

Humans as Enrichment: Human-Animal Interactions and the Perceived Benefit to the Cheetah (*Acinonyx jubatus*), Human and Zoological Establishment

S. J. Higgs, E. Van Eck, K. Heynis, S. H. Broadberry

Abstract—Engagement with non-human animals is a rapidly-growing field of study within the animal science and social science sectors, with human-interactions occurring in many forms; interactions, encounters and animal-assisted therapy. To our knowledge, there has been a wide array of research published on domestic and livestock human-animal interactions, however, there appear to be fewer publications relating to zoo animals and the effect these interactions have on the animal, human and establishment. The aim of this study was to identify if there were any perceivable benefits from the human-animal interaction for the cheetah, the human and the establishment. Behaviour data were collected before, during and after the interaction on the behaviour of the cheetah and the human participants to highlight any trends with nine interactions conducted. All 35 participants were asked to fill in a questionnaire prior to the interaction and immediately after to ascertain if their perceptions changed following an interaction with the cheetah. An online questionnaire was also distributed for three months to gain an understanding of the perceptions of human-animal interactions from members of the public, gaining 229 responses. Both questionnaires contained qualitative and quantitative questions to allow for specific definitive answers to be analysed, but also expansion on the participants perceived perception of human-animal interactions. In conclusion, it was found that participants' perceptions of human-animal interactions saw a positive change, with 64% of participants altering their opinion and viewing the interaction as beneficial for the cheetah (reduction in stress assumed behaviours) following participation in a 15-minute interaction. However, it was noted that many participants felt the interaction lacked educational values and therefore this is an area in which zoological establishments can work to further improve upon. The results highlighted many positive benefits for the human, animal and establishment, however, the study does indicate further areas for research in order to promote positive perceptions of human-animal interactions and to further increase the welfare of the animal during these interactions, with recommendations to create and regulate legislation.

Keywords—*Acinonyx jubatus*, encounters, human-animal interactions, perceptions, zoological establishments.

I. INTRODUCTION

ENGAGEMENT with non-human animals (henceforth referred to as animals) is becoming a fast growing field

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and topic of interest within animal studies, allowing for research collaboration between the animal science and social science sectors [1]. An encounter, defined by Tyler and Rossini [1] as “a meeting between two parties that ceases at the moment they become separate” implies that an encounter can occur *ex situ* and be conducted in captivity, whereas Bulbeck [2] describes an encounter as “an animal being in its natural habitat and thus free to choose the encounter ... not always guaranteed”. Claxton [3] furthers this discussion by stating that the term ‘interaction’ may only be used if “a number of repeated interactions between the same animals and human occur, eventually allowing each party to make predictions about the other’s behaviour”. This therefore assumes that one-off ‘interactions’ would not occur when members of the public interact with animals in captivity and these ‘interactions’ would in fact be termed encounters, agreeing with Tyler and Rossini [1] and Bulbeck [2]. Hosey [4], however, goes on to term ‘encounters’ as ‘interactions’ and states that touch interactions are key to generating a positive attitude towards zoos and highlights this is where zoos should be focusing, with Gore [5] writing that encounters are any managed interaction between a human and animal. The term interaction is also coined in the predominantly domestic use of animals in ‘human-animal interactions’ or ‘animal assisted therapy’ [6] with Wilson and Barker [6] agreeing with previous research from Cook and Hosey [7] that these sessions and behavioural observations are determined on how the human and animal interact together per independent session [8]. The authors are aware of the interchanging definitions between encounter and interaction, however, for the purpose of this paper, these terms will be termed as interactions [8].

Hosey [8] refers to an animal being able to generalise interactions with the public, and differentiate these experiences from their keeper interactions as shown in Fig. 1; demonstrating that if an animal has limited fear towards its keeper, it is less likely to fear a member of the general public during an interaction. Lory Park Zoo is a successful educational and zoological establishment, founded in 2001 by Eddy Van Eck, that rehabilitates and rescues animals. Lory Park Zoo houses a wide range of animals including all taxonomic groups; mammals, birds, amphibians, reptiles and fish. Lory Park Zoo is a member of Pan-Africa Association of Zoos and Aquaria (PAAZA), one of only six zoos to be a part of this accredited welfare organisational body in Africa. This body conducts welfare checks every four years to ensure that

welfare standards are high, met and maintained, that animals are housed correctly, and encounters are conducted appropriately to the highest welfare standards.

