

ReptileJam 2021: Designing Enrichment for Reptiles in Captivity

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This is a proposal for a ZooJam workshop around the theme of designing tech-enabled enrichment opportunities for zoo-housed and domestic reptiles.

Fiona French, F, French*

School of Computing and Digital Media, London Metropolitan University, f.french@londonmet.ac.uk

Leah Williams, L, Williams

Chester Zoo, l.williams@chesterzoo.org

Jon Coe, J, Coe

Joe Coe Design, jon@joncoedesign.com

Eduardo Fernandez, E, Fernandez

School of Animal and Veterinary Sciences, University of Adelaide, edjfern@gmail.com

Chris Martin, C, Martin

Indianapolis Zoo, cmartin@indyzoo.com

Lewis Single, L, Single

Indianapolis Zoo, lsingle@indyzoo.com

This workshop is focused on the design of novel kinds of environmental enrichment for zoo-housed reptiles, using technology to support the development of interactive systems and devices for capturing data. Participants will work virtually in small groups to ideate, reflect on and develop concepts, using a *ZooJam* approach, which is similar to a game jam. Briefs for participants may include lizards, snakes, turtles and crocodilians.

CCS CONCEPTS • Human-centered computing • Applied computing

Additional Keywords and Phrases: environmental enrichment, animal welfare, Animal-Computer Interaction, ZooJam, game jam, interaction design, reptile, ideation

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1 INTRODUCTION

Offering environmental enrichment to zoo-housed animals is now standard practice in many zoos, as it is known to enhance welfare by facilitating the expression of natural behaviours [7, 11, 18, 19]. However, in regard to the provision of enrichment and consequent evaluation of its efficacy, some animals seem better served than others. This workshop focuses on reptiles and will explore what kinds of enrichment are appropriate for meeting key behavioural goals.

Bringing together knowledge and skills from the animal expert, computer science and interaction design communities, we hope to co-create some novel experiences for these animals, using technology as an enabler. The use of technology to support enrichment has a long history and was first documented 50 years ago by Markowitz and colleagues, who described their designed procedures as ‘behavioural engineering’ [14, 15]. We are committed to offering more autonomy to reptiles in captive settings, for example in the form of controllable systems they can learn how to use. This could be a huge benefit for the animals, who would be able to independently initiate enriching interactions without having to rely on a carer being available [4]. Since the same principles of care apply to all members of a species, enrichment that is fit for purpose in a zoological setting could potentially be adapted to work in a domestic environment as well.



Figure 1: Nile crocodile and hippopotamus, Namibia. 2015. © Fiona French

2 MOTIVATION

In this workshop, we highlight the importance of designing enrichment opportunities for reptiles maintained in captive settings. As stated by Burghardt, “...reptiles... show many traits common in birds and mammals, including sophisticated communication, problem solving, parental care, play, and complex sociality” [3]. As an example, Dinets [5] reports

extensive play behaviour observed in crocodylians, particularly in aquatic environments that reduce the energy cost for these ectothermic animals. He describes object, social and locomotor play, including playful relationships with other species that might usually be regarded as potential prey. Play behaviour has also been documented in tree monitors [12], while black-throated monitors have demonstrated their problem-solving skills, learning how to manipulate hinged doors on food containers [13]. Showing evidence of cognitive ability usually associated with higher mammals, longitudinal studies by Gutnick et al. [10] testified that zoo-housed giant tortoises (Fig.4) are able to recall their operant conditioning nine years after the event, as well as perform colour discrimination tasks. Nonetheless, there remains a misconception that reptile intelligence and capacity for emotion is minimal.



Figure 2: Loggerhead turtle nest, hatchling and adult, Kefalonia. 2021. © Fiona French

In general, humans seem to have less empathy with animals classified as reptiles than with non-human mammals. Perhaps the idea of hatchlings in eggs (Fig.2) rather than viviparity creates an emotional distance; perhaps it is the fact that some reptiles are associated with our deepest fears - sharp toothed predators near the water supply, hidden venomous snakes; perhaps having scales rather than hairy skin contributes to a sense of otherness. Indeed, one of the problems human carers face is that it can be hard to assess the emotional and behavioural responses of reptiles without expert knowledge of the species [2]. In zoological settings (Fig.3 , 4, 5), staff are much better equipped to look after the animals than in a domestic environment, yet increasingly, reptiles are being sold as house pets – the bearded dragon being a case in point.



