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Animal Models of Human Psychology: A Critique of Science,
Ethics, and Policy

Kenneth J. Shapiro

CHAPTER 1:

PSYCHOLOGY'S USE OF ANIMALS: CURRENT PRACTICES AND ATTITUDES

Introduction

The field of modern psychology first became well-known to the public during World War II-- as an applied rather than as a research enterprise. For this reason, the person on the street is often surprised when informed that not all psychologists are therapists and that many are engaged in animal-based laboratory research. Yet it is estimated that 8-10% of research psychologists study nonhuman animals (American Psychological Association [APA], 1984). Further, their research often involves considerable suffering and impairment to the animals involved. As psychology is a popular course of study on the undergraduate and, increasingly, secondary levels and since its texts often graphically feature animal-based research, the field is highly influential in forming and maintaining attitudes toward animals in contemporary society and especially among those considered well-educated.

In this chapter, I present a psychology primer for the uninitiated, with special emphasis on psychology's uses of animals. After sketching the scope of the field generally, I review available data on present numbers and species of animals used in psychological

research, level of suffering induced and current trends. I also provide several concrete examples of psychological research involving animals. Finally, the chapter concludes with a presentation of attitudes of psychologists toward animals and these practices.

The Field of Psychology

Psychologists do research and practice in a wide variety of settings: the laboratory, school, clinic, hospital, industry, advertising agency, and courtroom. The breadth of the field is also indicated by the variety of "units" that different psychologists take as the object of their research or practice. In addition to feelings, thoughts, motivation, attitudes and behavior, some psychologists focus their attention on a physiological system or even a single type of neuron in the brain. Still others take as the organizing unit of their work a human relationship, a family, or a formal institution, such as a corporation.

A listing of the subfields of psychology provides an additional view of the scope of the field. The *Directory of the American Psychological Association* (1989, p. xlvi) divides the field into 58 "major fields." Here is a partial listing: biological, clinical child, consumer, ecological, engineering, exercise and sports, forensic, pharmacological, philosophical, psychoanalytic, rehabilitation, and transpersonal psychology. "Specialties" within these major fields number several hundred.

Finally, there have been several different dominant theoretical frameworks or, loosely, paradigms in the brief history of modern psychology. At first, introspectionism, structuralism, functionalism, gestalt theory, and psychoanalysis all vied for dominance, then

behaviorism largely replaced them, while cognitive psychology currently prevails, perhaps soon to give way to or amalgamate with neuropsychology.

In approximate numbers (see Rosenzweig [1992] for actual estimates), there are 500,000 psychologists in the world. The number has doubled in the past decade (1982-1992). Of the current total, about 80,000 (16%) do research as at least part of their work. Research psychologists include both those using human and nonhuman animal subjects. The United States has roughly half the world's psychologists (250,000) and half the number of research psychologists (40,000).

It is generally agreed that since the early 1950s, when applied psychology really came into its own, there has been a decrease in traditional academic and research areas relative to the number of psychologists in applied or "health-service-provider" areas. Evidence of this is the proliferation of professional schools of psychology that produce psychologists whose exclusive interest is clinical practice. An older model of the psychologist as scientist-practitioner, as a person who combined the pursuit of scientific research with its direct application in the clinic, is no longer dominant. The shift is also evidenced in trends in relative numbers of students earning doctorates in research as distinguished from applied subfields. While in the 1950s and 60s, the ratio of PhDs in health service subfields versus research and academic subfields was 1 to 3, this ratio was reversed by the 70s and 80s (cited in Boneau, 1992, p. 1588). Despite an absolute increase in the numbers of researchers,

this relative decline is a matter of considerable concern to some within the field.

One concern is that the decline exacerbates the perennial tension between researchers and practitioners in the field. A common perception is that this tension is resulting in a growing rift between these two groups. A survey of the views of "senior" psychologists toward "psychology's past and future" (Boneau, 1992) is illustrative: "...[S]cientists and practitioners seem further apart than they were then [comparing 1962 to 1987]" (p. 1589); "There will be a continuing and growing split between the academic/scientific group and the practice group" (p. 1592).

The growing rift between "psychology's two cultures" (Kimble, 1984) is seen in tensions in professional organizational politics. These tensions culminated in 1988 when a group of predominantly academic and research psychologists broke away from the American Psychological Association to form their own organization, the American Psychological Society. The rift is also evident in the relative lack of communication between researchers and practitioners. There is "...a major flaw in the bridging function of research; very little research is done that is helpful to the practitioner and very little in the world of practice has influenced research" (Schneider, 1990, p. 523). Researchers and practitioners read and publish in different journals and relatively rarely cite each others' work-- in effect, they live in different worlds. I specifically examine the significance of this separation as it exists between animal researchers and practitioners in a later chapter.

The relative decline in the research arm of modern psychology is a threat to the field's view and presentation of itself as a science-based enterprise. "...[T]he dramatic shifts of recent years [from psychology as a scientific discipline to one dominated by practice] have the potential for drastically altering the discipline" (Sexton & Hogan, quoted in Rosenzweig, 1992, p. 721). The concern is that the field "would be a psychology without a science" (p. 721).

One "solution" is that the field will succumb to "centrifugal" forces (Spence, 1987) which will push some of the research subfields into existing fields or new amalgamations no longer recognizable as psychological science. For example, physiological psychology will become part of biology or neuroscience; while cognitive psychology and psycholinguistics will become part of the new field of "cognitive science" (see *Cognitive Science: An Introduction*, Stillings et al., 1989). Spence, a former president of APA, states: "In my worst nightmares I foresee a decimation of institutional psychology as we know it" (p. 1053).

There is, then, a certain vulnerability in the academic/research side of psychology. This is not to say that practitioners do not have their problems. Changes and upheavals in health care systems may be a threat to the traditional private practice approach of many practitioners (Schneider, p. 521). However, despite all these developments, we should not lose sight of the fact that psychology as a field is presently very robust and continuing to grow. If numbers of undergraduates enrolling in a particular field is any measure of its future, the well-being of psychology is assured.

Animal-based Research in Psychology

Psychology's reliance on animals has varied in the different paradigms, both now and in the past. Research in introspectionist and Gestalt psychology was laboratory and human-based, while psychoanalytic research was and is clinic- and human-based. In its heyday, behaviorist research was, and to a somewhat less extent still is, heavily reliant on lab animal studies. Cognitive psychology is largely a human-based research enterprise. Physiological psychology heavily utilizes animal subjects in the laboratory. Comparative psychology and ethology utilize animals, in both laboratory and natural settings.

Numbers: Of Animals Used and of Users

The absolute number of animals utilized by psychologists in research is not readily available. As we will see, several countries provide data on numbers of animals, but it is not broken down to indicate use in psychological research. Further, US data typically do not include rats, mice, and birds, animal groups commonly used in psychological research in the largest numbers.

