Psychological Well-Being of Primates in Captivity

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ABSTRACT: Recent amendments to the Animal Welfare Act will, upon taking effect, require that researchers who maintain nonhuman primates in captivity house their animals in such a way as to “promote their psychological well-being.” Unfortunately, no consensus presently exists in terms of how to define or identify psychological well-being in primate subjects. We propose a strategy for defining psychological well-being that includes assessment of physical health, comparison with species-normative behavioral repertoires, detection of distress, and evaluation of coping responses. This set of definitions is then used to characterize prototypical primate laboratory environments (e.g., single-cage, pair, and group housing) in terms of fostering psychological well-being. The importance of factors other than housing, such as species-specific characteristics, rearing histories, and phenotypic differences, is also emphasized in developing prescriptions for psychological well-being in captive primates. It seems unlikely that simple prescriptions will be broadly applicable across the whole range of captive primates. Instead, researchers must be sensitive to the needs of their particular subjects in order to optimize their psychological well-being, however defined.

The use of animals in research has once again become a provocative and controversial topic of debate between many scientists and some other members of the public. Charges and countercharges permeate both written and oral discussions of this topic. Researchers point to the benefits derived from animal research and focus on the “greater good for humanity,” whereas animal rights activists consistently question the morality of such animal use and raise concerns about the quality of life experienced by laboratory animals. This latter point, “quality of life,” is important to all scientists for practical as well as humane reasons. Today, virtually all researchers are aware of their responsibility to provide humane care and treatment for their animals and to make improvements continually as the state of our knowledge increases. This is an obligation not only to the animals but also to the research enterprise itself. Animals that are not housed and treated humanely yield data that are clearly confounded with distress.

However, a recent amendment to the Animal Welfare Act now places an additional responsibility on researchers working with nonhuman primates, namely that they must “promote the psychological well-being” of the animals under their care (amendments to Animal Welfare Act, 1985 [contained in Food Security Act of 1985], §1752). Part of the impetus for this legislation has come from activists who erroneously believe that all research animals are kept in sterile laboratory environments lacking in basic opportunities for stimulation and expression of species-typical behavior patterns. Although the overall intent of the new regulation is laudable (i.e., researchers should perceive nonhuman primate subjects as living organisms and not as mere research tools), its implementation clearly presents many formidable challenges. The purpose of this article is to explore what is meant by the phrase “psychological well-being,” to consider the extent to which typical laboratory housing arrangements foster or fail to foster such well-being, and to develop prescriptions for promoting psychological well-being in captive primates.

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*This debate has recurred several times during the past century. For an insightful discussion of the terms of the debate 60 years ago, see Dewey (1926).
Psychological Well-Being and Anthropomorphism

However well-intentioned the phrase “psychological well-being” may be, it is enormously difficult to interpret when applied to a species other than our own. Indeed, interpretation of the concepts embodied in this phrase even for our own species is clearly no simple matter. How would a researcher or society “promote the psychological well-being” of subjects if the subjects were human? Not only has there been less than general consensus about the meaning of “psychological well-being” for much of recorded human history, but also there has been considerable disagreement over the target and extent of programs promoting psychological well-being. Even under circumstances in which virtually all would agree that psychological well-being was being promoted—as in cases where subjects were made happy and contented—problems would remain. For example, there could be legitimate debate as to whether such conditions should be maintained continuously (might they eventually lose their effectiveness?) or whether they would be equally appropriate for subjects of different ages or cultural backgrounds.

The problem in assessing psychological well-being at the human level would be compounded if the subjects either could not verbalize their feelings and preferences or could not comprehend what was being asked, as in the case of preverbal infants or individuals from an entirely different culture. Here, the possibility for misinterpretation (or honest disagreement) over what might constitute psychological well-being is twofold: first, in deciding how to assess well-being in subjects without asking them verbally and second, in assuming that psychological well-being is the same for researcher and subject alike. Such potential problems, especially the latter one, become even more complicated when one moves from human to nonhuman primate subjects.

It is common to attribute our own human desires, preferences, and needs to animals such as monkeys and apes, which resemble us in many ways. This phenomenon, termed anthropomorphism, has played a pivotal role in the development of intense emotional attitudes toward animals by some humans. More importantly, anthropomorphism has frequently resulted in the misinterpretation of animal actions. For example, to the uninitiated, the grin (smile) of monkeys and apes is one of happiness or gaiety, the yawn an indication of fatigue. That is what these signals typically mean to us when expressed by humans. However, in many species of nonhuman primates, the grin is really a manifestation of fear, and the yawn is a signal used to display the canines or indicate tension (Van Hooff, 1967). Thus, anthropomorphism leads us astray in these cases. This is not to say that humans cannot know or should not care about the feelings of nonhuman animals, only that these feelings should not be assumed to be the same as those of humans. Indeed, expert training is usually required to interpret the needs and feelings of animals, and even then some questions remain.

