Final grant report: Student Grants

Project title:	The effects of change of keeper and level of human-animal relationship on the behaviour of Kikuyu black-and-white colobus (*Colobus guereza kikuyuensus*) and Scarlet Ibis (*Eudocimus ruber*).
Researcher:	Sheryl Bradley
Supervisor:	Sabrina Brando and Simon Turner
Year awarded:	2020

Provide a lay summary outlining the project, focusing on the project's achievements and potential impact to animal welfare.
Introduction

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Evidence is starting to emerge that human-animal bonds (HAB's) exist between keepers and the animals in their care, but that these bonds are dependent on management styles and factors, such as the number of keepers providing care and the style in which they provide it. However, the formation of a bond requires that the positive human-animal relationship (HAR) be reciprocal and beneficial to both human and animal. This study aimed to combine strength of relationship scores from an adapted version of the Lexington Attachment to Pets Scale (LAPS) with behavioural data to make attempts to determine if HAR's and HAB's are present and reciprocal within a zoo. The objectives of the study were:

1. To identify any behavioural changes linked to the alternating of keeper providing care for an animal

2. To identify if human-animal bonds exist between keepers and animals.

3. To determine if the strength of human-animal bonds identified influence the degree to which behavioural changes occur in the animal being cared for.

Methodology

Eleven Kikuyu black-and-white colobus (*Colobus guereza kikuyuensus*) and 12 Scarlet Ibis (*Eudocimus ruber*) and their keepers were studied at the Zoological Society London (ZSL) London Zoo. Video footage of animal behaviour was obtained over a period of 28 days for each species using two GoPro Hero 4 Silver (GoPro, San Mateo, CA, USA) cameras in each enclosure. Cameras recorded during hours of the day which captured the main period of husbandry provision. Instantaneous scan sampling every 30 seconds was performed on the video recordings to record the study subjects' behaviours and proximities to keeper. Following behavioural data collection, two surveys, a keeper survey, and a survey to assess keeper-animal relationships were distributed to the 13 keepers at London zoo involved with Colobus and Scarlet Ibis during the period of video collection. The keeper-animal relationship survey took the form of an adapted version of the LAPS, which measures the strength of attachment between human and pet animal (González *et al.,* 2014; Hosey *et al.,* 2018).

Comparison of relationship scores between species and keeper gender were performed using an independent samples *t*-test, and keeper age (categorized as <20, 20-30, 31-40, 41-50, >50) was compared with relationship score using a Welch's *t*-test, due to only two age groups being represented within the completed survey responses. A One-Way ANOVA was performed to compare relationship scores to the variables job role, years worked with study species (categorized as 0-6months, 6-12 months, then number of years) and the number of days per week working with study species (Dytham, 2003; Gardener, 2017).

The behavioural count data collected for each day, was transformed into mean frequency of behaviour for the group. These frequencies were then grouped into categories of behaviours, as based on previous studies (Melfi and Thomas, 2005; Manciocco *et al.,* 2009; Martin and Melfi, 2016; Pedersen *et al.,* 2019) – retreat, affiliative, activity and out of view for the Scarlet Ibis and affiliative,

activity, social and out of view for the Colobus.

To test whether frequencies of behaviour correlated to different keepers and different LAPS score, a linear mixed model analysis was performed for each category of behaviour. For Scarlet Ibis, predictors of behaviour were analysed with relationship score, years worked with the species and time spent providing husbandry as fixed effects and day as a random effect. For Colobus, predictors of behaviour were analysed with relationship score and time spent providing husbandry as fixed effects and day as a random effect; years worked with the species was dropped as a fixed factor from the main model due to collinearity issues but was run separately as a fixed effect with day as a random effect to determine correlations with behaviour.

To test the hypothesis that there may be mild behavioural changes on day before and the day after a keeper changed, descriptive statistics and graphical summaries were used, and the behavioural data on the days around a change of keeper were compared using a paired t-test (Dytham, 2003; Gardener, 2017).

Results

Keepers achieved scores indicative of relationships ranging from poorly bonded to well-bonded. There was a statistical tendency in mean relationship score between Colobus and Scarlet Ibis keepers, with Scarlet Ibis keepers scoring higher (indicating weaker bonds) than Colobus keepers (p = 0.052). There were no significant differences in relationship score according to keeper gender, age, job title, years worked with study species or days working with the study species per week (p >0.05).

Relationship score and keeper had no significant effect on the mean frequency of Scarlet Ibis retreat, activity or affiliative behaviours and had no effect on Colobus activity, affiliative, social behaviours, or close proximity. Time spent providing husbandry and years worked with the study species were also non-significant as predictors within the model. There was no significance in changes of behaviours before and after a keeper changed across all categories of behaviour for both species (p >0.05).

