts. Discriminating a cat is not having the concept CAT. If the *Language of Thought*-hypothesis is true (cf. Fodor 1975, 1987) and some animals have something like our language of thought then with respect to some observational concepts they might possess the core of what makes an observational concept in humans. We humans identify such a supposed language of thought symbol by the

intersubjectively shared distal stimulus. In animals it can be supposed given their discriminatory abilities and the way their brain resembles ours. Elaborated discriminatory abilities (cf. Allen 1999) consist in: (a) self-monitoring with error-detection (e.g. in pigs), which involves (b) an internal representation of what is discriminated and memory of how it has been done, so that this results (c) in an improvement of discriminatory abilities. Even if we do not call the involved mental representations and nodes in the animal`s categorisation scheme "concepts"–avoiding to blur important differences–they are something like *schemata*, precursors of concepts unfortunately being isolated instead of systematic.

§7 Belief Like States

Looking for intentional/propositional attitudes in animals seems as obvious as looking for sensation or awareness in general, but is confronted with a situation like the one with respect to concepts. We have a highly complex model of propositional attitudes in the human case (cf. Davidson 1982, 1984) which involves capacities that make it highly unlikely that animals have beliefs and desires *in that sense*. I divide the discussion into several reflections:

(a) Real intentionality or intentional stance?
(b) Why belief and desire like states at all?
(c) Belief like states aren`t beliefs?
(d) Can there be a theory of belief like states?

(ad a)

The *intentional stance* (Dennett 1971) can be adopted towards systems that do not have intentionality, but which can be described for some purpose as having it. In these cases the intentional idiom is employed only as a place holder for an explanation to come at the design or physical level of the system. You can talk about an ant in intentional terms: "The ant *wants* to get to the food and confronted with the *choice* between two paths *it believes* the right path to be the better." There is, however, a sufficient explanation at the *design level* of the ant, since ants are controlled by olfactory input: An ant looks for food that gives more energy than needed to get it, and confronted with two paths the shorter one will have, after a while of use by co-working ants, more ant scent, so the ant takes it. There might be animals in case of which the intentional description is the most simple or even the only one we have so far. Reduction to the design level might be possible in the future only. And furthermore there is a crucial distinction between inbuild intentionality (i.e. control of behaviour by some computational level that the system need not be aware of) and intentionality coupled with awareness of the intentional state. So we may to be able to interpret the mouse in intentional terms, and maybe the mouse is a computationally controlled systems, but that does not settle the question whether the mouse experiences states with different intentional content. Humans do, since they can represent their intentional states in language. Complete reduction is wrong headed in case of such systems that describe themselves *as* intentional, even if we could revolutionise the intentional idiom (cf. Bremer 2001:202-204). So–is it *like something* for the dog, ape… to be in the state *we* describe as "belief" or "desire"? The

instrumentalist attitude akin to the intentional stance is not–apart from being a heuristic–an option for a realist cognitive science not only including ethology but also neurophysiology and phenomenology.

(ad b)

Sentience, which we ascribe at least to vertebrates, must be connected to states of 'recognising' and 'doing' since otherwise there would be no point in having it (cf. DeGrazia 1996:129-36). These states need not be beliefs and desires in the full human sense (cf. [ad c]), but we often can explain animals using belief/desire-psychology, so the states they have have a similar role like beliefs and desires. Otherwise explanatory power within ethology would be lost. Desire like attitudes regulate behaviour within an *experienced* situation, so it would be queer if it was nothing like to have them.

(ad c)

Beliefs are fine grained (i.e. involve fine grained concepts). So beliefs require language, which is able to supply words with fine grained meanings, to their expression. Beliefs form a system that has to be coherent. Individual acquired new beliefs are not put in a belief bas, but have to be integrated coherently into your belief system. Therefore individual beliefs have to be represented as being believed ("I believe A", "I believe B", "So I believe A&B"). So having beliefs requires higher order beliefs and so requires having the *concept of belief*. Beliefs (as opposed to knowledge) live from a distinction between mere belief and true belief (i.e. they involve the concept of *truth* and the concept of mere belief). Higher order beliefs represent lower order beliefs using the concepts of belief and truth. Animals do not represent in language. So animals do not represent beliefs–at least as far as their awareness goes. There might be a tacit level of information representation that supports ascribing something like beliefs to animals. After all, applying belief/desire-psychology to animals seems to be successful. In that case the logic rests on the side of the ascriber, who is human, of course, and is merely built in on the side of the animal (assuming a kind of computational–language of thought(?)–level in the animal). Belief like states ("BL-states" for short) are not part of the accessible mind of such an animal, say a dog. The animals might have a content of awareness that as a sensation is tied to some BL-state, feeling "Wow!" in the BL-state with a content like "That smells real good! I wanna take a look there". We have no access to this representation. It cannot be like an articulated sentence, but the state a dog is in when expecting food is a state different from the one chasing a rabbit. Maybe these states are not just experiential states, their content might be more structured. So we should say that those animals which require an intentional description or the behaviour of which requires some kind of belief/desire-psychology have belief like states or desire like states.