Nowhere is anthropomorphism more pervasive than in considerations of the psychological well-being of primates. Nearly everyone, regardless of background or training, has an opinion on what makes monkeys happy and content. Unfortunately, these opinions are often treated as facts even before any empirical data are collected. Studies of cage size in social groups of primates fit into this category.

Cage size is one feature that would appear to have some relevance for psychological well-being. Furthermore, it is commonly believed that psychological well-being can be enhanced by providing group-housed animals with more cage space. After all, this is what we as humans in western societies would prefer. This notion seems so obvious as not to require experimental verification. However, experimental studies of cage expansion or reduction do not always support the view that “more is better” for nonhuman primates. Here, if “better” is defined in terms of reducing or preventing an increase in the levels of aggression between group members, then all possible experimental outcomes have been reported. A reduction in cage space has been associated with both an increase in aggression (Alexander & Roth, 1971; Elton & Anderson, 1977; Nash & Chilton, 1986; Southwick, 1967) and an actual decrease in aggression (Erwin, 1979). Furthermore, an increase in aggression has also been associated with an increase in space for some captive primates (Novak & Drewsen, in press). In sum, there appears to be no simple, direct relationship between cage space and aggression; other variables, such as the physical features of the cage space and characteristics of the social group, may also be important. Thus, our own intuition of what must be better for nonhuman primates with respect to cage size clearly does not hold up in a general way. This underscores the importance of experimentally determining what is better for captive primates rather than relying on our own views of what we as humans might prefer.

Defining Psychological Well-Being

Despite the problems described above, the task before us, as mandated by law, is to define and thereby identify psychological well-being in captive nonhuman primates. At this point, however, there is no clear consensus among scientists as to what constitutes psychological well-being in the various primate species. At least four different approaches have been...
proposed directly or indirectly in recent literature. Two emphasize physiological processes—physical health and reaction to stress. The remaining two depend critically on behavioral responses—namely, species-typical repertoires and competence. Each approach has its strengths and limitations, and no single approach is claimed to be independent or exclusive of the others.

Physical Health

One way to define psychological well-being is to consider it synonymous with physical health. This is basically the veterinary care approach. Physical health can be assessed in a number of different ways, including (a) monitoring external signs, such as skin and coat condition or the appearance of the eyes, (b) examining the rate of growth and aging (cf. Kerr, Scheffler, & Waisman, 1969, for rhesus monkeys), (c) conducting various neurological and morphometric tests, and (d) measuring physiological variables, such as those associated with blood profiles and immune function (cf. Keeling & Wolf, 1975, for a description of most of the above procedures in rhesus monkeys). Some of the measures, however, may be more indicative of species-normative biological change than they are of psychological well-being. For example, aged monkeys may show certain characteristic signs of physical weakening, but this may or may not have anything to do with their relative happiness or contentment. Thus, we need to determine the precise linkage between psychological and physical health. Poor physical condition would usually be expected to compromise the animal’s well-being; however, a physically healthy monkey might still be unhappy or discontented.

Behavioral Repertoires

A number of researchers have argued for the use of various behavioral markers of psychological well-being. In one scheme, psychological well-being is viewed in terms of the range of species-typical responses expressed by captive primates (Markowitz & Spinelli, 1986). Animals that exhibit well-being are said to be those whose activities most closely resemble the full behavioral repertoire of their free-ranging conspecifics. In another scheme, psychological well-being, as defined in terms of behavioral repertoires, is equated with the likely success of a captive animal surviving reintroduction to the natural habitat of that species (Snowdon, in press).

Although these schemes have the advantage of relatively simple assessment (i.e., listing the number of different behavior patterns exhibited by captive primates), several limitations should be noted. The phrase “range of species-typical responses” is vague and unspecified. Is it sufficient merely to record the number of different behavior patterns expressed by a monkey or do the frequencies, durations, sequences, or contexts of these behaviors also matter? How much of the range of species-typical behaviors must a primate exhibit before it is considered to be happy and fit? How should we evaluate the appearance of those species-typical behaviors, such as aggression, that are known to produce distress at least in their social targets? Is distress sometimes acceptable and even desirable in captive primates as long as it is produced in a species-typical context and is not the result of experimental protocol? Such issues have to be resolved before these schemes can be fully considered.