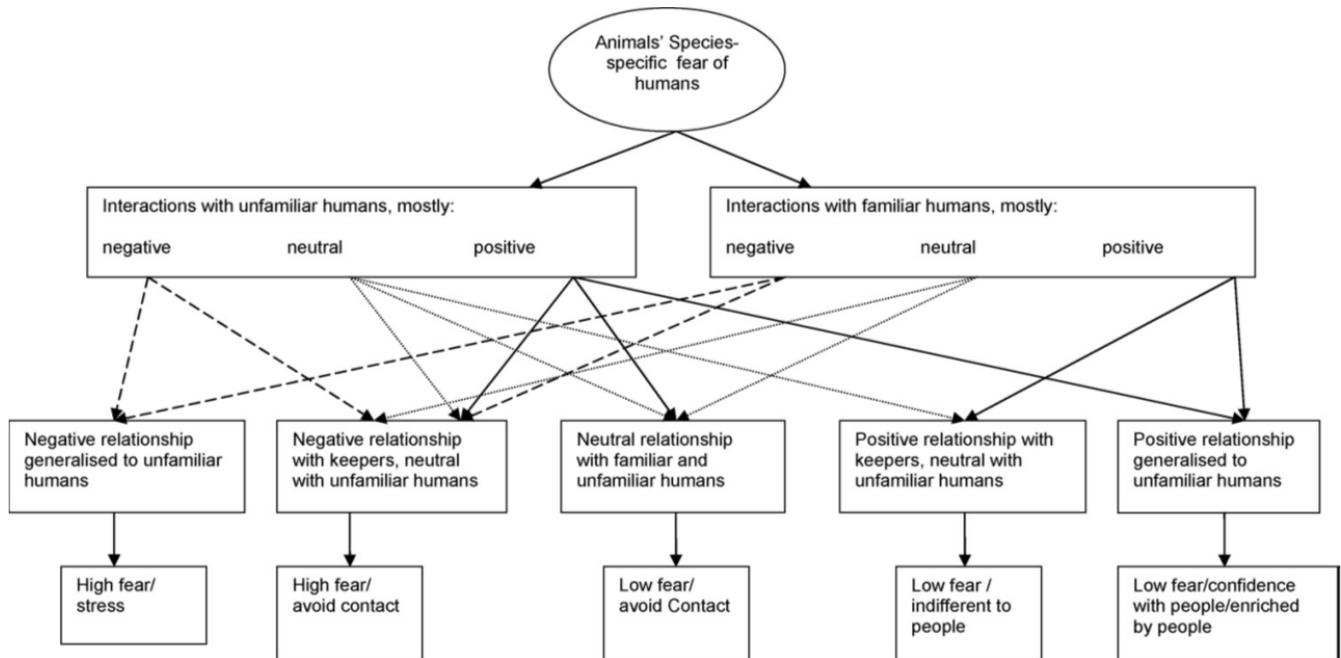


Fig. 1 Human – non-human animal interactions and human - non-human animal relationships in zoos [8]

Lory Park Zoo allows the general public to partake in animal encounters with its big and small cat cubs, owls and reptiles. Alongside zoological establishments such as Lory Park Zoo, animal encounters are conducted in educational establishments globally. Derby College, a further and higher educational establishment based in the East Midlands, United Kingdom, allows for interactive encounters of its' African Crested Porcupine (*Hystrix cristata*) and Meerkats (*Suricata suricatta*).

