

# **WHAT'S WRONG WITH PAIN?**

A Thesis

by

**ADAM JOSEPH SHRIVER**

Submitted to the Office of Graduate Studies of  
Texas A&M University  
in partial fulfillment of the requirements for the degree of

**MASTER OF ARTS**

August 2005

Major Subject: Philosophy

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Approved by:

Chair of Committee, Gary Varner

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## **ABSTRACT**

What's Wrong With Pain? (August 2005)

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The experience of pain is something that most people are extremely familiar with. However, once we begin to examine the subject from an ethical point of view, and particularly when we examine so-called marginal cases such as nonhuman animals, we are quickly confronted with difficult questions. This thesis, through an examination of a particular feature of moral language and a description of recent research on pain, provides an analysis of how pain fits into ethical theory.

It is argued that universalizability is an important feature of ethical systems and provides a basis for claiming that an agent is acting inconsistently if he or she evaluates similar situations differently. Though the additional features prescriptivity and overridingness provide an important connection between moral judgment and action in Hare's two-level utilitarianism, it is argued that they ultimately lead to claims incompatible with lived moral experience. Arguments by Parfit and Sidgwick are discussed which tie acting morally to acting consistently, and it is concluded that self-interest theory is not a tenable position.

After the features of moral judgment are discussed, the necessary features of a moral subject are examined. It is concluded that sentience, or the ability to feel pleasure or pain, is a sufficient condition for being a moral subject. Arguments are examined that attempt to show which animals likely consciously experience pain. Difficulties for these

arguments are discussed and an original argument is presented that at least partially addresses these difficulties. It is concluded that from an ethical perspective our current practices such as factory farming are probably not justified. It appears especially likely that our treatment of other mammals is unethical, but the answers are not as clear with other animals. However, all of the conclusions are tentative, as no doubt future scientific investigation will shed more light on our knowledge.

## **DEDICATION**

To Laurie, who continued to fill my life with love and peace  
by braving the badlands of Texas.

## ACKNOWLEDGEMENTS

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# CHAPTER I

## INTRODUCTION

### 1. What's Wrong With Pain?

What's wrong with pain? In one sense, this question seems too absurd to answer. People don't need to be told why pain is "bad" because the fact is obvious to anyone who has felt it to a sufficient degree. However, once we move beyond the immediacy of the experience, the question is no longer so simple. Some people believe that pains are bad only when they happen to a particular kind of being or in a particular set of circumstances, while others think that they are bad in any form. Some people think that pains are objectively bad, as in a bad *about the world*, while others have argued that pains are bad only *for* the individual that experiences them. Progress in the sciences has also begun to challenge the coherency of our ordinary intuitions about pain, and as a result, it may turn out that some of the qualitative aspects often experienced as pain have nothing at all to do with the "unpleasantness" we perceive.

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This thesis follows the style of *Philosophical Psychology*.

One of the biggest practical challenges that needs to be addressed in relation to pain is deciding which pains we are to take seriously. Intense pains in normal, adult human beings are almost universally assumed to be bad for the individual<sup>1</sup>. However, once we begin to consider marginal cases such as developing embryos, severely mentally damaged humans, or nonhuman animals, opinions begin to diverge. This thesis will focus in particular on the pains of nonhuman animals, and especially mammals, in an attempt to provide a thorough analysis of just how seriously we should take instances of pain in these animals from an ethical perspective. Though I do not have the space to adequately consider other marginal cases, the analysis in this thesis will provide some useful new guideposts to look for when considering these other cases.

Along the way of analyzing whether nonhuman pains should be considered morally relevant, difficult ethical questions will arise. In particular, any argument for taking others' interests seriously will have to provide some justification for why one should act morally at all. Arguments need to be provided which explain why one should care about acting ethically rather than just acting out of self-interest.

Finally, it is becoming increasingly obvious that serious philosophical answers to questions about marginal cases cannot be given without an adequate understanding of psychology, neuroscience, and in general the relationship between mental states and a physical, third-person description of the organisms under consideration. These results, far more than the conceptual analysis philosophers had to rely upon for many years, have

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<sup>1</sup> To be more precise, these intense pains are assumed to be bad for the individual when (1) the pains are not experienced in order to achieve some more valuable reward, (2) they are considered apart from their ability to "strengthen the constitution" of the affected individual in the future.

the potential to provide robust evidence for claims for or against the suffering of nonhuman animals.

## **2. Overview**

Chapter II will begin by examining a particular feature of certain ethical systems, universalizability. Arguments will be given for why we should accept universalizability as a constraint upon any coherent ethical theory, and for why what I will call approximate universalizability is necessary for answering the question “should we take nonhumans’ interests seriously?” and even the question “should we take other humans’ interests seriously?” Further discussion will help to define approximate universalizability’s role in ethical reasoning, and an analysis of the role of two other features of moral judgment, prescriptivity and overridingness, will help to clarify the relationship between judgment and action. These two features are ultimately rejected, but it will be argued that universalizability can cover the same ground as theories that rely on those two notions.

Chapter III extends the discussion of approximate universalizability to argue against theories of self-interest. It will be argued that anyone who values his or her own interests, has adequate information, and acts consistently will also value the similar interests of other beings. The chapter will consider arguments by Sidgwick, Vendlar, and Parfit which support this claim. A section will also be devoted to arguing against the Cartesian ego, which provides a particular challenge to this argument.

Chapter IV considers what features are necessary for an organism to be considered a moral subject, which in this thesis will mean an entity that is capable of being the recipient of the consequences of a morally significant action. It begins with a review of Singer's arguments for the moral standing of nonhuman animals, and supports his conclusions using the notion of approximate universalizability. It will consider and reject arguments from a contractualist position, which has often been used to claim that nonhumans are not appropriate objects of moral concern because they cannot enter into agreements with moral agents. It concludes that any animal capable of suffering should be considered an appropriate moral subject.

Chapter V provides a review of current research on pain in humans. It will discuss many features of the human pain system, from the peripheral nervous system to the spinal cord to the brain mechanisms believed to be involved in the experience of pain. It will also describe how the traditional view of pain is being challenged by current discoveries.

Chapter VI analyzes two previous arguments by analogy in favor of the claim that nonhuman animals feel pain in a way that meets the criteria for moral significance established by approximate universalizability. It provides a distinction between nociception and pain, and considers in detail arguments by DeGrazia and Varner. It briefly discusses the structure of arguments by analogy.

Chapter VII discusses some problems raised for traditional arguments by analogy by Allen (2004, 2005). It discusses some recent research on the affective pain pathway in nonhuman mammals and argues that this research provides evidence against skeptical

challenges to the claim that nonhumans suffer. Though the arguments do not defeat the skeptics, they challenge them to provide more substantial scientific details to their theories in order to defeat the argumentative burden imposed by the precautionary principle.

Chapter VIII summarizes the argument and discusses what practical consequences follow. It also suggests that the results might be useful for discussions of other marginal cases in ethics.

## CHAPTER II

### FEATURES OF MORAL JUDGMENT

#### 1. Universalizability

To understand why many philosophers have argued that people should take some animals' interests seriously, it is useful to examine in more detail a particular feature of many ethical systems, universalizability. Universalizability, in most descriptions, is a feature that links moral thinking with rationality. For most ethical systems that have a universalizability constraint, to act immorally is to act inconsistently or to demonstrate a lack of knowledge. Hence, the motivation for acting morally comes in part from the desire to act rationally.

Universalizability is most famously associated with the moral theory of Immanuel Kant. The primary formulation of Kant's categorical imperative was the declaration, "act only on that maxim through which you can at the same time will that it should become a universal law" (Kant, 1785/1964, p. 421). Kant thought that if a person acted on a maxim that they could not will everyone else to act on in the same situation, then that person was acting irrationally.

According to an analysis by Marcus George Singer (1961, chapters eight and nine), a fully stated Kantian maxim would specify a goal or purpose that the agent is pursuing, the action by which they intend to achieve that goal, and the circumstances under which acting that way would achieve the goal. So if Jane was considering whether to steal a book from the library, we could use the following description to generate a maxim: Jane's goal is to get a textbook for her course without having to pay,

her circumstances are that she is in the university library and knows that she can easily escape with the textbook, and her action would be to steal the book. It can be easily argued that Jane's maxim is not universalizable. By imagining a world in which everyone acted according to the maxim (in other words, everyone who knew they could get away with stealing a textbook and desired to get the textbook without paying went ahead and stole the textbook), it seems likely that Jane would never have the opportunity to steal the textbook in this world. Either someone else would already have taken the textbook, or the library would have taken extra security precautions to prevent stealing because it would be common knowledge that everyone in that situation would steal the book. Jane could not both take the book in that situation and will that everyone do so in the same situation, because if everyone did so she would not be able to achieve her goal. So if Jane took a book in that situation, Kant could say that she is contradicting herself.

Kant's account of universalizability, though very influential, has some obvious problems. Perhaps one of the most important problems is that Kant does not give any guidance as to how specific or vague we are to be when we formulate a maxim for a given situation. By altering the specificity of our description, we can change a non-universalizable maxim into a universalizable one. For example, if we formed a maxim for a particular situation such as:

Goal: John wants to kill Harry.

Circumstances: John has a gun.

Action: John shoots Harry.

then it seems clear that John could not will everyone to perform similarly under similar circumstances, and hence would be acting immorally if he chose to shoot Harry.

However, if we describe the same situation as:

Goal: John wants to kill Harry to protect his family.

Circumstances: John has a gun; and if Harry is not shot he will harm John's family.

Action: John shoots Harry.

then John could will this maxim to become a universal law. John could consistently will that everyone shoot people if the shooting is necessary to defend their families. It would be easy to continue to add details to the description of the circumstances to again further change our evaluation of the situation.

Kant's version of universalizability attempted to show that acting immorally was irrational. However, different moral evaluations of the same set of circumstances could be reached by providing different descriptions. A moral system that allows such conflicting judgments about the same circumstances does not provide much guidance in everyday life and, probably equally disturbing for Kant, seems to be internally inconsistent. Hence, a different version of universalizability is needed to connect moral thinking with rational thought.

For the purposes of this thesis, universalizability will be treated as essentially the idea that we should treat relevantly similar situations similarly. If we accept universalizability as a feature of an ethical system, and we judge that in a particular situation person A ought to perform action X, then we must admit that any person also

ought to perform action X in any situation with all of the same relevant features in common. Accepting universalizability as a logical feature (or necessary feature) of all moral judgments ties moral thinking to basic rationality by making dissimilar judgments in similar cases a species of inconsistency.

Note that there is nothing special going on in applying the term “universalizable” to ethical language as opposed to other common words. If Sally notices certain movements on the part of Bill and declares that “Bill is running,” but, in a situation with all of the same relevant features in common declares, “Bill is not running,” we would rightly say that she is not using the term “running” consistently. Adding a universalizability constraint in ethics merely means requiring that ethical words be used consistently.

## **2. Exact Universalizability**

One way of thinking about universalizability, which can be called *exact* universalizability, is to consider two situations relevantly similar only if they share *all* of the same properties. If any ethical theory were not universalizable at least in this sense, so that it could generate contradictory proclamations about what one ought to do in the same situation, then the theory clearly would not provide much guidance as to how to act in particular situations. Most theorists (though not all) would say that such a theory is lacking a crucial component of what it means to be an ethical theory.

Philosopher R.M. Hare (1981) thought that exact universalizability (together with other features of ethical words to be discussed below) was all that was needed to

establish utilitarianism. If a person was deciding whether or not to perform a particular action then, according to Hare, she should consider what she would prefer if she had to undergo, in random order, the experiences of everyone affected by her action in that same particular situation. If the preference from another perspective to not perform the action would be stronger than her current preference to perform the action, then performing the action would not meet the criterion of exact universalizability. Hare thought that the only way to meet the criterion of exact universalizability was to make a decision based on weighing each of the preferences, or in other words imagining what it would be like to live through each life in random order (Hare 1981, p. 129).

Though I think Hare's two-level utilitarianism is a fruitful ethical theory (as will become evident later), the notion of exact universalizability described so far is not particularly helpful in answering the questions "should animals' pain matter?" or "should other people's pain matter?" It is clear that no nonhuman animal will ever be in exactly the same situation as a human, and in fact that no human would ever be in *exactly* the same situation as another human<sup>2</sup>, so before we can imagine what it is like to have the preferences of someone else in a particular situation, we have to have some way of establishing what features of the situation we are going to consider relevant. As Hare says, "we cannot, when making a moral judgment, be expected to ascertain all the facts that there are," and that consequently, "we need some way of selecting those facts to which we are going to attend" (Hare 1981, p. 89).

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<sup>2</sup> In other words, no nonhuman would ever be in a situation in which *all* of the properties were the same as a situation in which a human were in pain, and no particular person would ever be in a situation in which *all* of the properties were the same as another person being in pain.

### 3. Approximate Universalizability

With this in mind, a notion of approximate universalizability will be useful. In comparing two similar, but not exactly identical situations, it seems likely that many features will not be particularly relevant. For example, if we judge that it was wrong for the Grinch to steal presents from the Whos on a cold winter day, we would likely also judge that it would be wrong for the Grinch to steal these presents on a warm winter day. The outside temperature does not seem to be a relevant feature of whether we judge this particular kind of action to be wrong or not. Of course, elaborate stories can be made up where perhaps the temperature would make a difference; perhaps one of the Whos would have gotten a new winter coat for Christmas and thus missed out on an opportunity of trying it on for the cold winter day. But if we compare, say, 21.0004° Fahrenheit to 21.0003° Fahrenheit, it becomes clear that there are *some* differences in temperature that are not relevant to our evaluation of whether the action was right or wrong. Thus using approximate universalizability, two situations may be said to be relevantly similar if they have the *right* properties in common, even though they may not have *all* of the same properties in common.

One of the difficulties encountered with approximate universalizability, as opposed to exact universalizability, is that it is often difficult to decide which features are relevant for evaluation. Any attempt to give a systematic list of all of the important features to look for is destined to end in confusion or combinatorial explosion. However, it is not likely that this problem is particularly important, nor unique to moral reasoning. In fact, one of if not *the* most difficult problems for artificial intelligence

design, called the frame problem, is building a system that is able to pick only the features of the environment relevant to the system's goals (Shanahan 2004). If humans, or any other system, spent time and resources thinking about every possible feature of the environment, there would not be enough time to take the correct actions.

