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Posters

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Match That Cue - Behavior Shape Cues with Polar Bears

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Finding ways to keep a polar bear mentally stimulated is always an ongoing process. Even with varied sessions, enrichment ideas, and training, our work is never done. We are able to work more closely with the polar bears in our off habitat areas, accomplishing behaviors that would be much more difficult to train with distance between the keeper and bear. But what can else can you do with those behaviors that are now solid? Why not add a new way to ask for them?

Our Idea: Engage more with our polar bears in their habitat.

Our dilemma: How can we translate our completed simple and complex behaviors from our holding areas to our polar bear habitat when we do not have access to a training wall or easy verbal/visual communication with the polar bear and other staff.

Our solution: Using simple shapes as behavioral cues! A different take on "match to sample" training.

Within the marine mammal field the use of "match to sample" training is common. Yet, it is always impressive to see the different levels of intelligence of each species and individual, and for our guests it is an amazing teaching opportunity. We paired simple shapes to each of the bear's most solid behaviors in our behind the scenes areas, and then began to ask for the behaviors in their habitat. Over the summer we were able to transfer 4 behaviors to our habitat, 1 that they had not previously be able to understand while outside.

MATCH THAT CUE:
Behavior Shape Cues with Polar Bears

Amanda Westerlund
Mammal Keeper

INTRODUCTION

Finding new ways to engage with our two polar bears, Koda and Snowflake, is always an ongoing challenge. Our team wanted a different way to train with our bears, and also teach our guests about this amazing species.

The Idea:
Engage more with our bears in their outdoor habitat

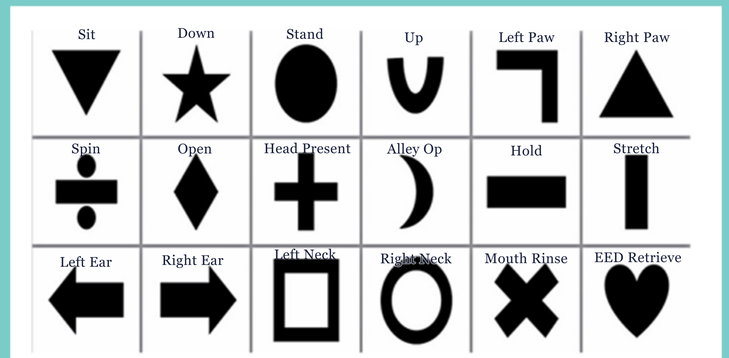
The Dilemma:
The outdoor space has tall acylic walls and is difficult hear from the public side. Frustration can happen quickly for both the bear and keeper.

The Solution:
Use shape cues to easily communicate which behaviors we are asking for. This will also help to ask for behaviors that are difficult to train with the distance between the bear and the keeper outside.

PROTOCOL

Simple shapes were assigned to 18 well established behaviors, pairing the beginning behaviors with the most distinguishable shapes.

Similar shapes were selected for similar behaviors, to test each bear's perseption. Each shape cue was printed on a separate sheet of paper, laminated, and attached together with binder rings.



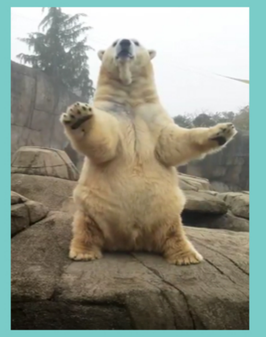
Two behaviors were selected first to be paired with the shape cues:
right paw present and left paw present

Reason:
1. Easy behaviors - set them up for success
2. Communicated with the bear that each shape meant a different behavior
3. Easy behaviors to ask in their outdoor habitat

The shapes were shown to each bear prior to asking for a paw present with the normal verbal and visual S^D inside. Once they showed progress pairing the shape cue to the behavior, the process was repeated in their outdoor habitat. The next behaviors were chosen: spin and stand.

When training outside, a secondary person or rope was used to help give the primary trainer space. This helped to keep the bears focused without guest distraction. This also gave a chance to talk about polar bear under human care and training.

