ANIMALS AS MODELS OR ANALOGS

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Content

1. Introduction

Non-human animals are frequently the research subjects in a variety of areas, particularly in the life sciences. In 1997, the Canadian Council of Animal Care reported that 1 474 611 non-human animals were tested as part of research, testing, and teaching in Canada, a reduction from the 2 075 923 non-human animals that were tested in 1985. Most of these were tested as part of basic research in the life sciences, medicine, and veterinary medicine. This article will investigate the strengths and limitations of non-human animal research in the life sciences, specifically psychology and the neurosciences.

Discussions of non-human animal research typically focus on whether non-human animals constitute adequate analogs of human systems. Often non-human animals are used in situations that can not be ethically examined in humans (e.g. the carcinogenic properties of novel chemicals or inducing brain lesions to examine the behavioral consequences). However, it is the use of non-human animals in psychology and the neurosciences that is more ambiguous, frequently provoking negative public opinion. Currently, there are over 100 organizations that are actively proposing the restriction or end of animal research. Although some of the decrease in the number of non-human animals used in research can be attributed to advances in molecular biology and tissue culture techniques, much of the reduction can be directly attributed to the successes of animal rights organizations. As such, a brief (and hopefully objective) examination of a few of the assumptions underlying the objections to research in non-human animals will precede the discussions of the types of research that involve non-human animals, the general utility, and the generality of non-human animal research.

2. Objections to Research in Non-Human Animals

Historically, the debate regarding research with non-human animals has its origins in Victorian culture. In 1859, Darwin with his theory of evolution suggested a continuity among animal species, controversially unequivocally including humans. In this view, non-human animals were no longer irrevocably divided from humans. As such, investigation of animal behavior and physiology provided an important insight on human behavior and physiology, albeit a less complex account. As has been detailed elsewhere, much of the population was, at best, ambivalent about their placement within the animal kingdom. However, consistent with the theory of evolution is the proposition that if humans and non-human animals are relatively equivalent, then investigations that can not be performed on humans must not be performed on non-human animals. These views, combined with the effects of the increased urbanization of the populace, subsequent compartmentalization, and decreased general participation in the production of food from animals, resulted in a newfound opposition to vivisection.

Of the many moral and philosophical objections to non-human animal research, only a few of the philosophical objections will be touched upon. At present, a number of objections to research with non-human animals focus on the spectacular results from computer simulations and tissue culture preparations, methodologies that some claim can render non-human animal research redundant. However, there is a useful distinction between analogies and homologies: an analogy allows for similar items performing the same function to be compared, while a homology is more rigorous, the items to be compared needing to be identical in structure. As far as current technology exists, the relation between computers and the human brain is only an analogy. It is intriguing to note that many individuals (researchers included) appear to be more comfortable with comparisons between humans and computers than between humans and non-human animals. The final argument that will be discussed regarding the opposition to animal research is the contention that animals are far too simple to model interesting and important human cognitive behaviors. As will be demonstrated in the following sections, non-human animals exhibit many of the same behaviors as humans. Further, non-human animals show complexity and flexibility either the same as or exceeding human ability, worthy of study in its own right. As a species, humans tend to underestimate the complexity of other species and overestimate their own complexity.

3. Animal Research in the Life Sciences

Interestingly, the results of research since the mid twentieth century with non-human animals in many of the life sciences are almost synonymous with the advances that these fields have made. Despite the importance of animal research in psychology and the neurosciences, the identification of progress with advances in non-human animal research is less obvious in these fields. A review of eight introductory psychology textbooks found that although they cited animal research, most did not explicitly state that the research had been conducted using animals. As such, readers were often left with the impression that most psychological research deals with the study of humans, and that the study of non-human animals is archaic or suitable only for preliminary investigations.

Is the subject matter of psychology, and for that matter neuroscience, humans, human brains, and human behavior? Many would suggest that understanding humans, through animal research when necessary, is the focal point of psychology and neuroscience. However, others would contend that psychologists are interested in the natural laws governing behavior of any living creature, whereas neuroscientists are interested in studying the brains of any species. It is unlikely that this debate will be solved any time soon. Suffice to say that in many departments of psychology, research is being conducted on behavior unique to humans and there is research being conducted on behavior unique to other species.

In psychology, most research using non-human subjects is in one of three categories: 1) physiological psychology (also known as psychophysiology, biopsychology, behavioral neuroscience, or neuroscience), which is concerned with the investigation of how the brain produces behavior; 2) animal learning (or animal cognition), which is concerned with the mechanisms involved with learning and memory; and 3) comparative psychology (or evolutionary psychology or ethology), which is concerned with instinctive behavior, the nature and evolution of the animal mind, and the evolutionary and developmental analysis of behavior. However, animal cognition and physiological psychology differ in their preferred method of investigation from those in comparative psychology. That is, behavioral neuroscientists and learning theorists tend to study animals that have been raised in controlled laboratory conditions, whereas comparative psychologists tend to study animals in their home domain. These two approaches have different strengths and weaknesses and will be considered separately.

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Biographical Sketch

Deborah M. Saucier received the B.Sc. (Hons) in psychology (1988) from the University of Victoria, Canada; M.Sc. in psychology (1990) from the University of Victoria, Canada; Ph.D. in psychology

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