Nevertheless, when the alarm clock goes off in the morning, though the situation will never be *exactly* like all of the other times the alarm clock has gone off, we know how to turn the clock off. The reason we can do this is because we have extracted the relevant features from past situations and are able to conclude that the action that turned off the clock in those situations will also turn it off in the current situation. There is little reason to think that moral reasoning does not operate under similar rules. Though we cannot give an exact description of what is similar in the two Grinch scenarios with slightly different temperatures, our minds are able to recognize them as being relevantly similar.

It is this notion of approximate universalizability, I believe, that is at the heart of most arguments claiming that the interests of nonhuman animals should be taken seriously. Since it is generally taken as true that suffering in normal, adult human beings is a morally relevant event, ethicists argue that if animal suffering is a relevantly similar event, then animal suffering should be treated as being as important as that of humans. If we believe that animal suffering is relevantly similar to that of a human yet treat the latter as a morally significant event but not the former, we are being inconsistent. Though this kind of argument is most explicit in Singer's utilitarianism, other theorists

working from contractualist, rights-based, and deontological theories all make arguments emphasizing the similarities between humans and the other animals.

#### **4. Prescriptivity and Overridingness**

However, some have argued that no version of universalizability alone, even approximate universalizability, can show that one ought to take the pains of others seriously. For example, Gary Varner (2005) argues that it is impossible to pretheoretically rule out that some kind of natural law<sup>3</sup> theory is true, and that a true natural law theory could entail that being a Caucasian, or being born at time 12:34:07 AM, or any other bizarre feature may in fact make a morally relevant difference. Similarly a natural law theory might entail that intense suffering is not actually a morally relevant feature of any situation.

Varner claims that if we agree with Hare that prescriptivity and overridingness are also features of moral judgments, then the relevance of others' pains can be assured. Prescriptivity provides a connection between actions and moral judgments. To say that a moral judgment M is prescriptive, according to Hare's use, means that if one sincerely agrees to M then one will act according to that judgment in the relevant situations, other things being equal, i.e. if no other prescriptions to which one assents apply to those situations. To say that a moral judgment M is overriding, according to Hare, means that where other prescriptions to which one assents do apply, one will act consistently with

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<sup>3</sup> A natural law theory grounds moral norms in the nature of the universe, typically by claiming that God's will is reflected in creation and that humans can know God's will by studying nature.

M. In other words, though other judgments (such as aesthetic judgments) may suggest actions contrary to M, an agent will still act on M if the judgment is overriding. Hare (1949) points out that if a person were to say “one ought to do action A in situation S” but then the person did not do action A while in situation S, most people would claim that the person is acting inconsistently. This claim is controversial, but I think it is supported in Varner (2005).

Returning to the examination of how these additional features can overcome the pretheoretical inability to defeat natural law theory, Varner describes an argument that can be given against a moral agent (such as a natural law theorist) who thinks that causing pain X in a subject is morally permissible even though this pain is not necessary for any more important purpose. For the purposes of his example, Varner assumes that pain X has an affective dimension<sup>4</sup> such that if one is having X one necessarily has a desire to not have X any longer. Varner claims, citing Hare, that for the moral agent to know what it means that the subject would suffer an X pain, the agent would also have to have an aversion to herself suffering an X pain in a similar situation. But since, Hare claims, a prescription “has the property of entailing at least one imperative,” and since assenting to an imperative means acting accordingly to that imperative, it follows that the moral agent would be contradicting herself by causing X pain in the situation. This is because the agent would both be assenting to the imperative by acting accordingly with it, and not assenting because she herself would not be willing to agree to being caused an X pain were she in that situation.

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<sup>4</sup> The affective dimension of pain will be discussed in much more detail below.

However, I am not convinced that this argument defeats natural law theory in the way Varner claims it does. For to believe a natural law theory to be true that claims something as bizarre as “pains to blue-eyed people are morally significant but pains to brown-eyed people are not,” is to deny that moral judgments are in fact prescriptive in Hare’s sense. The bizarre natural law theorist would claim that we can assent to a prescription that we should sacrifice important, brown-eyed people’s interests for the sake of relatively minor blue-eyed peoples’ interests despite the fact that, if he were the blue-eyed person, he could not will the action to be done. Thus, they would simply deny that prescriptivity is a necessary feature of moral judgments. Fortunately, there are other reasons for denying natural law theories, such as the fact that they posit the existence of entities for which there is very little evidence. So the fact that some natural law theorists would not be convinced that prescriptivity is a necessary feature of moral judgments need not be taken as a serious objection to Hare’s theory, at least in absence of further arguments.

However, there is one serious problem that I do think undermines Hare’s claim that prescriptivity and overridingness, along with universalizability, are features of moral words. As stated above, prescriptivity and overridingness imply that if an agent sincerely assents to a moral judgment M, then that agent will act on M in the relevant circumstances, even when it conflicts with other values. However, this claim is contrary to our lived experiences where it seems clear that there are many instances of people knowing that a particular action is the moral thing to do but choosing to do something

else instead. It seems clear that people often assent to prescriptions but do not act on them.

Hare, in *Moral Thinking* (1981) and *Freedom and Reason* (1963) explains how his theory accounts for many different instances of this problem, often called weakness of the will or moral backsliding. In *Moral Thinking*, he argues that cases where people break intuitive level rules or precepts of common morality are not genuine instances of weakness of the will, because critical thinking sometimes requires us to break these kinds of rules in order to be moral (Hare 1981, pp. 53-58). Likewise, in *Freedom and Reason*, he rules out such cases as people who think that they ought to do an action but forget to do it, people who say they ought to do an action but lack conviction, and people who think they ought to do an action but don't realize when they are in the relevant kind of situation (1963, pp. 82-85). I don't object to his treatment of those cases, but I think that an important problem for his account arises in his treatment of what many would probably call the prototypical case of weakness of the will: a case where a person knows they ought to perform an action but cannot get him or herself to do it.

Hare handles this case by pointing out that, "nobody in his senses would maintain that a person who assents to an imperative must (analytically) act on it even when he is unable to do so" (1963, p. 79). He says that just as we do not think that someone has violated a prescription to perform an action when that person is in a situation where he or she is physically unable to perform the action, we likewise should not think of the person as violating the prescription in situations where he or she is psychologically unable to perform the action. Thus, it seems, the cases most commonly

described as weakness of will are cases where the person was not psychologically able to act in accord with the moral judgment she or he had endorsed.

While, as someone who believes that the laws of physics ultimately probably determine human behavior as much as the behavior of everything else, I am sympathetic to Hare's description of these cases, I think this description ultimately undermines his account of the meaning of moral words. The term "overriding" loses its meaning if we can use it to describe moral judgments that are ignored whenever more powerful desires are present. We could claim that moral judgments are overriding in some other sense, by claiming for example that a moral judgment M that one ought to do X is overriding if it means that one ought to do X even when more powerful desires are present and even when we are in fact not psychologically able to do X. But this sense of overridingness lacks the necessary connection to action that makes Hare's account so appealing.

Prescriptivity and overridingness are appealing because they provide a connection between action and judgment that is lacking in an account that relies only on universalizability. Without a feature like prescriptivity, it is not possible to claim that someone who says, "I ought to do X," but does not actually do X is acting inconsistently. An account emphasizing only the connection of ethics to consistent reasoning provided by universalizability has a difficult time evaluating the behavior of people unless it can also establish some relationship between judgment and the way people actually act.

Though I think that this is a serious difficulty for my account, which relies exclusively on universalizability, I do not have space to fully address it here. As Singer (1973) notes, there is a gap in almost any ethical system between statements of fact and

reasons for acting, and the account I am endorsing is no exception. For even if universalizability can show that it is inconsistent to make different judgments about relevantly similar circumstances, it does not explain what the connection is between making moral judgments and acting on them. In short, the account given so far of universalizability does not answer the question, “why be moral?”

However, the arguments in the next chapter will at least attempt to address these questions. Arguments by Sidgwick and Vendlar, and in particular the conclusions drawn by Parfit suggest that adopting an interpersonally neutral perspective, which has universalizability as a central feature, may be the only consistent position to take. If this is so, then the answer to the question “why be moral?” may be equivalent to the question, “why be consistent?” Though this would still not overcome the gap Singer describes, it does make the amoralist position far less plausible.

## CHAPTER III

### UNIVERSALIZABILITY AND RESPECT FOR OTHERS' INTERESTS

#### 1. Morality and Self-Interest

Before considering which properties suffice to make someone or something a moral subject, more needs to be said to strengthen the case that universalizability implies we should take other people's interests seriously. It should be noted that the universalizability constraint only provides *conditional* guidance for ethical decisions. *If* (1) two situations are relevantly similar and *if* (2) we should perform action A in one of the situations, *then* it follows that (3) we should perform a similar action in the other situation. Without (1) and (2) being true for a given situation, universalizability does not entail (3). Thus, in order to show that we ought to treat animals as moral subjects, it is not enough to only show that animals are like certain other subjects; it must also be shown that these other subjects are moral subjects.

This last claim is perhaps not a problem for many people. Many people probably believe that other humans are clearly moral subjects. Thus, if it could be shown that a certain animal is relevantly similar to a human, then an ethical theory with an approximate universalizability constraint would claim that the animal is also a moral subject. The rest of this chapter would not be relevant for these people.

However, I want to argue for a stronger and more controversial claim: that anyone who values her own interests and is rational should, given approximate universalizability, value the interests of others. The claim is more difficult to argue for,

and many authors have avoided it. For example, Singer in *Practical Ethics* (1993) and *Animal Liberation* (1975) starts from the assumption that most people consider other humans to be worthy of equal consideration, and Varner (1998) takes adult humans as his paradigm case.

However, I think that it is actually an important addition to any complete argument for the moral standing of nonhuman animals for the following reason: we often assume that people act the way they do because they believe that the interests of other people are morally significant, but this may not be true. People may treat other humans fairly and compassionately not out of moral concern, but because they are self-interested. Though I think there are many examples where some people have clearly sacrificed their own self-interest for the interests of others, this may not be unequivocally true of all people. It could be that many people act the way they do because they are worried about legal punishment, or social standing, or because they get feelings of satisfaction from helping their family members and friends. If they act only for these reasons, then they need not believe that the interests of other people are actually morally significant. Hence an argument that applies to self-interested people could be significantly further reaching than an argument that assumes that all people take others' interests seriously.

## **2. Utilitarian Arguments**

The move from valuing our own interests to valuing the interests of others has a long history in utilitarian authors. John Stewart Mill, in *Utilitarianism*, wrote that “no

reason can be given why the general happiness is desirable, except that each person, so far as he believes it to be attainable, desires his own happiness” (Mill 1861/1985, p. 44), and later that “each person’s happiness is a good to that person, and the general happiness, therefore, a good to the aggregate of all persons” (Mill 1861/1985, p. 45). Mill’s claim can be understood in light of the idea of approximate universalizability: if happiness or the absence of pain is desirable in situations where I am the subject of an action, then it should also be desirable in situations that are relevantly similar.

However, Mill’s argument is commonly regarded as making an obvious mistake. Mill seems to be putting forward an argument of the form “If I desire my happiness, then I desire X’s happiness,” where X is anyone capable of being happy. But it is clearly true for most if not all people that in some situations we desire our own happiness yet have ill-will towards others, or are completely indifferent to their happiness. Thus, Mill’s conditional claim about the relationship between these different desires does not hold.

Mill denied that this was what he was trying to show in a letter to Henry Jones. Mill said, referring to the above argument, “I did not mean that every human being’s happiness is a good to every other human being, though I think, in a good state of society and education it would be. I merely meant in this particular sentence to argue that since A’s happiness is a good, B’s a good, C’s a good, &c., the sum of all these goods must be a good” (quoted from Crisp 1998, p. 132). However, Mill seems to have jumped from the frying pan into the fire since, as Roger Crisp (1998) points out, his new formulation commits the fallacy of composition, assuming that because the parts of a composition have a certain property, the composition as a whole must have that property as well. It

does not follow from the fact that all of the individual members of a basketball team have a mother that the team itself has a mother, so why should it follow from the fact that the happiness of each individual is a good that the sum total of their happiness is a good?

Though Mill's arguments are not very successful, they do resemble some of the more successful arguments below and as such it is worth discussing one point in more detail. Above, I claimed that the standard interpretation of Mill's argument as trying to establish that we all desire the happiness of others could be put in terms of approximate universalizability. But since the conclusion reached seems to be false, doesn't this imply that there must be something wrong with the universalizability constraint?

I think the answer to this question is no, because the notion of universalizability cannot, in fact, be applied to the notion of desirability in the standard interpretation of Mill's argument. To borrow the terminology of Hare (1981), a differentiation can be made between singular and universal prescriptions. Generally speaking, we think of our desires as expressing singular prescriptions: I want this particular cup of coffee, rather than coffee in general. It is likely true that some other cup of coffee sufficiently similar would also appease my craving, but nevertheless my thought takes the form "I want *that* coffee" and hence is specific to the situation I am in. When statements include references to particular objects in the world, those statements cannot be universalized.

Returning to Mill's original argument, a self-interest theorist could argue that this demonstrates what is wrong with Mill's claim. When I say "I desire my own happiness," I am not claiming that I desire happiness *in general*; rather I am claiming

that I desire a particular kind of happiness. I desire only happiness *that is felt by me*.

Insofar as desires are psychological states that, in folk psychology terms, predict certain behaviors on the part of individual organisms, they are singular and not universal. As such, a desire for others' happiness need not result from a desire for our own happiness.

However, an emphasis on the particular nature of desires would lead a self-interest theory to other problems. As Henry Sidgwick pointed out, there appears to be a symmetrical relationship between being impartial to *who* feels happiness or suffering and being impartial to *when* happiness or suffering is felt: as he writes, "If the Utilitarian has to answer the question, 'Why should I sacrifice my happiness for the greater happiness of another?' it must surely be admissible to ask the Egoist 'Why should I sacrifice a present pleasure for a greater one in the future?'" (Sidgwick 1907/1981, p. 418).

