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Moving Beyond the Welfare Standard of Psychological Well-Being for Nonhuman Primates: The Case of Chimpanzees

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KEYWORDS

psychological well-being, chimpanzees, animal research, policy, ethologically appropriate environments, primate research

ABSTRACT

Since 1985, the US Animal Welfare Act and Public Health Service policy have required that researchers using nonhuman primates in biomedical and behavioral research develop a plan “for a physical environment adequate to promote the psychological well-being of primates.” In pursuing this charge, housing attributes such as social companionship, opportunities to express species-typical behavior, suitable space for expanded locomotor activity, and nonstressful relationships with laboratory personnel are dimensions that have dominated the discussion. Regulators were careful not to direct a specific set of prescriptions (i.e., engineering standards) for the attainment of these goals, but to leave the design of the programs substantially up to “professional judgment” at the local level. Recently, however, the Institute of Medicine, in its path-finding 2011 report on the necessity of chimpanzee use in research, bypassed this flexible and contingent concept, and instead, required as a central precondition that chimpanzees be housed in “ethologically appropriate” environments. In so doing, obligations of ethical treatment of one great ape species were elevated above the needs of some research. The evolution and significance of this change are discussed.

Introduction

The goal of this paper is to trace the historical development and moral importance of the proposition that the ethical treatment of nonhuman primates must go beyond a narrow focus on research convenience, hygienic environments, and attempts to limit the number of primates used and to minimize pain and

distress during an experimental procedure. The progress of this history has been toward a more adequate conception of how to protect the physical and psychological welfare interests of research animals, and how to create living conditions that actualize essential behavioral dimensions of their natural lives. There has also been an increasing appreciation that these requirements are not merely optional good-faith objectives but are morally necessary conditions of the involvement of nonhuman primates in research.

Early twentieth-century history

During most of the twentieth century, virtually any scientist with a perceived need, institutional support, and required funds could contract with a licensed primate importer to purchase nonhuman primates typically living in the wild thousands of miles away for delivery to a laboratory loading dock [1]. Many animals would die during capture or in transit. Early on, the housing of those who survived was determined by some combination of the individual researcher's knowledge, preferences, specific experimental needs, and type of caging equipment and space on hand.

This methodological flexibility was grounded in the obvious fact that because the animals' bodies were made of flesh and their bones jointed, it was easier for them to accommodate to the available cage space than it was to modify rigid pre-existing equipment or to alter the rooms in which they were to be housed. This situation was further exacerbated by the fact that early on in the history of primate research, many facilities were derived from previously used office or general laboratory spaces or those originally designed for other species.

The desire to have convenient handling access to the animals combined with these variables to create a reality in which nonhuman primates were predominantly housed in individual cages. Keeping the cage sizes to a minimum also had the benefit of allowing for the retention of a larger number of animals necessary to fill sample size needs required by experimental designs. While these cages allowed for basic postural adjustments, they offered little or no opportunity for more wide-ranging locomotion or the expression of a broad profile of species-typical behaviors like climbing, perching, socializing, and foraging. These housing arrangements were not just passive inconveniences to which the animals needed to adjust, but were instead active interventions that altered the psychological and physiological character of the animals held within them. Unfortunately for the animals so housed and for some of the science so generated, however, this fact went unrecognized and unacknowledged for decades [2].

This focus on short-term practicality persisted even though established animal welfare groups, such as the Universities Federation for Animal Welfare (UFAW) in the United Kingdom and the Animal Welfare Institute (AWI) in the United States, though not categorically opposed to the use of animals in scientific research, were promoting, as early as the 1940s, the notion that good science requires housing designed with the evolved natures of the animals in mind [3]. For example, the British biologist and welfarist William Russell stated it simply in 1956: "captive animals usually know what is good for them, and our chief concern must usually be to provide them with the essential components of the environment from which we have removed them" [4]. Additionally, there was no shortage of basic information about the natural lives of nonhuman primates that could be used to shape the design of housing systems. Beginning around 1920, the primatologist Robert M. Yerkes had established a broad program of scientifically rigorous field studies intended to inform researchers about the nature of those wild lives [5].

