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**Front Cover**

Chimpanzee Enclosure at Twycross Zoo  
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## Table of contents

Letter from the editors .....	2
Letter from a module leader .....	3
The effects of various enrichment methods on the engagement and inter-group behaviour of captive chacma baboons .....	4
Enclosure use and behaviour of a pair of captive Colombian black spider monkeys: Does visitor presence matter? .....	6
Role of vocalisation and impact of auditory enrichment for captive gibbons.....	8
Does primate personality affect enrichment engagement and behaviour in L’Hoest’s monkeys? How can we use this to tailor enrichment to individual animals? .....	12
How BIAZA accredited zoos shape people’s perception of primates on Facebook: The pros and cons of post popularity.....	15
Interview with Elizabeth Jennings (cohort 22/23) – Working with primates in captivity.....	22

## Letter from the editors

Welcome to the 2022 winter edition of Canopy, Oxford Brookes University's in-house Primate Conservation journal.

In this edition of Canopy, we have chosen to focus on primate studies in captivity. Primate breeding and maintenance in captivity is utilised as part of conservation strategies across the world. The success of a breeding colony in captivity depends on care and veterinary procedures, which must be based on an understanding of primates' behavioural requirements. In improving the quality of life of captive primates, environmental enrichment must be maintained.

Natural environments rarely have ideal circumstances; hence, animals in the wild develop adaptive responses and adjust more readily to unexpected events. Captive primates gradually undergo reduced attention and their search capabilities for new stimuli. The disparities in these processes due to their captive environment have a significant impact on their psychology, cognition, and emotions. As primatologists and conservationists, the onus is on us to propose better methods of enriching primate species in captivity and catering for their general wellbeing. The hunger for knowledge spurs us to strive for greater understanding and to contribute to a safer, more inclusive future for non-human primates.

In this issue of Canopy, we explore different facets of studies on primates in captivity, ranging from their enrichment engagements to vocalisation and behavioural change. All the studies were carried out by past students of the MSc in Primate Conservation and MRes in Primatology and Conservation programmes and cover a diverse range of locations. Also in this issue is an interview with Elizabeth Jennings, a current student of the MSc programme with over three years of experience working with primates in captivity.

We hope you find this issue insightful and that it gives prominence to the efforts and achievements of the Primate Conservation group at Oxford Brookes University in the larger primatology and conservation community.

Finally, we would like to thank the staff, academics and all the speakers who came to give talks at the Monday evening seminars.



We hope you enjoy,  
The Editors: Elizabeth, Mirian, Douglas and Praneetha

## Letter from a module leader

While reading the papers chosen for this issue I was reminded of my own time as a Masters student. I was interested in ideas of primate sociality and how primates develop and reinforce social bonds between group members. To examine this I studied grooming relationships in Diana monkeys at three UK zoos. I later went on to study the same species in the wild, shifting focus to look at female territoriality and male-male competition. Studying guenons in the wild was a life-changing experience for me, but there were times when I really missed the captive research environment, where I was able to observe my study animals up close, identify and locate all individuals in the group almost instantaneously, and see exactly what they were doing, and who or what they were doing it with! That kind of fine detailed observation just wasn't possible with fast moving, arboreal animals in dense secondary rainforest! My research on captive animals had nothing to do with their welfare or their conservation but was directed at testing theoretical models of animal behaviour. The same was true of my doctoral research, but it was the experience of studying wild Diana monkeys in Sierra Leone that encouraged me to switch from testing theoretical models of animal behaviour and sociality, to focus on more applied, conservation-oriented issues. However, without that initial opportunity to study captive Diana monkeys I doubt I would have ended up teaching and researching about primate conservation, but instead would have followed my other great interest at the time – animal welfare in farm animals.

The purpose of zoos has changed significantly over the last century. Where once they were mainly a source of entertainment for the public, most now have a mandate to promote and further biodiversity conservation, as exemplified in Peter Scott<sup>1</sup> address to conference delegates at San Diego Zoo in 1966. In his speech Scott proposed six practical points of action for zoos to engage in conservation: public education about wildlife, heightening of people's aesthetic appreciation of animals to strengthen their receptiveness to conservation ideas and ideals, fundraising to support conservation, research on species of conservation concern, breeding programmes for endangered species, acting responsibly by not exhibiting single animals from rare species, thereby reducing their value to the breeding population. Some of these points occur repeatedly within the literature, modified and updated, but nevertheless, the message remains clear, that zoos can, and should, be proactive conservation organisations "applying their popularity to win support for wildlife protection and their expertise to help sustain reduced numbers of wildlife in marginal habitats"<sup>2</sup>.

The authors in this issue explore a range of different topics of relevance to primate welfare and conservation. Weir examines the effects of different enrichment methods on behaviour in captive baboons and points out that maintaining and encouraging a species-appropriate behavioural repertoire among captive animals is important, not just for animal welfare, but also to facilitate post release survival and wellbeing of animals destined for release into the wild. Homer examines visitor effect on enclosure use and behaviour in a pair of captive Colombian spider monkeys, demonstrating that the animals' use of enclosure, and time engaged in certain behaviours, vary according to whether visitors are present or not. Lenden-Hass discusses the role of duetting in gibbons, and potential impacts of various types of auditory enrichment on captive gibbons, pointing out that some forms of auditory enrichment might even induce unintended stress in captive animals. O'Neill's study explores whether captive animal personality types respond differently to environmental enrichment, and whether enrichment should be customised to individual animals. Finally, Norman examines the impact of zoos' use of social media on the public's perceptions of, and responses to, primates. From his results he recommends that zoos could include more conservation information in social media posts about primates to encourage further positive engagement with, and responses to, these posts.