Since it may not be obvious that there is a connection between what Derek Parfit (1984) calls intertemporal impartiality (being indifferent across phases of life) and interpersonal impartiality (being indifferent as to whose life is involved), a few other points are worth mentioning. Both *me* and *now* function like the indexicals *this* or *that*: they all point to certain parts of the world. *Me* and *now*, however, are different from *this* and *that* in that their content is dependent upon having a particular point of view of the world, a particular first-person perspective.

Building on this idea, Zeno Vendler (1984) considered a thought experiment that he claimed showed that the content of *me* was empty. Vendler asked his readers to imagine a world in which everything was the same except that *I* was *Ernest Hemingway*

and *Ernest Hemingway* was *me*. He is careful to contrast this thought experiment with imagining that, say, *Adam Shriver* was *Ernest Hemingway* and vice versa. It is, of course, impossible to imagine *Adam Shriver* being *Ernest Hemingway*, but it is not impossible to imagine *me* being Ernest Hemingway, where this just means imagining having the point-of-view on the world of Ernest Hemingway. People are quite able to, and in fact often do, imagine themselves experiencing the world from the point of view of someone else.

The interesting result from Vendler's thought-experiment, however, is that in a world in which everything were the same except that I occupied Hemingway's point of view and Hemingway occupied my point of view, *no facts about the world would be different from the facts of this world* (Vendler 1984, p. 41). I would have Hemingway's desires, name, intentions, and memories and Hemingway would have mine, but from a third-person perspective the world would be exactly the same. *I*-ness and *me*-ness, then, do not tell us anything about the world; and Vendler concludes that *I* is essentially contentless. I think this is true unless we believe that *I* consists of something like the Cartesian ego, but there are very good reasons not to believe this that will be discussed later.

Using this same reasoning, it is easy to see that the concept of *now* is similar. A complete description of the facts of the universe would not include the concept of *now* (Metzinger 2004, p. 50). Again, we cannot imagine the world at time 21:41:04 being the same as the world at time 22:40:44 because this would be logically impossible, but we can imagine what it would be like if *now* were a different time. In fact, we have

experienced many *nows* at different times. So, using the same reasoning as above, *now*-ness does not convey any facts about the world, but merely picks out a particular point of view.

Returning to Sidgwick's comparison, it is easy to see how the similarities between *me* and *now* would lead to some bizarre conclusions for self-interest theorists. Since self-interest theorists treat *me*-ness as a morally relevant consideration, Sidgwick asks why they would not then treat *now*-ness as one as well. If we treated *now*-ness as a relevant consideration and gave it priority, then it seems as though we would have no reason to sacrifice our current pleasures for greater pleasure in the future, or for the sake of living a better life *as a whole*.

But clearly most self-interest theorists would not want to accept this latter claim. Self-interest theories, as Derek Parfit (1984, p. 137) explains in great detail, say that we should do what is best for us *on the whole*. And even if this were not what most self-interest theories hold, it would certainly be true that most people would believe someone to be acting imprudently if they continuously sacrificed their future livelihood for relatively trivial pleasures.

Parfit expands upon Sidgwick's criticism by claiming that self-interest theory is what he calls incompletely relative (1984, p. 140). A theory could be relative to time (and hence care about pleasure *right now* but not later pleasure) or could be relative to persons (and hence care about pleasure *for me* but not pleasure for someone else). Self-interest theory, however, is relative to one but not the other. This, Parfit claims, makes it

vulnerable to the charge of inconsistency. Moreover, he claims, this makes self-interest theory vulnerable to an “attack on two fronts” that ultimately makes it indefensible.

Parfit claims that self-interest theory occupies a place between a fully relative theory (the present-aim theory) and a fully neutral theory (consequentialism). Whenever a self-interest theorist attempts to attack one of the other theories, he or she is open to the same attack from the other theory. For example, if a self-interest theorist criticizes the present-aim theory by stating that “overall, if you act for the sake of your long-term interests rather than always acting on your present desire, you may in fact achieve more of your present aims over the course of your lifetime,” the theorist will be open to the objection by the consequentialist who can say, “overall, if you act morally rather than always for your own self-interest, you may in fact achieve more of your own interests over the course of your life.” Likewise, when the self-interest theorist criticizes the consequentialist for being interpersonally impartial, then the self-interest theorist is open to the analogous criticism from the present-aim theorist for being intertemporally impartial. Since whichever arguments are presented, one of the theories is superior to self-interest theory, Parfit claims that the theory is defeated<sup>5</sup>.

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<sup>5</sup> One might wonder if we should, following this reasoning, think of the present aim theory as a rival of utilitarianism. However, since present aim theory (at least on most of its formulations) would claim that it would be rational to, using Parfit’s example (1984, p. 134), choose a momentary experience of moderate pain at the expense of a later lifetime full of intense pain, present aim theories can be easily rejected, at least on practical grounds.

### 3. Personal Identity

However, there is one other possible escape from this argument that Parfit considers. As I mentioned earlier, if people believed in the existence of a Cartesian ego, they might believe that there is an important difference between being partial to one's self and being partial to right now. They might believe that the *I* is a distinct metaphysical entity while *now* is not. Even if they do not believe in the *I* in the strong terms that Descartes did, if they think that personal identity is a fact about the world above and beyond a mere description of the physical and psychological states that make up a person, they might believe that this identity entails an important difference between *I* and *now*. The rest of this chapter will be devoted to arguing against this view of personal identity, so the reader may want to skip ahead if he or she does not find the topic particularly interesting.

Parfit rejects the personal identity view because he thinks that reductionism is the best view about the world. Parfit writes that a reductionist would hold, "(1) that the fact of a person's identity over time just consists in the holding of certain more particular facts," and, "(2) that these facts can be described without either presupposing the identity of this person, or explicitly claiming that the experiences in this person's life are had by this person, or even explicitly claiming that this person exists. These facts can be described in an *impersonal way*" (Parfit 1984, p. 210). Thus, according to his view, personal identity does not consist of a Cartesian ego nor does it entail any further facts about the world beyond those that could be described impersonally.

This, of course, is not to say that the idea of personal identity does not have heuristic value for practical life or for disciplines such as biology. However, if someone is attempting to ground their ethics on a particular metaphysical doctrine about the world, then they cannot rely only on heuristics and probably should take Parfit's claim seriously. Parfit also argues that psychological continuity can play much the same role in practical decision making and ethical theorizing that personal identity has been supposed to play, and as such the change in thinking his view entails is not as radical as might be supposed (though he certainly does not deny that it is a radical view).

Parfit considers a particular thought experiment to support his claim that personal identity does not involve a further fact about the world. He begins by describing the now well-known cases of split-brain patients. In order to treat epilepsy in certain patients, the connections between their two brain hemispheres (particularly in the corpus callosum) were cut. A good deal of evidence suggests that after this kind of surgery, the two hemispheres act roughly independently of each other and do not have access to much information from the opposite hemisphere. For example, if a picture was flashed only to the part of the visual field that the right side of the brain would normally receive, a question asked that required the activity of the left hemisphere (which controls the right side of the body) would rarely be answered correctly.

Parfit notes that, in general, the different hemispheres play different roles in most people. However, he says, there is some evidence that the two hemispheres are to a limited degree functionally symmetrical in some individuals. His thought experiment asks people to consider a case where a person with roughly symmetrical hemispheres has

the ability to flip a switch to disconnect the hemispheres temporarily. For example, when that person is taking a test and is running out of time, he may decide to flip the switch and have different hemispheres work on different questions. After doing the calculations, the person can flip the switch again to reconnect the brain. Though Parfit notes that this case may not ever actually occur, he says that it would be merely “technically impossible” (Parfit 1984, p. 252) rather than logically impossible. Because it seems to be the case that actual split-brain patients have divided consciousness, Parfit says that his description, “seems both coherent and to describe something we can imagine” (1984, p. 247).

What is the point of such a thought experiment? Parfit claims that this experiment shows the limitations in our notions of personal identity. Believers in the idea that personal identity constitutes a further fact about reality have a difficult time explaining what is happening in this case. If it is the unity of consciousness that is meant to determine personal identity, then Parfit claims this would entail that “the whole episode involves three people, two of whom have lives that last for only ten minutes” (1984, p. 248). Furthermore, he writes, the person after the two hemispheres were reunited would have memories of the other two persons and would mistakenly believe that he had undergone those thoughts and experiences. This view, writes Parfit, is hard to believe.

Equally hard to believe, he writes, is the view that there are two distinct persons involved, one for each hemisphere. This would not explain why, when the hemispheres

were united, the person believed that he was having a unitary experience involving experiences from each of the hemispheres. This too, Parfit claims, is problematic.

Finally, Parfit considers the claim that there is only one person involved in this description, based on the idea that what unites the experiences is the fact that the experiences belong to *that person*. This he claims is unacceptable because, “it ignores the fact that, in having each of these two sets of experiences, I am unaware of having the other” (Parfit 1984, p. 249). Though Parfit goes into far more detail and considers other cases that support his point, I think this brief description is enough to support his argument for the purposes of this thesis.

Since all of the answers given to the question “how many persons were involved in this thought experiment?” were flawed, Parfit suggests that the question is what he calls an empty question. An empty question for Parfit is a question for which, “there is only one fact or outcome we are considering. Different answers to the question are merely different descriptions of this fact or outcome” (1984, p. 214). For example, he describes a club that has met regularly for a number of years under a certain name and then disbands. After a few years have passed the same members begin meeting again using the same name. Parfit says the question, “Is this the very same club, or is it merely another club, that is exactly similar?” is an empty question (1984, p. 214). No matter how many facts we have about the case, the answer will not be obvious. We could stipulate an answer, Parfit says, but this will merely be changing the definitions we were using and would not actually tell us anything new.

Likewise he claims, in regards to the thought experiment, there is no clear answer to the question. We could stipulate a definition for the term “person” that could give us an answer, but this would not add anything to our understanding of the case. Because the answer is in fact indeterminate, Parfit suggests that this thought experiment lends support to reductionism. A reductionist would claim that there is no further fact of personal identity, and so would predict that this would be an empty question. Since no view of personal identity can give a convincing answer to this question, Parfit thinks we should reject the idea that personal identity is a further fact.

#### **4. No Sum**

A recent book by Thomas Metzinger (2004) also supports Parfit’s attacks on the notion of personal identity. Metzinger focuses in particular on the Cartesian ego, but his arguments can also be seen as an attack on any claim that *I*-ness or *me*-ness is a metaphysical entity distinct from the other facts about the world. He gives an evolutionary account of why we tend to believe that we have a personal identity, but argues that ultimately this belief is a heuristic that has helped our species to survive rather than something that reflects a fact about the world.

Metzinger’s attack on the *I* derived from Descartes’ Meditations centers on two ideas: (1) the transparency of mental content is *phenomenal* transparency and not *epistemic* transparency (and hence should not be taken as indubitable) and (2) the reason people generally believe that there is a thinking *I* (including Descartes in his “Cogito ergo sum” passage) is because our mental content is modeled so as to produce the

illusion of a self and is presented *as if* there were a self. Hence, if our intuitive belief in the existence of a self can be explained as a product of the way individual human organisms represent the world and if there is no reason to believe that the way individual human organisms represent the world actually reveals any epistemic truths about the world, it is a mistake to conclude from our experiences that there are actually such things as selves.

Metzinger differentiates epistemic transparency from phenomenal transparency as follows: an epistemically transparent kind of mental content would reveal a truth about the way the world is, whereas phenomenally transparent content *represents* the content as real. Phenomenally transparent contents would be those such as the visual image of a book or the feeling of a stomachache, which are represented as real properties of the world. Phenomenally transparent contents can be contrasted with phenomenally opaque contents, such as daydreaming or planning out a series of things you need to do later in the day, which are represented *as representations* rather than as properties of the world. In other words, we know as we are daydreaming that our dream is being constructed by us.

As Metzinger brings out in his book, there are important reasons for doubting that our mental representations are epistemically transparent. For example, Gestalt properties of perception (such as the fact that contrasts between adjacent surfaces in visual perception reflect greater differences than those contained in the actual luminance differences between the surfaces in the environment, or that the same color of grey looks darker against a light background than it does against a dark background) indicate that

our visual system is oftentimes not directly representing properties of the environment. In fact, recent research (Howe and Purves 2005) is indicating that what human visual systems are depicting may not be direct representations of the environment as much as representations that have helped organisms to survive and reproduce in the evolutionary past of the species.

Perhaps this would not be an especially interesting problem if it were limited to minor tweakings of our perceptual experiences. After all, the fact that we experience contrasts in the environment as more dramatic than they actually are doesn't mean that there are not actually contrasts in the world. However, Metzinger cites reasons for believing the problem is more pervasive than this. He writes that research has indicated that events taking place as far as three seconds apart in the world can all be experienced as occurring *right now* (Metzinger 2004, p. 131). *Nowness*, Metzinger writes, would not be included in a complete description of the universe and hence should be regarded as a construction of our perceptual systems. Since pretty clearly most if not all of our phenomenal experiences include the content of *nowness*, Metzinger concludes that we should not regard our experiences as "actual properties of the environment as given through the senses," but rather as "internal representations of properties of the world" (Metzinger 2004, p. 50).

As mentioned before, however, we are not phenomenally aware of many of our experiences as representations because they are phenomenally transparent. Metzinger claims that phenomenal transparency results from what he calls autoepistemic closure. A human nervous system picks out features of the environment or of the system itself for

representation. However, due to constraints on the carrying capacity of this nervous system, it can never represent all there is to know about the current state of the environment or the current state of the system, so instead it represents selected features. Autoepistemic closure occurs because the system is not able to represent all of the features of the representandum it is trying to model; in particular, it occurs because the representation cannot represent itself *as a representation*. So our visual representation of a red book just produces the image of a red book, and not an image which contains information about how the light hit our photoreceptors, how nerve impulses were sent to the back of our brains, how the information was then disseminated, etc.