Clarence R. Carpenter, who had received his Ph.D. in comparative psychology at Stanford University under the direction of Calvin Perry Stone, a staunch laboratory animal research proponent and also a mentor to Harry F. Harlow, was one of the first to energetically take up Yerkes' field initiative. Specifically, Carpenter collected and reported detailed information about the social behavior of "howling" monkeys in

Panama and apes in Asia beginning in 1930. He also captured a group of rhesus monkeys (*Macaca mulatta*) in India and then transported 409 of them to Cayo Santiago Island near Puerto Rico where they lived in free-roaming groups, making social behavior studies more accessible to researchers [6]. In addition, many other researchers began to provide a steady stream of field data beginning in the 1960s, including Irven Devore's study of monkeys and baboons in east Africa, the work of the famed ornithologist-turned-primatologist John T. Emlen and his student George Shaller on the mountain gorillas in central Africa, and Jane Goodall's monumental studies of the chimpanzees of Gombe.

Adding to this limited view of what was required of the design of laboratory housing to provide for the well-being of primates was the professional antagonism that existed between the scientific goals of comparative psychology and ethology that were prominent in the mid-twentieth century. Both fields were embroiled in the nature-nurture question and in determining what factors were the primary drivers of behavioral development. Where ethology tended toward describing the details of the adaptation of animals to the environments in which they theoretically evolved (i.e., nature), American comparative psychology was interested in determining the limits of animal cognitive, sensory, and social capabilities independent of their evolutionary fit in a particular environment and how they could be modified by experience (i.e., nurture) [7].

Two studies by Margaret K. Harlow and Harry F. Harlow illustrate the point. While field research on the rhesus macaque had indicated that dominant males spent little or no time interacting with newborns or infants, Margaret K. Harlow created what she called the "nuclear family" environment in the laboratory which purposely housed adult males, females, and infants together in close physical contact in order to determine how they would interact. She found that the males did not injure infants as some field researchers feared they might, but instead showed tolerance and affection [8]. Similarly, with respect to the study of cognition, many ethologists argued that only observing animals in the field and studying how they confronted and solved problems encountered during everyday life could reveal an accurate picture of the special intellectual capacities that define a particular species.

In contrast, Harry Harlow proudly reported observing a New World capuchin monkey who had been confined in a small group cage defend himself against attack from another monkey with a 13-inch pole that had been placed in the environment. Harlow asserted that this observation contradicted the belief that the species was not a tool user, a "fact" that had been based on field studies [9]. The point for the comparative psychologist was that one could not determine the extent of the capabilities of an animal by limiting observation of them to environments to which they had become thoroughly adapted. To acquire that information required challenge, like exposure to novel social situations and cognitive problems presented in an experimental context adapted from those used in the study of human intelligence. The fact that most primates did survive and manage to reproduce in austere laboratory environments fit neatly into this perspective and was seen as evidence that uncomplicated housing was well within their coping abilities and therefore acceptable.

The 1966 Animal Welfare Act

This situation of laboratory practices and indifference to well-being was not significantly altered by the passage of the Animal Welfare Act (AWA) in 1966. The passage of this act by the US Congress was motivated more by its primary focus on stopping the illicit ways "pet" animals found their way into research laboratories and less about what happened to them once they were there [10]. The symbolically important but minimalistic regulations focused on laboratory hygiene, air quality, methods of animal acquisition, and veterinary care, not whether the accumulating information about animal behavior from field studies was being translated into housing design. Even at that, the regulatory reach of the AWA stopped at the laboratory door. Researchers remained accountable to no one but themselves, their self-

selected peer groups, and the occasional institutional care committee when it came to the standards of animal husbandry provided inside their laboratories [11].

Therefore, due to differences in epistemological focus, data on social and nonsocial behavior acquired by field researchers was either not attended to or not generally seen as providing necessary insight into the way laboratory housing “ought” to be designed in order to promote welfare. American researchers showed either ignorance of or strident resistance to the animal-centered housing suggestions coming from established welfare groups. Rather, the ability of researchers to readily lay hands on the animals required by a research protocol was the dominant consideration.