In a 1985 publication produced by its public information office, the APA stated that "...252,000 animals [were] used in psychological research in university psychology laboratories in the US in 1983...(APA, 1985a, p. 2). This number is a gross underestimate of the number of animals that psychologists use annually in research in the US. It is based on a survey of universities only and does not include the various other settings in which psychologists conduct psychological research: notably, undergraduate psychology departments (of which there are several thousand), medical centers (particularly departments of psychiatry), industry (e.g. Bell Laboratories), and

governmental agencies (eg. National Institutes of Health [NIH]). In addition, the item in the survey that asked for "number of animals used" did not stipulate annual use. It is more likely read as requesting the number of animals in the lab at the time the survey is being completed. Given the resulting underestimate from this critical survey item and consideration of the actual number of institutions in which psychologists conduct psychological research, the actual number of animals used in psychological research in the US annually is probably 5-10 times greater (1.25 to 2.5 million).

In addition to this admittedly rough estimate of the absolute numbers, there are some data available on the percent of psychological research involving nonhuman rather than human subjects. Gallup and Suarez (1980) state that about 7.5% of psychological research is animal-based. They derive this estimate from a survey of the articles in *Psychological Abstracts* in 1979. This publication presents abstracts of published studies in psychology. The abstracts are not exhaustive as only selected studies from selected journals are included.

Finally, there are some data on the percent of research psychologists using animal rather than human subjects. An APA brochure offered that roughly 5% of its then 60,000 members (or 3,000 individuals) "are involved directly in research with animals, either as scientific researchers or educators" (APA, 1985a, p. 2). Assuming that 16% of psychologists do research (from Rosenzweig [1992, p.718]), this would mean that roughly 30% of research psychologists use animals. This is discrepant from the 7.5% estimate derived from *Psychological Abstracts* of published animal-based research as there is

no reason to suppose that researchers using animal subjects publish less than do those using human subjects. Other possibilities are that they publish their research less, and/or are less often cited in *Psychological Abstracts*. (I discuss the implications of high rejection rates, unpublished and uncited animal-based research in a later chapter). Another interpretation is that Gallup and Suarez's estimate of 7.5% animal-based psychological research is an underestimate. Perhaps there is a bias in Gallup and Suarez' method-- the figure was offered in the heat of a rebuttal to Bowd (1980) who had tendered some "ethical reservations about psychological research with animals." Or, there could be a bias against animal-based research operating in the selection process in *Psychological Abstracts*.

Several studies offer data pertaining to trends in the numbers of animals used. Gallup and Suarez (1980) found that the proportion of animal-based research articles in *Psychological Abstracts* fell from 10% in 1939 to 7.5% in 1979, a result they offer in support of their claim that the field's reliance on animal research has "[not] changed appreciably." Benedict and Stoloff (1991) reported no decline in the number of animal facilities for psychology, at least at "America's Best" colleges. Domjan (Thomas & Blackman, 1991, p. 208) reported a reduction in the number of animal-based research articles by American psychologists in four relevant journals during the preceding 10 years. Schneider cites a study showing that all research fields in psychology, with the exception of developmental psychology, a largely human-based research enterprise, have "suffered major losses" in the number of doctoral degrees awarded since the mid-70s (1990, p. 522). Finally, Thomas and Blackman (1991) offer, to them, "disconcerting"

data all of which point to a considerable decline in animal-based research in the United Kingdom. Comparing data from surveys in 1977 and 1989, they found the following significant reductions: numbers of psychology departments with animal facilities (25%), animals used (69%), staff conducting animal-based research (35%) and graduate students engaged in animal studies (62%). They bemoan what they take to be "a fundamental change [that] may be taking place in psychology's scientific base" (p. 208), issue a "call for action," and suggest "mount[ing] a defence" to stop the decline.

Taken together, these data suggests a decline in the past 15-20 years in numbers of animals used in animal-based psychological research. It remains to be seen if this relatively recent trend is a portent of a long-term decline or a short-lived fluke.

Trends from the use of animals in all research settings (experimentation, toxicity testing, education...) also point to a reduction in total numbers of animals used world-wide in the past 15-20 years. The following table presents a sampling, beginning with selected European countries and working back to the US by way of Canada.

Table A about here

Turning to the US, data on both trends and absolute numbers is limited, and equivocal, and what data is available is a matter of controversy. In her recent review of current data, Orlans concludes that "...with the current information available in the United States, it is impossible to tell whether use is increasing, declining, or

holding steady" (1994, p. 223). A Congressionally mandated report (US Congress, Office of Technology Assessment [OTA], 1986) states:

Upon reviewing all the data sources available for predicting the laboratory-animal use in the United States, it is clear that no source accurately portrays the number of animals being used. Each has methodological problems that prevented it from accurately counting all users of animals (emphasis in original, p. 53).

The difficulties stem from inadequate governmental record-keeping and from the failure to count rodents and birds as animals under the Animal Welfare Act. These problems have forced reliance on production and sales information from the laboratory animal breeding industry, estimates which have their own problems. Despite its disclaimer about the inaccuracy of any estimate, the OTA offered the figure of 17-22 million animals used annually in its 1986 report. The lower end of this range, 17 million, has been enshrined as the definitive number by pro-animal research groups such as the Biomedical Research Foundation while being disputed by animal rights groups (McArdle, 1988).

Arguing from sales records from Charles River, the largest breeder of laboratory animals, and Jackson Laboratory, another major breeder, Rowan concluded that the lower end of an accurate estimate for all types of research is 70 million animals (1984a). According to the OTA report, he later adjusted his estimate downward to 25-35 million (US Congress, OTA, 1986, p. 56). McArdle, who was a member of the OTA advisory panel of experts on laboratory animal production, stated that "...the best current estimate of overall animal consumption is between 60 and 70 million..." (1988, p. 15). We are left unclear whether the absolute number of animals used in the mid-80s in the US was 17 or 70 million! (It is interesting that a recent

controversy over the number of cats and dogs killed in shelters annually in the US provides estimates that also differ by a factor of 2 or 3 to 1 [5-12 million] and that some of the same people are arguing the numbers [Clifton, 1993]).

Without valid data on the absolute number used in a given year, of course, tracking trends is obviously problematic. The OTA report concludes that data on trends in animal use should be "...assigned a confidence rating of 'poor'" (1986, p. 57). This notwithstanding, the report offers several data sources indicating declines comparable to European and Canadian trends (p. 57). In his most recently published observation on the issue, Rowan (1994) gathers evidence from individual pharmaceutical facilities and from Department of Defense laboratories that indicate that trends in the US are comparable to those found elsewhere and that the current trend is still downward. However, he also notes that "official data" (United States Department of Agriculture [USDA] and Institute for Laboratory Animal Resources) are "limited and flawed" (p. 3).