In yet another scheme that is tacitly employed in studies of environmental enrichment, the frequencies and durations of behavior are evaluated and psychological well-being is defined in terms of a particular behavioral profile. A “desirable” profile might be one in which the animal displays a high level of affiliative, exploratory, and/or playful behavior; is active within its environment; and shows low levels of aggression and stereotyped activities. However, choice of a desirable profile is often based more on animal management issues than on what may be typical for free-ranging conspecifics. Thus, the objective may be to produce a profile that looks suitable to zoo visitors (e.g., low levels of aggression) or that serves a particular research function (e.g., high levels of social behavior associated with breeding). Whether animals displaying the “ideal” profile are better off psychologically than animals showing a different profile remains to be determined. There is reason to believe that patterns associated with aggression are more stressful to animals than patterns associated with more affiliative kinds of social activities (Goo & Sassenrath, 1980). However, some primates may be more content to be by themselves than to interact socially (e.g., adult male orangutans, Horr, 1977).

Reaction to Stress

Moberg (1985) has argued that it is difficult to define psychological well-being directly because the term is quite subjective and therefore prone to anthropomorphic interpretation. As an alternative, he suggested that well-being be defined as the absence of stress. If it is assumed that a state of stress is incompatible with happiness and contentment, such a characterization may be useful because biobehavioral reactions to stress can be measured objectively in most primates.

Although virtually everyone would agree that severely stressed animals are not experiencing psychological well-being—at least during exposure to the stressor(s)—this definition is problematic from several standpoints. First, stress itself is not easily defined. Despite extensive research on this topic, scientists still
have no precise meaning for stress, nor can they necessarily measure it accurately in individual organisms (Friend, 1980; Levine, 1985; Mason et al., 1976; Ursin, 1982). In most studies utilizing nonhuman primates, stress typically has been measured hormonally and not behaviorally because hormonal responses may still be present even after behavioral habituation to a stressor has occurred (Coe, Glass, Wiener, & Levine, 1983). This approach, however, is complicated by the fact that there are multiple stress pathways (Levine, 1985), including one involving the hypothalamic-pituitary-adrenocortical system in which ACTH and cortisol are monitored and another involving the sympathetic-adrenomedullary system in which the levels of various catecholamines and their metabolites are typically assessed. These systems may be activated or even suppressed under different environmental conditions (Levine, 1985; Lundberg, 1980). Such diversity of response patterns and of the circumstances that elicit them raises the question of what the various patterns of activation tell us about the quality of life of captive animals.

Moreover, stress is far from a unitary concept, and it may be argued that some stressors can actually be beneficial to organisms. Selye (1974) proposed the term eustress to denote such beneficial sources of stimulation and distress to denote potentially injurious stimuli. Given our current inability to understand fully the affective significance of the hormonal changes described previously, it may be more appropriate to classify well-being in terms of the relative absence of distress. The added benefit of this characterization is that both behavioral and physiological measures of distress can be utilized. Indeed, there are reliable clinical signs for the recognition of distress in primates, such as grimaces, abnormal breathing, hunched body posture, and changes in affective state (Morton & Griffiths, 1985).

A related problem with Moberg’s (1985) formulation involves the proposed interrelationship between stress and well-being. These two concepts are usually presented as opposites. Are we to assume, however, that we can produce psychological well-being simply by eliminating much or all of the stress/distress that an animal experiences? Or, by contrast, do these two concepts exist along a continuum, such that under some conditions primates might experience neither distress nor psychological well-being? Perhaps a monkey chronically maintained in a safe but unstimulating environment would fit into such a category. Because we have little information on the physiological responses of such potentially “bored” monkeys, this question is currently unanswered. Furthermore, periodic stress is probably a ubiquitous feature of most primate societies, and its total absence may ultimately be no more desirable than its presence. What differentiates a contented monkey from one that is not may be better reflected in how it copes with the stress it experiences than in how much stress it actually encounters. Further research will be needed to verify this view.

Competence

According to some researchers, psychological well-being can be defined as a primate’s ability to respond effectively to the social and nonsocial environment (Mineka, Gunnar, & Champoux, 1986; Novak & Drewsen, in press). Instead of focusing solely on behavioral frequencies and durations, sequential patterns and their appropriateness are also rated. Animals are monitored and evaluated in some of the following ways: (a) How responsive is the animal to naturally occurring environmental events, (b) how appropriate is the response given the stimulus, (c) how effective are the animal’s strategies for obtaining food or deterring antagonists, and (d) how quickly does it recover from noxious events, such as being chased or bitten by another monkey? At an experimental level, animals may also be given specific challenges to look at their coping reactions. Such challenges could include dominance testing, exposure to an unfamiliar animal or object, or a change in cage location (e.g., Mineka et al., 1986). However, the precise linkage between competence and psychological well-being needs to be examined. Does a monkey who effectively copes with environmental events automatically experience psychological well-being?