Figure 3: Rhinoceros iguana, London Zoo. 2012. © Fiona French



Figure 4: Galapagos tortoises feeding, London Zoo. 2012. © Fiona French

Research on reptile cognition and emotion is growing but has historically been neglected [3]. There is a similar lack of studies on their environmental enrichment needs, although despite the paucity of literature, Eagan found that there is in fact a lot of practical work being undertaken by zoos, particularly in the area of habitat design [6]. Recently, Nagabaskaran et al. has shown that zoo-housed snakes (Fig.5) are better able to perform their natural behaviours when living in an enriched environment [17], while Bashaw et al. found an improvement in captive leopard gecko welfare with the provision of different types of enrichment. The geckos reportedly responded to enrichment in a manner similar to carnivorous mammals [1].



Figure 5: Emerald tree boa, London Zoo. 2012. © Fiona French

All these considerations have inspired us to organize a ZooJam [8] focused on reptiles this year, and we plan to offer participants an opportunity to work on some real briefs provided by domain experts.

3 WORKSHOP AIMS

Our aims for the ReptileJam are as follows:

- To provide a cross-disciplinary virtual environment where animal welfare experts and animal carers can discuss enrichment ideas with ACI experts, interaction designers, computer scientists and other interested participants.
- To offer a structured ideation experience with an emphasis on collaboration and speculative thinking.
- To share and reflect on concepts using a themed deck of cards.
- To develop responses to enrichment design challenges directed at specific reptilian species, with the purpose of meeting key enrichment goals.
- To disseminate outputs within our communities and beyond.
- To improve the wellbeing of reptiles in human care.

4 WORKSHOP ACTIVITIES

Previous co-located ZooJam workshops have used craft as a technique for enabling participants to co-create round a table, and for drawing attention to the material qualities of their designs. This year, we will use Miro [16] as our shared online whiteboard, where participants can contribute ideas using different media. Teams will explore different dimensions of the proposed designs, including aesthetics and UX. To support this objective, we will be testing a deck of Concept Craft Cards.

The virtual event will be held in Gathertown [9], allowing participants to move freely between tables and enter in and out of remote conversations.

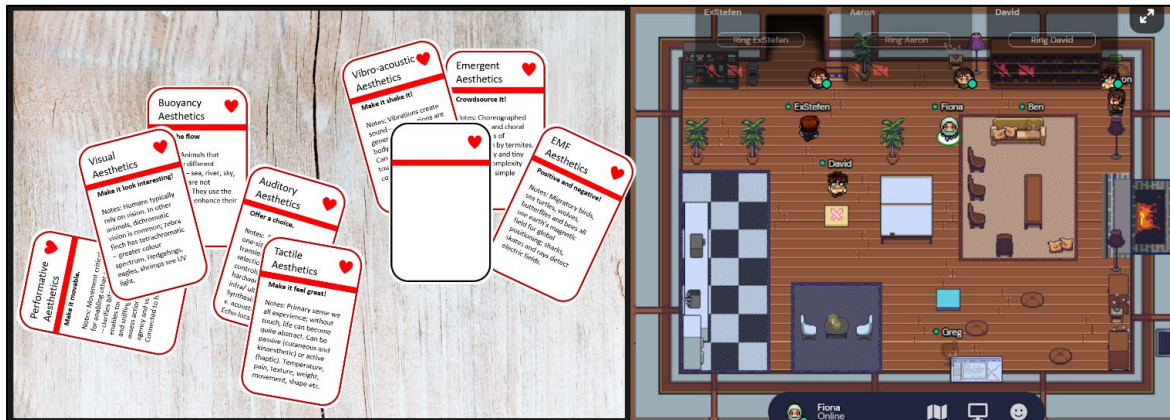


Figure 6: Concept Craft Cards and Gathertown environment.

4.1 Provisional Schedule

1. Introduction to Gathertown workshop space.
2. Species-specific briefs presented by animal experts. After each presentation, there will be an opportunity to brainstorm ideas with your team.
3. HERBAL TEA BREAK
4. Sharing ideas for each brief – questions and feedback.
5. LUNCH
6. Choose a brief to develop in collaboration with colleagues.
7. Preparing a detailed solution.
8. AFTERNOON TEA BREAK
9. Presenting outputs (often a plenary activity).