RESULTS



Koda was able to completely pair 4 behaviors outside after 6 months. "Spin" was a new outdoor behavior.

Snowflake was able to pair 2 behaviors after 6 months.

Both bears would participate regularly.

Guest interactions were more interactive and helped to demonstrate how we work alongside the animals under our care.

FUTURE TRAINING

Shape cue training will be continued with Snowflake at the Pittsburgh Zoo & PPG Aquarium.

Koda has moved to a new facility and the training progress was passed along with him.

The next step is to modify and begin this idea with a new species.

CONTACT

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Increasing and Retaining Minorities in Aquarium and Zoo Science

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National Aquarium,

MIAZS was founded by two women who are professional aquarists and researchers. We aim to promote diversity and inclusion in the aquarium and zoo sciences by countering the financial and social barriers that disproportionately prevent racial and ethnic minorities from entering and flourishing in these fields.

Increasing and Retaining Minorities in Aquarium and Zoo Science

Meghan M. Holst, MSc & Jennie D. Janssen, MS: Co-Founders of Minorities In Aquarium & Zoo Science (MIAZS)

American Association of Zoo Keepers, August 29-31, 2021

BACKGROUND

Ethnic and Racial Representation

- Diversity in people leads to diversity in thought, which leads to greater innovation
- The lack of ethnic and racial diversity in aquarium and zoo science leadership and management positions, conference attendance, and conference speakers is obvious and limiting industry potential
- This lack of representation can negatively influence a minority's sense of isolation, not only at their home facility, but across their field as a whole
- Demographic data in aquarium and zoo science fields is needed to understand current trends, future directions, and if or when progress is made
- Analogous data from fisheries fields show that there are 31% ethnic and racial minorities at the PhD level, however, only 8% are granted full professorship (Arismendi & Penaluna (2016) Examining diversity inequities in fisheries science: a call to action. BioScience (66):7)

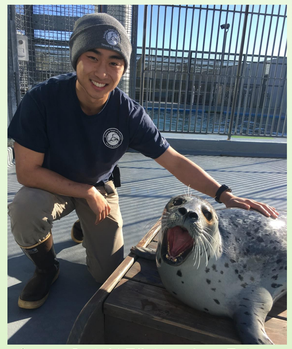

Figure 1. MIAZS Member Tyler Jung working with a seal

Barriers Contributing to Lack of Diversity

<u>Financial barriers</u>:

- 4-year degrees are often desired for aquarium or zoo science jobs
- Husbandry positions often require additional unpaid internships or volunteer work for resumes to move past the first round of reviews
- Minimal pay compared to cost-of-living expenses, compounded by increasing debt for recent college graduates
- Entry-level professionals are less likely to be funded for professional development or conference attendance
- Self-funding conference attendance is cost-prohibitive
- Barring active efforts to retain BIPOC professionals yields few opportunities for advancement leading to attrition and scant representation

<u>Social barriers</u>:

- Succeeding in aquarium and zoo science fields is greatly influenced by *who* you know versus *what* you know
- Wariness about relocating to communities or work environments where minorities feel unsafe or even threatened in order to gain experience or career advancement is real
- Lack of minority representation at conferences highlights the lack of diversity in science fields as a whole and can leave minority attendees feeling even more professionally isolated
- Creating and maintaining welcoming and supportive work, living, and learning environments in our communities – where inequities, microaggressions, and ignorance toward the challenges of BIPOC are not tolerated – is critical to retaining existing and future BIPOC professionals

Figure 2 (left). MIAZS Member Claudia Tibbs working at a waste management facility

WHAT CAN ONE PERSON DO?