An Integrative View

As we have seen, psychological well-being can be examined from a number of different perspectives. It may not be unreasonable to conclude that happiness and contentment can be a product of all the factors proposed above. We do not yet know if these factors are of differential importance under some conditions or if they interact with each other in unique and complex ways. Nonetheless, it is still possible to propose a set of criteria that might be used to establish the presence of psychological well-being in nonhuman primate subjects. These criteria, based on the above described definitions of psychological well-being, can be summarized as follows: (a) The primate is in good physical health; (b) it exhibits a substantial range of the species’ behavioral repertoire and, if individually housed, does not display high levels of bizarre, stereotyped, or disorganized patterns of behavior; (c) it is not in a chronic state of distress; and (d) it is able to respond effectively to environmental challenges. It is our present position that demonstration of any two of the above criteria would constitute reasonable evi-
An Evaluation of Laboratory Environments

So much has been said and written about the impoverished nature of the "laboratory environment" that the statements take on a sense of legitimacy even in the absence of any extensive empirical data. For many people who have never been in a research facility, the word "laboratory" brings to mind a setting that is stark, sterile, and devoid of human compassion. However, if we examine those laboratory environments in which captive primates are typically maintained, three general points emerge that are counter to this view. First, there is no such thing as "the" laboratory environment. Although it is convenient to refer to laboratory environments as a single entity, in actuality primates in research facilities are maintained in a variety of ways. They may be housed alone in small cages, with a partner, in social groups living in large indoor pens, in indoor-outdoor pens, or in very large outdoor enclosures. This diversity of caging arrangements belies the view that laboratory environments are uniform and always impoverished. Maintaining a monkey in a single small cage for months or years at a time should not be equated with housing monkeys socially in indoor-outdoor pens. Even monkeys that are housed in individual cages may live there only for relatively brief periods, may have exposure to enrichment devices (Champoux, Hempel, & Reinhardt, 1987), or may experience increased stimulation in the form of complex learning tasks (Schrier, Angarella, & Povar, 1984). Obviously, not all laboratory settings are impoverished.

When animal rights activists refer to laboratory environments as stark and sterile, they are usually making comparisons between the single cage housing arrangements found in some laboratories and the "natural" or field environment (Stevens, 1976). Unfortunately, the field environment frequently held up for comparison is some idealized view of nature where all animals are always free to make choices, to gambol and cavort in the sun, and to live out their lives in harmony with the other species around them. But just as there is no one standard laboratory environment, there is clearly no unitary field environment. Very few field settings even begin to approach the qualities of the idealized one described above.

Indeed, many field environments can actually be characterized as impoverished or stressful. There may be droughts or food shortages that produce competition and lead to high mortality in monkey troops (Wrangham, 1981). Even when there is an abundance of food and water, life in a monkey troop can become very tense and dangerous during certain times of the year. For example, during a nine-month observation period, Lindburg (1971) recorded a total of 93 wounds, presumably inflicted by group members, in a troop of 115 free-ranging rhesus monkeys. Most of the wounding involved adults (both males and females), and 61 percent of these wounds occurred during the three-month breeding season. Thus, it is not uncommon in the field to observe minor and sometimes serious wounds (e.g., evisceration, deep puncture wounds, or loss of eyes or limbs) in many species of Old World monkeys and apes. Some of the primates with serious wounds survive and recover; others clearly suffer for a time and then die.

Monkeys living in nature are also exposed to numerous diseases and viruses without the benefit of treatment. Wild primates often die of parasitic infections, tuberculosis, polio, or other infectious agents. Infant primates are especially vulnerable to disease, and mortality rates can be extremely high in nature (for example, less than one half of all wild-born baboons survived beyond their second year of life in a ten-year study of free-ranging baboons in Amboseli; Altmann, 1980). In the final analysis, wild-living primes, like other animals, must struggle under difficult conditions just to survive and to reproduce.