Conclusion

This study identified that keepers scored as having relationships of varying strengths with the animals they work with. This strength did depend in some part on what species it was being worked with, which correlates with previous research (Carlstead, 2009; Hosey and Melfi, 2012; Hosey *et al.*, 2018; Birke *et al.*, 2019), but despite the potential for the keeper to be 'bonded' with their animals according to their relationship score, this was not identified as being reciprocated by the animals by the behavioural data obtained. Therefore, the establishment of a true HAB cannot be confirmed. Despite the paucity of evidence for positive HAR's and thus HAB's in this study, the finding that behaviours of both Scarlet Ibis and Colobus did not change significantly between keepers and around days keepers changed over care for the animals is encouraging for zoo animal welfare and implies habituation to the routines and management within zoological collections, ruling out keeper change as a potential stressor in zoo animal management for these species. It may be that with fewer keeper changes though, HAB's would have had the chance to develop and resulted in improved welfare; further investigations into this are warranted. Research into HAR's and HAB's within zoological collections is growing, and this study makes a start at combining evidence for HAR's from both the human and the animal's standpoint by combining animal attachment survey data with behavioural observation data. However, further research and future studies are warranted to contribute to the evidence of how human-animal, and more specifically keeper-animal, relationships may impact on animal management and welfare.

Challenges

Technical difficulties were inevitable with the use of cameras to collect behavioural data, but for the most part, these were overcome without issue. However, COVID-19 restrictions were implemented at the beginning of data collection for the Colobus and thus some days of data were lost due to camera malfunction and lack of access on site to fix the issues. Another unexpected impact to the study by COVID-19 was the change to the routine and management of keepers providing care to the Colobus. This change potentially impacted both the interactions between keepers and the Colobus but also how many keepers were providing care for them during the study and for how long they provided care before being changed. The behaviours of the Colobus may have also been impacted by the change in circumstances, such as by the lack of visitors and the quieter external environment. Research into the impacts of changes caused by COVID-19 were underway at the time this study was being written, but conclusions were not available for the purpose of commenting on for this

study.

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Carlstead, K. (2009) A Comparative Approach to the Study of Keeper-Animal Relationships in the Zoo. *Zoo Biology.* **28**:589-608

Dytham, C. (2003) *Choosing and Using Statistics. A Biologist's Guide.* Oxford: Blackwell Publishing. 2nd Edition.

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Hosey, G and Melfi, V (2012) Human-Animal Bonds Between Zoo Professionals and the Animals in Their Care. *Zoo Biology.* **31**:13-26

Hosey, G., Birke, L., Shaw, W.S. and Melfi, V. (2018) Measuring the Strength of Human-Animal Bonds in Zoos. *Anthrozoös.* **31**:273-281

Manciocco, A., Chiarotti, F. and Vitale, A. (2009) Effects of positive interaction with caretakers on the behaviour of socially housed common marmosets (*Callithrix jacchus*). *Applied Animal Behaviour Science.* **120**:100-107

Martin, R.A. and Melfi, V. (2016) A comparison of Zoo Animal Behavior in the Presence of Familiar and Unfamiliar people. *Journal of Applied Animal Welfare Science.***19**:234-244

Melfi, V.A. and Thomas, S. (2005) Can training zoo-housed primates compromise their conservation? A case study using Abyssinian colobus monkeys (*Colobus guereza*). *Anthrozoös.* **18**:304-317

Pederson, J., Sorensen, K., Lupo, B. and Marx, L. (2019) Human-Ape Interactions in a Zoo Setting: Gorillas and Orangutans Modify Their Behavior Depending upon Human Familiarity. *Anthrozoös* **32**:319-332

Provide a short description of your personal experience in undertaking this project

By undertaking this project as part of my MSc I was able to develop my skills in behavioural studies, from the creation of ethograms to performing observations on the video data. The statistical analysis was particularly tricky due to the unexpected small sample sizes and resulting confounding of some variables so it proved a steep learning curve, but I hope to withhold some of the statistical analysis techniques I learnt and apply them to current and future research projects.

By applying for and being awarded the AWF student research grant, I also learnt a lot about the grant application and budgeting process and how unexpected costs can arise once a project gets underway, something I was completely new to prior to this. Now that my research project is written for the purpose of submitting for my MSc dissertation, I am thinking about the next stage and potential publication, another new area for my myself and something I am already learning a lot about through my supervisors and research into potential options.

Overall, it has been rewarding both personally and professionally having undertaken this project, and I am grateful to the AWF for the funding that allowed me to conduct the project to the best of my ability.

Please provide details of any reports, papers or other publications that have been or will be published to communicate your findings.

I am in discussions with my supervisors about potential publication after submission and grading of my dissertation project has been achieved and will be in touch should this prove successful.

In addition to the report please send us any photographs of the project in action and/or a one-minute video, introducing yourself and the project and outlining the skills and experience you gained during the project.