II. METHODOLOGY

The principle aim of this study was to determine if there were any identifiable benefits to the cheetah, the participant or establishment during a human-animal interaction. Data was analysed from nine, 15-minute interactions whereby eight interactions had four participants and one interaction had three participants (n=35) (determined by participant availability only); and two questionnaires, one offered to participants and one to the general public. Particular focus was on short (immediate) and long term effects on the animals' welfare and any welfare implications that may have arisen, or were reduced. Negative welfare here is determined by the animal exhibiting atypical behaviours such as pacing and aggression [9]. In this study, resting behaviour and not vomiting food was determined as an indicator of positive welfare in the cheetah. Positive benefits for the human were determined as active engagement with the animal and leaving with a feeling of 'happiness and contentment'. Negative benefits to the human were determined as leaving the enclosure feeling 'sad', and not perceiving to gain anything (knowledge or reduction in

perceived stress behaviours) from the interaction. Positive benefits to the establishment were determined as active engagement by the participant in the conservation work the zoo conducts, alongside positive perceptions of the zoo itself (increase in positive comments); negative benefits to the zoo include poor portrayal of the zoo through negative media coverage.

A range of research methods were used in order to determine the outcomes of human-animal interactions on the animal, human and establishment. Behaviour data were recorded before, during and after nine human-animal interactions had occurred over a period of two non-consecutive days in order to collate information on the cheetah and humans' behaviours. Questionnaires, allowing for anonymity, were given to participants before an interaction and immediately after an interaction had occurred.

Collection of behaviour data and participant questionnaires were conducted over a period of two non-consecutive days in July 2017. The online questionnaire was available on esurv.org for three months between May and July 2017.

Participants were aged between 17 and 24 and were studying a Level 3 Extended Diploma in Animal Management or Level 4/5 Foundation Degree in Animal Science. There has been limited quantitative data published on animal assisted interactions (therapy) [10], [11] and therefore questionnaires were designed to enable further information to be collated.

The questionnaire directed at participants had strong links to the empathy, defined by Daly and Morton [10] as being "cognitive or affective ... comprised of both components to emphasise the perceived emotional experience", that the human puts towards the animal. The participant was asked to

measure, through words, their emotional empathy towards the cheetah in the interaction to determine if a benefit existed.

Wright [12] states that the accessibility of online surveys and automated data collection, in the form of percentages and open and closed answers, is as an advantage. Wright [12] does go on to state that the data may be invalid as the individual may be dishonest or complete the survey on many occasions, and random sampling is complicated as only one specific audience may be targeted. Whilst the survey was limited in responses by the audience target market being completed by those within, or with links, to the animal science sector, there was a cap on IP address usage restricting the same IP address from completing the survey more than once. An online survey allowed for a longer time frame to be allocated, three months, which therefore allowed for more responses to be gained (n=229). This online method also allowed for the survey to reach the most amount of people with the least time spent [12]-[14]. The online survey allowed for both quantitative (closed questions) and qualitative (open questions) to be asked [15]. Part of the qualitative aspect allowed for the participant to be able to expand on their prior experiences [14] and what has led them to their current perceptions on human-animal interactions and zoological establishments.

This study was subject to ethical approval by the University of Exeter ethics committee.

III. DISCUSSION

This study allowed for a range of research methods to be utilised enabling both qualitative and quantitative data to be analysed to determine preconceived perceptions of interactions and zoological establishments, and for detail of where these perceptions had arisen, and changed. All participants in each of the three methods of data collection had anonymity with all participants able to opt out of the data collection at any point and void their contributions, however, no participants chose this option.

A. Perceived Benefits

Behaviour data were recorded for 15-minutes on two days (10th and 24th July 2017) prior to any human-animal interaction commencing with the subject cheetah. Both days of study were conducted on a Monday following a weekend of interactions. The human-animal interactions started at 1.15pm with no other individual having an interaction with the cheetah prior to this on these days. The cheetah was fed twice daily; at 7.30am and 4pm, with minced horse meat (750 g and 900 g respectively) and supplements of predator powder, calcium, Efazol and copper sulphate. It was therefore highly unlikely the cheetah would anticipate presentation of food during the interaction at this time. The cheetah was diagnosed with gastroenteritis grade three (May 2017), a common issue in the captive cheetah [16], [17] whereby the cheetah vomits his food regularly, partially linked to stress and an incompatible diet [16], [17]. The cheetah was hand-reared from four months old and therefore it is assumed he associates human interactions positively [18], however, due to his previous health conditions he was often in isolation and therefore

human interactions minimal due to staff time constraints. Due to stress factoring into his gastroenteritis diagnosis, the cheetah was moved back to the main zoo where he was exposed to restricted public interactions, 10 participants per day, with the aim of improving his condition through reduced stress and subsequently cessation of vomiting. This decision was made as there was no prior evidence of interactions negatively affecting him or his illnesses.