Given the realities of various field settings, how do laboratory environments really compare with respect to promotion of psychological well-being? Monkeys definitely live longer under virtually all current captive conditions. Far fewer neonates die under laboratory conditions, and their mothers’ rate of reproductive success is generally higher than for wild-living conspecifics. Laboratory primates are healthier by virtue of lowered exposure to disease or parasites and because of the treatment they receive when they are ill. They
need not experience severe food or water deprivation. In fact, strict attention is paid to their nutritional needs. They are protected from the vicissitudes of the weather as well as saved from the grasp of potential predators. However, most monkeys housed in laboratories do experience restrictions in their activity, and such restrictions are obviously greater in some indoor environments than others. It is the responsibility of the scientist, then, to evaluate such environments and determine which are best for each species of captive primate, given the nature of the research program. As we shall see when we compare laboratory environments, such evaluations are often complicated by a lack of necessary information (most of the information provided below comes from studies of squirrel monkeys, rhesus monkeys, and chimpanzees). Furthermore, even an idealized laboratory environment, like the “natural” environment, is not without benefits and costs to the animals involved.

Single Cage Housing

Monkeys housed in single cages enjoy a level of physical health that is typically not found in the wild. For example, rhesus monkeys maintained in individual cages all their lives show a significantly lower incidence and decreased severity of degenerative joint disease than free-ranging monkeys (Kessler, Turnquist, Prizker, & London, 1986). They are less likely to contract disease and cannot be wounded by other monkeys. On the other hand, such monkeys sometimes become obese and lethargic.

In terms of behavioral repertoires, however, single cage housing greatly limits the expression of species-typical behaviors, especially those related to complex physical interaction. Not all social interaction is eliminated because single cage-housed monkeys are able to see, hear, and smell and therefore communicate with other monkeys in the room. Nonetheless, monkeys kept in single cages sometimes exhibit bizarre, stereotypic, and self-directed patterns of behavior, the incidence and severity of which are greatly compounded the earlier this housing arrangement is begun (cf. Mitchell, 1970; Sackett, 1968).

Individually housed monkeys are not exposed to the physical stresses that are typically associated with group life. Furthermore, their day-to-day experiences may be much more predictable than those of free-ranging or group-housed primates, a desirable characteristic from the standpoint of minimizing stress (Mineka & Kihlstrom, 1978). However, such reduced stress carries with it a cost measured in terms of the primate’s resilience to change (Levine, 1985). Alterations in cage location or in routine husbandry practices may produce major stress reactions that are likely to be exaggerated in primates with impoverished early rearing experiences (Kraemer & McKinney, 1979). This point is also relevant with respect to competence. Individually housed monkeys have little opportunity to develop or to display species normal coping strategies and instead may respond with strange, bizarre patterns of behavior (Goosen, 1981). Nonetheless, there may be research projects for which individual housing is clearly necessary from the standpoint of both human and animal health.

Pair Housing

Pair-housed primates also enjoy a state of physical health that is usually superior to that of many free-ranging monkeys. In contrast to individually housed monkeys, pairs can groom one another and remove debris and loose hairs from each other’s coat. In addition, pair-housed monkeys are probably more active than their individually housed counterparts. These potential health advantages, however, may be offset by the increased potential for the transmission of contagious diseases, for wounding, and for undernourishment in the less dominant partner.

Providing a monkey with a social partner is sufficient to elicit most species normative social behaviors for the sexes involved except for those patterns characteristic of groups of three or more (e.g., recruitment of agonistic aid, Cheney, 1977). However, long-term housing with the same partner may sometimes lead to boredom, as expressed by a decline in social interaction and an increase in general passivity. The presence of a social partner can serve as a buffer to changes in the environment and thereby reduce levels of stress (Stanton, Patterson, & Levine, 1985). Conversely, stress may be increased in pairs as a result of incompatibility or excessive aggression by the dominant member of the pair. Partners also provide each other with opportunities not available to individually housed primates to develop some socially relevant coping strategies.

Group Housing in Indoor Pens

Group-housed monkeys experience all the health benefits associated with pairs, including an opportunity to exercise within the larger space provided by a group pen. However, potential health costs of social housing are generally magnified beyond the pair condition. There is increased risk of wounding, undernourishment, and the spread of disease.

Animals living in compatible groups typically show a high level of complex social interaction, which is in large part dependent on the distribution of animals of different kinship, age, and sex. However, behavioral repertoires may be limited in submissive animals as a
result of actions by other group members (Stynes, Rosenblum, & Kaufman, 1968).

Stress effects, both beneficial and deleterious, are magnified in the group situation. There may be greater buffering with more animals (especially if kin groups are present), but there is also greater potential for stress associated with patterns of aggression. Furthermore, animals may be unable to avoid social interaction. Chimps, for example, do occasionally choose to be apart from their social group and may show distress if this opportunity is not available. The ability to develop coping strategies is potentially enhanced in the group situation (e.g., recruitment of agonistic aid).

