

## Animal Addiction Experiments in Psychology Promises, Problems, and Prospects

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*Abstract:* Administered 2-4 g/kg of ethanol twice daily to rhesus monkeys and beagle dogs. Severe reactions of a withdrawal syndrome were observed for 2-3 wks in monkeys and 4-6 wks in dogs. Ethanol administration interrupted withdrawal reactions at any stage (Ellis & Pick, 1973).

*Abstract:* Administered controllable or uncontrollable shocks to rats, followed by *ip* injections of amphetamine or cocaine. In both cases, Ss that received uncontrollable shocks were more sensitive to the drugs than those that received controllable shocks. Findings have implications for the role of stress and coping in amphetamine and cocaine psychoses, endogenous psychoses, and some form of schizophrenia (MacLennan & Maier, 1983).

*Abstract:* Male rats housed in semi-naturalistic colony environments and given access to ad lib water and 10% ethanol showed rhythms of alcohol consumption that do not develop in caged isolates and that are similar to those that develop in human populations. A subpopulation of Ss developed extreme preferences for alcohol. Compared to nonconsumers, these Ss were relatively inactive and low in dominance. Implications for a new animal model of alcoholism are discussed (Ellison, 1987).

Nobody really knows how many animals are used in psychology addiction experiments. Research universities are reluctant to report animal use because of fears about how the information will be used (Allen, 1994-1995). We do know that use of animals is substantial (Overmier & Burke, 1992), 90% of the animals used are rodents and birds (American Psychological Association, 1995), addiction experiments are among the most painful and distressing in all of behavioral science (National Research Council, 1992), administration of drugs to animals occurs in the undergraduate psychology classroom (Cunningham, 2003), and the continued use of animals in psychology research and education is justified on the basis of its claimed benefits for human beings (Carroll & Overmier, 2001). We also know that there are serious scientific objections concerning the internal and external validity of laboratory animal experiments (Greek & Greek, 2002; LaFollette & Shanks, 1996; Shapiro, 1998). Animals are poor models for humans for the same reasons that humans are poor models for animals.

### ***Factors Affecting Internal Validity or Certainty***

The *internal validity* of an experiment is the extent to which the observed effect (dependent variable) is actually caused by the planned experimental treatment (independent variable). There are a tremendous number of biasing variables (called “confounds”) that operate within even the simplest animal experiment whose effects are rarely evaluated which threaten the certainty of cause-and-effect inferences in animal psychology experiments making them scientifically defective (Pratt, 1980).

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1. *History bias.* Extraneous laboratory events may occur during the course of the animal experiment which account for or contribute to the observed results (e.g., variations in staff, cage-mates, food, temperature, bedding, lighting, humidity, cage construction, insecticide sprays used in laboratories, extent to which animals were handled in fancy as well as prior to treatment, time of day when a treatment is administered).
2. *Multiple-treatment interference.* Individual experimental animals (e.g., monkeys because they are expensive) may be used in several different experiments, thereby confusing the results.
3. *Maturation bias.* Biological or psychological changes in the animals may occur as a result of the passage of time or through normal developmental experiences that could partly explain the observed effect.
4. *Experimenter bias.* The researcher's intellectual, emotional, and financial investment in the experiment may subtly and unconsciously bias data in the direction predicted by one's theory skewing the interpretation of results.
5. *Demand characteristics.* Animals themselves form perceptions and react to differences in experimenters' behavior that can affect test results.
6. *Psychological bias.* Inadequate anesthesia and postoperative analgesia, rough handling by staff, fear, depression, confinement, presence of other animals or humans, and the nature of the experimental procedure may all increase the animal's suffering and cause extreme biological and psychological reactions that affect behavior instead of the planned experimental treatment.
7. *Selection bias.* Because all animals are individuals (even mass-produced, genetically-engineered animals) the "same" experimental animals will differ from one another and this individuality increases as animals are inevitably exposed to variations in their laboratory environment, resulting in experimental and control groups that are not equivalent prior to the planned experimental manipulation.
8. *Instrumentation bias.* The decrease in the accuracy or sensitivity of measuring instruments over the course of the experiment due to lack of skill of technicians, errors of recording, elapsed time between treatment and testing, and the failure to recognize the nature of pain or distress in animals can distort research findings.
9. *Experimental mortality bias.* The unintended and unanticipated illness and loss of animal subjects during the course of the experiment can further distort the findings.