Clearly, the claim that there is a downward trend in numbers of animals used in the US is in contention. Orlans notes that the number of research sites has almost doubled in the period between 1975 and 1991, from 1,932 to 3,495 (1994, p. 221). Consistent with this and accepting for the purpose its limitations, her presentation of USDA data from 1973 to 1994 shows "...no marked decline in animal use in the U.S." (Orlans, 1996, p. 154).

As to explanations for a decline, if, indeed, one has occurred, there are several offered. The cost of animal care has risen; animal care regulations have partly contributed to this cost; technical

advances in the use of alternatives have greatly reduced use of animals, particularly in toxicology and product testing; animal rights activism has provided political pressure for increased regulation and also encouraged investment in the development of alternatives.

In psychology specifically, Viney speculates that animal care costs, animal rights activism, and changes in research interests have all contributed to declines in the numbers of animals used (1990, p. 324). While Gallup and Eddy (1990) argue that animal rights activism has not been an important influence, Thomas and Blackman hold that "decline in work with animals stems largely from changing student attitudes" and that these attitudes "...are in tune with current widely shared concerns for the natural environment and animal welfare" (1992, p. 1679). In citing changes in research interests, Viney is referencing the shift from behavioristic to cognitive psychology. He quotes a "definitive text" on cognitive psychology: "Information-processing [cognitive] psychologists, in contrast to the neobehaviorists, largely ignore the literature on animals; the only animal data cited in this book are some interesting recent studies of language-like behavior in primates" (1990, p. 325).

For all their vagaries, the US figures allow us in a roundabout way to return to the primary issue of the extent of animal-based research in psychology. Citing a 1979 report of the British Psychological Society, Rowan states that "psychological research accounted for approximately 8% of the annual British use of laboratory animals" (1984a, p. 138). If I apply this percent to absolute numbers of animals for all uses in the US, I can estimate the number of animals used for psychological research in the US. This assumes that

animal-based psychology research is the same percent of all uses in the US and UK. However, since the US, recalling Rosenzweig's finding cited earlier, has half the world's research psychologists, psychology in general and presumably animal-based research in psychology may be more than 8% of the total animal usage in the US. This would make the following an underestimate. If I take the moderately low estimate of 20 million for total annual US usage, psychological animal-based research accounts for 1.6 million animals annually; while if I use the moderately high estimate of 60 million, the number of animals used in psychological research is 4.8 million. The 1.6 million estimate is within the range of our earlier estimate (1.25 to 2.5 million) based on upwardly adjusting the figure from the APA survey, of which I was critical. This adds some confidence that this number has some validity.

Species Used

What species of animals do psychologists use in their research and what are the trends in relative usage by species? Again, data from the UK are helpful. In their study comparing usage in 1977 to 1989, Thomas and Blackman found that psychologists in the UK use rats, pigeons, and mice most commonly, in that order; that those three animal groups comprise 95% of the animals used; and that this same order of frequency of usage obtains in both years studied (1991, p. 209). Other animals used in 1989 in the order of most frequent usage are: invertebrates, monkeys, "other mammals," "other birds," and fish (p. 208).

Primarily relying on *Psychological Abstracts*, Viney, King and Berndt (1990) calculated usage in each year from 1967 to 1988 for 17

species. In 1988, the order of frequency of number of articles reporting use of a particular species is, beginning with the most frequent: rats, mice, pigeons, cats, rabbits, hamsters, dogs, chimpanzees, gerbils, baboons, snakes, bats and guinea pigs (tied), dolphins, gorillas, and lemurs and seals (tied). Comparable to the UK study, the first three animal groups comprise 94% of the studies published. In terms of trends, the authors note that in the years surveyed the "absolute number of studies on standard laboratory animals such as rats, pigeons, and guinea pigs remained relatively stable, whereas the absolute numbers for larger, more specialized animals, such as cats, dogs and rabbits, have been declining" (p. 324). Numbers articles describing use of chimpanzees, bats, hamsters, mice, and snakes are stable.

Nature and Scope of Use: The Strategy of Animal Models

I have indicated that different paradigms or subfields of psychology differ in the degree of their reliance on animal research-- for example, cognitive psychology uses fewer animals than behavioristic psychology. The use of animals in psychology also has different purposes which are more or less distinct. Some psychologists study animals to understand just those animals and/or differences among them and nonhuman animals of other species. These "comparative psychologists" are interested in understanding animals as an end in itself. However, other psychologists study animals to discover processes that they believe to be universal, that is, that they believe will help understand the behavior of all human and nonhuman animals. Typified by the behaviorists, they hope to illuminate the general processes of learning, motivation, memory, and perception.

A third group studies nonhuman animals to understand particular conditions in humans. Sometimes such conditions, or at least arguably similar conditions, occur naturally in nonhuman animals. These, then, can be induced in laboratory animals. However, more often, comparable conditions do not occur naturally in nonhuman animals and investigators must attempt to devise situations which induce what are at least analogous versions of the human condition under study. In either case, this purpose and strategy is called "animal model" research. A fourth use of animals and one of more recent vintage than the other three is in applied human clinical and institutional settings where they are utilized as an adjunct to therapy. I will not deal with this "pet-facilitated therapy" here.

The focus in this monograph will be on animal model research. It should be noted, however, that the "universal processes" style of research is closely related to the animal model strategy. For these researchers, in effect, any animal is a model for all other animals, including humans, since the working assumption is that behavioral processes exist that apply virtually independent of species. Also, some comparative psychologists do extrapolate results of their studies to further understanding of human behavior and some even characterize their efforts as the search for animal models (eg. Rajecki, 1983). Typically, their emphasis remains understanding an animal for its own sake. DeWaal states this emphasis explicitly, "Although I draw parallels between animal and human behavior, even at the level of international politics, I am not in search of an animal model of our species. Each organism deserves attention for its own sake, not as a model for another" (1989, p. 3).

As I will show, animal model research proper has a typical distinguishing style. In it, there is little direct interest in understanding animals or animal behavior in itself. Further, it is directed less at the study of universal processes than at particular undesirable human conditions-- disorders, pathology, and dysfunctions. One hallmark of animal model research is the attempt to induce just these negative conditions in laboratory animals.

To illustrate this feature and, as well, the scope of the contemporary animal model enterprise, I list selected examples of typical conditions for which animal models have been sought. They are taken from the subject index of a recent APA publication, *Animal Models of Human Pathology: A Bibliography of a Quarter Century of Behavioral Research, 1967-1992* (Overmier & Burke, 1992).

Table B about here

It should be clarified that typically there are many specific models within each of these general categories. For example, according to Willner, "the list of animal models of depression has grown to include more than 20 experimental procedures" (1991, p. 131). He organizes these into several families of models: (a) stress models, such as learned helplessness, behavioral despair, and chronic unpredictable stress induce depression through stressing the animals in different situations; (b) separation models induce it through maternal separation and social isolation; and (c) pharmacological models which induce depression through the use of drugs or the use of

a second drug to block the effects of a first or withdrawing the use of a drug, following addiction to it (p. 132).