Group Housing in Indoor–Outdoor Pens

All the group housing effects described above for indoor environments also apply when access to outdoors is provided. In addition, animals allowed outdoors are exposed to seasonal changes in light and climate. Seasonal variation is known to produce changes in coat, weight, and hormone levels and may contribute positively to the animal’s overall level of health. On the other hand, access to the outside provides potential exposure to airborne pollutants and, in some settings, to thorn bushes, toxic plants, dangerous snakes, and insects.

Seasonal changes can also produce variation in behavioral repertoires and in the employment of specific coping strategies. Stress may be heightened if the breeding season is intensified by seasonal events. Conversely, stress may be reduced because of increased opportunities for escape from or avoidance of aggressive encounters (i.e., animals can move from the indoor to the outdoor section or vice-versa and remain temporarily out of sight of the attacker; cf. Erwin, Anderson, Erwin, Lewis, & Flynn, 1976, for the effects of barriers in reducing aggression).

Group Housing in Outdoor Enclosures

Large outdoor environments, in naturalistic settings, provide all the benefits and carry most of the costs present in indoor-outdoor environments. Although primates may be able to forage for nutrients in the vegetation and soil, there may be a significant health risk if the vegetation and soil contain toxins. Animals in outdoor enclosures may also experience more extremes in temperature and other weather conditions, as in the case of low-ranking group members who are excluded from shelter areas.

Animals in outdoor enclosures typically display a wide range of species typical patterns of behavior not always present in the other environments. These include highly complex social interactions when groups are large (i.e., more animals of different ages, sex, and kinship line may be represented), foraging behavior, and reactions to potential predators. These additional behavior patterns can also lead to new coping strategies (e.g., the development of foraging strategies that take into account the nutrient quality of the fauna in the enclosure).

Stress for low-ranking animals may be reduced because there are more opportunities for escape and avoidance as a result of the size and complexity of the enclosure. Furthermore, the presence of a large group of animals may provide even greater buffering from environmental and social stresses. However, the potential for serious fights may also be greater in this setting (Samuels & Henrickson, 1983).

Issues for Environmental Management

Although there is tremendous spatial and social variation in the five laboratory environments described above, each of these environments has its associated advantages and disadvantages. Animals that are housed individually may be exceptionally healthy physically even if the expression of species-normal responses is curtailed. Animals in social groups generally show a wide range of species-normative patterns of behavior, but some individuals within these groups may be exposed to certain stress and health risks. Does an individually housed monkey experience less psychological well-being than the lowest ranking group-housed individual who may be the target of some form of aggression by other group members every day?

Moreover, we are confronted with a possible dilemma concerning the psychological well-being of some low-ranking monkeys who may be frequently harassed. Should such monkeys remain in their social group, despite daily tension? (Obviously, monkeys would have to be removed if they were the targets of severe aggression.) Should they be removed from their social groups to eliminate the harassment? Removal of animals is not always a desirable alternative because separation from familiar group members may produce behavioral apathy and depression (Suomi, Eisele, Grady, & Harlow, 1975). In some cases, then, judgments must be made about the relative psychological well-being of specific individuals under different conditions, recognizing that there may be no optimal solution.

Given the criteria developed above, it is possible for primates to experience some degree of psychological well-being in each of the environments we have described. Whether they are, in fact, happy and contented in any of these environments can only be determined by observation and testing. If animals fail to exhibit well-being in a particular environment, then the researcher has two choices: (a) to improve that environment (e.g., individually housed monkeys might be provided with enrichment devices to reduce bizarre
behavior, cf. Markowitz & Spinelli, 1986; group-housed monkeys might be exposed to techniques that reduce the levels of aggression in the group) or (b) to move the primate to a different environment (e.g., individually housed monkeys might be paired; a very low ranking animal in a group might be removed and paired with an amicable conspecific). Unfortunately, we do not yet know precisely how to optimize all environments (e.g., exactly which enrichment devices are more effective in reducing bizarre behavior), nor do we fully understand the consequences of moving animals to different environments. However, the language of the relevant animal welfare amendment may leave no legal alternative.

Prescriptions for Promoting Psychological Well-Being in Nonhuman Primates

Once psychological well-being has been defined in a regulatory context by the U.S. Department of Agriculture (USDA), researchers will be faced with the task of ascertaining how to promote or maintain such psychological health in their nonhuman primate subjects. This may well prove to be problematic because no single prescription for promoting psychological well-being will ever be developed that can be applied to all primates in all types of settings. In fact, it is our strong belief that prescriptions should vary not only as a function of laboratory caging arrangements but also with other considerations in mind. It seems clear, as noted previously, that promoting well-being in singly housed monkeys would require different manipulations than for group-housed monkeys. In addition, effective strategies for promoting psychological well-being will depend to some extent on the characteristics of the primate subjects themselves. These characteristics may encompass relevant species differences as well as factors reflecting within-species variation, such as the individual’s history, stage of development, sex, and temperament.