The contributions in this issue are from some of our recent alumni, including those who had to cope with the trials and tribulations of studying during the Covid 19 pandemic. I'd like to take the opportunity to express our appreciation for the way the MSc/MRes students in the last two cohorts particularly, took up the challenge of completing a postgraduate degree during such extraordinary and difficult times, and to thank them for the patience, support and tolerance they extended to us as we also got to grips with how to teach and support students during such trying times.

**Prof. Kate Hill**, Module leader, People-Primate Interactions, Primate Conservation

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<sup>1</sup> Scott was chair of WWF, SSC IUCN and Flora & Fauna International at the time of his address (Scott, 1967. *Oryx*, 9: 82-86).

<sup>2</sup> Conway, 2003. *International Zoo Yearbook*, 38: 7-13.

# The effects of various enrichment methods on the engagement and inter-group behaviour of captive chacma baboons

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The use of enrichment in captivity encourages individuals to display natural behaviour, decreases instances of abnormal and stereotypical behaviour, and provides the opportunity to practise survival—critical behaviour (Newberry, 1995). The wide variety of enrichment methods are categorised into three types; feeding, structural, and social (Carlstead & Shepherdson, 2000). The provision of high value and monopolizable enrichment, however, may increase agonism and aggression (Wolfensohn & Honess, 2005) and thereby decrease wellbeing (Bloomsith, 1994). It is important that the enrichment provided is novel and not frequently repeated to maintain high levels of engagement; this is especially important for highly intelligent species such as carnivores and primates.

In South Africa, chacma baboons (*Papio ursinus*) are viewed as pests as they often raid crops and poorly stored food waste, due to their opportunistic nature. Consequently, many chacma baboons are hunted and/or killed in retaliation, leaving infants as orphans (Hoffman & O’Riain, 2012). The orphans are then taken in by rehabilitation centres that aim to return the individual to the wild. Such organisations utilise enrichment in order to

prepare individuals and troops for eventual release to the wild. Therefore, it is imperative that enrichment is utilised in an appropriate way to increase the chance of survival post-release.

Conducting my study at the Centre for Animal Rehabilitation and Education in South Africa, I focussed on two research questions; (1) how important is it to rotate enrichment types to maintain high levels of engagement in individually-housed adult chacma baboons? and (2) which methods of enrichment prompt the highest impact on levels of inter-group aggression, submission, and dominant behaviours in a troop of chacma baboons?

For the first part of the study, two individually-housed adult baboons were observed engaging with the same enrichment repeated over five consecutive days. The results showed a large negative relationship between enrichment repetition and engagement time for both individuals (Spearman’s correlation coefficient,  $r = -0.723$ ,  $p = 0.018$ ); engagement time decreased over repetitions. The results confirm that rotation of enrichment types could be beneficial. In experiment two, one troop of ten baboons were observed with the provision of four

different enrichment conditions to determine the effect on inter-group aggression, submission, and dominance behaviours. The largest change in behaviour was seen when frozen fruit enrichment was provided, instances of aggressive behaviours increased by 746 %, increase in dominant behaviours by 180%, and submissive behaviours by 342%, thereby presenting the largest impact on troop behaviour. On the other hand, the smallest change in behaviour was seen when scatter enrichment was provided. This enrichment method in fact decreased rates of dominant behaviour by 12% compared to the baseline, whereas aggressive and submissive behaviours were increased by 96% and 24% respectively. There was a significant difference between instances of aggressive behaviours across all enrichment conditions: seed pods;  $Z = -3.186$ , scatter;  $Z = -3.186$ , pap sticks;  $Z = -3.199$ , frozen fruit;  $Z = -3.201$ , compared to the baseline data (Wilcoxon signed-rank test,  $p = 0.001$ ). The results show that the highest value enrichment, frozen fruit, increased instances of all behavioural categories more so than any other condition, and the lowest value increased these behaviours the least. It also showed that the most monopolizable enrichment conditions, frozen fruit and pap sticks, increased the instances of all categories of behaviour more so than the less monopolizable enrichment types.

My study highlights the importance of providing captive animals with varied enrichment, and sufficient time periods between repetitions. This is especially important for those housed individually, as these animals are more susceptible to boredom and lack the social stimulation experienced when kept in troop enclosures (Fajzi *et al.*, 1989). Due to the results obtained in my study, organisations are recommended to develop various novel enrichment procedures for individually-housed primates with an interval of three to four days minimum between repetitions. Furthermore, the enrichment provided should be as natural as possible, and encourage the use of species—typical behaviours in order to improve individuals' well-being.

My study also emphasises the potential issues that can arise when providing enrichment to a troop. Although enrichment is important for promoting natural behaviours and improving well-being, some enrichment methods may cause an increase in aggressive behaviours and therefore may be detrimental to well-being (Bloomsmith, 1994). As such, it is advised to consider the impact of foods that are high value and highly monopolizable when creating enrichment, and the behaviours of the troop and individuals within must be considered when choosing which enrichment is appropriate.



