Pro Pain

On the Role of the Phenomenon and Concept of Pain in Studying Animal Minds

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Pain and suffering are *prima facie* bad things. They are widespread. So the traditional argument against theism (the argument from evil) starts with them. Defendants of God's goodness either have to explain why there is evil (i.e. offer a theodicy) or have at least to show that the argument from evil has no force against theism. Alvin Pantinga (1985) distinguishes between offering a (positive) theodicy and countering the argument from evil (e.g. Plantinga 1996). The traditional defence against the argument from evil sees evil as either a unavoidable consequence of human freedom or a consequence of human freedom after the fall. This defence applies to evil as stemming from human action. But there is more suffering in the world. Assuming animals to be able to suffer, there is the pain of an animal in agony being killed by a forest fire caused by lightning. The free will defence of evil is of no use here except we assume the whole natural order to have changed after the fall (cf. van Inwagen 1988). Van Inwagen (1991) sets himself the task to account for this not human caused evil *without* giving a full fledged theodicy. The question is what could be the role of suffering and pain in the natural order. A role that could not be fulfilled by something else than pain[1]. A defence of God's goodness in the face of pain can argue along the two lines:

1. Pain plays a necessary role in a natural order that leads to human minds; since human minds are part of the purpose of creation, pain is unavoidable (and justified)[2].
2. The distribution and duration of pain might be adjusted just to its purpose, even if we do not see the connection.

In this paper I try to develop these ideas, focussing on (1). The perspective I take is that of investigating animal minds. Investigating animal minds is a test case for the interdisciplinary

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[1] For short I will speak of pain, meaning this to include suffering, both being *prima facie* occurrences of evil. *Suffering* if understood as involving the concept of being in pain or missing better circumstances might be beyond (most) animals, pain need not involve this and may amount to a mere phenomenal state (cf.§1).

[2] It is „unavoidable" given arguments – hinted at by van Inwagen – that human beings with freedom are part of the purpose of creation (involving maybe some pattern like evolution) and that a massively irregular world (a world ensuing if God by intervention would always prevent the occurrence of pain) is a defective creation. I will not discuss these points here, see (van Inwagen 1991 and 1988).

approach of cognitive science. The aim to develop an account of cognition by introducing appropriate terminology and reaching a *reflective equilibrium* between the approaches of the participating sub-disciplines (like neurophysiology, philosophy of mind, cognitive psychology…) comes into sharp view in case of animal minds (cf. Bremer 200x)[3]. Reflections on the difficulties we encounter here might help even with the study of human cognition. Pain, therefore, is considered here from a *methodological* point of view. I try to argue that both the *phenomenon* of pain or pain behaviour[4] as well as the *concept* of pain play a fundamental role in investigating animal minds, especially with respect to attributing awareness to animals. In distinction to other mental states the occurrence of pain seems obvious. The concept of pain seems to be a paradigm case of functionalism. The paragraphs in the first part (§§1.1 – 1.3) argue that the occurrence of pain or pain behaviour are inseparable from the occurrence of awareness in animals and from the supposed structure of animal cognition. The paragraphs in the second part (§§2.1 – 2.2) argue that pain is the paradigmatic case by which we – using a broadly conceived functionalist account of the mental – understand the workings of an (animal) mind from without and from within.

§1 The Role of the Phenomenon of Pain in Studying Animal Minds

Pain as we know it from the human case is a state of mind. A state for which it is *something like* to be in that state. Pain is a phenomenal state. You do not have to tell yourself "I am in pain" to be in pain, supposedly having pain does not require the possession of the concept of pain. With "the phenomenon of pain" I mean the occurrence of pain states and/or the occurrence of states, say in the brain, that correspond to these phenomenal states, and/or behaviour that is linked to these states.[5]

§1.1 Attributing Awareness

Pain plays a crucial role in attributing awareness (something like consciousness) to vertebrates and cephalopods and withholding attribution of awareness (and pain feelings) to insects. Starting from the human case of pain we derive two sets of criteria for attributing awareness (as being evidenced by being attributed pain):

1. Criteria based on similarities of neurophysiology, pain being the paradigm case for establishing mind-brain-relationships;

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[3] In the paragraphs 1.2 and 1.3 I adapt some material from the earlier paper.

[4] The relation between pain and pain behaviour has to be discussed, of course.

[5] In some cases it may be useful to use the tautological expression „phenomenal pain" to emphasize the pain as felt in contrast to the pain behaviour.

2. criteria based on pain behaviour, pain being a phenomenal state with a distinguished set of related behavioural symptoms.