It is unlikely that prescriptions for promoting psychological well-being will have broad generality across a diversity of species ranging from prosimians, New World monkeys, Old World monkeys, and apes. Different primate species have different needs, use different modes of locomotion, come from different habitats, and have different species-typical responses to conspecifics and to various laboratory environments. One can readily conceive of procedures that might promote psychological well-being in one species but have absolutely no effect or even a harmful effect in another species. For example, arboreal primates prefer multiple perches and poles so that they can move through their environment without touching the ground. Horizontal poles are useful for certain species, such as marmosets and tamarins, but are of no benefit to leapers, such as tarsiers, which typically jump from one vertical branch to the next. Tarsiers need poles or vine tangles that are arranged vertically in their environment (Roberts & Cunningham, 1986). Thus, there is no general prescription about the location of poles and branches in laboratory cages for arboreal species that transcends species differences in locomotor styles.

Even for a single species, it is likely that prescriptions will vary as a function of the animal’s rearing history. Early rearing experiences are known to have different social consequences in nonhuman primate subjects. For example, rhesus monkeys reared in peer-only groups tend to show delayed social development compared with animals raised by their mothers (Chamove, Rosenblum, & Harlow, 1973). Rhesus monkey juveniles reared in peer-only groups are more likely to exhibit distress if moved into single-cage housing, and they appear generally less competent in coping with other physical and social changes in their environment (Kraemer & McKinney, 1979). Thus, peer-reared juveniles may be at greater risk for having their psychological well-being compromised following changes in laboratory routines than are their mother-reared counterparts. Whether such findings generalize to other primate species remains an empirical question.

Effective prescriptions for promoting psychological well-being are also likely to vary as a function of the developmental stage and sex of the primate. What is adequate for young adults is clearly not appropriate for infants and may not be suitable for elderly primates. Furthermore, because there are basic sex differences in many primate species, a single prescription for a given species may not serve the needs of both sexes equally, particularly after puberty. For example, rhesus monkey males living in the wild typically are driven out of their natal troops at puberty and move on eventually to join other troops, whereas females remain in their natal troop throughout their lifetime (Lindburg, 1969; Melnick, Pearl, & Richard, 1984). Therefore, it may be appropriate to remove captive-born adolescent males from their respective social groups but to keep adolescent females in the same groups.

Finally, it should be recognized that strong individual differences in terms of personality traits or characteristics are present in most primate species. For example, rhesus monkeys differ widely in the manner and extent to which they display anxious behavior (Suomi, Kraemer, Baysinger, & Delizio, 1981), and highly anxious monkeys may be more resistant to techniques designed to promote psychological well-being than monkeys with a more relaxed constitution.

Of course, this description does not exhaust the list of potential factors that can make individual primates differ in what makes them happy and content. More
important, these considerations should caution those who would prescribe blanket standards that would clearly be less than optimal for some animals if applied without awareness of their particular needs or requirements. They should also serve to remind us how little we actually know about most species of primates, notwithstanding the wealth of knowledge that has been accumulated to date for a few species (e.g., squirrel monkeys, rhesus monkeys, and chimpanzees).

Conclusions

Recent amendments to the Animal Welfare Act will, upon taking effect, mandate that researchers and others who maintain nonhuman primates in captivity must house their animals in such a manner as to “promote their psychological well-being.” Such a stipulation clearly goes far beyond simple considerations of procedures for cleaning and feeding and of standards for cage size, temperature, humidity, and air exchange rates that characterize current regulations. Moreover, there is presently little consensus among researchers, regulators, or even animal rights activists in how to define “psychological well-being” operationally for nonhuman primates and how best to “promote” it for specific individuals.

At least four different approaches to defining psychological well-being can be found in the literature, and they yield different conclusions regarding optimal ways to house primate subjects (e.g., from the standpoint of physical health, single-cage housing may be preferable to group housing, whereas the opposite is true from considerations of behavioral repertoires or coping capabilities). Yet, these approaches need not be mutually exclusive, and one alternative way to define psychological well-being might be to employ strategies in which there is convergence of approaches (i.e., demonstrating the existence of two out of four of our proposed criteria).