Every animal experiment is susceptible to these variable factors. If the variables are uncontrolled, or unrecognized or unreported, then the scientific value of the animal experiment is impaired because the researcher does not know whether the experimental treatment or uncontrolled factors produced the observed effect and it becomes impossible for a later investigator to reproduce the experimental results. Even the claim that animals will benefit from research on animals becomes scientifically suspect because of the impossibility of controlling the many variables.

### ***Factors Affecting External Validity or Generality***

*External validity*, or generalizability of results, is the extent to which the specific subjects, research procedures, laboratory settings, experimental tasks, observed behaviors, and types of measurement reflect an accurate picture of human phenomena. Biasing variables that negate the value and ruin the application to the human condition of animal experiments include the manipulation of experimental treatments that ethically cannot be used on humans (which is why animals are used in the first) to create artificially-induced conditions in animals that only superficially

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correspond to the naturally occurring human condition. Animal behaviors are measured that have no apparent correspondence to human behaviors (e.g., rearing, freezing, pecking, switch-pressing, pacing, vocalization, pole-climbing, swimming, tail reflex, activity level, dominance) and whose construct, criterion, or content test validity are not established for human subjects.

Subject variables that interfere with drawing animal-human comparisons (extrapolation) are virtually endless and include genetic, biomolecular, metabolic, immunological, cellular, anatomical, physiological, reproductive, circadian, behavioral, cognitive, motivational, and social differences between species. Nonhuman animals are different not only from humans, but also from each other on these variables. Subtle systemic differences in biological organization between species can result in widely divergent responses to the same stimuli.

Most animal species used in psychology experiments are selected on nonscientific grounds (e.g., cost, reproductive capacity, ease of handling, size). Rodents, a favorite species used in psychology drug experiments, sleep 14-15 hours a day, live an average of 2-3 years, produce 8-10 litters a year, are completely colorblind and physically unable to vomit, have a four-day menstrual cycle and sexually mature in four months, possess no tonsils or gall bladder but a liver that regenerates, walk on four legs (quadruped), and have a natural aversion to tobacco, alcohol, and cocaine. Any student of Psychology 101 knows that we cannot automatically generalize results of psychology experiments from one person to another, males to females, infants to elderly, Chinese to Americans, blacks to whites, poor to rich, Rhode Islanders to Californians, or even to the same individual at different stages of the lifespan. The problem is compounded when we want to generalize across species with different genetics and evolutionary histories.

The animal research establishment emphasizes surface structure similarities between human and nonhuman animals (e.g., all animal species share the same genetic material and phylogenetically related animals, such as mammals, have all evolved from the same ancestral species) that make it *appear* at first glance that nonhuman animals are nothing more than humans dressed up differently. Yet further examination reveals that very small differences in the arrangement of genetic material can be of enormous biological significance between species who have adapted to different ecological niches through the process of evolution and demonstrate why in fact we cannot use animals as surrogates of humans (LaFollette & Shanks, 1996). The canon of scientific method states that the sample must be selected from the *same* population to which one wants to generalize results. “Similar” is not good enough.

### ***Alcohol-Addiction Animal Experiments in Psychology: Major Scientific Flaws and Fallacies***

Alcohol-addiction studies illustrate some of the major scientific flaws of animal experiments and fallacies of interspecies comparisons (Cohen & Young, 1989). First, there is the problem of species variation. Many different animal species are used in alcohol-addiction research because no single animal reflects all aspects of the human phenomena of alcohol dependence and withdrawal. Ethanol, the alcohol used in animal studies and the major ingredient of alcoholic beverages, exerts different effects in different species because of variations in absorption, distribution, storage, excretion, and biotransformation of the drug across species.

Beyond the genetic and evolutionary differences that make human-to-animal analogies break down and become disanalogous, there are the inevitable psychosocial factors of “set” and “setting”

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to consider. A person's private experience of drug addiction happens in the context of his or her purposes, expectations, and intents, and basically cannot be separated from his or her psychological well-being and biological health status, religious sentiments and philosophic beliefs, socioeconomic status and cultural environment, political realities and linguistic community. Drug addiction must be seen in the light of all these factors and cannot be understood unless they are considered in this far greater context that falls completely outside the animal model altogether.