As another example, Reines describes three families of models of schizophrenia: (a) conditioned avoidance response models, in which animals are trained to press a lever to avoid a shock and then different potential anti-schizophrenia drugs are tested for their effects on behavior-- drugs that reduce the avoidance response are said to be effective potential treatments of schizophrenia; (b) hallucinogenic drug models, in which drugs are injected to see if they produce schizophrenic-like behaviors; and (c) reward-appreciation deficit, in which the reward or pleasure appreciation center of the brain is destroyed by injection of a toxin-- to test the hypothesis that schizophrenia is a loss of ability to appreciate reward or pleasure (1982, pp. 19-28).

From this partial listing, it is evident that psychologists have attempted to develop an animal model for virtually every known problem in the human condition that has even a remotely psychological cast. Indeed, one would be hard pressed to think of a problem to which their considerable ingenuity has not been applied. Although in this monograph I will not attempt to analyze the motivations of investigators, particularly the economic and political contexts of such motivations, that attracts them to this strategy of using nonhuman animals to understand human animals, one investigator offers the following conjecture:

Surely *model* has become the most overworked word in animal research. I attribute this to the exigency of obtaining grant support: The research must be interesting, it must be relevant,

and thus, it seems to have been concluded, it must be a model of a human disease condition if it is to be funded (Silverman, 1994, p. 659; emphasis in original).

The scope of the procedures devised to create the models are as broad as the conditions to be modeled. In general, the procedures extend from (a) genetic manipulation-- animals are bred for certain dispositions, such as susceptibility to seizures from auditory stimulation, or, more recently, biological engineering techniques manipulate certain susceptibilities or deficits; to (b) manipulations of the nervous system-- different parts of the brain are implanted with electrodes, electrically stimulated, lesioned or cut, surgically ablated or removed, or destroyed through toxic injection; to (c) invasive manipulation of other parts of the body-- different systems and organs of the body are monitored through fistulas (surgically created holes), stimulated through substances introduced into cannulae (surgically implanted tubes) or destroyed; to (d) behavioral and environmental manipulations-- food or drink are made conditional on the performance of certain tasks; avoidance of painful conditions such as shock, heat or cold are made conditional on performance of certain tasks (or abruptly applied independent of any performance or made conditional on another animal's performance); all manner of basic, even life-sustaining social supports and environmental stimulation and enrichments are withdrawn or otherwise manipulated; and all manner of painful, distressing and/or harmful social and environmental stimuli are presented.

Suffering involved

The nature of the conditions for which models have been sought and (as will be discussed) the goal in this research strategy of duplicating those conditions experienced by humans in every respect possible raise the question of the amount of suffering that animal model research involves. Surprisingly, there is disagreement in the field about whether there is substantial suffering, and I defer a fuller discussion of that controversy and of other issues associated with the question of suffering for chapter 6.

As part of the disagreement stems from what constitutes suffering, here is a working definition suggested by DeGrazia and Rowan. "Suffering is 'the unpleasant emotional response to more than minimal pain and distress'" (1991, p. 199, emphasis deleted). Note that suffering is not the pain or distress itself, but the emotional response to it, and that such an emotional response is not limited to pain. Most of those both in animal research and in animal protection agree that the concept of suffering should be broadened from a narrow notion of pain to the inclusion of experiences like distressful situations. In fact, as will be seen such broadening is often incorporated in recent animal welfare policy and guidelines. However, there is disagreement as to whether harm and injury should be included as forms of suffering. While typically harm and injury are accompanied by pain and/or distress, in some instances, harm can involve the loss of capabilities that are not so experienced. For example, in the case of the deprivation of a capacity from birth, an individual could be harmed without experiencing that deprivation as a loss. Under this working definition such harm would not be accompanied by suffering. More importantly, the definitional constraints of the term "suffering"

aside, should we include such losses in our concerns about animal welfare? The same arguments are raised about death. When there is no pain involved or little anticipatory distress, as in non-survival surgical procedures, the death of an animal does not necessarily involve suffering. However, animal protectionists, most philosophers, and many animal researchers now do count death as an animal welfare issue, conceiving of it as the ultimate harm.

One other point of clarification regarding suffering in psychological research is a general contrast between it and biomedical research. On the one hand, as the list of animal models above suggests, psychologists do study many conditions usually considered to be biomedical or medical in nature, and psychological research does include the study of physiological processes. On the other, it should be clear that most psychologists are primarily interested in behavior and experience, and only secondarily in physiology. This interest has important implications for the degree of suffering involved in psychological research. For while, to some extent, physiology, such as the physiology of a particular disease process, can be studied in an unconscious animal, the study of behavior and experience usually requires the animal subject to be conscious.

When psychologists study the behavioral correlates of depression, the structure of environment and behavior that maintains an eating disorder, the social effects of maternal deprivation, the mood correlates of chronic pain, the cognitive deficits associated with schizophrenia, or the lifestyle features correlated with the incidence or consequence of cardiac disease, they typically study the fully conscious "intact organism." While physiologically as well as

environmentally invasive procedures are often part of animal model psychological research, typically investigators require the animal subjects to survive and/or recover from the invasive procedures so that behavioral and experiential effects, the primary phenomena of interest, can be studied. In much biomedical research, by contrast, animal subjects are not allowed to recover and do not experience any pain or subjective distress from the procedure. They can not then be said to have suffered.

While on the face of it, to a layperson it is apparent that animal model research in psychology involves considerable suffering, research psychologists are distrustful of such face validity and require more exacting evidence. They limit their inferences to conclusions drawn from the application of instruments that measure the phenomenon of interest. Fortunately, several rating scales have been developed that measure invasiveness. We use the term "invasive" for any procedure, whether genetic, physiological, psychological, or environmental, that causes suffering (Field & Shapiro, 1988). One of these instruments specifically measures the invasiveness of typical psychological experimental manipulations (Field & Shapiro, 1988). In this introductory chapter, I employ the Scale of Invasiveness simply to further describe and illustrate the nature and scope of animal model research in psychology-- by highlighting the varying degrees of suffering associated with such studies.

The Scale of Invasiveness rates psychological experiments on a 6 point scale, ranging from 0 (little or no invasiveness) to 5 (highest level) (Field & Shapiro, 1988, p. 43). Table C provides abbreviated definitions and examples of the scale points. The actual scale

provides more detailed specification and definition, amounting, in effect, to a scoring manual which "reliably" (independent scorers agree on assigned ratings) allows the assignment of a scale point to virtually any experimental procedure in the psychological literature.

TABLE C about here

To assure that the examples offered are representative of mainstream research accepted or even highly valued within the field, I have selected studies published by investigators who have served as chair of an APA committee that promotes and oversees animal research in psychology, the Committee on Animal Research and Ethics (CARE) (Field, Shapiro & Carr, 1990). Most of these experiments offer the further advantages that two independent raters assigned the scale points and data are available that establishes its reliability (p. 3).