Adding to the problem, there was little evidence of an ethical “obligation” at play even from the start. The impact of logical positivism, which relegated cognitive propositions concerned with the ethical as unverifiable and meaningless feeling states, was a powerful force in the minds of many US scientists. The partitioning of a “value-laden” ethics from a “value free” science was very much a part of the experimental assumptions of this period, and remains so today even though the influence of logical positivism is a distant memory [12].

The 1985 welfare expansion

In reaction to a series of well-publicized cases that involved the abuse of primates at respected research facilities at the University of Pennsylvania and Edward Taub’s Institute of Behavioral Research in Maryland, audits by the Public Health Service revealed limited knowledge and appreciation of standards of experimental justification and animal care by principal investigators. This led to increased attention to the issues of animal moral standing and rights by a number of philosophers and expanded activity by the US animal protection movement. A body of research had also developed that described the presence of behavioral pathologies, such as self-injurious behavior, stereotypies, and distorted reproductive and maternal behavior that appeared when primates were housed alone or raised with little social experience.

In response, Congress enacted the Improved Standards for Laboratory Animals Act (Subtitle F of the *Food Security Act of 1985*) [13]. The law and subsequent regulations vastly altered the landscape of animal research in the United States. Now, instead of simply “encouraging” pre-review of research protocols, formal review became a requirement. In an attempt to avoid the development of an echo-chamber of only like-minded scientists, the review committees were required to include non-scientist members and, in the case of PHS policy, members of the general public.

As a part of a research proposal’s justification, investigators were required to formally check for the possibility of using less pain-producing procedures, reducing the number of animals involved, or eliminating animals altogether, and to protect against unintended experimental redundancy. Instead of encouraging the availability of veterinarians, their presence in the laboratory and on the review committees was mandated. Finally, and most surprisingly, those regulations directly asserted that researchers using nonhuman primates as subjects must develop a plan “for a physical environment adequate to promote the psychological well-being of primates” [14]. A muted version of this theme also appeared in Principle VII of the *The Government Principles for the Utilization and Care of Vertebrate Animals Used in Testing, Research and Training*, which was promulgated in 1985 and became part of the PHS policy in 1986. Principle VII states that “The living conditions of animals should be appropriate for their species and contribute to their health and comfort” [15].

The surprising changes in the requirements for justification, the concern for pain and distress during an experiment and numbers used, and a new focus on the mental health of nonhuman primates in their living

environments were evidence that ethically-based concern for animal welfare had cracked the “value free” facade of traditional animal-dependent science.

Response to the psychological well-being requirement

The fundamental contention nested in the psychological well-being requirement was that nonhuman primates have a mental life that has value to them and which can be negatively influenced not only during experimental manipulations but also by living arrangements unsupportive of central aspects of the animals’ natural lives. Researchers were in effect asked to accept the idea that monkeys housed in austere individual cages were harmed by ensuing mental conditions such as boredom, frustration, and depression, and to make an effort to reduce or eliminate these harms by altering housing environments. The promotion of primate psychological well-being elicited a variety of responses from researchers.

Some researchers responded defensively by falling back on the behavioristic rejections of the scientific usefulness of trying to work with unobservable mental events and decried the project as misguided anthropomorphism [16]. Others began to estimate the economic costs that would result from providing social housing that would be required for compliance. Researchers wondered how even a small laboratory could afford to make the transition from individual cages, disparagingly called the “Billion Dollar Solution” [17]. Still others warned that establishing laboratory procedures attuned to the psychological needs of nonhuman primates would require many years of research and study in order to tease out the essential variables necessary to accomplish the task that theoretically might be applied to the 200 species of nonhuman primates [18]. This position seemed to reject the usefulness of what was already known from field research.

Still others warned that housing animals in groups would be more complex and dangerous than it appeared. It was pointed out that dominance hierarchies of many nonhuman primate species meant that there would be fighting and serious injury to some members as a consequence of group housing. For example, trying to interject a stranger into a pre-existing rhesus monkey group could be expected to elicit a harsh xenophobic reaction by the other members with sometimes fatal results. Still others warned about the risk of food hoarding and the spread of enteric infectious diseases such as *shigellosis* and *campylobacter*, which were known to wreak havoc on the health and experimental usefulness of a primate colony.