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## Enclosure use and behaviour of a pair of captive Colombian black spider monkeys: Does visitor presence matter?

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Colombian black spider monkeys (*Ateles fusciceps rufiventris*) are highly social and live in groups of up to 30 individuals (National Geographic, 2022). They are arboreal, with their bodies and prehensile tail specifically adapted to navigate through the canopy (Asensio *et al.*, 2017). They are classified as Vulnerable on the IUCN Red List, with a declining population, deforestation and poaching being among the most significant threats to their survival in the wild (Link *et al.*, 2021). There are many populations of spider monkeys held in captivity, with management and breeding programmes in place. However, there are several complications that arise

from housing captive primates. Understanding social requirements, dietary need, and maintaining appropriate housing are all vital to successfully sustain a captive population. Managing captive populations also has added challenges in having to manage the 'visitor effect'. The visitor effect explores the physiological and/or behavioural changes that visitors may cause in captive animals (Hosey, 2000; Davey, 2007). Understanding the visitor effect on specific captive populations is important as it provides keepers the opportunity to minimise any detrimental impacts and maintain a high standard of welfare for animals in their care.

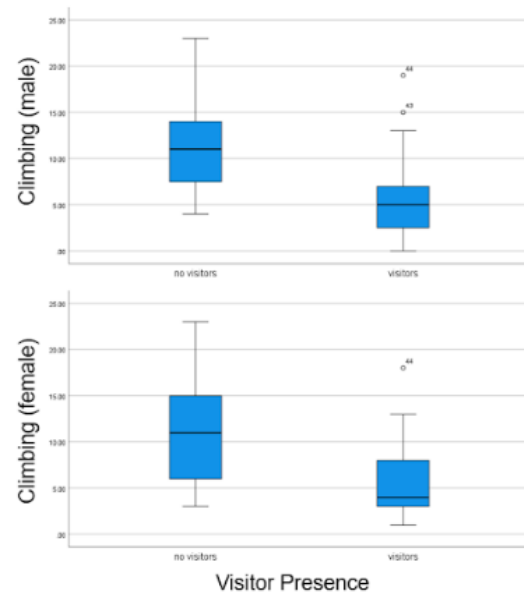


As the visitor effect can be dependent on individuals, it is vital to study this impact on individual captive groups.

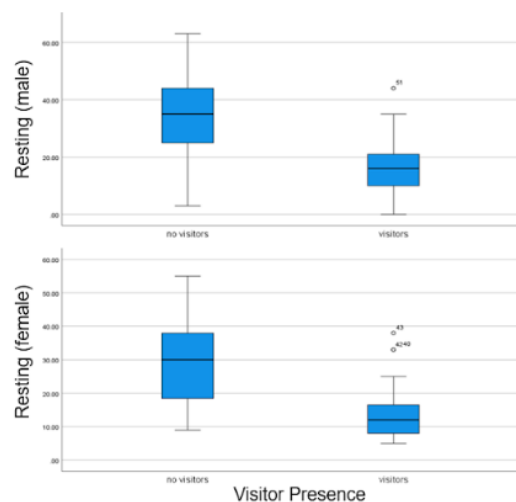
This study focussed on a pair of Colombian black spider monkeys housed at Birmingham Wildlife Conservation Park in the UK. I aimed to determine whether enclosure use and behaviour of the spider monkeys was impacted by the presence of visitors. The pair consists of a 31-year-old male and a 7-year-old female who have been living together for approximately four years. Two sets of focal time sampling were run concurrently: one for the male and one for the female. A total of 146 hours of observations were conducted per individual across a seven week period. 20 behaviours were monitored and recorded along with monitoring the enclosure. To do this, the enclosure was split into six roughly equal sections and labelled. The height use of the spider monkeys was also recorded, with the enclosure being divided into three positions.

A Mann-Whitney U test was conducted to determine if visitor difference does have a significant impact on enclosure use and behaviour. Results differed slightly depending on the individual. For enclosure use, the outdoor section nearest the window where visitors could observe the spider monkeys was the most significantly impacted for both individuals. The height use most impacted the most was above ground level.

For behaviour, 'climbing' and 'resting' were the most significantly impacted behaviours for both individuals (Fig. 1 & Fig. 2).



**Figure 1.** Spider monkeys (top, male; bottom, female) engage more in climbing when no visitors are present.



**Figure 2.** Spider monkeys (top, male; bottom, female) also rest more when no visitors are present.

These results are indicative of there being a visitor effect, however the type of visitor

effect was not being recorded during this study. Inferences can be made based on the type of behaviour displayed. A decrease in 'resting' behaviour may indicate that visitors illicit a stress response in captive animals, with an increase of restlessness and pacing (Hashmi & Sullivan, 2020). A decrease in 'climbing' behaviour may indicate that the animals spent more time conducting another behaviour, potentially budgeting more time to 'vigilance' or 'watching' behaviours. As this was not specifically considered during analysis, this cannot be conclusively determined.

Moving forward, I recommend that further research is conducted to allow the type of impact to be explored for each individual. If the impact appears to be detrimental to welfare, alterations could be made to the enclosure to minimise the impact. It is also recommended that research be conducted on different groups and sites to determine

whether the visitor effect can be applied to all groups of spider monkeys or whether each group is impacted differently.