Table D about here

The study scored "5" is part of an extensive literature involving the development of models of maternal and other social deprivation, using nonhuman primates. (See Stephens [1986] for a critical review of over 350 studies conducted between 1950 and 1984; see Sackett [1988] for a critique of Stephens' critique). Some of the research in this literature claims to provide models for early attachment and its dysfunctions, for the "nature of love" (Harlow, 1958), for depression and for a so-called total isolation syndrome. In some of the studies,

the deprivation is total rather than partial, involving "chambering" animals in settings in which they have no social contact in even the most limited sense. In more recent studies there is a trend toward employing shorter periods of deprivation, isolation or separation.

The experiment scored "4" confirms the investigators' hypothesis that a rest period immediately following a period of stress increases the degree of ulceration, that is that the effects of stress continue after termination of the stressful condition. This is one of numerous different animal models of stress-induced ulcers (p. 372). Within this model featuring restraint and cold water immersion, these investigators have explored many variations. For example, Overmier and Murison (1989) found increased degree of ulceration when rats were subjected to a post-stressor rest period in which they were exposed to cues previously associated with "80 5-second uncontrollable electric shocks distributed over four sessions" (1989, p. 1296). These investigators (1991) also found that rats subjected to footshocks prior to the restraint and partial immersion had more ulceration, whether or not the footshocks were predictable, that is signalled prior to onset.

The experiment scored "3" is "part of a larger research project... aimed at studying the effects of chronic marijuana usage on brain function and behavior" (p. 207, emphasis deleted). The results indicate that chronic usage of this drug does change sleep and wakefulness patterns and that these changes persist for at least 40 days after the termination of the drug. The investigators also found a decrease in a stage of sleep (slow-wave) reported elsewhere to result in a decrease in aggression.

The results of the study scored "2" confirm the investigators' hypothesis that gymnemic acid reduces sucrose preference. The investigators state as a goal of the study "the search for a non-human model of the effects of [gymnemic acid] in humans" (p. 903). The investigators present no discussion of a broader context of interest in the model. Related studies refer to the physiology of taste in humans and to "suppression of sweet sensitivity." Presumably, one area of application of the model is to dieting and, possibly, eating disorders. Some other studies using this paradigm are more invasive than the present one as they involve physiological measures of gustatory nerve activity.

Scored "1," this study showed that the handling of female rats in infancy affects the activity level and weaning weight of their grandchildren. It is part of an extensive literature on the effects of early infant environment on subsequent development, here on the development of a later generation. It should be noted that while this study is relatively noninvasive, some experiments in this infant enrichment/deprivation literature can be highly invasive. For example, the same senior investigator (Denenberg, Garbanati, Sherman, Yutzey & Kaplan; 1978) incorporated surgical removal of one hemisphere of the neocortex with subsequent handling.

I offer no example for the "0" point on the scale as animal model research almost by definition is not done in the field (as opposed to the lab) and, in any case, rarely involves no pain or harm. There was not one instance of a "0" score in the sample of 135 experiments in the study of research conducted by CARE chairs from which I have drawn these other examples. In fact, only 12 of the 135 scored "1", while 46

of the 135 scored "4" or "5" (Field, Shapiro & Carr, 1990, pp. 4-6). It is also interesting to note that of those 46 highly invasive studies 22 (48%) involved monkeys, cats and dogs, while 24 (52%) involved mice and rats. The relatively high percent of the former species contrasts dramatically with the data reported earlier on species typically used in psychological research-- 90-95% rats, mice and pigeons. Clearly a disproportionate amount of highly invasive research involves nonhuman primates, dogs, and cats. It is not clear why this is the case. A speculation is that investigators perceive these species as providing "higher fidelity" (more similar) models and assume that only such models can justify highly invasive procedures.

The five examples presented suggest that developing or finding animal models of human psychology is a complex and involved enterprise. The extent of "variations on a theme" is almost inexhaustible. Also, it should be clear that most models are of pathological conditions, although occasionally normal or even optimal conditions are modeled. The predominant use of models to attempt to faithfully create pathological conditions assures that this kind of research is typically quite invasive.

Trends in invasiveness

While the results are mixed, the several available studies of trends in invasiveness in psychological research, all employing the Scale of Invasiveness, indicate that the level has not changed and remains moderately high. Examining research published in both physiological and comparative psychology journals, Field (1988) found an increase from 2.60 in 1947 to 3.12 in 1967 and then a decline to 2.34 in 1987. However, both Lindquist (1990) and Schmorow (1993)

found no decline for a comparable recent period. Lindquist rated five journals, featuring behavioristic, physiological and comparative psychological research, for invasiveness. The comparison of studies in 1975 and 1989 revealed no difference that was statistically significant. The average score was around 3. There was a statistically insignificant trend to less invasiveness and a trend to fewer studies scored "4" and "5", while more were scored "3". Schmorrow rated studies in a behaviorist journal from 1958 to 1992 and found no change in level of invasiveness, which remained between 3 and 4 (except for 2 years in the 60s when mean invasiveness levels were over 4).

Psychologists' Attitudes toward Laboratory Animals

I complete this primer on psychology and its use of animals with a discussion of psychologists' attitudes toward that use. I review the available literature, provide a brief history of views toward laboratory-based animal research, and close with a sampling of psychologists' views of some of the issues in the current debate.

While not of direct interest, the literature on the public's attitude to laboratory animals and research is extensive and provides some general findings that are consistent with and features that characterize psychologists' attitudes.

From her own study and from her review of the literature, Driscoll (1992) concludes that such attitudes are "unitary" or "consistent" or "hard." This means that individuals have consistent attitudes toward animals in general, and that these attitudes likely form at an early age and endure over time.

This is not to say that attitudes toward animal use are simple or logically coherent on their face. A number of investigators have found

that attitudes vary according to the species involved (Driscoll, 1992). Herzog notes that "human likes and dislikes about an animal species are often based on emotional criteria such as how cute they are and how we define their social role" (1991, p. 246). The culture distinguishes many categories of animals, "pets," "exotics," "pests," "endangered species," "farm animals," "sea food," and "feeder animals" (those fed to pets and exotics). It also does not imply that attitudes do not change, as, with the advent of the animal rights movement, many people have become more sensitive to issues of animal suffering and exploitation.

The morally acceptable practices that get built up around this panoply are necessarily complex and inevitably involve many conflicts of interest. As an example of "treading these murky [moral] waters," Herzog (1988) describes the different "moral status" accorded to different categories of animals of the same species within a research laboratory-- mice that are objects of study (laboratory animals), those that live outside the cages within the laboratory walls and corridors (pests), and those that are raised to feed other laboratory animals (feeders).

However, while complex philosophically in its own right and due to the overlay of the many distinct cultural "niches" which we have constructed for (really, from) animals, attitudes toward their use are strong and enduringly held. Perhaps because they occupy a peculiar moral space between people and things, nonhuman animals are important to us, and our attitudes toward specific uses of them reflect this: Gluck and Kubacki report informal evidence "that Congress has received more mail on this issue [specifically, the use of animals in research]

than any other topic in the history of the country (1991, p. 157).