All of the talk so far, however, seems to be quite compatible with Descartes' project. Descartes himself famously called into question whether we could regard our sense perceptions as revealing truths about the world. In fact, the research by Purves and the evolutionary conclusions he reaches actually fit very well with Simmons' (1999) account of Descartes as thinking that our sensations did not reveal truths about what the world is like but did indicate which things were good and which were bad for us. But Descartes believed that there were important differences between various objects of consciousness. In particular, he observed that we can differentiate between "actions" and "passions" of the soul (with passions being various kinds of perceptions), and thought that, "Our perceptions are likewise of two sorts: some have the soul as their cause, others the body" (Descartes 1649/1985, 335). If the fallibility of the human perceptual system is due to the fact that sensations come from the body, Descartes could accept all of the problems raised by Metzinger as legitimate yet claim that this has no

bearing on the “I exist” passage because the reasoning there is caused by the soul, and thus has a fundamentally different epistemological status.

This is why Metzinger’s claim (2) above is important. In order to show that Descartes’ reasoning is flawed, Metzinger needs to be able to show how the cognitive<sup>6</sup> introspection used in the “I exist” passage is of a relevantly similar kind of mental content as our sensory perceptions and hence vulnerable to the same objections. Metzinger does this by detailing several experiments that indicate that the feeling of ownership of various “introspective” as well as perceptual thoughts is given as part of their phenomenal content rather than as a fact about the world. Again, he claims that the feeling of “having a self” is phenomenally transparent but not epistemically transparent.

First, Metzinger describes cases of anosognosia, defined as “the loss of higher-order insight into an existing deficit” (Metzinger 2004, p. 430). The deficits can include blindness, deafness, or paralysis of entire sides of the body, among other things. For example, experiments conducted by Vilayanu Ramachandran (1995), showed that anosognosic patients who are paralyzed will emphatically claim that they can move the paralyzed arm, but when asked why they aren’t moving it, will come up with excuses like “because I don’t want to” or other such odd claims (Metzinger 2004, p. 432). What is striking about anosognosia is that the deficits cannot be explained merely by pointing to perceptual problems of the subjects<sup>7</sup>. The relevant information (both perceptual and

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<sup>6</sup> In what follows, I use the terms “cognitive” or “propositional” to refer to the kinds of mental content that resemble our inner speech, such as the explicit linguistic thought, “I need to remember to take my wallet.”

<sup>7</sup> It is also worth pointing out that anosognosia cannot be adequately explained by suggesting that these just happen to be really stubborn people, because it is an

propositional) is systematically denied by the patient, and elaborate explanations are created to avoid admitting the obvious truth. Metzinger describes what is going on by writing,

information about the lacking proprioceptive and kinesthetic feedback after a motor command has been issued to the left arm must be active somewhere in the nervous system of the patient. However...it cannot be integrated into the currently active *conscious* model of the self. (2004, p. 432).

Thus, the preconceptual model of the self has gone rigid with respect to certain elements in these patients, and does not allow any other information to alter their representation of *still functioning normally*. The representation of the self, both perceptually and cognitively, is locked into a perception that has nothing to do with the actual state of the world.

Another condition Metzinger uses to support his case is that of schizophrenia. Metzinger writes (2004, p. 447) that there are three general types of auditory hallucinations possible for schizophrenia: hearing one's voice as if spoken aloud, hearing someone else's voice, and hearing speech about oneself. In all of these cases patients do not attribute the thoughts to themselves. They have cognitive content minus the feeling of *mineness* that normally accompanies such content in normal subjects. The content of the hallucinations does not get incorporated into the subjects self-model.

More dramatically, subjects of the pathology Cotard's syndrome will often deny that they exist at all. This extremely bizarre claim is at odds with Descartes' argument

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asymmetrical disorder that only takes occurs in conjunction with right-hemisphere damage (Metzinger 2004, p. 433).

that “I exist” indubitably follows from “I am a thinking being.” Again, Metzinger attributes the malfunction to the fact that the relevant information is not incorporated in the subject’s self-model.

At this point, it is tempting to make the argument that since Cotard’s syndrome patients can have thoughts but still believe that they don’t exist, the indubitability of Descartes’ argument has been shown to be false. Neither subjects suffering from Cotard’s syndrome nor schizophrenia exhibit flaws in their ability to reason dramatic enough to indicate that they are somehow unable to complete an obvious inference such as that of the “I exist” passage. Metzinger’s analysis that the patients have selective inability to apply information to their self-models seems to be a good explanation of what is going on. However, as Michael LeBuffe pointed out (LeBuffe, personal communication), if we allow that there could be localized impairment to a self-model, it seems that we should also allow for the possibility that logical inference is locally impaired in regards to the required inference to “I exist” in Cotard’s patients, so their existence alone is not enough to prove that Descartes’ “I exist” conclusion is false for non-pathological subjects.

However, Metzinger’s strategy is not just to show that some people can have thoughts but believe they don’t exist. Rather, he presents a number of cases that seem to indicate that the belief that a self exists is similar to the belief that our perceptions represent true facts about the world. By showing that our sense of “self” is something that can misrepresent the world (or the system itself), can be dissociated from perceptions that it normally coincides with, can be triggered even in the absence of

perceptions that are normally present, and can be mistaken even in its cognitive conclusions about itself, Metzinger provides evidence that self-knowledge is in the same boat as the knowledge about the world which we have reason to doubt. Thus, we are not epistemically justified in concluding that a real self exists from that fact that we experience the world as though there is a self.

Using the results Metzinger discussed, an argument can now be formed against the indubitability of Descartes' argument. The intuition that it seems as though "I think" establishes the existence of a self can be explained by the fact that whenever we have the thought "I think" we are experiencing content marked with the *mineness* that characterizes the self-model. So though the statement "I exist" has considerable intuitive appeal, this appeal can be explained by the operations of our nervous system that in turn were shaped by millions of years of evolution. If it was evolutionarily useful for an organism to have a self-model, then such a model could have developed over the years into what we now possess

It is important to note that Metzinger's claims shouldn't be regarded as a proof that no such thing as an ontological self can exist, but rather as an argument for why the notion of such a self has no theoretical value for scientific psychology and cognitive neuroscience. If our experiences, including the seeming oddity of a first-person perspective on the world, can be explained as properties of "complex representational processes unfolding in certain physical systems" (Metzinger 2004, p. 577), then reasoning similar to that of Occam's razor would lead us to drop the notion of a "self behind the curtain" when describing what is really going on.

Perhaps it could be objected that this argument assumes the priority of a third-person perspective, yet we would not be justified in accepting the truth of the third-person perspective at the relevant stage of Descartes' Meditations. However, I think that this strategy fits with Descartes' other reasons for doubting previously held beliefs. For the reasons for doubt generated by considering the possibility of dreaming, of an evil deceiver, or a twist of fate all depend on considering the meditator *from the outside*. And if we take Metzinger's argument seriously and understand his alternative account of why it seems as though a metaphysical self exists, we can doubt (at least from an intellectual perspective) the truth of the claim that the existence of a metaphysical self necessarily follows from the fact that phenomenal experiences are taking place. And if we can doubt it from this perspective, it is no longer an indubitable truth upon which Descartes can base his system of knowledge.

Since the existence of the metaphysical *I* was the last serious possible escape for the self-interest theorist from the problems raised by Parfit, we have good reason to reject self-interest theory. Because we've rejected the view that *I*-ness can be a determining feature of whether a pain is morally significant or not, it follows that we should, in Sidgwick's terminology, take "the point of view of the universe" (1907/1981, p. 382). From this perspective, it is not possible to rule out the interests of others simply because they do not belong to *me*. As such, it is now possible to consider what features need to be present in an entity for it to be a moral subject and, in particular, whether or not sentience (the ability to feel pain) is a sufficient condition. This is the subject of the next chapter.

## CHAPTER IV

### WHY SENTIENCE IS A SUFFICIENT CONDITION TO BE A MORAL SUBJECT

#### 1. Singer's Arguments

In *Animal Liberation*, Singer approaches the question of what makes an individual a moral subject via a detailed discussion of the popular Western notion that all human beings are in some basic sense equal, a notion he refers to as the principle of equality. He argues, first, that all humans are equal only in the sense that they each deserve equal consideration of interests and, second, that sentience, or the capacity to feel pain and/or suffer (these will be distinguished in Chapter VII), is both a necessary and sufficient condition for having interests.

Singer describes the historical moral progression of the past century as a process in which certain properties (such as skin color, or sex) that had been taken to be morally relevant in ethical decisions were reconsidered. If the *only* difference between the moral subject in one situation and another is that one has darker skin, or that one subject is a female and one is a male, then it seems ridiculous to our modern sensibilities to think that the agent could have an obligation in one case but not the other. Recent developments have provided a strong argument in favor of claiming that discriminations on the basis of skin color or gender were misguided, since many women and people of diverse ethnicities are successfully occupying positions and status in society today that would have never been available to them one hundred years ago.

But Singer makes more substantive arguments than just patting modern society on the back. One such argument shows that group membership does not by itself qualify as a relevant property for being a moral subject. Singer considered research that had shown that African Americans did not score as high on IQ tests as most other Americans. Singer acknowledged the controversial nature of the findings (including questions such as whether or not IQ is really a good measure of intelligence), but pointed out that even if it were true that one group did score higher on intelligence tests than another group, this would not be reason enough to deny equal consideration for a member of the group that scored lower on average. This is so because it still is true that any given individual of the lower-scoring group may have a higher IQ than a given individual of the higher-scoring group, and thus it only makes sense to evaluate people's intelligence individually.

This is not to say that Singer thinks that the difference in IQs between individuals is enough for some but not others to count as a moral subject. Though a society that established a hierarchy based upon IQ scores would not be making the mistake of evaluating someone on the basis of group membership, since each individual would be judged on their own performance on the test, Singer argues that the society would still be engaged in an abhorrent practice. Young children or severely mentally disabled people would be granted very little moral consideration in such a society, which runs contrary to our current practices. It is also interesting to note that if a lack of intelligence is cited as the only reason why nonhuman animals are treated the way they are in modern society and if young children and the mentally disabled display a level of intelligence equal to or

less than that of nonhuman animals (as some of them surely do), then an ethics based on intelligence would likely have implications unacceptable to most people.

Singer also examines the claim that morality is a form of social contract between multiple parties. This idea is often associated with Thomas Hobbes (1641/1688) and enjoys its most popular modern form in the version of contractualism put forth by John Rawls (1972). Rawls postulated that a just set of rules would be those that all rational agents could agree upon behind the “veil of ignorance,” which prevented the agents from knowing whether or not they were rich or poor, black or white, male or female, etc. Presumably, the agents in this situation would come up with rules that protected the interests of even the most downtrodden members of society, since any of the agents may indeed be one of those people. Prima facie, this theory seems to exclude nonhuman animals from consideration since no nonhuman animal would be rational enough to “sit at the table” of rational agents coming up with a just set of rules. Though Rawls himself did not explicitly say his theory ruled out consideration of nonhuman animals, other authors have made this point based upon his theory (Carruthers 1992).

This theory of morality, similar to that based on IQ, again seems to exclude young children and other “non-intelligent” human beings. Rawls accounts for children in his theory by claiming that a spot at the table can be reserved for potential people. Singer objects to this as an ad hoc stipulation, though Singer has also had difficulty in trying to devise an “acceptable” way of dealing with potential people in his theory (Varner 2004). But even granting that potential people are given a spot at the table, Rawls’ theory would still exclude the mentally disabled and elderly people with

diminished mental capacities, because they, like animals, lack the ability to ever possess the intelligence of normal adult humans. Once again, the idea of giving no moral consideration to these people runs strongly against the intuitions of most people in our society.

Singer expands upon this difficulty by claiming that contractualism is ultimately based on a self-interested desire for others to treat us fairly. But if self-interest is the guiding principle behind the veil of ignorance, what principled reason is there for people to refrain from acting unethically when they know that it will not have any bad consequences for themselves? Why base our ethics on an artificial scenario of reciprocity when we are capable of acting on genuine evaluations of the ability of other agents to reciprocate? But basing our behavior only on the ability of others to reciprocate leads to a standard of ethics that would presumably care very little about people in other countries, dispose of charity organizations, and leave those at the top of the social hierarchy free to treat others as they wished. Thus, Singer rejects contractualism as a theory that flies in the face of what most people would want in an ethical theory.

Singer concludes, after this process of elimination, that the only potential criterion left for the principle of equality is sentience. Using this criterion, we can explain why we should care about the livelihood of men and women, people of different ethnicities, young children, the elderly and severely mentally disabled people; namely, we should care about them because they possess the ability to suffer and to feel pleasure. Singer sums up this idea by saying, “the limit of sentience (using the term as a

convenient if not strictly accurate shorthand for the capacity to suffer and/or experience enjoyment) is the only defensible boundary of concern for the interests of others” (1975, p. 9).

Singer rejected alternative interpretations of the basic equality of all human beings using the method of reflective equilibrium; that is, he compared the “fit” of various interpretations with widespread intuitions about our treatment of various human beings, and showed that the other, competing interpretations do not fit with these intuitive judgments. However, there are a number of reasons for being skeptical of the method of reflective equilibrium as a failsafe way of choosing one ethical theory over another.

For one thing, scenarios can generally be thought up for any ethical system that go against the common intuitions of our society. For example, Singer claims elsewhere that people “ought” to give money to programs that benefit children starving in other countries rather than choosing to spend money at an upscale restaurant, but this claim hardly can be said to fit with the intuitions of most people. Likewise, Singer’s views on what constitutes acceptable treatment of nonhuman animals differ substantially from the majority of people, and examples can be formulated where Singer’s views conflict with what many people would take to be intuitively true (such as a forced choice between saving the life a severely mentally disabled human or that of a healthy dog).

Furthermore, moral intuitions themselves are often products of the sociological facts or history of a society, and as such can hardly be relied upon to justify a particular system of ethics as “rational” rather than just circumstantial. Singer can and has argued

that many of the intuitions of the majority are wrong, and he has provided historical and sociological explanations for why moral reasoning may be misapplied. So, using similar reasoning, the fact that some of the proposals for the principle of equality conflict with common intuitions is not in itself enough to show that they are conclusively false. In particular, more needs to be said about the challenge contractualism raises for Singer's conclusion (I will return to this point shortly).