The first prior interactions' behaviour data were collected at 12.45pm on the 10th July 2017, 6 weeks after the cheetah was initially moved back to the main zoo. The second behaviour data was conducted two weeks later, at the same time, on the 24th July 2017. Both days were 16°C and 17°C respectively, sunny, with minimal wind. On the first prior behaviour data collection, the cheetah was observing humans over 50% more than during the second observation, indicating that he could be becoming more acclimatised and relaxed [3] to human presence around his enclosure as the time in his new enclosure progressed. However, increased pacing of the fence line, 43.5%, was documented when humans were present outside the enclosure; this can be due to assumed anticipation of an interaction, or indicating stress as the human was outside the enclosure but not inside interacting with the cheetah. The enclosure had a mesh fence, a 30 cm barrier and an additional 1-metre-high fence which meant no zoo visitor could physically touch him through the barrier. In total on the 10th July, six minutes was spent resting/sleeping, with only 5.15 minutes resting/sleeping exhibited on the 24th July, with an increase of 60% in walking around the enclosure during this period; whilst the cheetah displayed a mixture of positive (resting) and negative (pacing) behaviours [3]. It is inconclusive whether these were anticipatory of an interaction, therefore positively benefitting the cheetah, or whether these were stress induced due to the increased presence of humans, but lack of contact.

In total nine sets of behaviour data were recorded, five on the 10th July and four on the 24th July. The cheetah showed a decrease of 11 minutes to 0 minutes in resting behaviour during the second, third and fourth human-animal interaction on the 10th July, but this increased back to 1.3 minutes towards the end of the fifth interaction on the 10th July. This can be assumed due to the human presence within his enclosure and motivation to explore novel environmental enrichment [3]. There was an average increase of three minutes in alertness of watching humans, which Turner and Bateson [19] link to novel smells and differing human groups changing every 15 minutes, with short 2-3-minute breaks only in between each interaction.

Whilst novel smells provide environmental enrichment to an animal [3], these quick changes can over stimulate an animal [8] and lead to an increase in stereotypical, negative, behaviours being exhibited. The cheetah initially licked the hand of the participant for 83% of the duration of an interaction. A behaviour he has displayed since being hand reared at the zoo; assumed as a comforter and positive behavioural display, this hand licking decreased the more times he was involved in human-animal interactions to just

12%, with an assumption this was no longer in response to a novel stimulus, but anticipated with reduced benefit output [8]. This dramatic drop was associated with additional comments from participants that the cheetah was “disengaged and did not want us in the enclosure” and “he kept walking away and didn’t lick my hand for very long”. The assumption that the time period was not long links to perceived negative human benefit, with little thought for the effect the interaction is having on the animal.

Fig. 2 highlights the cheetah walking away from participants correlating with Fig. 4, participants following the cheetah as he walked away. This participant behaviour is detrimental to the animal, establishment and interactions as a whole as it puts unnecessary stress onto the animal and has the

potential for the animal to attack if it feels threatened [3], [20]. Fig. 3 highlights the mean human behaviours shown during each interaction with the cheetah. A mean of 60.5% highlights time spent either posing for a photo with the cheetah, or taking a selfie. Although prior to the interaction, participants were asked not to stroke the head of the animal due to the zoos policy and guidelines, this occurred on 8 of the 9 interaction periods and was carried out for an average of two minutes. The aim of the interaction was to educate [21], [22] the public on cheetah conservation, but also positively aid the cheetah’s health and wellbeing. Better management of the interaction needs to occur to ensure the interaction maintains a positive outcome for both parties and does not lead on to a detrimental occurrence that is often reported in the press [23].