1. **Initiate your own learning** about what allyship is and how to be an ally
2. **Strive to be an ally** at every opportunity
3. **Work to ensure a minority-friendly work culture** at your facility
4. **Engage in discussions** on minority-friendly work culture, identifying and countering/eliminating inequities, in particular unpaid pathways to career entry
5. **Elevate the visibility of BIPOC professionals** in your social media networks and beyond to normalize BIPOC working and excelling in these fields and to inspire the next generation
6. **Hiring Managers: Evaluate your own practices** in how job postings are crafted, where they're disseminated, and what criteria you are using to eliminate or advance applicants to the interview process.
7. **Advocate for appropriate compensation of BIPOC** for their expertise, insights, and extra work in correcting exclusionary institutional systems
8. **Connect <u>all aspiring professionals</u> with resources** and community through minority-focused organizations
9. **Get involved** in minority-focused organizations to aid their coordinated efforts

Figure 3. The first MIAZS Networking Event including professionals and aspiring professionals in aquatic and terrestrial husbandry and science education.

ACKNOWLEDGEMENTS

- AnimalProfessional.com and TheAquariumVet.com for making their digital library, educational and conference materials accessible to MIAZS Members
- Minorities in Shark Sciences (MISS) for blazing this trail of action and being awesome, inspirational women

Figure 4 (right). MIAZS Member Amanda (Hodo) Felix hookah diving as part of her job as an aquarist

METHODS

Departmental Level:

- Examine job postings for limiting factors not necessarily aimed at finding the best candidates
- Ensure an inclusive culture to help retain existing and future minority staff
- Increase the visibility of BIPOC professionals in media, conferences, and professional development/leadership opportunities to increase diverse perspectives and inspire the next generation

Figure 5. MIAZS Member Jordan Veasley working with a clouded leopard

Organizational Level:

- Examine the demographics of staff by department and level in the organization
  - If any group skews toward all or no minorities, ask what business practices might be influencing that trend
- If unpaid work is a potential pathway to entering in-house careers, consider ways to make those learning opportunities more equitable to those with less financial means:
  - Prioritize funds to create scholarships
  - Transition to part-time/seasonal paid positions
  - Offer housing and relocation assistance
- Ensure that staff in positions of management or mentorship of any aspiring professionals are equipped with the knowledge of how to be an ally
- Increase visibility of BIPOC professionals in media (Fig. 1-5), conferences, and leadership opportunities to normalize BIPOC working at all levels of these careers and inspire the next generation

Industry Level:

- Identify career pathways that yield top notch candidates and discuss ways those pathways could be more equitable
- Encourage professional organizations and conferences to examine their member and/or attendee demographics to understand their influence, role, and progress in professional/leadership development, networking opportunities, and the normalization of BIPOC working and excelling in aquarium and zoo science careers
  - Partner with minority-focused groups (e.g. MIAZS) to provide Conference Mentors who are designated to ensure that BIPOC attendees are invited to and welcome at social gatherings during and outside the conference agenda

CONCLUSIONS

- Greater diversity of aquarium and zoo science professionals will advance these fields by diversifying perspectives, solutions, and innovations
- Intentional actions are required to significantly shift career demographics
- Actions are needed at all levels
- Focus goals:
  1. Making career entry more equitable by countering or eliminating financial barriers through paid positions, scholarships, etc.
  2. Retaining existing BIPOC professionals by building a supportive culture and by making professional development, networking, and conference opportunities more accessible

CONTACT US

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Creation of a body scoring chart for Nile Crocodile (Crocodylus niloticus) and its use with body weight and length to establish ideal weight ranges (BMI) at Disney's Animal Kingdom®

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Disney's Animal Kingdom currently houses 21 male Nile Crocodiles (Crocodylus niloticus). Regular exams are conducted annually, at which time measurements of body length, weight and body condition score are recorded. Until recently, body condition scores were based on non-published guidelines and lacked consistency across users. In 2017, a project was undertaken to create a descriptive body condition score chart for the Nile Crocodile. The now standardized body condition scores were correlated with the biometrics of body weight and length such that the user can predict body weight using the length and body condition score. This body condition chart may be useful for other crocodilian species or at least serve as a starting point with which to create a tool for scoring specific species.