The other issue raised by the new regulations, that of “promoting” psychological well-being, also poses both conceptual and practical difficulties. It is clear that what keeps an individual subject happy and content may be very different for primates of different species, backgrounds, ages, sexes, or individual temperaments. In this respect, consideration of different factors will likely yield different judgments regarding optimal prescriptions for promoting psychological well-being of specific individuals. Furthermore, in some cases, optimal well-being may never be attained, and researchers and veterinarians may have to make relative judgments about what is “better” for a particular primate.

This suggests that the ultimate means of evaluating psychological well-being should be directed toward the subjects themselves rather than to the nature of the physical facilities or the standard operating procedures of the caretaking staff. In this light, all involved in the issue of promoting psychological well-being should acknowledge that many of our current ideas on this topic are founded more on intuition and emotion than on experimental data or clinical experience. Those who are truly interested in fostering psychological well-being in captive primates should be ready to support relevant empirical studies and then apply what has been learned in the formulation of both future regulations and future primate research. These studies, if carried out with methodological rigor and in good faith, should be welcomed by scientists, regulators, animal rights activists, and other members of the general public. Psychologists, among all professionals, can and should be contributing their expertise to resolving scientific and regulatory questions about psychological well-being in captive primates.

References


Commentary: Joy A. Mench and W. Ray Stricklin

Drs. Novak and Suomi discuss the difficulties humans experience when defining and measuring psychological well-being or welfare in laboratory primates. Although interest in this topic has been spurred by the regulations for housing laboratory primates contained in the 1985 amendment to the Animal Welfare Act, the issues raised in this paper are of more general significance. In fact, they are of considerable importance with respect to the housing and management of farm animals.

The recent technological intensification of animal agriculture has resulted in many farm animals being housed in environments where they may experience crowding or social isolation, a lack of environmental variability, and lengthy periods of close confinement. A major impetus leading to the consideration of farm animal well-being was the publication in Britain of Ruth Harrison’s book Animal Machines (1964). The public concern aroused by her description of the treatment of farm animals led the British government to convene an expert committee under the chairmanship of F. W. Rogers Brambell. The committee report (Brambell, 1965) recommended that agricultural management practices be evaluated with consideration for animals’ “behavioral urges” and modified to reduce suffering where possible. While recognizing the necessity for scientific studies to enable the objective assessment of animal welfare, the committee also expressed the opinion that decisions about the intensity of suffering by animals would ultimately be largely subjective and based on analogy with human emotions.

Despite extensive research efforts by animal scientists in Europe and more limited research efforts in North America since the Brambell report was issued, however, progress in objectively defining and measuring suffering and welfare in farm animals has been made only gradually. A major reason has been that the problems identified by Drs. Novak and Suomi for primates are compounded in farm animals as a result of several factors.

First, the extrapolation of “normal” behavior patterns to the production environment is extremely difficult. Unlike laboratory primates, the behaviors of some domesticated animals have been modified significantly from those of their wild ancestors. These changes have occurred not only as a result of intentional selection for particular behaviors, but also inadvertently as a consequence of selection for production traits. Second, criteria of well-being that are related to production traits (i.e., growth or reproduction) cannot be evaluated as unambiguously in farm animals, because they may be subject to manipulation by artificial photoperiods, the addition of growth promoters to the feed, the imposition of movement constraints, and so on. Additionally, the evaluation of suffering by analogy poses even greater difficulties in species that are taxonomically further removed from humans than are nonhuman primates.

Drs. Novak and Suomi discuss four distinct approaches to defining psychological well-being and indicate that these may yield different conclusions regarding the optimal way to house primates. Similar approaches, beset with similar problems of interpretation, have been used by researchers attempting to assess the well-being of farm animals (see reviews in Dawkins, 1980; Duncan, 1974; Mench and van Tienhoven, 1986). Because of this problem of conflicting interpretations, we concur strongly with Drs. Novak and Suomi that a multifaceted approach to assessing welfare that involves behavior, physiology, and health is essential. In farm animal species in particular, the development of reliable behavioral indices of stress is imperative, because behaviors can generally be easily monitored in the production environment.

We believe that the issues related to the well-being of laboratory and farm animals, whether primates or poultry, have a common root. It is unlikely that humans will resolve all differences of opinion regarding what constitutes the appropriate use and treatment of animals. The development of a societal ethic on this matter, however, should begin with an understanding of the behavior patterns and physiology of the various animal species under consideration. Progress in understanding the biological bases of animal well-being will be facilitated if biomedical researchers and animal scientists coordinate their research efforts and develop a dialogue on ethical issues. Because of growing public interest and professional obligation, we believe that it is of critical importance that the scientific community continue to pursue research of the type discussed by Drs. Novak and Suomi.

References


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