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## Role of vocalisation and impact of auditory enrichment for captive gibbons

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Gibbons are unique primates, with their monogamous social system, their brachiating movement in the canopy, the seed dispersal service they provide to forest regeneration, and finally, their duetting vocalisation. The

twenty species that are nowadays recognised are split into four genera: *Hylobates*, *Nomascus*, *Hoolock* and *Symphalangus*. They occur in South-east Asia, from north-east India to eastern Borneo, and have seen their

habitat and population drastically decrease because of anthropic pressure (Mittermeier *et al.*, 2013). They are all considered Endangered or Critically Endangered, according to the IUCN Red List of Threatened Species except for *Hoolock leuconedys* evaluated as Vulnerable (IUCN, 2021). Indeed, they are heavily hunted for the illegal pet trade, and being wholly arboreal they cannot survive in heavily logged forests (Nijman, 2004). Currently, the European Association of Zoos and Aquaria (EAZA) carry out a breeding programme to maintain a genetically viable *ex-situ* population. This also raises awareness towards visitors and collects funds for *in-situ* conservation programs. This association records six European Endangered Species Program for Hylobatidae, more than any other regional Studbook. There are three Species Survival Plan (SSP) for the North American association and three Australasian Species Management Programs for the Australasian one. The two last associations, unlike the EAZA, do not coordinate separate breeding programs for gibbon species. The six species coordinated by EAZA are *H. lar*, *H. moloch*, *H. pileatus*, *N. gabriellae*, *N. leucogenys* and *S. syndactylus*. Therefore, many gibbon species are not included in breeding programs, and none of the three different species of hoolock gibbon are. SSP programmes are led by expert advisors who aim to maximise the genetic diversity and appropriately manage the demographic

captive population over the long-term. In captivity, the interaction individuals have with their environment is completely different: they don't have to forage to fulfil their nutritional needs, they don't have to patrol their home range supported by loud vocalisations to indicate their presence, and they don't have to look after a potential mate. Many zoological institutions have reported that captive gibbons occasionally make loud vocalisations, with significant frequency differences between individuals. Here I try to understand what the role of duetting vocalisations for gibbons are and the impact of auditory enrichment in captivity.

The vocalisations produced by gibbons are unique, they are among the loudest in the animal kingdom and they can be perceived as very melodious. This kind of singing and duet-singing has evolved independently four times in different families of primates; Indridae, Tarsiidae, Callicebinae and Hylobatidae (Geissmann, 2000). Siamangs have the loudest call with harsh barking and booming notes that they perform with a large inflatable throat sac (Geismann, 1999). Gibbons have been observed making long-distance alarm calls in the presence of predators, with evidence that this vocalisation is linked to their strong kinship with conspecific neighbours. The time of the day when gibbons vocalise differs between species and can differ between male and female. A study

in Laos on *Nomascus* attested that gibbon song started 12 minutes before sunrise, stopped 13 minutes after sunrise and lasted 16 minutes on average (Coudrat *et al.*, 2015). Because good sight is essential when performing their locomotor display, they only practise duet vocalisation during daylight hours. It has also been hypothesised that gibbons' arboreality may have influenced their vocalisations. When communicating through a dense canopy, auditory communications may be superior to visual signals. Duet vocalisation is said to promote territorial defence and strengthen the bond between performers (Raemaekers *et al.*, 1984). The coyness hypothesis proposed by Serpell (1981) stated that the aims of duets were to prevent partners from deserting to locate a new mate after spending so much effort developing this bond. For gibbons, duet-vocalisation is more intense and frequent than sex, with the latter being a rapid and not obviously pleasurable act. Another hypothesis suggests that females sing to defend territory and food resources, while males sing to defend their female and offspring (Cowlshaw, 1992). Juvenile gibbons learn vocalisations while listening to their parents singing and then by copying their progenitors. This great call development takes place between five and 32 months old. Gibbons' vocal patterns are inevitably influenced by genetics. This has been demonstrated in a hybrid population of *H. lar*

x *H. pileatus* in Thailand, where a juvenile female raised by genetically different parents develops a great call unlike her mother (Brockelman & Schiling, 1984). Also, some dialect can be discerned according to geographical origin.

The environment of wild animals in captivity lack many of the stimuli that they would find in their natural habitat. This lack of stimulation can lead to abnormal behaviour such as stereotypy, coprophagy, or overgrooming (Hughes & Duncan, 1988). For gibbons, communicating with their neighbours via great calls is a means of displaying their social and physical status to intra- and inter-specific partners (Cheyne *et al.*, 2007). The auditory enrichment exhibit for *H. lar* at the London Zoo indicated that gibbons undertake significantly more activities, spend more time on the top of the cage, and travel further utilising brachiation after being exposed to playback (Shepherdson *et al.*, 1989). Simulating neighbours via a loud call encouraged individuals to engage in normal behaviour. However, it does this through environmental manipulation and so may cause an unwelcome degree of stress (Shepherdson *et al.*, 1989). Experiments on captive gibbons demonstrated that when individuals were exposed to classical music, behaviour such as self-scratching and self-grooming, considered as manifestations of anxiety and stress, became more frequent.

Another study on gorillas indicated that being exposed to naturalist sound reduced stereotypy (Wallace, 2013; Robbins & Margulis, 2014, Williams, 2017). The effect of naturalistic sound on captive behavioural individuals has also been investigated in parrots, with the finding that the number of calm vocalisations rose while the number of loud vocalisations increased.