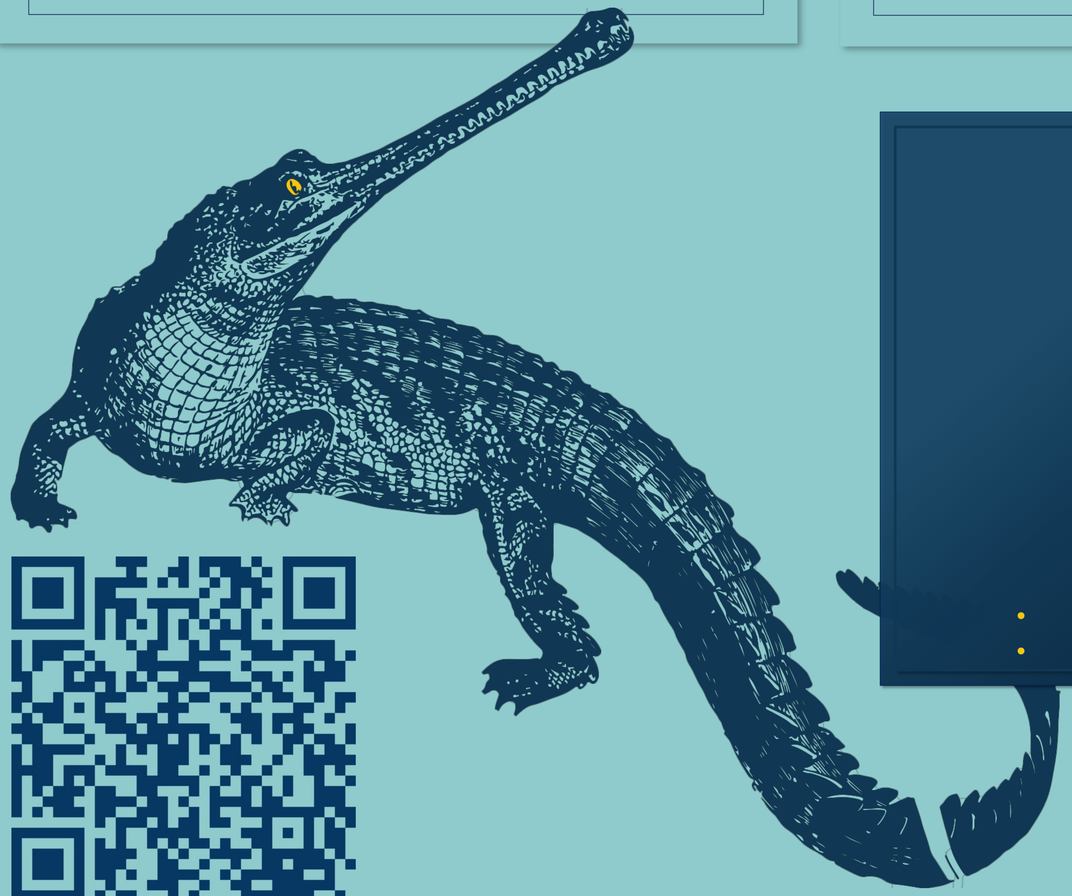
Creation of a body scoring chart for Nile Crocodile (Crocodylus niloticus) and its use with body weight and length to establish ideal weight ranges (BMI) at Disney's Animal Kingdom®