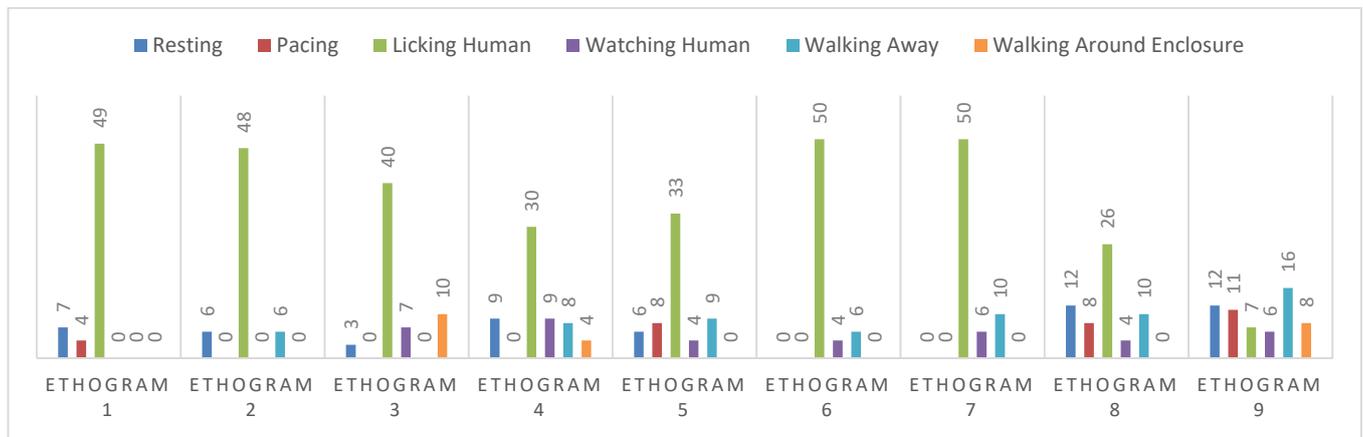


Fig. 2 Behaviours displayed by the cheetah during each of the nine human-animal interactions: Each interaction consisted of four participants, except interaction 9 which had 3 participants

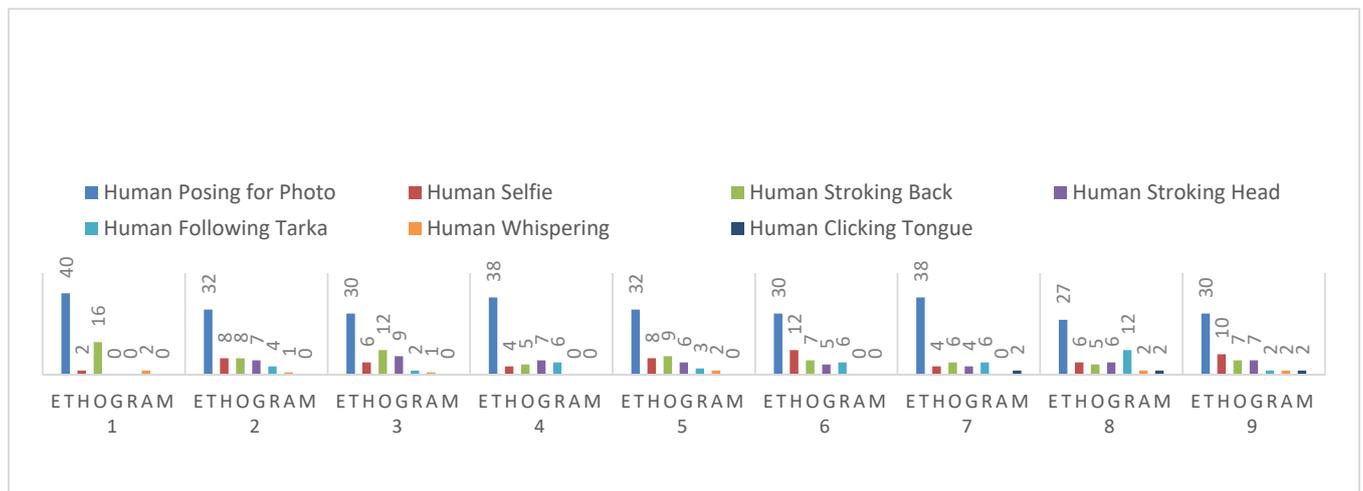


Fig. 3 Behaviour data of the mean human behaviour during each human-animal interaction: Period 1 – 8 had four participants whereas period 9 had three participants