## **2. Applying Universalizability**

Still, the very same conclusions reached by Singer can be reached using the notion of approximate universalizability without relying on the method of reflective equilibrium. If universalizability implies that we should treat similar situations similarly, then it follows that the same kinds of events we consider harmful or beneficial to ourselves should also be considered harmful or beneficial when they happen to other moral subjects under similar circumstances. Suffering and enjoyment are broad terms that seem to apply to all possible events of this type.

Considering the previous cases again, none of the rejected possible principles of equality have any bearing on the question of whether other agents are in a similar situation. When considering, for example, the experience of intense pain, it is the experience of the pain itself rather than the experience of pain in conjunction with some other property such as skin color or gender that accounts for my dislike of pain. Similarly, I can imagine the pain being just as unpleasant even if I were less intelligent and even if I had no inclination to act as a moral agent. So if to act ethically is to treat

similar interests similarly, all of the properties Singer ruled out in his discussions can equally be discarded by applying the notion of universalizability.

However, contract theory also presents a potential difficulty for the conception of universalizability as Hare presented it. Singer argued that contract theory was misguided because it relied upon a description of how self-interested people would act under artificially created circumstances. Yet, he said, if self-interest is the primary motivator for the theory, why not just apply it directly in experience? Singer's argument works well against theorists such as Hobbes, who explicitly describe their theories as being in the interests of the subjects who agree to the social contract, but more needs to be said as to how it addresses Rawls' more sophisticated theory.

In particular, Rawls and his followers do not present the theory as one motivated by the desire to maximize one's own interests. Rather, the veil of ignorance is used as a tool to determine what the ideal set of laws would be. It is true that Rawls relies on the notion of self-interest in describing how people behind the veil should craft the laws, but likewise Hare relies on the idea of self-interest in an artificial environment when he asks people to imagine "what it is like" to undergo the experiences of another and to use that information in moral reasoning. So in a sense Rawls and Hare are taking the same step, but extending the notion of universalizability to different sets of individuals.

Rawls' view that the principles of justice should be extended to agents who possess a moral personality (which requires a certain degree of intelligence) seems to be closer than Hare's theory to Kant's notion of universalizability. The previously

mentioned formulation of Kant's categorical imperative, expressed as "act only on maxims that you can will to become a universal law," clearly takes this form. Since violation of the categorical imperative is put in terms of violating a goal that a rational agent could have, the scope of morality would presumably extend only to other rational agents.

A hypothetical moral situation may help to bring out the differences between Hare's and Rawls' ideas of universalizability. For Hare, if an action could cause the moral subject S to have a sensation that agent A would try to avoid for herself (an intense pain for example), and we know that S would also mind it, then A should take S's feelings into consideration. However, according to Rawls' and Kant's formulations, A should take S's feelings into consideration only if *both* S would mind the sensation *and* S could in principle be the moral agent in a similar situation (or at least in some situation). Thus, if S is not a rational agent, S does not need to be covered by our ethical theory.

This brings out a problem that Singer alludes to and Richard Arneson (1999) describes in more detail. Rawls claims that possessing a moral personality above a certain threshold is enough for one to be included in the sphere of morality. But as Arneson points out, there are many different levels of "possessing a moral personality" that can be distinguished, and consequently describing its possession as an either/or proposition needs further justification from contract theorists. Applying Rawls' and Kant's reasoning can lead to some strange implications for an ethical theory. Suppose, for instance, that Jane has a knack for giving compliments in a manner that makes

people feel good and motivated to do good things while John is hopelessly bad at giving compliments and is incapable of ever improving in this regard. Arneson claims that it seems bizarre to say that John's being incapable of reciprocating removes him from the range of people Jane should consider complimenting, yet this follows from adopting a similar form of reasoning employed by contract theorists in regard to determining the appropriate range of moral subjects. Furthermore, if all moral judgments are made based on the ability of the subjects to reciprocate, it is hard to see how the theory can resist collapsing back into a pure self-interest theory, since there will always be some way in which the subject is more limited than the agent.

The contract theorist's emphasis on reciprocation may stem from a related worry that it is only in the case of moral agents where we are capable of actually understanding what it is like to "stand in their shoes." If it is true that a certain degree of mental capacity is necessary to have the qualitative experience that we deem to be unpleasant, then it follows that we will not be able to accurately characterize the experiences of subjects below a certain degree of cognitive sophistication as unpleasant, since we will have no way of knowing what it actually feels like to be in that situation. However, this is true only of mental capacities that sufficiently impact the qualitative character of suffering or enjoyment. Certain mental capacities, like those responsible for being able to score highly on an SAT test, seem highly unlikely to have any influence on the phenomenal quality of the experience of pain. People born without any hands, though lacking the exact experience of feeling pain in their hands, can nonetheless understand

that other people can have pains in their hands because they share a sufficiently similar experience of the “awfulness” of pain in other parts of their body.

So Singer’s conclusion that sentience is sufficient to make an entity a moral subject can be defended using the notion of approximate universalizability. Singer’s definition of sentience was roughly the ability to suffer and to experience enjoyment, so it might be tempting to think that any organism that shows pain behavior should be considered a moral subject. However, pain is a much more complicated phenomenon than is traditionally assumed. Thus, it will be useful to consider in more detail what scientists know about the experience of pain in humans. This is the subject of the next chapter.

## CHAPTER V

### PAIN IN HUMANS

#### 1. Problems With Pain

Since the experience of pain is least controversially assumed to take place in adult humans, it will be useful to examine some of the physiological mechanisms that underlie the experience of pain in human beings. A more detailed understanding of this process will help to determine which features we should look for in nonhumans when assessing whether they are capable of suffering.

In a widely discussed article in 1978, philosopher Daniel Dennett claimed that it is not yet possible to make a robot that feels pain. The reason for this, Dennett said, was that the current definitions of pain were grossly inadequate. Pain was supposed to report tissue damage, yet there were many reported cases of tissue damage without pain and similarly of pain without tissue damage. Pain was supposed to be aversive, yet patients who were given morphine reported that they still felt pain but that it no longer bothered them as much. Now, 25 years after Dennett's article, there have been tremendous advances in scientists' understanding of both the conceptual and physiological elements of pain in humans and other mammals. There may not yet be a precise definition of pain, but the phenomena Dennett described are far less mysterious.

In this chapter, I will attempt to give an overview of the current knowledge about pain in humans. I will begin by discussing those conceptual changes that have taken place that have aided in scientists' understanding of pain. Included in that section will be a discussion about how modern technology has aided the ability of researchers to

understand what happens during a pain experience, especially in the brain. Then I will discuss the current physiological knowledge about the brain, starting with the nociceptors that detect pain, moving on to the paths pain takes through the spinal cord, and then covering the two distinct pain pathways that come out of the thalamus. Lastly, I will return to some of the psychological factors that have been shown to influence the severity of experienced pain in humans.

## **2. History of Pain**

The notion that pain is an information state that results from physical injury dates back at least as far as Descartes (Melzack 1999). Descartes proposed three centuries ago that injuries activate pain receptors that in turn send signals up to a pain center in the brain. Although this theory was remarkably close to the truth compared to other beliefs of the time and no doubt led to many breakthroughs in the study of human pain, we now have many reasons to believe that the experience of pain cannot be something as simple as a mental representation whose information is derived entirely from the properties of the physical stimulus that caused the tissue damage.

For one thing, according to Ronald Melzack and Patrick Wall in their book *The Challenge of Pain*, there is not a strict one-to-one mapping of pain experiences to tissue damage (1983). H. K. Beecher wrote that 65% of soldiers who are severely wounded in battle reported feeling very little or no pain in the days following the injury (1959). Conversely, there have been strange cases like that of Miss C. of Montreal, where people

are incapable of experiencing pain no matter how severe or dangerous the tissue damage afflicting their bodies (McMurray 1950).

These findings, as well as many others, led Melzack and Wall to propose the gate-theory of pain in a 1965 article. This theory rejected the notion that the pain resulted from a one-way pathway from the site of stimulation to the brain. Instead, according to the theory, a large amount of cross-talk, ascending regulation, and descending regulation occurred between different pain pathways, mostly in the substantia gelatinosa of the dorsal horn (to be discussed more below). The brain was now seen not just as the recipient of pain-information but also as an organ that could influence the perception of pain through downstream excitation or inhibition. The gate-theory of pain led to many new research approaches and greatly expanded the conception of how the pain system works.

Despite its success, there were still many questions the theory left unanswered. The central question that led Dennett to say that we didn't really understand pain was the question of how it is possible that patients who are administered morphine can claim that they still feel almost the same amount of pain yet that it no longer seriously bothers them. The facts that pain is unpleasant and produces a desire to escape it have been crucial elements in people's folk understanding of what pain is. If pain isn't something that is necessarily aversive, Dennett's challenge implies, we have a long way to go before we can have an accurate definition of the concept.

Research since Dennett's article has shed some light on the claims of the "doped-up" patients. In two experiments by Rainville et al., subjects had their hands immersed

in a water bath with a moderately painful temperature of 47° C (1999). In the first experiment, the subjects were given hypnotic suggestions that enhanced the pain unpleasantness of the water, and the subjects reported that the unpleasantness increased but the intensity of the pain sensation remained the same. In the second experiment, the subjects were given hypnotic suggestion that the pain sensation increased, and in that case they reported that both the unpleasantness and the sensation increased. These results, combined with the claims of patients administered morphine, seem to indicate that the mechanisms responsible for localization of pain may be different from those that produce the sensation of unpleasantness.

The notions that the brain exerts some top-down influence and that there are (at least) two distinct pathways in the brain that account for different elements in the qualitative experience of pain would be on shaky ground if they were based only on the reports of human subjects. But recent technological breakthroughs have provided crucial support for these theories. Two especially important developments for the study of pain have been functional magnetic imaging (fMRI) and positron emission tomography scans (PET scans). Both procedures are based on the premise that activated areas of the brain require more oxygen, and thus more blood flow. PET scans detect positrons released in the brain after a radioactive solution injected into the bloodstream interacts with various parts of the brain, whereas fMRI detects the change in magnetic resonance that occurs when blood in the brain donates its oxygen (Bear et al. 2001). Both techniques allow researchers to study pain in humans in a relatively noninvasive manner.

Several PET studies have confirmed the notion that at least two distinct pathways are involved in the processing of the qualitative aspects and the affective or motivational aspects of pain (Price 2000). Repeating the hypnosis experiment while performing a PET scan on the subjects, Rainville et al. showed that activity in the posterior section of area 24 in the anterior cingulate cortex (ACC) varied proportionally to the amount of unpleasantness experienced by subjects (1997). In contrast, activation of the S1 area of the motor cortex varied proportionally to changes in pain sensation reported by subjects (Bushnell et al. 1996). Similar studies have confirmed these results (Tolle et al. 1999).

Findings such as these as well as strange events such as phantom limb syndrome, where people experience pains as occurring in limbs that they no longer possess, have led many neuroscientists to embrace the pain matrix theory (Jones et al. 2003). According to the pain matrix theory, pains are produced not by a single pain center in the brain, but rather by a widely dispersed pattern of activation that occurs in many different areas of the brain (Melzack 1999). This characteristic pattern, called a neurosignature by Melzack, presumably includes many loops between the thalamus and cortex as well as between the limbic system and the cortex. Thus, the occurrence of phantom limb experiences can be explained by the fact that the body produces neurosignatures in the absence of any input from the limbs. The neuromatrix theory provides a framework for understanding the interaction between many distinct pain pathways and the importance of psychological influence on pain sensations.

Many of the important conceptual developments in the study of pain are expressed by the pain matrix theory. Through fMRI and PET scans, scientists have

shown that different areas of the brain are activated by different properties of what we call the “pain experience”. They have also shown that psychological factors such as attention, anxiety, and anticipation can exert influence on the pain experiences through top-down and cyclical influence. As with many areas of neuroscience, the advances in the study of pain have come with an increased appreciation of the complexity of the system and its integration with the rest of the body. But, even with this complexity, the mysteries of pain are slowly beginning to be unraveled.

### **3. Physiology of Nociception**

Unlike many other somatosensory receptors, which are surrounded by corpuscles or epithelial cells, the transduction of pain information in nociceptors occurs entirely in free nerve endings (Bear et al. 2002). These nerve endings, when stimulated, pass on information to the cell bodies of the primary afferent neurons located in the dorsal root ganglia, a bundle of cells just outside of the spinal cord. The axons from the cell bodies then synapse inside the dorsal column of the spinal cord.

The nociceptive nerve endings are primarily responsive to three different types of stimulation: thermal, mechanical, and chemical. Although most receptors respond to more than one kind of stimuli, and are thus called polymodal, there is evidence that various nociceptors are more responsive to one particular type of stimulation than to others (Kandel and Schwartz 1985). It is important to note, however, that despite their sensitivity to many stimuli, nociceptors are believed to be functionally distinct from the

thermal receptors and mechanoreceptors involved in non-painful sensations such as touch, vibration, two-point discrimination, and proprioception.

The vanilloid receptors VR1 and VRL1 are two of the receptors that will respond to a noxious heat stimulus (Woolf and Salter 2000). Interestingly, these receptors are also responsive to contact with capsaicin, the compound in peppers that makes them taste “hot.” Applying capsaicin to skin also is known to cause a “burning” sensation (McCleskey and Gold 1999). The fact that it is the same receptors that respond to noxious heat ( $>42^{\circ}\text{C}$ ) that respond to capsaicin has been shown by several different studies (McCleskey and Gold 1999).

Studies have also shown that the vanilloid receptors have decreased thresholds for firing rates after they have been repeatedly stimulated (Caterina et al. 1997). This fits well with the common intuition that skin becomes more sensitive after longer periods of exposure to heat. The changes are rapid, significant, and are easily reversed (Woolf and Salter 2000). Thus, the nociceptive system shows a degree of flexibility even at the level of receptors.

As of June 2000, a specific transducer for noxious mechanical stimuli had not yet been found. Some experiments had indicated that the transducer might belong to the mDEG ion channel family (Waldmann and Lazdunski 1998). It is believed that pressure on these transducers can cause an influx of  $\text{Na}^+$  that produces an action potential along the nerve fibers.