5 ORGANISERS

Fiona French is a Senior Lecturer in Computing at London Metropolitan University. Fiona is course leader for BSc Games Programming; she teaches game design and development and AI. She has co-organised several game jams, as well as ideation workshops and ZooJams at previous ACI conferences. Fiona's recent research with animals has involved designing and developing playful interactive systems for elephants, in order to provide cognitive and sensory stimulation.

Leah Williams is Lead Conservation Scientist at Chester Zoo. Leah has a background in animal behavior and welfare research in zoo animals with a particular focus on birds and lower vertebrates. Leah's research has focused on evaluating

environmental enrichment, the impact of sound on zoo animal welfare, evaluating enclosure design and reproductive and social behavior across a number of species.

Jon Coe has fifty-six years of experience in design, creating enriching and sustainable habitats for people, plants, and animals. He has published over seventy papers and book chapters on zoo planning and design while developing two hundred ten projects for ninety-four zoos, aquariums, botanical gardens, theme parks, wildlife sanctuaries and national parks in thirteen nations on six continents. More recently Jon has collaborated with ACI specialists to suggest ways animals can participate in co-design and exercise greater choice and control over their own lives.

Lewis Single is a Michigan native who has worked across the country as an AZA herpetologist. After the completion of his Bachelor's in Zoology, Lewis interned with the Detroit Zoo, worked seasonally with the Brookfield Zoo, and then full time with Zoo Tampa in Florida. After 8 years as a keeper, Lewis transitioned back to the Midwest moving into management with the Indianapolis Zoo. Lewis currently serves as Deserts Area Manager.

Eduardo J. Fernandez is currently a Senior Lecturer of Applied Animal Behaviour and Welfare in the School of Animal and Veterinary Sciences at the University of Adelaide in Australia. He received his Ph.D. in Psychology (minors in Neuroscience and Animal Behavior) from Indiana University and his M.S. in Behavior Analysis from the University of North Texas. Much of Eduardo's past and current work involves the behavioral training and welfare of zoo, aquarium, and companion animals. His past positions include a Visiting Professorship in the School of Behavior Analysis at the Florida Institute of Technology, an Affiliate Assistant Professorship in the Psychology Department at the University of Washington, a Research Fellowship with Woodland Park Zoo, and a National Science Foundation Postdoctoral Fellowship.

Christopher Flynn Martin is a Research Scientist at The Indianapolis Zoo. He earned his Ph.D. and M.S. in Primatology from Kyoto University, and a B.A. in Psychology from The University of Pennsylvania. Chris is an adjunct professor at Indiana University and the founder of Zenrichment, a company that designs and builds computer touch-panel devices and software for animal cognitive research and enrichment in zoos. His research interests include great ape social cognition, communication, imitation, and strategic reasoning. At Indianapolis Zoo, Chris conducts daily touch-panel research with the orangutans at the Simon Skjodt International Orangutan Center, which is equipped with a shared touch-panel system that accommodates visitor/orangutan interaction over shared touch-panel software, creating an immersive educational opportunity for the public and advancing the Center's goal of orangutan conservation.

6 CALL FOR PARTICIPATION

Offering environmental enrichment to zoo-housed animals is now standard practice in many zoos, as it is known to enhance welfare by facilitating the expression of natural behaviour. However, in regard to the provision of enrichment and consequent evaluation of its efficacy, some animals seem better served than others. This workshop focuses on reptiles and will explore what kinds of enrichment are appropriate for meeting key behavioural goals. Drawing together colleagues from different disciplines and communities for a day of creative development, we hope to co-create some novel and engaging experiences for these animals, using technology as an enabler.

We invite participants from a wide range of communities, including but not limited to animal welfare, herpetology, game design, computer science, engineering, education, HCI and ACI, animal behaviour and environmental enrichment. This is an opportunity for those with an interest in designing experiences for captive reptiles to share ideas and explore the potential of using technology to enhance reptilian environmental enrichment opportunities.

The workshop will involve virtual collaboration as we discuss enrichment goals provided by domain experts and explore ideas in small teams. As the day progresses, people are encouraged to move between teams and focus on one species for a focused concept development session. Ideas will be presented and shared with the wider community via social media and our dedicated website: <https://zoojam.org/reptile>.

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