Fig. 4 was conducted immediately after all interactions had been concluded on both days. After the first day of interactions on 10th July, the cheetah did not display any resting or sleeping behaviours and was highly alert for the whole 15-minute observation with 80% of the time spent watching the humans through the mesh fence, and 20% spent

pacing up and down the fence line. This is indicative of stress behaviour [3], [4], [7], [8], [21], [25] as although the interactions have ended, the cheetah is highly alert and responsive to human presence, even when they are not in his enclosure. It is proposed that lack of human contact, familiar or not, may increase the exhibition of negative behaviours due

to a stress response [8]. During the completion of the final data period on the 24th July, the cheetah displayed an increase in normal behaviours with 58% of his time spent resting after the interactions had occurred, and only 25% and 17% watching

humans and pacing, respectively. It is proposed that the cheetah has become accustomed to human presence and therefore does not perceive humans positioned by the enclosure fence to be a negative stimulus.

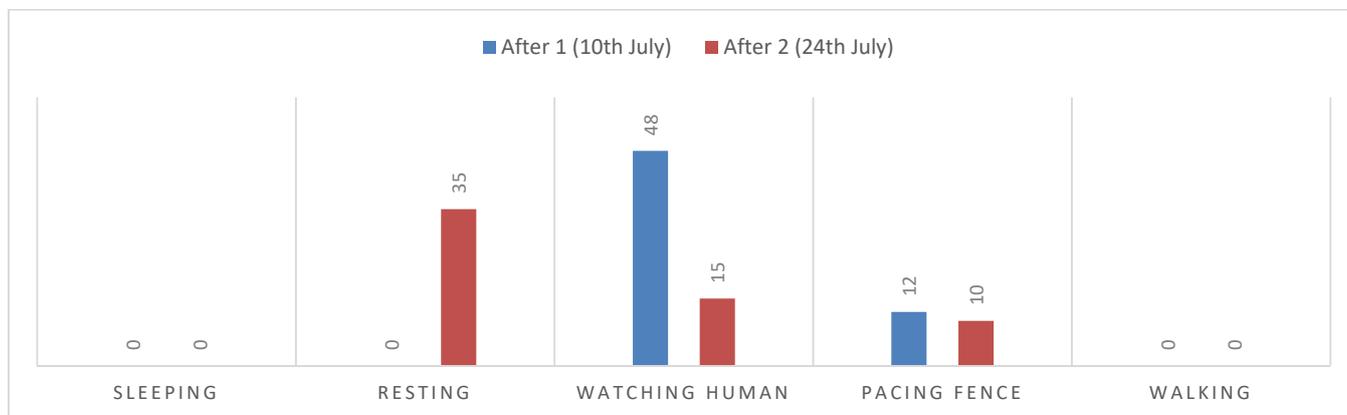


Fig. 4 A comparison to show a 15-minute observation of the cheetah after human-animal interactions occurred on both days (10th July and 24th July 2017)