Pain might not provide us with a knock-down argument for animal awareness, but it provides us with clues:[6]

In human neurophysiological architecture pain is channelled to the brain by way of nociceptors. Noxious stimuli applied to innervated body parts yield a message to the brain. The brain should be caused by this to initiate some motor activity protecting the inflicted tissue. In humans there are nerve endings in most bodily tissue that respond to stimuli like pinching that usually cause pain. Nociceptors respond to chemicals produced by damaged tissue, as well. Second-order neurons in the brain contacted by afferent nociceptors transform their impulses and might signal to further neurons, leading ultimately to pain recognition and avoidance behaviour. These nociceptors we also find in vertebrate brains (as we find there endogen morphins to alleviate pain by inhibiting the neurons linked to the nociceptors, it seems). The brain areas governing pain are similar across the vertebrates. We find structurally similar brains to human brains in vertebrates (including a CNS). There is also an autonomous nervous system in vertebrates.

From the behavioural perspectives pain behaviour is more easily identified then, say, starting to look for a mate because of arousal. Pain is more easily identified, since often it is caused or accompanied by bodily injury. Pain is unpleasant and, therefore, linked to a behaviour (or attitudinal state [cf. §1.3]) directed at its termination. Vertebrates in general show pain behaviour similar to humans. Rats, dogs, monkey etc. show changes in posture, vocalizing, temperament, locomotion/immobility and respiratory and musculoskeletal systems. They also show anxiety behaviour – supposing anxiety being closely related to pain or expected pain sensations – consisting in increased arousal, tension and inhibition of usual behaviour. Pain supports learning by avoiding the averse situation or stimulus. As long as an individual reacts strongly to a stimulus and learns to anticipate situation of that kind to avoid them, we have clear *prima facie* evidence to attribute phenomenal pain.

Using animals in pain research obviously presupposes the similarity of human and cat or primate pain; experimental designs in pain research on animals are developed by using stimuli similar to ones painful for humans, and looking for responses similar to those of humans.

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[6] For the following paragraph cf. Bekoff 1988: 263-69; Churchland 1998: 40-41, 77, 144, 420-33; DeGrazia 1996: 97-128; Dubner 1984; Fields/Price 1993; Short/Poznak 1992. Wall (Wall 1992) sees an "obfuscation of such terms as ‚pain'" here, since the attribution of pain given some criteria is even less regular in animal cases than in the case of humans (and their physiology or behaviour); he does not deny the phenomenon.

In distinction to vertebrates the evidence speaks against phenomenal pain in case of insects. In insects we find no CNS. Compared to humans and vertebrates in general there are quite different brain structures in insects (and some fish). Insects lack the central processing mechanisms of vertebrates. They do not have a nerve fiber system equivalent to the nociceptors we find in vertebrates. Insects notably lack pain behaviour which protects injured body parts in vertebrates (e.g. a spider loosing a leg). If they show behaviour given noxious stimuli, it can be classified as a startle or protective reflex (involving no central mediation). Pain might be absent in insects because there is no selective pressure to protect the individual in contrast to the kind given the short life span of insects. Simple neural reflexes fired by a noxious stimulus might be sufficient for a species of short-lived individuals.
To sum up: If you look for awareness in an organism, look for pathways of pain and complex pain (avoiding) behaviour.

§1.2 Evolutionary Consideration on the Role of Consciousness

There seems to be a simple evolutionary syllogism of attributing pain sensations to animals.

1. Pain 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, at least, pre-forms of pain in animals.

Assuming (1) to be right and notwithstanding the problem that pain 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 phenomenal states (as we know them from the human case) admit of degrees. But seen from human phenomenology this seems to be straight wrong: consciousness 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 the possession of phenomenal states does not come in degrees, it might jump from an evolutionary mutation without precursors. If there are different *kinds* of pains 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. We understand a trait by seeing how the creatures having it are better adapted with respect to

a challenge posed by their environment. Looking back (therefore it is *reverse* engineering) we recognise why a trait is built into a system. An evolutionary process must also subserve the maintenance of the behaviours and structures that evolved. Within this evolutionary approach we try to explain what the evolutionary function of being aware is. The phenomenon of pain might be crucial to make this clear. There has to be something like pain in an organism with multi-modal sensory input and plasticity of behaviour: There are (following Plotkin 1994) *primary heuristics* like the structure of our body which embody knowledge about our environment (the knowledge of gravity is *built in* in our shape). This hardwired or built in knowledge can usually not be accessed. It is given once the organism is there. *Secondary heuristics* are a little more adapted to changing situations. An example are plants which follow isolated features of their environment (e.g. a sunflower 'moving' the head with the sun). The secondary heuristic discriminates one feature of the environment, but it cannot be used to look for other things. In contradistinction to this animal behaviour shows *plasticity*. Animals possess *tertiary heuristics*, i.e. they have the ability to extract information out of a changing environment. A cat can adapt its foraging behaviour to new types of situations (places where it has never been or chasing animals, say newly imported guinea pigs, it has never seen before).