Jamison and Lunch (1992, p. 439) cite an article in the *Congressional Quarterly* which asserts that letters on the treatment of animals make up the third largest volume of mail to Congress.

Many studies find a strong sex difference in attitudes toward the use of animals. Fulero (1992) found females to be less accepting of animal research than males. Gallup and Beckstead found that females appeared "more concerned for pain and suffering in animals than did males" (1988, p. 475). In their cross-cultural analysis of attitudes, Pifer, Shimizu, and Pifer (1994) found that women significantly more than men opposed animal research in 10 of 15 countries studied, with a trend in the same direction in the remaining five countries.

Consistent with this, according to Plous (1991, p. 194) women comprise 80% of the animal rights movement (Plous, 1991, p.194). Also Jamison and Lunch (1992, p. 445) found that 68% of people, selected through a randomizing procedure for interviews at the March for the Animals rally in Washington in the summer of 1990, were women.

Kellert and Berry (cited in Driscoll, 1992) found a complex but negative relation between age and concern for animals-- younger people are more concerned with animal welfare. A possible implication of this is that somehow we (de)educate children from animal welfarists to animal exploiters (Shapiro, 1990b).

Turning to a more directly ideological demographic variable, liberals more than conservatives are animal welfarists. This finding encompasses both religious affiliation and political persuasion. Bowd and Bowd (1989) found this relation between individuals affiliated with liberal as compared to conservative Christian denominations in

Australia, while Kimball found that US Congressional "Representatives who exhibited a strong interest in the welfare of creatures that *can't* vote ...also exhibit a strong interest in legislation that *directly* supports the liberties and freedom of expression of individuals who *can* vote (1989, p. 7, emphasis in original). In their study of activists attending the 1990 March for the Animals, Jamison and Lunch (1992, pp. 450-1) found that they are "moderately liberal or liberal."

Nibert's study (1994) of the relationship between a belief in animal rights and opinions on various other social issues broadens these findings of religious and political ideology and affiliation. "The way people regard animals is related to the way they regard people" (p. 122). Nibert found that support for animal rights is associated with more tolerance of human diversity, specifically, acceptance of rights for women, homosexuals, and "persons of color." In the context of the frequent assertion by their opponents that proponents of animal rights devalue humans, Nibert offers that the two concerns, the welfare of human and nonhuman animals, are typically held by the same individual.

Hills (1993) also provides evidence that attitudes toward animals are more often associated with rather than divergent from attitudes toward humans. Using a scale that distinguishes between people who are more generally oriented toward or interested in things and those more oriented toward other people, Hills found that "...interest in animals is more strongly associated with interest in people than interest in things" (pp. 106-7). One possible implication of this finding is that those people who have "emotional concerns" for animals also have such concern for other people (pp. 108-9).

Consistent with this positive correlation of attitudes to humans and nonhuman animals, a recent poll reported that nearly half (47%) of Americans believe that animals "...are just like humans in all important ways" (Balzar, 1993). Sixty-one percent of people 18-29 years old and 52% of women espouse this view.

In terms of individual psychology, Broida, Tingley, Kimball, and Miele (1993) found that certain personality types were more likely to oppose animal experimentation-- intuitive and feeling types more than sensate and thinking types. The former are more focused on relationships, while the latter emphasize process. In the context of animal research, intuitive and feeling type individuals attend more to the effects and ethical implications, while sensate and thinking types key on the process of scientific investigation.

Evidence as to the general level of opposition to the use of animals in research is mixed. While a number of studies converge on the finding that on average individuals espouse a middle position when asked their attitude toward the use of animals in research, an extensive recently published study surveying individuals in 15 different countries finds a high level of opposition (Pifer, Shimuzu, & Pifer, 1994).

In his review of five studies, Plous reported two general themes: While concerned about "the well-being of animals," most survey respondents do support selective use of animals, including their use in research (1993, p. 14). Driscoll concludes from her finding of a grand mean "right on the neutral point" that "there is little evidence of strong public opposition to the use of animals (1992, p. 36). While his findings are consistent with these other studies,

Takooshian interprets the middle position as an indication of "mixed feelings" with regard to the issue (1988, p. 8). This is in part based on his observation that respondents "explicitly note their discomfort over this issue [animal research] when returning their surveys" and are suspicious of the motives and bias of the investigator (1993). It is worth noting that it is difficult to distinguish between neutrality and strong but mixed feelings on an issue in survey research. It also should be clarified that an average middle position does not imply that many individuals do not take extreme positions. For example, Gallup and Beckstead found that 14.5% of a student population agreed that "most psychological research done on animals is unnecessary and invalid" (1988, p. 474).

Using a survey item that asked over 11,000 respondents from 15 different nations to weigh the benefits to human health against harm to "popular" animals, Pifer, Shimizu, and Pifer (1994) found high levels of opposition (over 50% disagreed or strongly disagreed with a statement permitting painful/injurious research) in most of the European Community nations-- only Greece and Portugal having less than a majority opposition. The authors suggest that the higher level of opposition found in their study is a function of what species of animals are referred to in the item-- here dogs and chimpanzees, rather than rats as in some of the studies reviewed above.

Turning from the general public to scientists' views, Takooshian included groups of scientists, not necessarily psychologists, in his general surveys of the public (1988). He found that, like the general public, scientists have mixed feelings about the use of animals in invasive research ("vivisection")(1988, p. 8). He also found that for

both the public and scientists an individual's attitude toward vivisection is more related to his or her views toward animals than it is to views of science. "Pro-animal" people, including scientists, are also "anti-vivisection," while a high faith in science does not predict any particular attitude toward the use of animals in research (1988, p. 8).

Like faith in science, scientific literacy does not predict attitude toward animal research. Of 14 nations surveyed, Pifer, Shimizu, and Pifer (1994) found that for the general public scientific knowledge is not consistently related to attitude toward animal research. In some nations there was a positive relation with individuals with higher levels of knowledge supporting animal research, while in others the relation was negative. In the US sample, no significant relation was found.

Paul (1995) studied the views of scientists involved in a British organization dedicated to the defense of animal research. Both these scientists and a group of animal rights activists were asked to generate arguments that support their own position and that of their respective opponents. While both groups tended to have a negative and somewhat extreme view of the other, each also had a "... clear knowledge of the arguments and ideas on both sides of the animal experimentation debate" (p.17). Both groups presented their own views as moderate, relative to the perceived extremism of their opponents. At least half of the participants of each group made concessions to their respective opposition-- the scientists by allowing that some animal experimentation is inadmissible; the animal rights activists, that some is admissible. While both groups agreed that animals have

the capacity to suffer, scientists focused their attention and concern for such suffering higher up the phylogenetic scale than did animal rights campaigners. Also, scientists, contrary to the activists, took the potential benefits of experimentation as their starting point when making judgments about admissibility, with suffering being given only secondary consideration.