There are a wide variety of receptors that respond to chemical stimuli. These include receptors that respond to chemicals such as  $\text{P}^+$  and ATP that are released when

cells are damaged, receptors that respond specifically to acid, and receptors that respond to histamines released from mast cells when they are exposed to foreign substances such as during a bee sting (Bear et al. 2001). Thus, it is not merely toxic chemicals that cause chemical receptors to fire.

Several studies have suggested that ATP may cause action potentials in nociceptors (McCleskey et al. 1999). One study reported that ATP applied to blisters caused pain. An even more convincing study showed that fractions of cellular cytosol high in ATP concentration caused pain when applied to blisters, whereas cytosol low in ATP concentration did not. The exact role of ATP has yet to be determined.

Even so, there have been some promising developments in the understanding of how ATP could cause action potentials (McCleskey et al. 1999). Ion channels have been found on sensory neurons that are opened by extracellular ATP. Cells that remove ATP from the extracellular space would also be necessary for ATP to function as an extracellular modulator, and researchers have found extracellular nucleotides that remove the phosphate groups from ATP. Although there are a number of indications that ATP may serve the function of causing action potentials during tissue damage, there is yet to be conclusive evidence.

The channels ASIC1, ASIC2a, ASIC2b, and ASIC3 are all believed to be acid-sensing channels (McCleskey et al. 1999). When activated, these channels allow  $\text{Na}^+$  to flow into and depolarize the cells. As members of the family of degenerins, the channels are all sensitive to amiloride. It is not known if one of these channels is more

responsible for the acid-evoked current in sensory neurons, but some evidence suggests that they work together.

One other chemical commonly implicated in pain and inflammatory diseases is bradykinin (Heitsch 2000). Bradykinin is often formed as a result of chemical reactions that occur after tissue damage, and can cause depolarization in nociceptors with B<sub>2</sub> receptors. Bradykinin has also been known to increase the long-term sensitivity of nociceptors around the site of damage (Bear et al. 2001).

Certain chemicals such as histamines and tumour necrosis factor are released from mast cells when these cells are exposed to foreign substances (Zuo et al. 2003). These two chemicals can bind to receptors and cause action potentials (Bear et al. 2001), and histamines have been shown to inhibit the antinociception caused by morphine-related effects in the spinal cord (Yanai et al. 2003). In addition to these two chemicals, mast cells also release factors that cause sensitization of other nociceptors and consequently hyperalgesia, such as histamine, leukotrienes, TNF $\alpha$ , and transforming growth factor. Experiments have indicated that these factors contribute to long-term neuropathic pain in mice and are likely to do so in humans (Zuo et al. 2003).

The sensitization of nociceptors is not a property unique to histamines and bradykinin. PGE<sub>2</sub>, 5-HT, epinephrine, and adenosine all sensitize terminals in relation to subsequent stimuli (Shu and Mendell 1999). One relatively famous sensitizing agent is substance P, a peptide synthesized by the nociceptors and released upon stimulation. Substance P causes a variety of effects in addition to decreasing the threshold of pain receptors, including causing swelling of blood capillaries and promoting the release of

histamines (Bear et al. 2001). It is thought to be a major contributor to secondary hyperalgesia, which can cause painful sensations from the activation of mechanoreceptors that normally do not send pain signals.

Clearly, there is a wide assortment of processes at work in the initial detection of tissue damage by nociceptors. The one thing all these processes have in common is that they contribute to the sending of information to the dorsal horn of the spinal column via action potentials in A- and C-fibers. A-fibers are lightly myelinated and are slightly thicker than C-fibers, causing them to send faster signals. C-fibers lack any myelination at all. Both A-fibers and C-fibers are significantly less thick and less myelinated than the primary afferent neurons involved in the sensation of non-painful somatosensory information (not including thermal detection), and are consequently far slower than these fibers (Bear et al. 2001).

A-fibers are faster than C-fibers and contribute to the sharp pain that initially follows noxious stimuli. The sharp pain is gradually replaced by a dull, often-throbbing second pain that is believed to be caused by the C-fibers. C-fibers are often thought to be responsible for chronic, long-term pains. The next section will discuss what happens after A- and C-fibers send action potentials into the spinal cord.

#### **4. The Dorsal Root Column and the Substantia Gelatinosa**

The axons from C-fibers and A-fibers synapse primarily in laminae I and II in the dorsal horn of the spinal cord. Their synaptic transmission is mediated by glutamate acting on AMPA and kainite ligand-gated ion channels (Woolf and Salter 2000). Some

research has indicated that substance P also plays an important role in the mediation of some synaptic transmission in the spinal cord as well as at the nociception sites.

The substantia gelatinosa (lamina II) played an essential role in Melzack and Wall's original formulation of the gate-theory of pain (Melzack 1983). They proposed that the A-fibers and C-fibers activated transmission (T) cells that projected directly to the brain. Cells in the substantia gelatinosa were assumed to mediate both facilitation and inhibition in the T-cells. Inhibition was presumed to be caused by inputs from large diameter A-fibers (those responsible for carrying the information from touch sensations) and also from descending pathways from the brain.

Unfortunately, the gate-theory as it was originally proposed is not completely accurate. The gate-theory predicts that activation of A-fibers should cause presynaptic inhibition of the nociceptive A-fibers in the substantia gelatinosa, but this has been shown not to be true (Whiteborn and Burgess 1973). Also, it has been shown that in many types of neuropathy there is no correlation between pain and the number of myelinated and non-myelinated C-fibers (Nathan 1977)

Despite its flaws, the gate theory has led to vast new horizons of research on pain. Perhaps as importantly, one element that was correct in the gate theory is that descending pathways from the brain play an active role in the excitation and inhibition of the signals traveling along the spinal cord. Various systems in the brain can, via neurons in the medulla, project down to the spinal cord and inhibit nociceptive activity.

After entering the spinal cord, there appears to be a divergence of the nociceptive neurons into at least two different pathways. Many of the axons from lamina I, also

known as Rexed's lamina, project directly to the thalamus (Kandel and Schwartz 1985). Some of the nociceptive information from lamina I and lamina II is relayed via lamina V to laminae VII and VIII (Sewards and Sowards 2002). These have been shown to project to the medullary reticular formation, the ventrolateral periaqueductal gray, and to intralaminar thalamic nuclei. More will be said about these two pathways shortly.

### **5. Trigeminal Complex**

As with other somatosensory neurons, those nociceptors that are located in the face and head have a more direct path to the brain than the spinal cord. The axons of many of these neurons travel through the trigeminal nerve to the spinal trigeminal nucleus, which then passes on the information to the thalamus. As with the spinal cord, most of the nociceptors terminate primarily in laminae I and II of the spinal trigeminal nucleus, but other, deeper laminae likely receive information indirectly via relay neurons (Hayashi 1985). Axons from the deep layers of the spinal trigeminal nucleus terminate in the posterior hypothalamic nucleus, so again it seems as though there are at least two distinct pathways through which pain information reaches the brain.

### **6. Medial and Lateral Pathways**

As was mentioned before, more and more research is pointing to the fact that different qualitative aspects of pain as experienced by subjects are mediated by different pathways in the brain (Price 2000). This point will be an important consideration later in the thesis. Evidence for the different pathways has come both from disassociations in

the reports of people and from PET scans of stimulated areas of the brain. Researchers have postulated a major difference between what is called the medial pain pathway and the lateral pain pathway. The distinction between these two pathways is really just the beginning; within these two structures, there are many more divergent paths as well. It should also be noted that there is clearly some overlap between the functions of the two pathways; both, for example are involved in the processing of acute pain and at least one type of chronic pain (Jones et al. 2003).

Growing amounts of evidence suggest that the lateral pathway is responsible for the sensory discriminative components of pain such as localization and texture (Jones et al. 1992). On the other hand, the medial system is thought to be concerned with the affective and motivational components of pain, such as the unpleasantness of pain experience. Support for this distinction comes from the previously mentioned study in which a hypnotic suggestion of increased unpleasantness increased activity in the ACC (of the medial pathway), whereas the hypnotic suggestion of increased sensation increased activity in S1 (of the lateral pathway) (Rainville et al. 1997).

It is also interesting to note that the highest concentrations of opioid receptors are found in components of the medial pain system, including the medial thalamus and the perigenual cingulate cortex (Jones et al. 1992). In contrast, S1 of the lateral system has a very low number of opioid binding sites. When viewed in relation to the earlier claims that many patients who have been administered opiates report that they still feel pain but that it bothers them much less, these findings seem to lend credence to the theory that these pathways have distinct functions.

## 7. The Lateral Pathway

One of the main reasons for thinking that the lateral pathway is responsible for the localization and texture of pain sensations is that S1 is the only area in the brain that demonstrates somatotropy for pain (Anderson et al. 1997). Studies have shown that S1 responds 67% to tonic pain, and 69% to phasic pain, both forms of acute pain. In contrast, S1 is activated only 23% of the time during studies of chronic, on-going pain (Jones et al. 2003). The fact that S1 may be responsible for the localization of pain seems to be supported by the general notion that chronic pains are more vague and dispersed than acute pains.

Before nociceptive information from the spinothalamic pathway can reach the somatosensory cortex area (areas S1 and S2), it synapses on the relay neurons of the ventroposterior lateral nucleus (VPL) and ventroposterior inferior nucleus (VPI) of the thalamus (Price 2000). From there, the information is sent to both S1 and S2 of the somatosensory cortex, where there is a substantial amount of cross-talk between the two brain regions. S1 and S2 are connected with a cortico-limbic somatosensory pathway that integrates information from many different sensory modalities as well as learning and memory systems. S2 also projects to the posterior parietal complex (PPC) in the cortical areas.

From the PPC, information is sent to the insular cortex, where it is rejoined with the same structures in the limbic system and subcortical areas that receive direct input from the medial pathways. The insular cortex passes on information to the ACC, the amygdala, the perihinal cortex, and the hippocampus. Thus, it appears that (under

normal circumstances) multiple systems ultimately converge to form the final pain sensation.

## **8. The Medial Pathway**

One area that receives early information from the afferent nociceptive neurons is the posterior hypothalamic nucleus (PHN). This area receives dense input from the deep layers of the spinal trigeminal nucleus. It has been shown that stimulation of A- and C-fibers elicit activation in the posterior hypothalamic area (Dafny et al. 1965). It has also been shown that electrical stimulation of areas in the PHN induce behaviors such as running, leaping, and rearing that are characteristic of escape behaviors (Sewards and Sewards 2002). Thus it is possible that nociceptive input can influence either the areas responsible for fear responses or areas directly adjacent to them. The PHN also projects to the periaqueductal gray (PAG) matter and the intralaminar thalamic nuclei.

In addition to receiving input from the PHN, there is evidence the PAG receives direct input from laminae I and II as well as the deeper laminae in the spinal column. Individual neurons in the PAG have been shown to respond specifically to nociceptive stimuli (Eickhoff et al. 1978). It should be noted that much of the information about the PAG comes from studies of nonhuman animals, and so may not map perfectly onto humans. However, there is evidence that stimulation of the dorsal PAG of human subjects can cause the experience of anxiety and fear (Sewards and Sewards 2002). These results suggest, but do not prove, that there is an area of the PAG that contains a

representation of fear and pain motivation in stimulated subjects. The representation of fear is presumed to be projected to many different intralaminar thalamic nuclei.

The intralaminar thalamic nuclei receive nociceptive input from the PHN, the PAG, as well as direct input from laminae VII and VIII of the spinal cord. These nuclei are believed to be a major relay to the anterior cingulate cortex (ACC). Studies have shown that nociceptive-specific neurons exist in the central medial, parafascicular thalamic, central lateral, and the paracentral intralaminar nuclei of the thalamus (Sewards and Swards 2002). The ACC of rats, cats, and monkeys all receive input from these nuclei.

The anterior cingulate cortex is generally thought to be one of the most important structures for the unpleasant experience of pain in mammals. Many studies have shown that the ACC is activated during exposure to noxious stimuli (Sewards and Swards 2003). Lesions in areas of the ACC have been known to produce similar effects to those of opiates, where subjects report that they still feel pain but that it no longer bothers them (Foltz and White 1962). Interestingly, an adjacent region in the ACC to the area that is activated during nociception appears to be stimulated when subjects are anticipating pain. Donald Price suggests that the ACC may have a pivotal role of associating information from frontal and parietal areas of the cortex, and using that information to establish emotional valence and response priorities (2000).

The ACC receives significant input from the intralaminar thalamic nuclei, the prefrontal cortex, as well as the insular cortex (Price 2000). Remember that the insular cortex received much of the information from the S1 and S2 of the somatosensory

cortices. The ACC is thought to play a major role in learned responses to pain and in fear activation because it has significant projections to the amygdala. It also sends significant amounts of input back to the prefrontal cortex and to the supplementary motor area.

The insular cortex (IC) is another region of the brain that is consistently activated during painful stimulation. It is believed to be an important component of cerebral pain mechanisms because of its anatomical connections to other important areas (Casey 1999). The IC provides much of the input to the ACC and correspondingly receives input from the posterior parietal complex as well as the ventral medial posterior thalamus.

Studies have shown that the ablation of the amygdala can cause decreased responsiveness to noxious stimuli (Melzack 1999). The basolateral area of the amygdala, and specifically the central nucleus, is known to play an important role in the fear response through its projections to the hypothalamus, the PAG, and diffuse modulatory systems (Bear et al. 2001). Some studies have indicated that the amygdala may play a more important role in conditioned responses to painful stimuli than in unconditioned responses (Antoniadis and McDonald 2000). The amygdala is also believed to play a central role in the conditioning of behavioral fear responses through its projections to the midbrain (LeDoux et al. 1988).

Another area that is proximate to the amygdala and is also thought to play a role in conditioning is the hippocampus. The hippocampus is known to play a role in memory systems in humans (Bear et al. 2001). Its involvement in the conditioned

response to pain is more controversial. For example, one 1970 study by Blanchard indicated that responses to conditioned stimuli remained the same despite lesions to the hippocampus (Antoniadis and McDonald 2000).