(ad d)

A theory of belief like states would have to work itself bottom up towards belief. It would explain features of BL-states that serve their purpose without making them full-blooded beliefs. Building blocks of such a theory can be found in Bennett`s theory of *registration* (Bennett 1976:§§14-26): Registrations are more simple than beliefs, goals are more simple than desires, despite there being a structure similar to belief/desire-psychology. A system A registers p, if A is in a sensory state which is

similar to a p-operative state, a state being p-operative if a behaviour because of p was not accidental. Registering need not be transparent to A (even a Cruise Missile can register p), but given assumptions about what A registers we can suppose what goals A has. Registering does not require language nor does pure registering require awarenes. We approach belief like states when registering is supplemented with further faculties, for example being able to *learn* given conditional registrations or being a system that *strives* for new information to extend its behavioural repertoire. Developing such an account might give us BL-states which are not beliefs but serve their explanatory power in the animal case and allow for BL-phenomenology.

§8 Signal Systems Aren`t Languages

Once again we start with the human case. A language is a finite transformational system which given an alphabet and some axioms/start symbols generates a word set. Natural languages are:

(a) compositional (exhibiting structural rules that allow to understand the [new] whole given the meaning of the parts, which contains their logical function within the whole),
(b) productive (allowing to make infinite use of finite resources by rules of generation)
(c) discrete (the signs [phonemes, letters] can be kept apart by their physical properties)
(d) semantic (signs are symbols in that speaker and audience share the meaning [by convention]).

A language is a discrete combinatorial semantic system. Semantics governs sentence construction, there being mental modules accordingly explainable within a computational perspective (cf. Pinker 1994:83-125). Animals use sounds and interact using sounds, but it is a misnomer to call these interactions “language use”. Lets consider the characteristics of language in reverse order:

(ad d)

Animal signals are almost ever used to make some other animal do something. For this purpose it isn`t necessary that speaker and audience share a meaning (one vervet monkey says ~”I see a eagle” and the audience hears ~”Go to the trees!”). If meaning requires mutual knowledge (i.e. higher order beliefs and expectations) it is way beyond the animal mind, lacking ordinary belief. Even signing apes use 95% of their signs in imperatives. Nevertheless in these apes 5% of their utterance are used to refer to something. Chimpanzees can translate real-world objects into mental representations, but are surprisingly weak in doing the opposite (taking photos, maps etc. as a guide to the real world). They can transfer abstract ideas (e.g. COLOUR), pigeons cannot. Apes even seem to understand the abstract relation between an arbitrary sign and an object, but they cannot represent second order relations (cf. Premack 1976, 1983). The bee`s dance exhibits a causal chain of reference to food and the direction towards it, but apart from being inflexible and innate the use of the dance is imperative and used only by foragers (i.e. not all members of the species ‘speak’). Most animal language is stimulus bound and shows no displacement (of reference); dolphins understand references to objects not within their visual field. A lot of animal sounds (e.g. in squirrels) can be explained by the effects of their acoustic features (e.g. on attacking hawks).

(ad c)

Apart from apes and dolphins trained in sign use and sign language animals almost never use discrete signs. A dog has one type of bark, which may become louder and faster, but cannot be split into discrete units. Baboons grade their calls (intense barking signing warning to very intense barking expressing fear or commanding escape). Animals use *graded tokens* (cf. Dobrovolsky 1989). This applies also to whales. That severely restricts the possibilities of recombination.

(ad b and a)

Despite some claims to novel signs produced by trained apes there is no evidence for productivity and compositionality in apes. There seems to be a elementary sensitivity to word order in trained dolphins (cf. Schustermann et al. 1986) and some apes, but distinguishing word order is not syntax. Apes cannot produce structural innovation, but only lexical substitution. Dolphins 'only' form a learning set and transfer it to novel examples. Some birds (e.g. a chickadee) have combinatorial songs, but the units have no function.

Although there is no animal language there are complex patterns of animal sign use and animal communication. Although they make up no language they obviously involve several cognitive faculties and awareness of sign production in the animal itself or some of its flock. Some animals have the ability to *classify* objects and *to link* the classification system used to arbitrary signs for the purpose of communication/interaction with another animal. These faculties–especially in apes–go beyond awareness in general. The beginning of reference and use of pronouns can be situated in a level above BL-states and beneath language and beliefs. What is crucially missing in apes is a theory of mind which allows them to see their comrades as intentional agents.