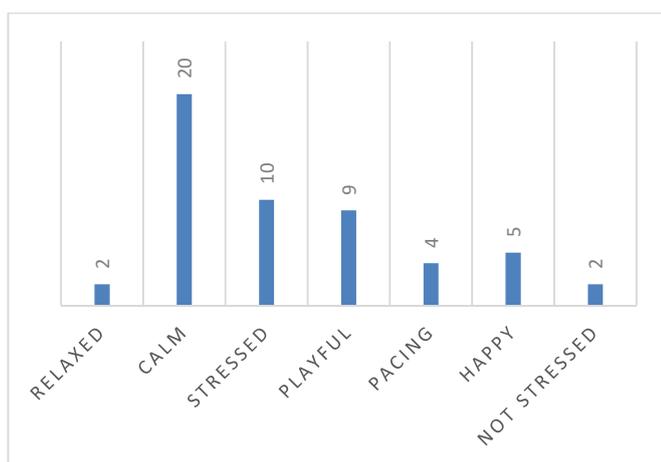


Fig. 5 Participant description of the cheetah's behaviour during the interaction

Participants were asked to describe how they perceived the cheetah's behaviour during their interaction period (Fig. 5). This was an open question allowing participants to define the interaction in their own words. Many were anthropomorphic with terms such as 'relaxed', 'calm', 'pacing' and 'playful', whilst others egomorphic; 'stressed' and 'not stressed'. 10 participants highlighted that they thought the cheetah was stressed, but only four noticing and attributing this to his pacing behaviour. One participant stated "he seemed stressed, but he licked my hand so I guess he was happy". The participant does not make clear why he perceives the cheetah as stressed, but associates the interactive contact as beneficial and positive for the cheetah. 20 participants determined the cheetah was calm, within the same cohort two highlighting that he was also relaxed during the interaction. Whilst the cheetah did not display any play behaviour during the interactions, 9 participants described him as playful which can

be assumed to be attributed to the licking of the hand and the misinterpretation of this as a play behaviour being directed towards the human. Many of the behaviours described, although anthropomorphic, link to positive engagement with the interaction and outlining further positive benefits for the cheetah.

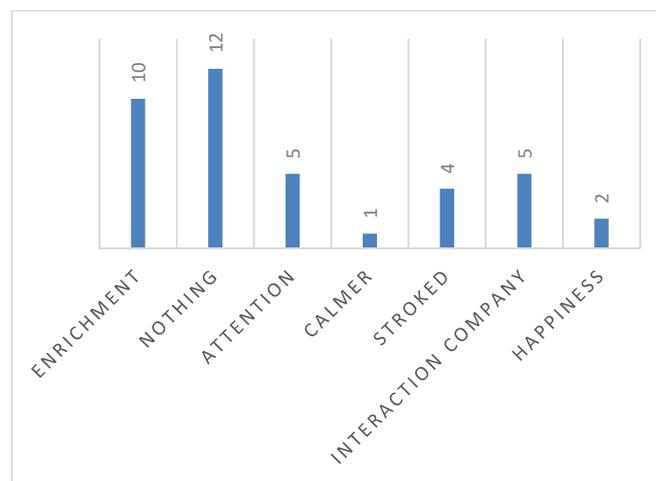


Fig. 6 Perceived benefits for the cheetah from the human-animal interaction

Fig. 6 identifies perceived benefits participants felt the cheetah would receive. 12 participants felt that the cheetah would gain nothing from the interaction with one stating "he hasn't gained anything from this", whilst 10 felt that the interaction was a good form of enrichment "we all smell different; I bet he can smell my pets on my clothes" highlighting the participant is aware of the novel smells that may stimulate a response, correlating with research from Claxton [3]. Three participants felt that the cheetah would be calmer and happier from the interaction; however, it was not

expanded on how this was determined by the participants. 10 participants felt that the cheetah needed and gained company and attention through these interactions, which correlates with the authors' knowledge of this individual cheetah being hand-reared as something he responds positively to, and aims to justify the reason for this individual being used in human-animal interactions.

Overall, the perceived benefits from the interactions can be categorised into three categories; definitions that the interaction anthropomorphically benefitted the cheetah, provided suitable environmental enrichment or provided no benefit at all. Prior to the interaction 91% of participants felt that the cheetah would become stressed during the interaction, with only 29% feeling he would benefit from this; compared to after the interaction, whereby 66% of participants perceived the cheetah to have benefitted positively from this interaction, indicated by his demeanour being calm and relaxed, and licking of the participants' hand. Whilst there is no overall consensus from the participants that the interactions either have a strong benefit or no benefit towards the cheetah, and therefore identifying the need for further research, this does highlight that after a participant has been involved in an interaction they are more positive regarding the experience and the benefits towards the animal. It is key to note that whilst there was no consensus of the participants perceiving these interactions to be beneficial, whilst these interactions have been occurring, this individual cheetah has not vomited since day three of moving to his new enclosure in the main zoo. Whilst signs of stress were still exhibited through pacing and walking away during an interaction, the cheetah's overall wellbeing, and lack of vomiting, has increased his overall health.