Alcohol dependence and withdrawal, like the dynamics of health and illness, can never be understood from a biological, environmental, or behavioral standpoint alone. Yet this is the framework that the animal model approach presupposes in both theory and practice. The context in which animal researchers visualize human problems and pathology becomes constricted to that which they can see in animals. Our psychological reality, however, is so sweepingly different from that of other animals (e.g., verbally structured thought, capacity for reflection, imaginative capacity, range and number of aesthetic and moral desires) that we inevitably show a wider variety of biological and behavioral reactions to the same stimuli. As someone once remarked: "You know you have a good animal model of drug addiction when the rat cleans the needles and the dog hides the bottle."

Second, there is the problem of artificially-induced independent variables. Nonhuman animals do not like alcohol and left alone do not seek it. In order to study alcohol dependence and withdrawal in humans, animals who have a *natural aversion* to alcohol (e.g., baboons, rodents, dogs, cats, fish) are forced into addiction, genetically altered, or operantly conditioned to "prefer" alcohol over other fluids. The frequency and duration of drug exposure, the dosage levels, and the conditions under which laboratory animals are exposed to the substance (e.g., inhalation, force feeding through tubes, infusing directly into jugular vein or stomach, made hungry by food deprivation then trained to drink alcohol to obtain food) can never be made to parallel human alcohol intake and bears little relationship to the conditions under which humans are exposed to alcohol in the natural context of human life.

Third, there is the use of dependent variables that have little or no content, criterion, or construct validity. Whether the rat's spinal tail reflex continues to function after alcohol administration is a debatable test of alcohol tolerance in humans.

### ***Why It Persists***

Given the scientific flaws and fallacies that plague animal psychology experiments, why does it persist? It seems to be largely a matter of social conditioning in a human culture that condones various forms of harm to animals (e.g., hunting, trapping, zoos, circuses, classroom dissection, factory farms, product testing, roadkill) (Fox, 1990). Animal experimenters are not bad or "evil" persons but are doing what they are trained to do and what thousand of their colleagues do in pursuit of what they think of as "the good" for human beings. Philosophy cannot be divorced from action. Distorted philosophies dealing with survival of the fittest, the end justifying the means, and the "natural" subordinate position of animals that are believed in fervently and repeated often enough with the best of intentions by revered mentors during their early years of scientific training become accepted uncritically by animal researchers and act like strong hypnotic suggestions that trigger particular actions strongly implied by the beliefs. No longer examined, these socially conditioned beliefs are taken for literal truth and appear to be statements of fact, proven "true" by

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the simple process of excluding anything else that seems contradictory, until finally, animal experimentation appears as the only logical kind of method of study that can so well and exactly identify the mechanisms by which nature and nurture are believed to produce consciousness, mind, and behavior in human and nonhuman animals alike.

Standing solely on the side of intelligence and reason, logical thought and objectivity, animal researchers are trained to be unemotional, to stand apart from their experience, to separate themselves from the animal, and to view with an ironical eye any emotional sensitivity or identification with the animal they are about to experiment upon and later kill and dissect. The animal research laboratory environment of non-feeling objectivity mirrors the standard for scientific ideas and behaviors. In their scientific training, animal researchers become desensitized and taught how to distance themselves emotionally from animals, to conceptually isolate the animal from all influences that may individualize or “animate” them. The animal loses his vital individualism and living quality in the researcher’s eyes so that he or she can number, categorize, dissect, and examine the animal’s body portions without qualm and without being aware of the living voice that protests.

Language is one device used to introduce and reinforce this conceptual distancing from the animal (Birke & Smith, 1985). Animals are referred to as “supplies,” or “specimens” that are “sacrificed” or “put down” in the laboratory. Language acts as a reductive lens for perception whereby individual animals become regarded simply as one physical object among others, like rocks and stars, as if they are themselves without intrinsic value or worth, except as carriers of scientific data that exist solely for human use and consumption. The great individual thrust of life that lies within each animal becomes reduced to a generalized mass of genes and neurological processes, environmental cues and reinforcement contingencies. Each creature is literally without a center of meaning, seen to operate by the mechanisms of neurobiological and conditioning processes alone.

In animal laboratory experimentation we have a situation in which one species definitely takes advantage of another species and a classic case of a society using ends to justify means. In pursuit of the ideals of protecting the sacredness of human life, promoting the genetic betterment of humankind, and improving the quality of our own lives, the quality of other kinds of life is destroyed (Rollin, 1995). Conscience is encountered and conquered once and for all by the unrestricted and detached desire to know and understand as the death of thousands of animals become justified if it is a means toward the goal of survival of the human species, regardless of the consequences.