The many areas of the brain that respond to painful stimuli show that it is very unlikely that there will be a simple answer to the question “what is the neuronal correlate of painful experiences?” and serves to showcase how necessary a holistic understanding of the brain is to understand even one system. Many other areas of the brain can influence the experience of pain, and this is what we turn to in the next section.

## **9. Descending Influences on Pain**

As was mentioned earlier, one of the key breakthroughs in the study of pain was the realization that the psychological states of subjects can have a profound influence on their experience of pain and, of course, the neuronal mechanisms underlying them. The next sections will first examine descending regulation in general, and will then examine two studies that show the influence that various psychological factors (anxiety and attention) can have on the experience of pain.

## **10. Descending Pathways**

Stimulation of certain areas of the PAG is known to cause analgesia in subjects (Bear et al. 2001). The PAG receives input from the hypothalamus so it is possible for a number of different brain structures to influence this process. The PAG, via relay

stations in the medulla, can send signals down to the spinal cord that inhibit nociceptive activity.

## **11. Attention**

It is common to hear stories about soldiers or other people in intense situations who are capable of performing amazing tasks despite the fact that they have been severely injured. In these situations, it is common to say that the actors “ignored the pain” of the situation because they were so focused on the activity they were engaged in. Experimental results have supported this idea by showing that attention can indeed modify the amount of pain perceived by human subjects (Miron et al. 1989). Bantick et al. set out to examine, using fMRI, whether the observed activation of brain areas would reflect these facts and, if so, in what way (2002)

The experimenters used a task called the counting Stroop to manipulate the attention of eight right-handed volunteers. Subjects were monitored by a 3T fMRI scanner during the testing. The subjects were presented with various numbers of words and asked to count the words as fast as they could while making sure to get the number correct. For example, if the subject was presented with:

Cat

Cat

they would be expected to answer “two.” The presented words were divided into two categories: neutral words and interference words. Interference words would be words such as “one” because the name of the word conflicts with the correct answer that the

subject is supposed to give (because it is in the same category, i.e. numbers). Neutral words are those such as “cat” which do not conflict with the answers. Past studies have shown that it takes more concentration for a subject to answer correctly when presented with interfering words than with neutral words.

As the subjects were engaged in these tasks, noxious heat stimuli were administered on the subjects’ left hands using a thermal resistor. The subjects were asked to give a rating to the unpleasantness of the pain on a scale of 1 to 10, while still making sure to pay attention to the Stroop task. The brain states of subjects were monitored throughout this process.

The experimenters found that subjects engaged in the more attention-intensive tasks (the interference words) gave lower ratings to the unpleasantness of the pain stimuli than they did when they were engaged in counting the less-intensive neutral words. Some areas of the brain showed higher activation rates during increased attention, but the areas of the brain associated with the pain matrix, such as the cognitive division of the ACC, the insula cortex, and the thalamus, were less activated during increased attention to the Stroop task. Thus, focusing attention on other objects appears to decrease the amplitude of unpleasantness in humans, and neuroscientists are narrowing down the neural correlates of such processes.

## **12. Anxiety**

Another common report is that anxiety can increase the feelings of unpleasantness from a painful stimulus. The ability of anxiety to produce hyperalgesia

has been demonstrated in clinical settings (Melzack 1973). It has also been shown that anxiety-reducing drugs have been known to eliminate this effect. Ploghaus et al. (2001) used fMRI to test which areas of the brain might be responsible for this commonly observed phenomenon.

Eight right-handed males between the ages of 22 and 40 volunteered for the study and were hooked up to a 3T fMRI scanner. Again, thermal resistors were applied to the left hand of the subjects that caused noxious thermal stimuli at the appropriate times. Subjects were presented with a visual cue of either a square or a triangle before they were administered the thermal stimuli. The triangle always was followed by a low-intensity heat stimulus, and therefore caused relatively little anxiety in the subjects. The square was sometimes followed by a low-intensity stimulus, but was also sometimes followed by a relatively higher noxious thermal stimulus. Thus the square produced higher anxiety states in the subjects. After administration of the thermal stimuli, subjects were asked to rate the pain experience on a scale of one to five. Because unpleasantness reports tend to be more biased by emotional state of anxiety, subjects were asked to report on the intensity of the sensory experience of pain rather than the intensity of the unpleasantness.

The results of the study confirmed past studies that suggested that anxiety can increase the intensity of the pain experience in subjects. Subjects, of course, reported far higher pain intensity levels for the high-intensity thermal stimuli. But, subjects also reported higher pain ratings for the low-intensity thermal stimuli when they were presented after a square than they did for the same level intensity thermal stimuli

presented after a triangle (by nearly 1 point on a four point scale). Thus, the anxiety that occurred upon seeing the square (which sometimes produces high-intensity thermal stimuli) increased the experience of pain in subjects even when the low-intensity stimulus was administered.

Comparison of the fMRI images between the high-anxiety and low-anxiety states receiving the low-intensity stimuli show significantly more activation in the hippocampus and the entorhinal cortex during the high-anxiety states. The Gray-McNaughton theory (Gray and McNaughton 2000) predicts that the hippocampus responds to aversive events when they are a part of a behavioral conflict (i.e. when they are not always reliably predicted by stimuli). According to this theory, the hippocampus responds in a worst-case scenario fashion by increasing the level of pain even though the correlation between the stimuli and pain is not conclusive. This study supported the predictions of that theory, and also showed that the entorhinal cortex plays an important role in anxiety-induced hyperalgesia.

### **13. Summary**

Though neuroscience has made many advances in our knowledge of what causes pain in humans, it has also shown us just how complicated a system pain can be. Since pain is influenced by attention, it is apparent that all of our sensory information has the potential to influence the amount of pain we experience at any given time. Since pain is influenced by the amount of anxiety we are feeling, it is clear that it can be influenced by cortisol release, which in turn can be influenced by factors as diverse as circadian

rhythms, psychological disorders, and memories and conditioning from previous experiences.

Although much progress can be made in the study of specific systems, it seems clear that some areas of neuroscience are so interrelated that, in some respects they will only be able to advance together. Pain is no exception to this. Though much progress can be made studying the particular neurotransmitters used at the level of nociceptors or spinal cord transmission, it is clear that the only way we can have a full understanding of how pain operates in our lives is by studying its relationships to many other neurological systems.

Though it is clear that the pain system is far more complex than is currently understood, some of the features described in this chapter can be used to better understand what features to look for in animals when trying to assess whether they can suffer and how comparable their suffering would be to that of a human. The next chapter describes two recent attempts by philosophers to summarize what current scientific evidence implies about these questions.

## CHAPTER VI

### WHICH ANIMALS FEEL PAIN?

#### 1. DeGrazia's Argument

In his book *Taking Animals Seriously: Mental Life and Moral Status*, David DeGrazia (1996) analyzes the concepts of “suffering” and “enjoyment” in detail, elucidating what counts as evidence for these states in humans. He then cites a wide range of empirical evidence showing similarities and differences between the behavior and anatomy of humans and various animals. For those animals that exhibit behavioral and anatomical reactions to painful stimuli sufficiently similar to humans, DeGrazia writes that the principle of parsimony suggests that the most reasonable conclusion to reach would be that these animals have similar conscious states. Though different causes can have the same effects, the fact that humans share a common evolutionary heritage with species that are most similar to humans in behavior (other mammals and avian species) strongly suggests that the same mechanisms are at work in all of the aforementioned groups since “it is a truism that evolution tends to preserve successful biological systems” (DeGrazia 1996, p. 110).

DeGrazia defines suffering as “a highly unpleasant emotional state associated with more-than-minimal pain or distress” (1996, p. 116). In addition to pain and distress, DeGrazia lists fear and anxiety as other negative emotional states that can count as “bads” for moral subjects. His approach is useful because it differentiates concepts that are all too often used interchangeably by authors and activists arguing whether or not nonhuman animals have interests.

Often, answers to questions about whether certain animals have interests are equivocated with determinations of whether animals feel pain; and DeGrazia provides an analysis of this issue. He starts by differentiating pain from nociception. Nociception differs from pain in DeGrazia's classification system since nociception can occur unconsciously, whereas pain cannot. Even some of the simplest neural mechanisms, such as the gill-withdrawal of the sea slug *california aplysia*, which can essentially be explained by the interaction of three neurons, count as instances of nociception under this definition, but would not satisfy most definitions of pain. However, DeGrazia writes, nociception is a necessary condition of pain and as such can be counted as partial evidence that a particular organism may be in pain.

DeGrazia incorporates nociception into his discussion by referring to tissue damage in his definition of pain as "an unpleasant or aversive sensory experience typically associated with actual or potential tissue damage" (1996, p. 107). He writes that in humans, the affective component of pain usually produces behavior that serves to "(1) avoid or escape the noxious stimulus, (2) get assistance, or (3) limit the use of an injured or overworked part to allow rest and healing" (1996, p. 108). DeGrazia writes that the presence of actions of types (1), (2), or (3) all should count as comparative evidence that a given organism feels pain. However, type (2) behavior is limited to relatively social animals such as mammals and avian species so a lack of type (2) behavior should not necessarily be counted as evidence that the given animal does not feel pain. DeGrazia cites research that suggests that types (1) and (3) behavior are found in all vertebrates and cephalopods, but are absent from most invertebrates (1996, p. 109).

DeGrazia also describes physiological similarities to make the case that most vertebrates are capable of experiencing pain. He points out that the neurophysiology in response to noxious stimuli is similar across many species. The primary physiological evidence he points to is the presence of opiate receptors across a range of species, as well as other chemicals associated with pain such as substance P. These similarities, he concludes, combined with behavioral similarities are strongly suggestive that vertebrates and possibly cephalopods feel pain and thus have interests.

Since he considers the mechanisms of distress to be similar to those of pain, DeGrazia next considers fear and anxiety in detail. Fear is generally described as being a response to something specific and known in the environment, whereas anxiety can be caused by threats that are not perceived directly or by exposure to unfamiliar circumstances. DeGrazia writes that anxiety appears to be a more cognitively sophisticated behavior than fear (since fear can be a habituated response to aversive stimuli), and concludes that animals capable of experiencing anxiety will also be capable of experiencing fear. He considers evidence for anxiety in animals to be sufficient to show that the animals are capable of experiencing fear.

Taking the same approach as he did with pain, DeGrazia begins his consideration of anxiety by listing the behavioral and physiological details that occur in humans when they describe themselves as anxious. These details include the occurrences of “(1) motor tension, as seen in shakiness and jumpiness; (2) autonomic hyperactivity (sweating, pounding heart, increased pulse rate and respiration); (3) inhibition of behavioral repertoire in novel situations; and (4) hyperattentiveness, as seen in vigilance

and scanning” (DeGrazia 1996, p. 120). These details, DeGrazia said, are present in many animals other than humans.

A more specific comparison he considers is the presence of benzodiazepine receptors in the central nervous system. A wide variety of experiments on these receptors have discovered that certain chemical agents that act on these receptors reduce anxiety and that other chemical agents enhance anxiety (measured in nonhuman animals and humans by quantifying conditions (1) – (4) or by observing changes in normal behavior; humans also verbally reported anxiety). An analysis across many species found that the five invertebrate species studied did not possess benzodiazepine receptors while seventeen species of vertebrates including avian species and herpetofauna did.

Combining his analysis of pain and distress with that of fear and anxiety, DeGrazia concludes that it is likely that vertebrates but not invertebrates (with the possible exception of cephalopods) have interests in a moral sense. DeGrazia’s analysis of “bads” includes but is not limited to pain, but all of his “bads” (fear, anxiety, and suffering) have in common with pain the aversive or affective dimension. He thus gives a more filled-out explanation of sentience than does Singer.

## **2. Varner’s Arguments**

In his book *In Nature’s Interests*, Varner (1998) provided a detailed chart of various characteristics of animal species that lend support to the claim that they can consciously feel pain. The chart was based on a survey of several different researchers’ investigations of various species’ pain systems. The first category considered was the

presence of nociceptors. As was mentioned previously, nociceptors are receptors in the body that respond to damaging or potentially damaging stimuli such as intense pressure, high temperatures, torn skin, and the presence of various chemical agents. According to Varner's chart, nociceptors have been found in mammals, birds, herpetofauna (reptiles and amphibians), and fish, but not in most invertebrates (1998, p. 53). Several investigators suggested that cephalopods (which include octopi, squid, and cuttlefish) may be an interesting exception among invertebrates because they have shown nociceptive-like responses to electric shocks and, in general, have much more sophisticated behavior patterns than other invertebrates.

Varner is careful to note (as was DeGrazia) that the presence of nociceptors is generally not taken by itself to mean that an animal feels pain. Nociception also occurs in reflex reactions where conscious perception need not occur. For example, decapitated insects will still withdraw their limbs from an electrified saline solution, and will even learn to hold their legs up after repeated exposures, but it is extremely unlikely that we would want to attribute conscious pain to headless insects (Varner 1998, p. 31), given what we know about the importance of human brains for our conscious experiences. In fact, humans who are paralyzed from the neck down can still reflexively withdraw limbs from damaging sources, but they have reported that they don't feel pain (MacPhail 1998), so we can be fairly sure that nociception can occur without pain.

Because nociception does not seem to be a sufficient condition of the experience of pain, Varner suggests it is also very likely that having a central nervous system is an important feature of the ability to experience pain, at least in anything similar to the way

humans feel it. Again, in the research he surveyed, it was found that fish, herps, birds, and mammals all had central nervous systems, and that their nociceptors were connected to the CNS. Again, with the exception of cephalopods, similar results have not yet been found in invertebrates.

Finally, Varner considers whether the behavioral responses of other species are similar to those of humans. Various criteria were used to make this judgment: whether “the animal responds so as to avoid or minimize damage to the body,” whether the animal “is unwilling to resubmit to a painful procedure,” and whether “the animal can learn to associate apparently nonpainful with apparently painful events” (Smith and Boyd 1991, p. 62). Once again, the scientists concluded that the behavior was present in vertebrates (fish, herps, birds, and mammals) but not in invertebrates (again except cephalopods).

Varner’s table graphically represents the way arguments by analogy work. These arguments generally have the following form (Varner 2003, p. 160-161):

*a, b, c, and d* all have properties *P* and *Q*.  
*a, b, and c* all have property *R* as well.  
 So *d* has property *R* too (probably).