With such examples, some defended their preference for nonsocial housing exactly because of these dangers. It was also pointed out that captive monkeys lived longer than their wild counterparts, had lower rates of infant mortality, ate better food, and suffered from fewer diseases and physical traumas. In this view, monkeys were benefiting from captivity and individual housing. This was an attempt to transform individual housing into possibly the most scientifically efficient and humane option open to the ethically concerned investigator [19].

One of the first attempts to discuss the implications of the new psychological well-being requirements in a systematic way was by Melinda Novak and Stephen Suomi [16], directors of large primate laboratories at the University of Massachusetts and the National Institutes of Health (NIH), respectively. They proposed that well-being be conceptualized as composed of four interacting categories: physical health, or at least the absence of diagnosable disease; ability to adjust to the day-today stresses of laboratory life; absence of high levels of bizarre behaviors such as self-injurious behaviors and stereotyped behaviors such as back-flipping and circling that indicate stress; and appropriate expression of species typical behaviors. They concluded that with respect to the laboratory environment, ability to assure at least two of the four categories should be considered adequate proof of the presence of psychological well-being.

Another influential perspective came from William Mason [20], a prominent primatologist with a long research history of studying behavioral development and raising thoughtful ethical questions. Instead of resisting the requirements, Mason suggested that researchers should embrace the psychological well-being initiatives and see them not only as welfare interventions but as a route to lengthening the research “careers” of nonhuman primates. In other words, attending to well-being at multiple levels would result in healthier animals who could tolerate experimental participation for a longer period and would yield data less tainted by deprivation-induced abnormalities. This thesis was an updated restatement of the position taken by UFAW and the AWI four decades earlier.

Others attempted to exert a calming influence by showing that relatively simple changes in primate husbandry could positively affect indicators of well-being. For example, Viktor Rheinhardt, a veterinarian at the University of Wisconsin, showed that increasing usable vertical space in a cage by adding tree branch perches and pairing compatible same sex monkeys in connected individual cages resulted in dramatic changes in their affect and expression of species typical behaviors. Contrary to the fears of fight injuries, he reported that incompatibility was a rare event if potential partners were slowly introduced before allowing direct physical contact. He challenged the status quo when he wrote, “where there is a will, there is a way” to improve the life of caged rhesus monkeys without undue risks to the animals or the budget [21].

It is clear from attempts to circumscribe the definition of well-being, delay implementation, and exaggerate the benefits of individual housing and the risks of social housing that the will to transform the limited lives of laboratory primates was in short supply.

Limits on the psychological well-being requirement

In 1998, the National Research Council (NRC) issued its critical assessment of the issue in the book *The Psychological Well-Being of Nonhuman Primates* [22]. Although the NRC committee, chosen by the Council in consultation with the National Academy of Science (NAS) and the Institute of Medicine (IOM), was deemed by them to be experienced and balanced, it was made up of nine research psychologists, four primate veterinarians, three physiologists, and one anthropologist, all of whom were active laboratory primate researchers. No member of an animal protection organization, philosophically trained ethicist, or nonscientist was appointed, though testimony was heard from Martin Stephens of the Humane Society of the United States (HSUS), Roger Fouts of Central Washington University, and Christine Stevens of AWI at a public meeting. The omission of impartial but well-informed nonscientists is particularly noteworthy because the publication of *Animal Liberation* by Peter Singer 23 years earlier [23] had raised what became widely discussed ethical questions about the treatment and usefulness of nonhuman primates in behavioral research. It was a significant event that helped motivate the new law and regulations under study. Also noteworthy is the fact that nearly 30% of the committee had formal academic involvement with the University of Wisconsin Primate Laboratory, which was the specific focus of many of Singer’s harshest criticisms.