Monogamy is rare among mammals, only 3% have selected such a social system, gibbons are one of them (Kleiman, 1977). Such behaviour could be promoted with auditory enrichment as vocalisations have a positive impact on captive gibbons. But on the other hand, zoos could use the vocalisations of gibbons to grab visitor attention using auditory enrichment and not necessarily considering the natural time of the day which different species vocalise. The presence of a conspecific close by might make them defensive and have a negative impact on an individual's well-being and pair connection. A supply of naturalistic sounds appears to increase natural behaviour.

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# Does primate personality affect enrichment engagement and behaviour in L'Hoest's monkeys? How can we use this to tailor enrichment to individual animals?

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The goal of my study was to understand the personality and activity budgets of the seven L'Hoest's monkeys housed at Twycross Zoo. This was done to understand how these primates engage with four different enrichment types: hay bales, scents, feeding tubes, and water baths. In turn, this was done to determine whether personality influences enrichment types. Once completed, I made suggestions regarding how enrichment can be tailored to suit each individual.

My study was conducted in partnership with Twycross Zoo, as a replica study of another masters' student, conducted on François Langurs. The two research questions were posed by the research team at Twycross Zoo: 1) Does primate personality affect enrichment engagement and behaviour in L'Hoest's monkeys? and 2) How can we use this to tailor enrichment to individual animals?

L'Hoest's monkeys are guenons. Genetic information highlights that guenons divided from other Old-World monkeys approximately ten million years ago, with the *Cercopithecus* family emerging as recently as six million years ago (Young, 1998). There are approximately 70 subspecies of guenon, that

are in an active stage of speciation, which has proven problematic when it comes to scholars correctly classifying these species (Young, 1998). This is highlighted by the ongoing debate surrounding the L'Hoest's monkeys scientific name. Prior to 2013, this species was classified as *Cercopithecus lhoesti*. Since then, some scholars, including the IUCN, have reclassified them as *Allochrocebus lhoesti*. Changing an animal's genus is important as it provides a different understanding of the evolutionary history of the species and those genetically similar (Groves, 2018).

The dynamics of zoos have changed drastically since the 1950s, as they were once places of entertainment. Zoos are now institutions of education, conservation and research (Dickie, 1998). Animals in captivity often display abnormal behaviours as they do not have adequate opportunities to demonstrate natural behaviours. This has led to concerns over their welfare. Animal care staff have aimed to address this through the introduction of environmental enrichment. Environmental enrichment is used to improve the lives of captive animals by introducing additional stimuli that in turn enhances the

use of natural species-specific behaviours. Environmental enrichment is often split into five categories (though some scholars further divide these into eight categories); social, physical, occupational, sensory, and feeding enrichments (Costa *et al.*, 2018; Osbourne, 2018). It is crucial that all aspects of environmental enrichment are considered when animal care staff develop enrichment plans for their animals.

Social enrichment: this form of enrichment is somewhat more difficult to implement than other enrichment types, though it is equally important. Social enrichments might include adding or removing an individual from the group, though this is not always appropriate and can cause unnecessary aggression (Maple & Perdue, 2013).

Physical enrichment: often referred to as structural enrichment. This form of enrichment includes long-term, permanent or semi-permanent changes to the enclosure including new platforms, ropes, water baths or perches. These enrichment types allow care staff to maximise the space of the enclosure and encourage natural behaviours (Honess & Marin, 2006; Maple & Perdue, 2013; Costa *et al.*, 2018).

Occupational enrichment: This form of enrichment provides animals with additional tasks or physical exercises. These are commonly used as a way of encouraging play behaviours and in turn reduce the amount of

time the individual spends inactive (Costa *et al.*, 2018; Osbourne, 2018).

Sensory enrichment: including visual, auditory, olfactory, tactile, and feeding enrichments (Maple & Perdue, 2013; Costa *et al.*, 2018; Osbourne, 2018). As feeding is such a large aspect of animals' daily activity budgets, this has been given a category of its own. Auditory and olfactory enrichments can come in many forms such as scents (markings, faeces or urine) and sounds (calls) of their predators. Novel scents (cinnamon, citrus, and mint) and music is also often distributed in animal enclosures (Maple & Perdue, 2013).

Feeding enrichment: food is regularly used as enrichment and can be used to diversify animals' diets and change the way food is delivered (Costa *et al.*, 2018). The way in which food is presented can have a significant impact on the animal's behaviour. Scatter feeding is one of the most common forms of feeding enrichment and it has been known to reduce antagonistic behaviours (Young, 1998).

An area of research in both humans and primates is personality. When regarding human personality, the Big Five factor model is commonly used to understand the relationship between personality and behaviour (Komarrangu *et al.*, 2011). This model is made up of five broad categories: openness, conscientiousness, extroversion, agreeableness and neuroticism (King &



Figueredo, 1997; Weiss *et al.*, 2009; Komarrangu *et al.*, 2011; Adams *et al.*, 2015; Robinson *et al.*, 2016). Research has shown that primates share these same five personality traits and supplementary research has found that these animals also have a sixth factor of dominance (King & Figueredo, 1997; Weiss *et al.*, 2009; Weiss *et al.*, 2011; Schaefer & Dieter Steklis, 2014; Robinson *et al.*, 2016). One way of understanding primate personality is to conduct Hominoid Personality Questionnaires (HPQ). These questionnaires contain 54 personality traits and were developed as a continuation of the Chimpanzee Personality Questionnaire.