In the argument for the consideration of animals, *R* would represent “is a morally significant subject,” *a, b, and c* would be normal adult humans, and *d* would be a particular animal. The properties listed in Varner’s table could all be inserted in place of *P* and *Q*. It is important to note that the strength of an argument by analogy is not dependent upon the number of similarities between *a, b, c* and *d*, but rather on the relevance of the properties used for comparison. For example, the argument:

Chickens, turkeys, pheasants, and cattle are all animals and they are all eaten by humans.

Chickens, turkeys, and pheasants are all born from eggs.

So cattle are born from eggs too (probably).

is not convincing because there is no relevant connection between being born from eggs and the other two properties. So in arguing that animals are morally significant, the argument hinges on the relevance of the similarities mentioned.

The same strategy of arguing by analogy is used by DeGrazia, and many other authors defending claims about which animals can feel pain or have other conscious mental states. However, as the following chapter details, arguments by analogy have recently come under fire from various quarters.

## CHAPTER VII

### ON CRITICISMS OF ARGUMENTS BY ANALOGY

#### 1. Difficulties for Arguments by Analogy

Allen et al. (2005) point out that arguments by analogy such as those described in the previous chapter have had notable weaknesses and have been unable to sway various kinds of skeptics. The first kind of skeptic is convinced that no empirical research will ever be able to reveal "what it is like" or if it is like anything to be a nonhuman animal. The second kind of skeptic does not take such a hard-lined approach to the problem, but thinks that there are important disanalogies between humans and nonhumans that suggest it is very unlikely that the nonhumans are capable of suffering. Allen suggests that arguments by analogy will always be vulnerable to these objections so long as they have no theoretical justification for *why* the similarities should be considered important.

Even with the sophisticated accounts of physiological similarities in the previous chapter, important theoretical considerations are not addressed. Take for example the "classic model" of pain (described in Hardcastle 1997) that suggests that the intensity of the sensation of pain and the degree to which a subject minds the sensation can be experimentally dissociated and are mediated by different pathways. Since the "minding" of pain in humans is what most closely resembles our conception of suffering, all of the details given by DeGrazia and Varner would be consistent with an account of other animals' behaviors that claimed that the animals were not suffering. Thus, any argument by analogy that proceeds along these lines would benefit greatly by giving due consideration to current research about this dissociation.

## 2. Affective Pain

Recall that the ACC in the medial pain pathway is considered a very important component for the minding of pain in humans. Removing the ACC caused subjects to report that they still felt pain but no longer minded it. Similar effects are achieved by the administration of morphine, which presumably acts on the opioid receptors in the medial pathway. And Rainville et al. (1997) used fMRI studies to show that ACC activity selectively increased when subjects reported that the “awfulness” of pain increased but not the intensity of the pain.

Interestingly, excitation in the ACC has also been observed in a range of circumstances as diverse as social exclusion (Eisenberger et al. 2003), startle-responses (Pissiotta et al. 2003), and increased aversive sensation due to expectation of pain (Sawamoto et al. 2000). Thus, a wide range of behavior described as negative emotional states in humans appear to selectively activate regions of the ACC.

Perry Fuchs and his research team have developed a way of testing the role of the ACC in nonhuman mammals (LaGraize et al. 2004). Rats generally prefer to spend most of their time in darkness rather than light, other things being equal. In Fuchs’ experiments, hyperalgesia (increased response to aversive stimuli) was caused in one of the paws of a rat by ligating the L5 spinal nerve associated with that paw. Rats were kept in chambers that were divided into one light and one dark section. The experiment was set up so that when rats were in the dark side of the chamber, painful shocks were delivered to the hyperalgesic paw; but when the rats were in the light side of the chamber, equal strength shocks were delivered to the contralateral paw (which was not

hyperalgesiac). Not surprisingly, rats with hyperalgesic paws began spending a much larger proportion of their time in the light side of the chamber. However, after electrolytic lesion was performed on the ACC, the percentage of time spent by the rats in the light side of the chamber decreased dramatically, down to approximately the same percentage they spent in the light chamber before ligation. Withdrawal reflexes of the paw upon shocking continued normally even after the ACC lesioning, thus producing something of a functional equivalent to the reports of “feeling pain but not minding it” by humans with ACC lesions.

Where does this leave us with nonhuman animals? All mammals have an ACC, and research thus far has suggested that it plays a similar role in humans and other mammals (Johansen and Fields 2004). Thus, at least one important theoretical step has been taken to strengthen the argument by analogy for the moral significance of nonhuman animals. Past critics have suggested that the mere processing of information and reflexive withdrawal behavior are not enough to prove the existence of the conscious experience of pain; research has confirmed their suggestion but has also suggested that other mammals possess both those parts of the pain pathway that can be dissociated from the conscious “minding” of pain and those parts of the brain that seem integral to the “minding.” Of course, it is inevitable that future research will further differentiate the roles of different parts of the pain system, so the possibility remains that there are fundamental differences between humans and other mammals.

However, another theoretical consideration that may be useful in determining what species consciously experience pain is the role that pain plays in learning. As

Allen (2004) notes, it is important to be cautious about such claims since detached spinal cords have been shown to learn responses to avoid noxious stimuli and such learning even displays relatively complex features such as latent inhibition and blocking learning to avoid specific stimuli when more salient stimuli are present (Grau 2002). However, as Allen suggests, consciousness may still play a role in more complex forms of learning such as operant learning. This would be consistent with our phenomenological observations, where “minding” a sensation often causes us to desire to avoid it in the future.

Returning to Fuch’s research on rats, this explanation fits well with the fact that rats with intact ACCs learned to avoid the dark side of the chamber, whereas rats with ablated ACCs did not. This idea is supported by research by Johansen and Fields (2004) which demonstrated that the injection of excitatory amino acids into the ACC produced an aversion to a particular location in the absence of a peripheral noxious stimulus in rats, and that the injection of an amino acid antagonist into the ACC blocked learning to avoid the location even in the presence of a peripheral noxious stimuli. The authors concluded that “ACC neuronal activity is necessary and sufficient for noxious stimuli to produce an aversive teaching signal.” Thus, there appears to be an important relationship between the affective pain pathway and learning, which may in turn be suggestive of an evolutionary role that the conscious experience of pain could play.

These considerations could be important when we turn our attention to non-mammalian species. Pain research in avian, reptilian, amphibian, and fish species is far more limited than in mammals, but we can be sure that they don’t have ACCs since they

lack cortices. However, since all of these species clearly avoid noxious stimuli, it would be premature to conclude that they must lack a functional equivalent to the medial pain pathway in mammals. Presumably, future research on mammals will give researchers more of an idea of what such a functional homolog could look like in more evolutionarily distant species.

### **3. Skeptical Arguments**

What do these results show in light of the two strands of skeptical arguments referred to earlier in the chapter? The first basis of skepticism was the claim that no third-person account could ever prove that “it is like something” to be a particular nonhuman animal. This argument, for what I hope will be fairly clear reasons, does not seem to be very relevant to ethical debates or to the interpretation of the research referred to in this paper.

I think that arguments from the first-person perspective are persuasive insofar as they attempt to show that we cannot be *certain* of consciousness in nonhuman animals. However, certainty (at least in absolute terms) is a very tenuous concept and one that is not particularly useful in everyday life. For example, Descartes’ dreamer argument suggested that since we have many times been deceived into believing that we were awake when in fact we were dreaming, we cannot now be certain that we are not dreaming. However, as many interpreters have noticed, this does not imply that it is unreasonable for us to believe that we are now awake (Broughton 2002).

Likewise, though the aforementioned experiments provide very little reason to think the claim that nonhuman animals are conscious is certain, they do provide evidence supportive of the claim that the attribution of conscious states to mammals is reasonable. And reasonableness is all that is needed for the moral argument. If it were reasonable to believe that genocide was taking place in a particular country, it would surely be morally reprehensible to point to the lack of certainty as an excuse for inaction, since the potential costs of inaction are so high (assuming that our actions could make a difference). Likewise, a similar “precautionary principle” is enough to override a certainty requirement in debates over the moral status of nonhumans since the costs are extremely high (at least on utilitarian grounds) if it turns out that nonhumans are conscious yet we continue our current practices.

The other form of skepticism provides a much stronger criticism of the argument by analogy, since it questions not just the certainty of the consciousness of nonhuman animals but also the reasonableness of this belief. Returning to the earlier example, if it is not even reasonable to believe that genocide is taking place in another country, then our apparent obligation to take action is much diminished. Likewise, if skeptical arguments are successful in showing that the belief in conscious states in nonhumans is unreasonable, then at least from the perspective of universalizability we have no obvious ethical obligations towards these animals (assuming that consciousness is a necessary condition for pains to be relevantly similar).

These arguments, perhaps most commonly associated with Peter Carruthers (see also Macpahil 1998), generally claim that some kind of higher-order cognitive capacities

are necessary for consciousness and point to evidence that suggests that nonhuman animals do not possess these capacities (Carruthers 2000). Even a theorist such as Michael Tye (1997), who believes that animals as simple as bumble bees are conscious, still believes that higher-order awareness is necessary for “suffering.”

However, regarding the question of consciousness, I think there are important reasons for preferring the approaches mentioned earlier to those suggested by Carruthers. Allen’s suggestion to investigate whether conscious experiences of pain are linked to certain kinds of learning points to a number of lines of investigation that can be confirmed or disconfirmed empirically. On the other hand, the scientific details of what is meant by the claim that consciousness consists of “being disposed to be targeted by a higher-order thought” (which is Carruthers’ position) are generally left pretty vague. It is not clear what research could be used to support or reject these theories (see Shriver and Allen 2005).

Consider the following: photons of light are absorbed in the human eye by rod and cone photoreceptors (Bear et al. 2001). These rods and cones are selective only to light in particular regions of the human visual field. Before traveling through the LGN to the visual cortex, information is already sorted in a manner that amplifies contrasts between light and dark regions, and between different colors. Later in the visual stream, neurons are found that specifically respond to lines of various sizes, to orientations of lines, to movements of various degrees and velocities. According to DeYoe et al. (1996), there are over 30 distinct areas in the macaque brain that have been identified as processing visual information, and there are huge numbers of connections between these

areas (which includes feedback loops and top-down processing). So if “higher-order” merely means consisting of a representation of some earlier stage of processing combined with “context-sensitive” information from higher areas of the brain, then it will be trivially true that conscious states consist of higher-order representations. What will not be clear, and in fact would be quite doubtful, is whether higher-order in this sense is enough for a representation to be conscious.

Of course, higher-order thought theorists are sure to point out that this is not the sense in which higher-order is used. However, what are not clear are the neurological details that would be relevant to their theories. Until these details or at least a sketch of what the details would look like are provided, it is hard to see how these theories can overcome the argumentative burden imposed by the precautionary principle. Given the current practices of society, this is not to say that the political burden of proof is on the skeptics. Since accepting that nonhuman animals feel pain in a morally relevant sense could suggest a moral obligation for particular lifestyle changes, it is clear that from a descriptive (rather than ethical) perspective the onus is on animal welfare advocates to provide motivational force for their arguments that current practices need to be changed. Even if the ethical arguments were conclusive, this would not be an easy task.

## CHAPTER VIII

### CONCLUSION

For people who value consistency or have other reasons for desiring to be moral, I believe this thesis has made a strong case that we should treat the suffering of other mammals similarly to the way we treat human suffering. Since universalizability, which is a desirable feature for any moral system that attempts to provide guidance for specific situations, means we should treat relevantly similar situations similarly, it follows that if animals can suffer in a way that is relevantly similar to humans, then we should try to minimize their suffering just as we do with humans. Recent studies have shown that mammals have many features of their pain system in common with humans and, in particular, have a similarly functioning medial pathway that in humans is responsible for a wide range of negative conscious experiences. Other vertebrates have many features in common with humans, but since their brains are radically different from mammal's brains it is hard to ascertain whether they have an analogous structure to the medial pain pathway.

Current practices do not treat the suffering of other mammals similarly to the suffering of humans. As has been detailed elsewhere (Singer 1975), factory farming operations have conditions that appear to be extremely unpleasant, and mammals such as hogs and veal calves get some of the worst of the treatment. The taste benefits of eating meat versus being vegetarian are small or (more likely) nonexistent once we remove the influence of cultural conditioning, and would certainly not be enough to justify similar suffering in humans, so from universalizability it follows that they are not enough to

justify this suffering in other mammals either. This thesis has not touched on the question of whether is it morally permissible to consume animals if they could be raised and slaughtered painlessly, but no answer to this question would defeat the conclusion that our current practices are flawed.

Scientific experimentation is another area where great amounts of suffering are produced in mammals. Though the consequentialist framework I have endorsed lends itself to arguments that say that some experimentation on animals may be justified if it produces scientific breakthroughs that benefit other sentient life in the future, there is no question that much of the current animal experimentation is done for relatively trivial reasons (Singer 1975); for the sake of capitalistic rather than scientific progress. Since these practices involve producing suffering that is very similar to human suffering, they too are not morally justified.

In the cases of birds, herps, and cephalopods, the comparison is more difficult to make. I am inclined to think that their behavior and the presence of similar features in the peripheral nervous system provide strong evidence that they suffer, and that this likelihood means that, from an ethical standpoint, we should err on the side of caution. However, I do think that the aversive aspect of pain is the part that humans most associate with suffering, so future research will have a lot to contribute to how we think about pain in species other than mammals.

Just as with birds, herps, and cephalopods, I think the arguments of this thesis provide a framework for evaluating marginal cases. It seems likely that the absence or impairment of function of the ACC in people in persistent vegetative states or in

developing embryos will be an important feature to look for when evaluating whether these humans are suffering or not. Of course, as with animals, it is important to consider this kind of evidence in the context of a full argument by analogy where many features are considered, but even so I think that arguments about moral standing are more powerful when they take the affective pathway into consideration.

So what's wrong with pain? In a sense, this is like asking, "what's colorful about red?" The experience itself is too close to us to be described effectively. But though we may not be able to describe what it is that's wrong with pain, an analysis of moral words and an evaluation of scientific research can help us to recognize the instances in the world that are similar to the experience that we so dislike in ourselves.

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