### ***The Human Cost of Animal Experimentation***

All of us, in one way or another, hope for scientific progress in the laboratory, safe drugs in the clinic, and quality education in the classroom, and wonder what methods might best help us achieve those ends. While some good to some human beings and some animals may have arguably been achieved by the use of animals in psychology research (Miller, 1985), much unnecessary and dangerous biological and spiritual tampering has also been accomplished that has had unfortunate consequences for both human and nonhuman animals alike (Sharpe, 1994; Greek & Greek, 2000, 2002).

It might seem that other animals such as rats, mice, and birds are far divorced from our own species. Monkeys are not considered human; they are not. So like any animal, they are thought of as dispensable to be sacrificed to fine humanitarian ends. This same thinking when applied to

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members of our own species led to the Nazi horrors of the Holocaust where Jews were thought of as “life unworthy of life” and, not being quite human, could be examined and manipulated, altered and mutilated, and then killed as justifiable sacrifices on the altar of science in the name of the genetic betterment of humankind (Lifton, 1986, p. 302). In many contemporary instances of genocidal violence when atrocities are committed against other human beings the same kind of twisted reasoning is often applied (Staub, 1996). Other humans are not considered human, but merely animals, and like any animal, are thought of as dispensable. In other words, the socialization process that trains us to accept socially-condoned forms of harm to animals - to distance ourselves emotionally from animals so that we can kill them for sport and food or educational and scientific purposes - can inadvertently condition and program us to see human life in somewhat the same non-feeling “objectified” fashion. Such an attitude can lead us to be less careful of life than we should be and separates us from nature in a way that can lead to some contempt of individual living things, including human life.

Certainly there is nothing more stimulating and worthy of actualization than our ideals. We become fanatics, however, when we consider the possibility of killing in pursuit of those ideals, when we are not willing to examine the worthiness of our methods to achieve those ideals, or when we refuse to search for non-animal alternative methods because we are afraid to do so. Must we kill in pursuit of our ideals? Is it reasonable to believe that we can learn one iota about the inner reality of human life, mind, and consciousness when our search leads us to destroy it in animals? Or does such destruction presuppose a misunderstanding of life to begin with? When we no longer treat animals as possessors of living consciousness and ignore the fact that the overall consciousness of animals has its own purposes and intents, then we lose any true conception of the great sacredness of all life and of our relationship within it. The field of psychology will forever escape opening up into any great vision of the meaning of life as a consequence.

### ***Reverence for Life***

What must we do? What is required is no more and no less than an inner willingness to allow a reverence for life to develop within us (Scully, 2002). Reverence for life brings with it a sympathy with life that may have earlier been lacking, a feeling of intimate connectedness with all beings, and a compassionate regard toward all forms of life, human life included. Reverence for life adds of itself important elements of understanding and growth that enables us to better understand other human beings and act in a more compassionate manner toward people without blaming them for their shortcomings.

Albert Schweitzer once observed: “By having a reverence for life, we enter into a spiritual relation with nature” (Joy, 1950). Reverence for life helps us realize that we are not separated from animals and the rest of nature by virtue of possessing an eternal, inner consciousness, but rather, that such a consciousness is within all life, whatever its form or perceived status in our eyes - a consciousness that is as valid and legitimate as our own. A reverence for life helps us recognize that the sacredness of animal life cannot be sacrificed for humanity’s benefit or else the quality of human life itself suffers as a result.

This is why developing a reverence for life in the animal research establishment is so important. A reverence for life has the power to rescue the beliefs and methods of laboratory animal science of the past from its thinking and unthinking acceptance in the present. It brings the

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realization that animal experimentation and dissection can neither prove nor disprove hypotheses concerning the dynamics of human health and disease because of the significant genetic, evolutionary, and psychic differences between species. The new knowledge and different values that a reverence for life can bring will require some unique understanding, intellectually and emotionally, on the part of the animal research establishment and an openness to question its methods, its research goals, and the declared benefits of laboratory animal experimentation. Such a change is not only feasible but also necessary if psychology is to achieve its greatest fulfillment as a scientific discipline in the 21<sup>st</sup> century.

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