In addition to these debates, various gaps in the literature were found including how personality and enrichment engagement are influenced by one another. These debates and gaps in the literature led to the research at Twycross Zoo being conducted.

I conducted 420 hours of instantaneous behavioural observations and seven HPQ's were completed by primate care staff at Twycross Zoo between May and July 2022. The seven L'Hoest's monkeys (Patricia, Gimini, Masindi, Kanye, Kano, Bikonzi, and Tumba) were evaluated. Results from the HPQ's were used to determine the personality types of each primate individual. The scores from the HPQ's were used to place the monkeys on a gradient from most to least introverted, with Patricia being the most introverted; Kanye

being an ambivert, as he scored almost the same for both introversion and extroversion; and Kano being the most extroverted. Four types of novel enrichment were introduced into the L'Hoest's monkey enclosure (hay bales, scents, feeding tubes, and water bath). The behavioural observations were used to determine the activity budgets of each primate to gather an understanding of how each individual engaged with each enrichment type.

Through my study I found that personality and enrichment engagement had a positive correlation. This data and information from the observations were used to answer the second question and highlighted that the more extroverted individuals would benefit from enrichment more than introverted individuals.

In conclusion, this research was successful at answering the two research questions posed by Twycross Zoo and was a helpful way of addressing the gaps in the literature. For this to be a more reliable study, it could be suggested that multi-species or multi-institution studies could be conducted.

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## How BIAZA accredited zoos shape people's perception of primates on Facebook: The pros and cons of post popularity

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The trade of live animals sourced from the wild has had significant impacts on wild populations throughout history, and in some cases leading to regional extinctions (Black *et al.*, 2013). Wild animals are taken into the live wildlife trade either for entertainment, harvesting/farming, biomedical research or as pets. Exotic pet keeping is estimated to constitute 20% of the live wildlife trade (Baker *et al.*, 2013). People keep exotic pets for

companionship, status, interest or as a collectible. The rarer a species becomes the more desirable it may become as a pet. This is known as the anthropogenic Allee effect (Siriwat *et al.*, 2019). Exotic pets are increasing in popularity. Social media has facilitated trade and the public's exposure to exotic pets (Siriwat *et al.*, 2019; Svensson *et al.*, 2022). Various species are protected by law to prevent being captured from the wild.

International regulations such as CITES aim to prevent international trade. Domestic laws aim to prevent the keeping of protected species from native areas. Enforcement however is often insufficient and punishments inadequate (Nijman *et al.*, 2019). The high profitability of the exotic pet trade as well as legislative floors and the demand allow the trade to thrive (Nijman *et al.*, 2019).

Most terrestrial exotic pets are birds and reptiles. Millions of individuals are traded annually in the exotic pet trade (Bush *et al.*, 2014). Their popularity can be somewhat owed to their often simple management in captivity, partly due to their small size. This has allowed captive breeding to become increasingly widespread and successful (Baker *et al.*, 2013). Captive breeding however does not always reduce the demand for wild animals (Nijman *et al.*, 2019). Wild populations of species in high demand for the exotic pet trade therefore continue to be impacted by the exotic pet trade (Duarte-Quiroga & Estrada, 2003). Mortality rates and the welfare of exotic pets are often inadequate (Baker *et al.*, 2013). This is during the capture, transportation, and the captive domestic life. Unlike domestic animals, exotic pets still have strong instincts to carry out wild behaviours. A captive environment often prevents this from happening leading to an under-stimulated and stressed life for the individual (Baker *et al.*, 2013). Non-domestic

animals also have strong instincts to be fearful of humans. The close relationship with humans that exotic pets often have, therefore can lead to stress (Baker *et al.*, 2013). The animal may be tamed to reduce stress however this taming is often cruel and results in the separation from the individual's mother (Baker *et al.*, 2013). This separation can disrupt natural cognitive development resulting in animals that cannot cope with their environment. Young pets are not only the most common because they can be easily tamed but also due to the factor of cuteness. Cuteness is arguably the biggest driver of the exotic pet trade (Nekaris *et al.*, 2013). Diets and healthcare are often poor for exotic pets due to inadequate veterinary and husbandry knowledge (Warwick *et al.*, 2018).

An exotic pet can vary in its meaning. It is often determined as non-domesticated and kept for various reasons that range from having a particular interest in that species, to wanting to own a novel or rare animal as a form of display of one's social status and power. However, domestication can be disputed such as the case of the guinea pig. One group of animals that are certainly not domesticated and are also popular pets are primates. Primates along with carnivores make up the largest proportion of exotic mammals in the pet trade that are undoubtedly not domesticated (Bush *et al.*, 2014). This is despite primates being a highly

endangered group of animals (Estrada *et al.*, 2017). All primates are listed under appendices in CITES. Due to CITES listings, pet primates in countries where they are not indigenous tend to be captively bred, however sources are often also from the wild (Nijman *et al.*, 2011). Primate pet trade in indigenous countries poses the biggest threat to wild populations (LaFleur *et al.*, 2017). Law enforcement is often lacking and punishment not harsh enough (Nijman *et al.*, 2019). Primates are popular pets due to the ease in which to anthropomorphise them (Ross *et al.*, 2011). Their intelligence and social behaviour make them appealing companion pets. The smaller species and juveniles are often the most popular as pets due to their cuteness appeal (Soulsbury *et al.*, 1996). Their high intelligence and social behaviour however makes primates especially vulnerable to poor welfare as pets.