Finally, Plous has conducted a major attitude survey of psychologists in practice (1996a) and undergraduate psychology majors. The results are largely consistent with findings in the general public. Based on a sample of 3982 psychologists and 1188 psychology students, he found support for research involving observation and confinement is high (1996a, p. 1171). However, when asked about research involving pain or death, a large percentage of both groups reply that it is not justified. Even when the research is described as "institutionally approved and deemed of scientific merit," 62.1% and 44.4% of psychologists indicate that research involving pain or death to primates and rats, respectively, is unjustified (1996a, p. 1171). Consistent with this, in a survey of psychologists selected from members of APA and APS, O'Sullivan found that "psychologists believed psychological research with animals to be important, however, the more invasive a research activity is, the less it was found to be acceptable" (in submission). O'Sullivan measured degree of acceptability of experimental procedures varying in invasiveness through sub-items derived from the Scale of Invasiveness, discussed earlier.

On various measures, psychology majors are even less supportive of animal research than are psychologists. For example, the percentage

of students who are strong supporters of animal research is less than half that of psychologists (14% vs. 31%). Further, among psychologists who received their doctoral degree during the 1990s were much less likely to support animal research than those earning it before 1970. Also, as reported in other studies, women are less supportive of animal research than men. The number of women enrolling in graduate programs in psychology is escalating dramatically, as are women enrollments in several other professions. These findings and developments, together the facts, presented earlier, that the numbers of animal facilities, animal-based articles published, and doctoral degrees in animal-related subfields are showing declines all suggest that support for invasive animal research in psychology is corroding and will continue to corrode.

I conclude with one additional study that bears on psychologists' attitudes, as it provides data on students' views of their psychology teachers' behavior with respect to laboratory animals. Keith-Spiegel, Tabachnick, and Allen (1993) studied students views of the ethics of certain actions by their professors. While also dealing with student rights, two of the items bear on the ethics of psychologists' use of animals. Specifically, 62.1% of students view a professor's requirement that students use electric shock on rats as unethical under many or all circumstances. Likewise, 48% of students consider a professor's requirement that students watch a film on how to do surgical brain implants in monkeys as unethical under many or all circumstances.

Psychology and the animal rights movement

In chapter 2, I shall present a historical account of the introduction of laboratory animals into the emerging field of modern psychology in the late 19th century. Here I supplement the relatively impoverished literature of formal studies of psychologists' attitudes toward animal use just reviewed with a brief sketch of the relation between psychology and the animal rights movement.

Most psychologists and the profession as a whole were caught short by the prominence which the contemporary animal rights movement gave and continues to give to psychological research involving animals. Three events early established that prominence-- (1) the publication of Singer's *Animal Liberation* in 1975, (2) the protest of the work of Lester Aronson in 1977, and (3) the exposure of the research of and subsequent trial of Edward Taub in 1981.

In a chapter entitled, "Tools for research," Singer clearly singled out psychological research with the statement, "Many of the most painful experiments are performed in the field of psychology" (p. 34). He then provided a dozen pages of graphic examples of psychological research which he found particularly unacceptable.

Just one year after the publication of Singer's book, animal rights activists, headed by Henry Spira, organized a protest at the American Museum of Natural History where Aronson was studying the sexual behavior of cats. The research involved blinding, deafening, and castrating cats, and surgically removing parts of their brains (Garfield, 1980, p. 104). The protest and attendant media attention prompted the museum to terminate the research (Jasper & Nelkin, 1992, p. 28). Ironically, whether or not Aronson was a psychologist depends on one's definition. He did not earn his doctorate in psychology.

However, he worked in and was chair of the Department of Animal Behavior at the Museum of Natural History and the APA's own newspaper, the *APA Monitor* ("Animals in research," 1982), referred to him to as a psychologist.

Taub's research involved cutting the sensory nerves of monkeys' arms to see if they could learn to use the affected limbs. This highly invasive procedure, deafferentation, was an attempt to provide a model for stroke and was funded by the National Institute for Neurological and Communicative Disorders and Stroke, a branch of NIH. Following the first of its kind arrest of a researcher and the seizure of laboratory animals, NIH first temporarily and then permanently suspended Taub's grant. The NIH review committee found inadequate veterinary care, housing, and review committee expertise (Shapiro, 1989, pp. 4-5) and "grossly unsanitary" conditions (Rowan, 1984b, p. 175) in Taub's lab. In addition to the inquiry by NIH, Taub was tried and convicted of animal cruelty in a state court. However, the conviction was later overturned when the appeal's court ruled that his federal funding exempted him from the provisions of the state's animal cruelty statute. As the publication of *Animal Liberation* launched the contemporary animal rights movement, the trial of Taub provided it with its cause célèbre, kicking off an uproar that continued for a decade.

While the vigor and strength of the contemporary movement caught most psychologists by surprise, there had been an earlier movement. In fact, Dewsbury concludes his history of its impact on the field of psychology at that time with the assertion that, "the resemblances between the antivivisectionist movement at the turn of the century and

the current agitation far exceed the differences" (1990, p. 325). If that were the case, if the earlier movement was truly a rehearsal for the present one, one would have expected psychology to have been more prepared institutionally than it was to deal with contemporary criticisms of invasive animal-based psychological research.

In any case, as Dewsbury notes, animal-based psychology developed at the end of the 19th century just as the Victorian antivivisection movement "was in full swing" (p. 316). Some psychologists became targets of the antivivisectionists, with the latter often receiving the support of press media. A notable example is James Watson, known in psychology as the father of behaviorism. In its original form behaviorism was an animal-based research enterprise which urged that observable behavior rather than "mental life" is the proper study of a science of psychology. Watson responded to criticism of his research on sensation and learning in rats with a justification of his research:

Much has been written about the artificiality, the abnormality-- yes, even the brutality of the present "laboratory" method in animal psychology. However well founded they may be in certain cases, these criticisms cannot with justice be urged against the present set of tests (quoted in Dewsbury, 1990, p. 322).

In our terms, his research was highly invasive, involving "removal of the eyes, destruction of the tympanic membrane, removal of the olfactory bulbs, cutting of the vibrissae, and anesthetization of the soles of the rats' feet" (p. 320). By systematically destroying in turn every sensory capability of the rat and then testing their learning in mazes, Watson intended to explain the sensory basis of learning in rats.

Other conflicts were played out more quietly within the field. William James, an early giant in psychology and philosophy, took a "moderate position" (Dewsbury's term) against his former student, Walter Cannon. James opposed the use of animals in classroom demonstrations and criticized his colleagues for opposing all regulation of animal research. However, James also stated:
Man lives for sciences as well as bread.... To taboo vivisection is then the same thing as to give up seeking after a knowledge of physiology; in other words, it is sacrificing a human intellectual good, and all that flows from it, to a brute and corporeal good (quoted in Dewsbury, p. 318).