The position taken by the NRC committee was that the ideal goals of a psychological well-being plan were to produce research subjects that in addition to being physically healthy:

1. were able to cope effectively with day-to-day changes in their social and physical laboratory environment;
2. were able to engage in beneficial species-typical activities;
3. showed no evidence of experimental maladaptive and pathological behaviors that were not the purpose of an approved protocol; and

4. showed a balanced temperament between aggression and passivity, and without chronic signs of distress. [22, p. 1]

These criteria show that what started as primarily a welfare move was eventually molded into the goal of producing a better experimental subject who might also suffer less during the research process.

The fate of the engineering standards approach to psychological well-being

In terms of implementation, the NRC committee warned that designs based upon common sense beliefs about humane housing provide a poor basis from which to proceed. After all, some primate groups in the wild live in environments that humans would find “unendurable” and yet they “prosper” [22, p. 6]. This position dispensed with the ethical relevance of a wide array of potential harms in favor of only survival and reproduction as the markers for prospering, and reveals a truncated understanding of welfare. Instead, the committee asserted that improvements should evolve from the professional judgments of individual researchers in conjunction with federal inspectors. An emphasis on fixed “minimal” or “engineering” standards was deemed unacceptable. Instead, it was argued that welfare improvement interventions should be determined on a case-by-case basis, taking into consideration an animal’s species, gender, developmental history, and experimental involvement. This meant that a plan for improving an animal’s psychological well-being that previously had been judged socially incompetent because of deprivation would require little more than adding visual and olfactory exposure to other animals to fulfill the policy. As we shall show below, there were many such animals in primate laboratories.

The experimental exemption

Currently, the AWA and PHS policy require that nonhuman primates be housed in environments that reflect their social needs. The eighth edition of the *NIH Guide for the Care and Use of Laboratory Animals*, published in 2011, promotes the ideal that social housing of primates should be considered the “default” condition [24]. Despite these strong statements, creating a plan for psychological well-being that involves social housing is necessary only if the goals of approved research protocols do not countermand it. For example, if a researcher has been approved by an authorized review committee to study the effects of rearing monkey infants without their mothers, that fact takes precedence over the overall goal of providing social exposure in pursuit of psychological well-being. In the specific wording adopted, “Animals used in research sometimes experience ... conditions that threaten their psychological well-being. Whereas every effort must be made to minimize those effects, it is the conditions that impair psychological well-being that sometimes are the subject of research themselves” [24, p. 47]. In other words, as long as the research proposed is judged to be a valid experiment, the goals of creating high levels of psychological well-being and concomitant research ethics standards can be vastly reduced in scope and, in effect, cast aside. The low-level of attention accorded to ethics in these standards is stunning.

Available literature reflecting the actual impact of the psychological well-being initiative is likewise revealing. Data from 2007 show that approximately 45% of monkeys living in indoor primate labs were housed socially [25]. This figure includes monkeys who are housed alone but in proximity to another same sex monkey such that some touching could potentially take place through wire mesh walls. Subtracting this group from the total reduces the degree of social housing to that estimated in 1994, that is, 38%. Recently, Jonathan Balcombe et al. [26] showed that the level of pathological behaviors such as self-injurious behavior exhibited by singly caged primates shows no evidence of decline since the psychological well-being regulations began. These data indicate that there is still strong resistance to housing primates socially and that they still suffer from behavioral pathologies as a consequence.

The move to require consideration of the psychological well-being of nonhuman primates must be assessed as a major ethical change for US regulations. However, the absence of some minimal housing standards and the presence of a complete experimental exemption allows researchers to avoid the question of whether suffering could at times be of such a high level that animal welfare interests ought to take precedence.

Ethical change: the Institute of Medicine report on chimpanzees

If the 1985 shift was a sea-change in animal ethics, a tsunami occurred on December 15, 2011. As described by Kahn in this issue [27], on that date, a committee formed by the Institute of Medicine (IOM) at the request of the National Institutes of Health (NIH) released its report on the scientific necessity of chimpanzees in biomedical and behavioral research [28]. The committee, composed of researchers, veterinarians, and one philosophically trained ethicist, reached consensus that most current research uses of chimpanzees are unnecessary. Further, they concluded that “usefulness” was too low a standard to justify experimental involvement of chimpanzees, a species considered genetically, behaviorally, cognitively, and emotionally close to humans. Instead they argued that use should be limited to those studies that meet the following three criteria [28, pp. 67-68].