Primates require high levels of social stimulation. Pet primates are however often left in isolation (Soulsbury *et al.*, 1996). Their separation from mothers is likely to disrupt their social development making human companionship stressful. Primates also have high ecological intelligence (Rosati, 2017). Their resources are often highly varied both spatially and temporally. They therefore require high levels of arousal produced from foraging and complex food extraction. As pets they are often in small cages with no

enrichment (Soulsbury *et al.*, 1996). The poor welfare for pet primates leads to stereotypical behaviours indicating stress. This stress can also have damaging physical effects and even lead to mortality (Soulsbury *et al.*, 1996). Despite being popular pets, their management is difficult especially due to their complex diets. This leads to primates with poor healthcare and diets (Reuter & Schaefer, 2016). Pet primates also pose risks in terms of zoonosis due to our biological closeness. They can additionally pose a physical threat to pet owners.

Pet primates are ill suited as pets and their demand can significantly affect wild populations (LaFleur *et al.*, 2017). Social media however has been influencing people to believe that they are indeed suitable pets (Nekaris *et al.*, 2013). The increase of popularity of posts of primates as pets has even led to increases in the trade of them such as the case in bushbabies (Svensson *et al.*, 2022). Education on the effects of welfare and wildlife/conservation appears to have no effect however information on zoonosis and legislation does (Moorhouse *et al.*, 2021).

Zoos commit to displaying conservation information. Education however can be less popular (Freund *et al.*, 2021). Popularity of animals is often dependent on the use of cuteness, charisma and human interactions and this popularity can in turn increase conservation concern (Ballouard *et al.*, 2020;

Freund *et al.*, 2021). This comes at a cost so is a double-edged sword. The display of cute animals and human interaction can increase their 'pet appeal' (Ballouard *et al.*, 2020; Freund *et al.*, 2021).

My study aimed to show how UK zoos display primates on Facebook and the resulting effects this has on people anthropomorphising them and the 'pet appeal'. My study also aimed to determine how different portrayals of primates affected popularity. The effects of educational information on popularity and people's reactions to this was also analysed.

The top five most visited UK zoos in 2021 were selected for this study; Chester Zoo, Longleat, ZSL London Zoo, ZSL Whipsnade Zoo and Edinburgh Zoo. The Facebook pages of the five zoos were analysed. Posts from 2021 containing images or videos of primates were identified, totalling 132 posts. These were analysed for educational information. Analysis also included primate species identification, conservation status, age category, anthropomorphism, emphasis on 'cuteness' and human interaction. Other non-relevant factors were also analysed such as time and length of video to be used in partial correlations to act as controls. The popularity of the posts was measured by analysing likes and other displays of popularity such as shares and tags. Perceptions of primates and educational information were analysed in the

comments. Over 22,000 comments were examined.

Various statistical analyses were conducted to determine significant correlations. Partial correlations were importantly used to maximise the reliability of these significant correlations.

The use of human interaction was low as well as the use of cuteness. Use of young primates, anthropomorphism and educational information was around 25%. More endangered species were represented than non-endangered species. Charismatic large species such as gorillas and small and cute popular pet monkeys such as squirrel monkeys were the most highly used in posts. Positive comments were much higher than negative comments associated with viewing primates as suitable pets or as cute.

Posts emphasising cuteness and anthropomorphism were found to have no significant predictions on post popularity or positive comments; however they were found to significantly predict negative comments associated with pet primate desirability. Human interaction was found to have no relationships. The use of young primates was found to influence popularity and positive comments but also increased the likelihood of comments associated with cuteness and pet comments. Conservation information had a positive effect on popularity and positive comments associated with conservation

comments. Conservation status and species had no effects. Total/popularity was found to positively associate with all outcome variables.

The high representation of charismatic species was as expected, corresponding to findings from other studies that analysed zoo collection representation on social media (Llewellyn & Rose, 2021). The high use of endangered species correlates with other findings, emphasising the strong conservation aims of many accredited zoos (Glatfelter & Zoo, 2015). Species and conservation status having no effects was not as expected. The cuter species were expected to increase popularity, as were charismatic species (Soulsbury *et al.*, 1996). Cute species were also expected to increase comments associated with pets (Nekaris *et al.*, 2013). Conservation comments and related positive comments were expected to be increased by the use of cute and charismatic species, but this was not the case (Soulsbury *et al.*, 1996). This was most likely due to the other factors playing a more important role. Young primates most likely affected popularity as people prefer young cute animals (Freund *et al.*, 2021). This is likely the same reason why pet comments were highly associated with young primates. The emphasis of cuteness and the use of anthropomorphism in posts had negative impacts as expected (Nekaris *et al.*, 2013). My study suggests that they are

however redundant as they did not favour popularity. The only variable that affected positive comments associated with conservation was conservation information itself. This is not like the double-edged sword proposed by Ballouard *et al.* (2020) where the more popular a species was made the more conservation interest it received. Educational information including conservation information unexpectedly actually had a positive effect on popularity. This suggested that people were more likely to have a positive reaction with the post if conservation information was present. This suggests that people are not put off by conservation information contrasting to the findings by Freund *et al.* (2021). Conservation information as expected did not decrease pet comments as only specific information on zoonosis and legislation have had that effect (Moorhouse *et al.*, 2021). Human interaction had no significant effects, but this may have been due to its presence being so low so therefore sample size was limited.