Here is a statement of Cannon's more extreme pro-vivisectionist view, in which he rails against:
the propaganda and ill-advised restrictive proposals of that small minority of our fellow citizens who make a fetish or a religion of "antivivisection" and who sometimes act as though other organisms are more worthy of considerate treatment and preservation from accident or disease than is man (quoted in Dewsbury, 1990, p. 319)

In the context of media attacks on psychologists, conflict within the field, and the more threatening antivivisectionist attempts to pass state legislation against animal research, the APA, at Cannon's instigation, formed a Committee on Precautions in Animal Experimentation in 1925 (Dewsbury, p. 324). The charge of CPAE was to:
cooperate with other organizations interested in safeguarding animal experimentation, and which shall endeavor with them to disseminate accurate information about animal experimentation and to combat attempts to prevent or restrict it... (Young, 1928).

Both the occasioning contexts and the formal charge of the committee indicate that its primary purpose was to protect animal research by "combat[ting]" attempts to limit or reform it. The charges do not

refer to protecting animals or to animal welfare more generally. Further, from the outset CPAE took a "low-profile" on the issues and was a relatively inactive committee (Dewsbury, 1990, p. 324).

Not until the emergence of the contemporary animal rights movement and the three events indicated that thrust psychology again and more prominently into the limelight did the committee in the early 80s add the protection and welfare of animals to its official charge (Field, Shapiro, & Carr, 1990, p.2). While retaining the earlier charges about safeguarding animal research and combatting attempts to restrict it, the Committee proposed and the Council of Representatives approved language requiring it to "...review the ethics of animal experimentation" and "...to disseminate...guidelines protecting the welfare of animals used in research, teaching, and practical applications..." (Dewsbury, 1993, p. 11).

Psychology and the animal rights movement

Relative to their share of the total output of animal-based research in science, the number of psychologists targeted by the contemporary animal rights movement has been disproportionately high. Speculatively, the reasons for this issue from within as well as from outside the field. From within, I have described the divided camps separating research from applied psychology. Through sheer numbers, applied psychologists have had political control of the APA. Professionally, they have little or no vested interest in protecting laboratory animal research. Personally, they tend to be caring people who are relatively uncomfortable with the notion that some individuals, whether human or nonhuman, would have to suffer for the sake of the presumed benefit of others. As mentioned, in 1988 the

tensions between researcher/practitioner culminated in the formation of a split-off organization primarily backed by researchers and academicians, the American Psychological Society.

The general public is less aware of animal-based psychological than of biomedical research. When informed of it their response often is that psychological or behavioral research is less important than its counterpart in biomedicine, for it is not perceived to directly contribute to their own health. As I have described, animal-based psychological research is often highly invasive.

Through a survey of selected animal rights organizations who undertake campaigns on the laboratory animal issue, I have identified 15 psychology research laboratories that have been the target of a major protest, or published critique, or an exposé following infiltration (see Table E).

Table E about here

Research selected for criticism and campaigns involves relatively highly invasive research. These targets are strikingly unrepresentative of animal-based research in terms of the species used-- only two of the 15 campaigns noted are directed at research utilizing rats, mice and pigeons, animals selected for over 90% of psychological research. As noted earlier, however, psychologists disproportionately select primates, dogs, and cats for highly invasive research. Research on cats and primates predominates in the targeted research. Campaigns are predominantly launched against major university facilities. Areas of research gravitate around topics that

are clearly high on the contemporary health or social problem agenda: addiction, aggression, depression, sexual behavior, heart disease.

It is interesting to note that a number of psychologists who have borne the brunt of criticism have responded by becoming spokespersons for animal research. Of course, another scenario is that self-appointed pro-research spokespersons, through that exposure, have become campaign targets.

On the other hand, a number of psychologists who were trained as and, indeed, conducted laboratory-based animal research, often quite invasive research, have gone through a kind of conversion experience in which they quite dramatically renounce that enterprise. Some of these, together with a few individuals from areas of psychology not involving nonhuman animals, now devote their full professional effort to animal protection issues. Adding to the many different areas in which psychologists work, there now are psychologists who are career animal protectionists.

Psychologists' sound-bites and sound advice

It is no surprise, then, that within the field of psychology, as in the general public, there is a broad spectrum of views of animal research. I close this chapter with a brief discussion that displays the scope and diversity of positions taken by the many psychologists who have chosen to publish their views on this issue, leaving an analysis of the complexities and nuances of arguments as the burden of the remainder of the monograph. The discussion is organized into several selected points of contention.

On the philosophical question of whether rights should be attributed to nonhuman animals, Fox argues in the affirmative based on

their "intrinsic natures and interests" (1988, p. 6). King states that "[M]an [sic] is justified and moral in his denial of rights to animals and his use of them in his own self-interest" (1986, p. 406). Without depending on rights talk, Ryder provides the term "speciesism" to "describe the widespread discrimination that is practiced by man [sic] against other species" (1975, p. 5). Also, independent of reliance on rights, Segal refers to "ethical obligations" as "(o)ver historical time, the perception of who constitutes "family"...has gradually expanded" to include nonhuman animals (1989, p. xii). Seligman clings to the traditional ground that scientists "basic commitment is to the alleviation of human misery," so that not to do animal research "would be unjustifiable" (1975, p. xi).

Baldwin asserts that "(t)he most persuasive argument for using animals in behavioral research...is the untold benefit" gained from that use (1993, p. 123) and Gallistel offers that "science cannot progress without [experiments on animals]" (1981, p. 360). Yet Ulrich abandons his career as animal researcher because, he comes to believe, that research is artifactual and does not contribute to the understanding of human phenomena (1992, pp. 384-385).

Gallup asserts that "there are simply no viable alternatives to the use of live organisms in behavioral research" (1985, p. 110), while Heim urges the direct study of human subjects "wherever this is practicable" instead of inducing disorders in animals and drawing an analogy between that condition and the allegedly comparable human disorder (1978, p. 17).

Miller refuses to set "a limit on the degree of suffering that may be produced in an animal experiment," lest that reduce our

understanding of the human conditions that produce the most suffering (1984, p. 8). Other psychologists are concerned with the effect that such inductions may have on themselves and the general public. Bernstein writes of the costs of learning "detachment" (1987, p. 156); Bowd describes a moral callousness that results from treating animals as "simply complex research tools" (1980, p. 203). Finally, Gluck and Kubacki argue that a "state of siege exists" on the issue of animal research, and chide animal research scientists for adopting a "strategic defensive posture" (1991, p. 158). In their survey of the treatment of animal welfare issues in scientific literature, Phillips and Sechzer (1989) found a marked increase in defensiveness between the 1960s and the 1980s. Hopefully, by clarifying some of these divisive points through conceptual analysis and empirical data, the following chapters will contribute to increased openness.