1. Forgoing chimpanzee use in the research in question will significantly slow or block important advancements to prevent, control, and/or treat life-threatening or debilitating conditions. In terms of behavioral and genomic research, necessity was defined as studies that provide otherwise “unattainable insight” into comparative genomics, normal and abnormal behavior, mental health, emotion, or cognition.
2. There is no other suitable model available, such as in vitro or nonhuman in vivo, and the research cannot be ethically conducted on humans. Unfortunately, the committee was not permitted by their charge to discuss how a project judged to be too risky or painful for humans can be conducted ethically on a chimpanzee who is simultaneously judged to be like humans in morally significant ways.
3. Research must take place while the animals are living in either “natural habitats” or in “ethologically appropriate,” that is, physically and socially appropriate, environments.

The committee rejected without comment the 1985 psychological well-being approach in favor of a specific and much higher quality minimal living standard for all chimpanzees in all laboratories. In the context of behavioral and genomic research, chimpanzees also cannot be coerced by physical or psychological means and must instead “acquiesce” to invitations to participate. This requirement acknowledges some degree of voluntary, and possibly autonomous, action in chimpanzees (see in this issue Beauchamp and Wobber [29] and Wendler [30]). While the report does not make clear how justified invasive biomedical research will take place under conditions in which acquiescence is unlikely, one may assume that the rigorous standards derived from the principle and the unambiguous recognition of the capacity of self-directed choice in chimpanzees will guide the specifics accordingly.

In February 2012, NIH Director Francis Collins charged a Council of Councils Working Group to provide advice about how to best implement the IOM committee’s principles. On January 22, 2013, the Working Group submitted its report, *Use of Chimpanzees in NIH-Supported Research* [31]. The recommendations were substantially grounded on what is known about chimpanzee life primarily from decades of field studies. Specifically:

1. Chimpanzees are to live in multi-male and female social groups of no fewer than 7 animals;
2. The physical space should have a minimum of 1000 ft² per animal, have year-round outdoor access, permit 20 foot vertical climbing, promote daily nest-building, have varied diets that are

challenging to obtain, and have enrichment activities that provide opportunities for choice and self-determination.

On June 26, 2013, the NIH accepted these recommendations except for the square footage requirement, arguing that data were insufficiently clear on this point. It is obvious from these standards that ease of access was removed as the primary guiding management principle and the ethical requirement of assuring psychological welfare was elevated to first position (see Kahn [27] in this issue).

The reports of both the IOM and the Council of Councils have thus basically become official NIH policy. They raise the ethics bar considerably. Together these documents advance the position that chimpanzees' lives must not be co-opted in the name of science unless the topics involve a crucial human health need for which there is no other experimental option, including the ethical use of humans. The humans-first consideration of the second criterion in the IOM report modifies longstanding norms about the chronological primacy of animals in biomedical research and is an ethical landmark. Behavioral and genomic studies must be expected to provide "otherwise unattainable" insights and chimpanzees must not object to participation, which notably adds chimpanzee choice into the research transaction. Strikingly, current policy sets living requirements of either natural habitats or ethologically appropriate environments as a first-order duty and not a psychological well-being default condition that can be traded away for the sake of science.

Conclusion

Left unanswered in the historical progression traced in this paper is the question of whether the primary duty to provide truly adequate ethologically attuned housing as a precondition of use that the IOM committee found necessary for chimpanzees should also be extended to other nonhuman primates that are cognitively and genetically similar to humans or to other species that are less obviously similar. In responding to public comments about the Council's report, the NIH acknowledged that such a question had been raised but offered no response [31, p. 34]. Finally, of equal importance, the IOM committee was subtly and sometimes overtly critical of the limitation set on the scope of their work by the NIH and IOM, which was to evaluate "scientific necessity" without considering the ethical costs to animals. In so doing the committee gently, but still pluckily, challenged the historic ideology of partitioning science from ethics. Their conclusions are thoroughly warranted based on the history of weak, slow, and uncomprehending responses by government and research investigators traced in this paper.

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