§9 Self-Awareness And Theory of Mind In Animals?

Physical self-awareness (awareness which parts belong to one`s body) is present in many animals. As argued in §4 it seems absurd, however, to suppose cognitive self-awareness (an *ego* knowing *itself*) to be present in animals. Some have supposed that the use of pronouns (e.g. "me") in trained apes might be a sign of self-awareness, and most famous is the mirror recognition test (cf. Parker et al. 1994). This evidence has been contested (cf. Budiansky 1998:161-88), especially since some animals we otherwise would not rate as highly developed as the great apes (e.g. some monkeys, maybe even some ravens) pass the mirror test. Which behaviour could be the basis of an attribution of self-awareness? Having the resource to understand oneself, one would have the resource to understand others as (intentional) agents. Reasoning about others might even evolutionary precede reasoning about oneself. Some researchers training apes in sign language claim that *trained* chimpanzees, for example, are able to recognise intentions in other chimpanzees. A dolphin is aware of the effects of its behaviour on others; anecdotes are claimed to show that a dolphin can behave as if he knew that the behaviour was illicit and did it only when no people were around. Imitation also ascribed to some animals like apes would require understanding the other as intentional. Tomasello (1999) argues that animals lack the

required *theory of mind* and this being the decisive difference between a chimpanzee and a one year old child. One humans understand conspecifics as intentional which enables a new form of cultural learning and enables conventions (cf. Searle 1995). Non-humans do not see the world in terms of intermediate and hidden forces (i.e. causality and intentionality). So they cannot plan given an understanding of these forces. Non-human primates are quasi-intentional beings (having belief and desire like states), but they do not understand the world in intentional and causal terms. So they do not point, show, offer or teach. They learn not by understanding a conspecifics strategy but by focusing on clues in the environment. They see others as animate (not being stones, being unpredictable etc.), but not as intentional. Humans can take the other`s point of view and by internalising the respective communicative encounters form a medium of internal description and redescription of themselves and others. Higher order intentionality enables humans to have linguistic beliefs or beliefs at all.

Can an animal which has no beliefs be conscious/self-aware? Once again we are at a loss to specify *how* the animal is aware of something, what animal representations are like. Encounters with conscpecifics and ritualised behaviour in the flock surely have a distinctive feel to them. Animals like apes and wolfs that show ritualisation and co-operation seem to be on some level beyond the turtle and below the two year old child. The difficulty lies in outlining their representational resources. Theories of mind, on the other hand, that entail that animals have no awareness *at all*, since awareness requires higher order states (cf. Carruthers 1994, 1996), fly in the face of the evidence of most approaches in cognitive science and should be disregarded.

§10 Complex Behaviour and Miscellaneous Remarks

Lots of animals have been reported to use tools. Unfortunately “tool” is used very vaguely and use of tools cannot be sufficient nor necessary for intelligence or awareness, since some ants do it and gorillas do not. Many animals play with each other, so being able to communicate their goal to play (instead of fighting) and being able to teach their offspring by involving them in play.

Tools and play in animals are important for ethology since investigating them might be another methodological option. Allen and Bekoff (1997) investigate play and anti-predatory behaviour to search for animal consciousness. Whereas here we followed the lead of human capacities and looked whether they can be found in the animal kingdom taking them in isolation, it might be a helpful (heuristic) contrast to look at complex behaviour. In complex behaviour several faculties work in co-operation. The dog smells, sees signals and starts a behaviour using some object at the same time. The achievement of co-ordination itself might be evidence of awareness. There is a job to do for a central agent co-ordinating input/output-relations and focusing attention on the spot if necessary. Play seems even to involve higher order states, so there could even be a compartmentalized module of higer order representation involved in some activities but not present for general purposes!

Weighing this evidence with respect to animal cognition can also be seen as a test case of meta-theoretic principles: Dawkins (1993) appeals several times to the principle of *the best explanation*. There

might be non-cognitivistic explanations of animal behaviour or explanations that do not involve animal awareness but an appeal to the animal being aware of what it was doing might be the best explanation why it did what it did. Similar Griffin (1992) acknowledges that individual behaviours might be explainable by referring to unconscious mechanisms, but claims that in face of all the evidence it would be simpler to assume animal consciousness, thus appealing to *simplicity*. Adding to this that misunderstandings stemming from a misuse of concepts covering human capacities can be avoided–as hinted at in these theses–the burden of proof shifts to those trying to explain away supposed animal awareness.

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