



Review

# Enrichment and aggression in primates

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## Abstract

There is considerable evidence that primates housed under impoverished conditions develop behavioural abnormalities, including, in the most extreme example, self-harming behaviour. This has implications for all contexts in which primates are maintained in captivity from laboratories to zoos since by compromising the animals' psychological well-being and allowing them to develop behavioural abnormalities their value as appropriate educational and research models is diminished. This review examines the extensive body of literature documenting attempts to improve living conditions with a view to correcting behavioural abnormalities and housing primates in such a way that they are encouraged to exhibit a more natural range and proportion of behaviours, including less self-directed and social aggression. The results of housing, feeding, physical, sensory and social enrichment efforts are examined with specific focus on their effect on aggressive behaviour and variation in their use and efficacy. It is concluded that while inappropriate or poorly distributed enrichment may encourage aggressive competition, enrichment that is species, sex, age and background appropriate can dramatically reduce aggression, can eliminate abnormal behaviour and substantially improve the welfare of primates maintained in captivity.

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## 1. Introduction

The field of environmental enrichment is still a relatively young one and the scientific study of its effects and efficacy in improving the psychological well-being of captive animals is younger still. Environmental enrichment forms just one part of any coherent strategy that cares for the lives of animals held in captivity either to meet the interests of man or, increasingly, as part of *ex situ* conservation efforts. Caring for an animal’s non-psychological health is of equal importance and there are times when efforts to optimise both physical and psychological well-being can conflict, for example outdoor enclosures may have some clear behavioural benefits (see below) but also hold added disease and climatic exposure risks for the animals (Wolfensohn and Honess, 2005).

Whilst the general principles of environmental enrichment apply to all contexts in which animals are kept in captivity, we are specifically concerned here with nonhuman primates (hereafter referred to as simply primates). Whilst zoos have long been aware of the paying public’s concern over the welfare of the animals they exhibit (Young, 2003) the drive to carry out environmental enrichment in research facilities (experimental and breeding) is more recent and to an extent is driven either by the concern of animal care staff working in them or by force of legislation (Wolfensohn and Honess, 2005), this being despite the consequences for research models of animals that are stressed and in poor psychological health (see Honess and Marin, 2005). The greater body of literature we examine derives from laboratory housing contexts but it is important to point out that the findings are relevant for all captive primate contexts. It is clear that zoo housing may provide conditions that allow animals to exhibit behavioural profiles and time budgets that may be very similar to those of wild conspecifics (Hosey, 2005), nevertheless they do form part of a continuum of

conditions in which primates live that spans barren, solitary caging through to undisturbed natural habitat. Hosey (2005) in his excellent review of the effects of zoo environments on primate behaviour identifies three dimensions on which to distinguish zoo from other captive environments: The chronic presence of human visitors; restricted space; and being managed. Although quantities and qualities of these dimensions may differ between primate housing contexts all have a great or lesser impact on primates, and their welfare, in all captive contexts and therefore, his approach is also extremely valuable and valid for non-zoo environments. It is also worth pointing out that while there may be a general perception that zoos provide better conditions for their primates than laboratories or primate centres, it is of course true that not all zoos are better than all labs and we consider the following review relevant to all housing contexts and not solely the laboratory one in which most of the research was conducted.

A number of definitions exist for the term *environmental enrichment* but few are very concise (for examples see Young, 2003). A practical definition that covers all major aspects of environmental enrichment and relates it to behaviour in the wild is that of Carlstead and Sherpherdson (1994) who define it as ‘A practice aiming to provide environments of greater physical, temporal and social complexity that affords animals more of the behavioural opportunities found in the wild’. Aggression as considered here includes that which is more intense such as contact aggression between individuals, more mild such as non-contact aggression (such as threat displays) and varying degrees of intensity of self-directed aggression as is often exhibited as part of a suite of behavioural pathologies by animals suffering significant stress or psychological problems. The major concepts surrounding aggression in primates are covered elsewhere (e.g. see Honess and Marin, 2005).

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