This has to involve *representations* of some kind. It was evolutionary required to stay alive in an unpredictable environment (showing "predictable unpredictability"). Pure instincts cannot deal with that. The animal with these representations has multi-modal input (to achieve a more coherent representation of its surroundings) and tends to some stimuli according to its learning history and its current goals (like feeding, mating, looking for shelter). Once behaviour exhibits plasticity there might very well be an evolutionary function for pain as setting priorities between inputs: "Mind the pain first!"

Being in a pain state has the obvious advantage of tending to immediate (bodily) problems within a highly complex environment. Multi-modal input and all the corresponding enticements given the animals goals could very well be dysfunctional if there was no alert system setting priorities. Pain is part of that system.

Evolution of a kind itself might involve pain *as building block*. A new kind evolves by mutation and selection of a more fit phenotype given the environment the animal lives in. Selection here is short hand for the elimination of the unfit. In case of sentient creatures the evolution of higher (more complex, more versatile) types of these creatures presupposes that some forms that do not optimally fit the species' environment die out. Those which die are, of course, individual animals capable of feeling pain: Dieing out involves pain. Without massive

ancestral pain there would be no higher animals or humans around. If the theory of evolution is our best theory to explain why we and other complex animals are around, the concept of pain is an indispensable part of that theory, pain – respectively – is an indispensable part of the world described by that theory.

§1.3 Sensitivity and Belief Like States

Talking about animal cognition usually does not start with talking directly about an animals states of awareness, but rather starts with ascribing attitudes or states like attitudes as we know them from the human case (beliefs, desires, fears…) to animals. 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. 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*. 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 build in 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. Now sensational states like pain might account for the presence of real belief like states in animals. 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). Pain would be entirely otiose if you could not do anything about it. Animal research – seemingly presupposing this connection – employs "behavioral animal models which utilize an operant escape response to electric shock as a measure of pain" (Dubner/Beitel/Brown 1976: 156; cf. Dubner 1984).

If we know or can justifiable believe that an organism is able to feel pain, this is at the same time reason enough to assume that this organism has some like attitudinal states, states which are directed at the objects which have given rise to the sensations. These states need not be beliefs and desires in the full human sense, but we often can explain animals using belief/desire-psychology, so the states they possess 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. 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 level in the animal). Belief like states 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 belief like state, feeling "Wow!" in the belief like 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. In any case the phenomenon of pain points us to the presence of these types of states.

§2 The Role of the Concept of Pain in Studying Animal Minds

In distinction to §1 let us now look at the concept of pain. A theory of animal cognition involves a model how cognition works, what cognitive architecture it is based on. The concept of pain contains how we conceive of pain, what are the conditions to employ the expressions "pain" or "is in pain" with respect to an organism. One major tradition in cognitive science (the tradition that really started cognitive science [cf. Fodor 1974]) is based on the computational theory of mind or functionalism. "Pain" is the paradigmatic case to introduce the functionalist's view. This concerns our use of the concept of pain as scientists. Besides that we can consider whether an animal possesses something like a concept of pain.

§2.1 Introducing Functionalism

Functionalism (cf. Lewis 1980, Lycan 1994) *defines* a mental state type by its functional relations to the individual's sensory input, other mental states and the individual's behaviour. The whole of these relations defines a causal role. Being a state of type α is being a state with that causal role that defines type α. Depending on the variants of functionalism pain states are either just those states that play the pain role (1^{st} order functionalism) or pain itself is identified with that very functional role (2^{nd} order functionalism). The whole cognitive system is described as a teleological unit at a computational level to explain its behaviour. Cognitive ethology, especially when using belief/desire-psychology, is nothing but a variant of functionalism, employed in this case to derive at a systematic theory explaining animal behaviour. The concept of pain is the concept of a functional state.