IV. CONCLUSION

Human-animal interactions occur widely in modern society through many mediums; interactions, encounters and assisted therapy sessions [6], [7] to name a few. Currently, to our knowledge there is little to no enforceable legislation regulating these interactions, with many laws, and in turn, organisational bodies and associations such as CITES and the SPCA [24]-[26] only able to ensure the animals welfare is maintained to adequate standards and prosecute if they determine necessary. Human-animal interaction legislation needs to be established and enforced for all non-domesticated animals, with regulations in place for domestic animals, that are used in human-animal interactions where the human and/or animal is perceived to benefit. This legislation would aim to prevent the fatigue of an animal and over exploitation [27] with the aim of reducing negative media coverage of the interactions through positive interaction occurrences for the animal and human.

Human-animal interactions that occur in zoological establishments do so on the presumption that they will engage the visitor, increase awareness of the animal, and generate much needed monetary funds, whilst meeting the zoo's aims and purpose of raising educational awareness and contributing actively towards conservation work [28]. Whilst this study

highlighted that conservation, research and education, when grouped together, do prevail highly in their perceived importance over recreation, as stand-alone roles, with recreation just 1% behind research and 4% behind education, many participants perceived the human-animal interaction to have educational values, but over 65% perceived there would be no conservational value attached [28], [29]. Many (91%) participants felt before commencing a human-animal interaction the cheetah would be stressed during the interaction from human presence but all still opted to partake in the activity, however, after the interaction less than 50% of participants stated that they felt the cheetah was stressed, with many using terms such as 'calm', 'relaxed' and 'playful'. Whilst these are aesthetically positive terms, it was highlighted that many participants did not find the interaction educational and participated purely for their own enjoyment and to be close to an exotic animal. Further emphasis on enforcing the importance of educational messages to be delivered during the interactions is paramount to ensure that the zoo not only meets and exceeds their purposes, but that the individual leaves with a positive message of the work that zoos are conducting, and potential ways in which they can help towards conservation work both at the zoological establishment, at home or *in situ*.

Whilst the interactions do form part of environmental enrichment, and can prove novel due to varying auditory and olfactory cues; it is possible to over use an animal and not provide sufficient breaks. Ianuzzi and Rowan [27] found that animals can be used in interactions for up to an hour before breaks are required. Whilst this is a good starting point, it is imperative that the zoo keeper is able to understand and interpret the specific animal's behaviour to highlight when stress is being induced, and therefore stop the interactions as soon as the animal demonstrates negative behaviours such as pacing, baring teeth or walking away [20], [25], [26]. Alternatives to direct human-animal interactions can also be offered in the form of interactive activities that engage the visitors but also contain educational take home messages. Whilst many participants in this study stated they would still participate in an interaction if other activities were offered, 23% stated they would utilise alternative activities if they were available, highlighting a target market area whereby educational and conservational messages can be delivered through hands-off contact activities.

Human-animal interactions have the potential to provide positive benefits for the animal, human and educational establishment; however, it is imperative these interactions are conducted by trained staff in establishments that uphold the highest welfare standards, with aesthetically pleasing enclosures to allow for positive perceptions to be assumed. It is vital that the animals' welfare is priority and that participants follow instructions for their own safety, but also that of their peers and the animal; reducing the potential for negative media coverage. It is also imperative that the interactions contain educational messages regarding the animal and conservation work the establishment is involved with allowing the visitor to leave with a positive take-home

message.

In hind-sight, had more time been available, the authors would have conducted a pilot study to ensure the questions were relevant and applicable to the aims of the study. Although the interactions may need limiting further, with additional rules, closer monitoring of participants and breaks in between, the overall impact of the interactions is positive in terms of welfare in the cheetah and positive perceptions of using human-animal interactions by participants, and therefore of the zoological establishment. Further work is required to ensure conservation and educational messages are incorporated into human-animal interactions to enhance the benefits of these.

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