The relatively low use of human interaction, young primates, cuteness and anthropomorphism and high diversity in conservation status suggests that BIAZA accredited zoos are in general being responsible in how they portray primates on social media. This also explains the low number of pet comments and the higher volumes of comments associated with

harmless positive reactions. My study however suggests that zoos could increase conservation information on social media with no cost to popularity. The results from my study also suggest that these zoos should not stop using young primates on social media despite its negative outcomes as they are necessary for popularity. The more popular a post became both negative and positive outcome increases. This means that popularity although beneficial for conservation and the zoo comes at a cost.

My study was limited due to comments not reflecting genuine actions and viewers and commenters were not controlled. This inconsistency may have affected the reliability of the results. Future studies could control viewers' exposure to certain posts of primates and determine genuine outcomes and consequences with the primate pet trade.

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## **Interview with Elizabeth Jennings (cohort 22/23) - Working with primates in captivity**



**What has your experience and role been, working with zoos previously?**

I have volunteered at Kansas City Zoo and I also volunteered in Belize where I was part of a rehabilitation program for howler monkeys and spider monkeys, but the howler monkeys were in cages and reintroduced into the wild about four years later. I have had multiple roles, from being an intern in the tropics and on water's edge sections of Kansas City Zoo and hoofstock intern and summer keeper of hoofstock at Omaha Henry Doorly Zoo. My last role was as a keeper of great apes at the Omaha Henry Doorly Zoo. I worked with 12 others in the department of

care of the husbandry of gorillas, orangutans, Francois' langurs, agile gibbons, buff cheeked gibbons, yellow-backed duiker, horn bills, porcupines, blue monkeys, angola monkeys, macaques, wheelers and tree shrews.

**What are the histories of the primates at the zoos you have worked at?**

Omaha Henry Doorly Zoo is part of the Gorilla Species Survival Plan (SSP), so gorillas were bred when the SSP gave the go ahead. They work with a stud book to make sure that there is no inbreeding and/or overcrowding. Most of the animals we had were born under human care with accordance of breeding programs.

**You have also worked with rehabilitation of primates. Can you tell us a little bit about that?**

In Belize any primate from the illegal trade, we would take care of and make sure their physical and mental state was evaluated. We would then introduce the spider and howler monkeys to the others to make a troop which would then undergo a process of rehabilitation to reintroduce them into natural forests. Later, they would be released into protected lands where previously monkey populations were present but none currently.

**What do you think are the animal welfare standards for zoos which are not AZA accredited?**

Being accredited by Association of Zoos & Aquariums (AZA) means zoos have good welfare for animals. There are also AZA affiliated zoos that still comply with these welfare standards. Personally, if a zoo doesn't meet any of the AZA accreditation standards then it is a zoo I

would not like to support. When you are AZA accredited, this is advertised everywhere, on their website for example, and I think that most people know what AZA is.

**How did the zoos you worked at help with conservation efforts?**

Omaha Zoo's conservation work is the Wyoming toad, so we have an amphibian conservation team which works on endangered amphibians around the world. They bred and released the Wyoming toad back into the wild so now their population is increasing in the US. Omaha Zoo funds many projects in Madagascar, to help protect the lemurs, as well as the Dian Fossey Gorilla Fund. The zoo also participates in the Great Ape Heart project. Many gorillas in human care have heart problems, so this is just a project where we collect data on their hearts and how it is working to help research by non-invasive methods. The Omaha Zoo does a lot of research for conservation and helps in situ efforts and also donates money and gives grants.

**Thoughts on zoos on educating the general public about animal welfare and conservation, and do you think they do enough?**

They could do more, but I think I would always say they could do more. I also think that when the public sees a zookeeper do something then they want to do it and it's really hard as a zoo keeper to not show people what we do. I think zoos do a good job with educating kids by setting up different day camps at the zoo or keeper for day events when kids can see what all keepers do to maintain animal welfare standards.

**What are your thoughts on primates being in captivity?**

As a general rule, I don't like that they have to be held in human care. However, those individuals, who have lost their natural habitats, where would they go now? Some of them have been founders for Zoos' captive breeding programs and we can't go back and change what happened in the past. These individuals would now be unable to survive in the wild. They are also great ambassadors for their wild populations; for those of us who don't live in primate range countries zoos are the only place we can watch, be fascinated, fall in love, and be inspired to conserve them.

**How would this help with long-term conservation?**

I think the best outcome is when these animals can inspire and educate people to learn more about them; and for research as well on their behaviour and ecology which can hopefully help in conservation of wild populations, and vice versa. I hope that one day these animals too can be reintroduced into their wild habitats, that is the end goal I want.

**What are your future plans as a primatologist?**


I don't know yet. I love providing rehabilitation for animals, seeing them recover and live in natural environments with wild behaviours and even have offspring. I think that is amazing to see. I would like to try to make it illegal to own any primate in all of the states in the United States.



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