Pain is the paradigmatic mental states obviously accompanied by more or less distinct behaviour. Remembering what we have said so far that pain has a definite causal role (i.e. protecting tissue or avoidance behaviour) seems obvious, as well. It is, therefore, no accident that pain is the typical example in introducing or discussing functionalism. Taking pain to be defined by its causal role and being the typical functional states unites critics of functionalism with the functionalists (see, for example, Bennett 1976: §§1-3, 10; Lewis 1980; Lycan 1994; Putnam 1975). In the sense of "paradigm" introduced by Kuhn (Kuhn 1962) pain (respectively *the concept of* pain) is *the paradigm* for the computational theory of mind, and thereby for cognitive science.

§2.2 Triangulation and Theory of Mind

The highest developed cognitive faculties in animals we find in the primates, the great apes. With respect to them we can ask whether they have something very near to a conception of themselves (cf. Parker et al. 1994). Having a conception of oneself, however, presupposes to distinguish between oneself and others as different cognitive or animate agents. So: Do primates see their flock (and maybe other animals) *as* animate? This may require

discriminating them as having states of awareness, which involves on the side of the discriminating animal something like the concept of a phenomenal state. 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 (Tomasello 1999). They do not point, show, offer or teach. They learn not by understanding a con-specifics 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. 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. Nevertheless seeing another animal as animate attributes phenomenal states to this animal (even if this attribution does not proceed as employment of a belief/desire-psychology). This seems to involve the ability to discriminate phenomenal states in others or even involves the possession of the *concept* of pain (recognising that some other ape feels bad *given* its corresponding behaviour).

Secondly: Primates have been the object of linguistic studies. Over the years there have been several experiments to teach apes sign use or even sign languages as those used by humans (cf. Premack 1976, 1983). Now, understanding a language results from a period of teaching and engagement in language acquiring situations. Language teaching situations involve a teacher, a learner and circumstances which allow the use of the expression to be acquired. This constellation has been called "triangulation" (the angles being the teacher, the learner, the fact referred to). What does the acquisition of some term require on the side of the learner? In case of observational terms like "banana" the learner has to perceive the object (be in state of perception) and relate the salient feature of the percept (the qualia complex the learner is aware of) to the expression used by the teacher. The learner has to be in some (phenomenal) state, but she need not have any concept of being in such a state. The situation in case an expression for a feeling is acquired is quite different. First of all what functions now as the object? It might be some other animal or human pointed at, it might be the teacher to begin with, but at some stage in the learning process the object referred to (as being the bearer of the state talked about) is the learner herself. Acquiring the expression "is in pain" involves relating some observed behaviour (the third person perspective) to some phenomenal

state (known from one's own first person perspective[7]). The teacher is able to recognize the phenomenal state in the learner by observing some corresponding behaviour, and on that occasion conveys that that very state the learner is in *subjectively* shall be called "pain". Mental predicates have this dual aspects semantics (cf. Strawson 1959, Chap.3), on which also the functionalist theory of mind is based (cf. §2.1). Pain is the paradigmatic case of being introduced to mental predicates. By showing appropriate usage of the expression "is in pain" the learner shows that she has acquired (or linguistically expressed) the concept pain. An organism able to use mental vocabulary, therefore, has not only phenomenal states but also (precursors of) concepts of these states. An ape engaging in signing behaviour involving mental vocabulary at least gives *prima facie* evidence of its possession of these second level discriminatory abilities or even of concepts. And that is what some of the language learning apes did. They employed not haphazardly expressions like "anger", "surprise" and even "sadness" (sadness being not only pain, but involving an evaluative component) showing some kind of understanding what it is like for themselves or others to be in these states (cf. Miles 1993, Patterson/Gordon 1993). So basic feelings such as pain might be things that at least the great apes have (something like) concepts for.

Epilogue

Pain is a bad thing. I have not explained pain away. It seems to be, however, that you cannot have awareness without having pain. So pain might be a necessary evil. If that is so, the options of a theodicy based on more than human free will broaden. More has to be said though since this justification of pain is one for us as (cognitive) scientists. Nothing was said about the broader evaluative or affective dimension of pain and its relation to the question whether it is good rather than expedient to be sentient at all. Furthermore even a theodicy for us will not be one for the pig screaming in pain.[8]

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[7] I loosely use the expression „person" here to refer to apes, although these are not persons in the full sense of the word – substitute „first ape perspective" if necessary. Also I will not go into the discussion whether animals have concepts in the full sense or rather someting like systematic discriminatory abilities (see Bremer 200x, §6; Davidson 1999).

[8] On this debate see the papers by Joseph Lynch and Peter van Inwagen.

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