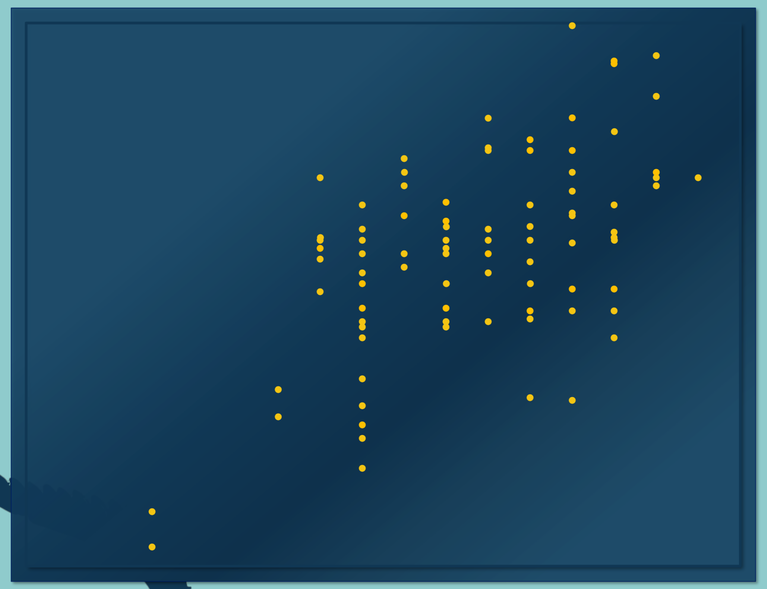
Megan Terry

Introduction

Body condition scores (BCS) and weights are an effective tool to monitor animal wellness. On my team we utilize BCS and weights for all animals. The majority of existing BCS charts are for mammals as well as individual target weight ranges. This lead me to ask…

- Does a BCS chart for crocs exist?
- Do crocs have an ideal body weight based on their length? Like a BMI chart for humans.





Methods

- Graphed all weights, lengths, BCS
- Created BCS chart on historical notes and photo comparison
- Created weight ranges based on records
- Tested chart and ranges

Results

- Graph of all weights, lengths, and BCS showed a correlation similar to a BMI chart
- BCS chart unanimously voted as useful. Scorers felt more confident assigning points when using chart vs without
- Weight ranges accurate to within 5kg

Length (ft)	Target Range (kg)
10	200-220
10.25	200-230
10.5	200-240
10.75	200-250
11	210-260
11.25	210-270
11.5	220-280
11.75	230-290
12	240-300

Discussion

- Using the BCS chart and known length of a crocodile you can estimate its weight. This is useful in applications where an animal is not weighed regularly
- The crocodilian can be assigned a target weight range
- The data from this project is useful across all species and can be used as a jumping off point to further tailor a target weight range to an individuals needs

Acknowledgments

I'm grateful for all the support I received from my curator and zoological managers, the Animal Nutrition team, the Science and Research team, and my Ituri team. Special acknowledgments go to my zoological manager Kristen Wolfe and keepers of the Ituri and Ecto teams who actively participated in the project. Shannon Livingston and Eduardo Valdes of the Animal Nutrition team who gave support and guidance from start to finish.

Reproductive Husbandry of the Pygoscelia adeliae at the Guadalajara Zoo

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The Guadalajara Zoo is the first institution in Latin America to successfully breed Adelia penguins (Pygoscelis adeliae), also making it the first successful breeding of Antarctic penguins in Mexico. This poster will explain the needs, requirements, and environmental modifications necessary for successful breeding. The reproduction of this species is seasonal and occurs during the Antarctic spring, and, being birds, we will focus on the importance of photoperiods along with appropriate stimulus that indicate the breeding season. We will also cover husbandry topics such as diet, supplements, cleaning, and the use of adequate nesting materials.

Reproductive husbandry of the *Pygoscelis adeliae* at the Zoo Guadalajara.

D. Herrera-Prado[1]; I. Reynoso-Ruiz[1].
[1]Zoológico Guadalajara.

Introduction

In the world exists eighteen species of penguins distributed in the southern hemisphere, four of them live in the Antarctic continent, among which *Pygoscelis adeliae* stands out for its status of least concern and its specific ambient conditions that requires for its reproduction. These birds spend most of their lives on the water and only remain on land in the reproductive and molt period. Their reproductive season is wide, from the arrival to the nesting site in September through February until the chicks independence. The Zoo Guadalajara performs a fundamental role in its conservation, being the first institution in Latin America harboring this species and has successfully reproduced them, receiving an AZCARM award in 2019 for "highest impact reproductive achievement in exotic species".

The present work seeks to contribute real data about the ex-situ reproductive management for this species as well as to contribute with data for the drafting of husbandry manuals that can facilitate the experience of care and reproduction of this species.

Method

In the site of nesting pallets, anti-fatigue mats and rocks of different sizes were placed for the construction of the nests; these materials passed through a disinfection process with chlorine and chlorhexidine respectively before being introduced to the enclosure. This process was replicated methodologically every year. During nesting season, the space was dry, well ventilated, and with access to the land and pool area all the time.

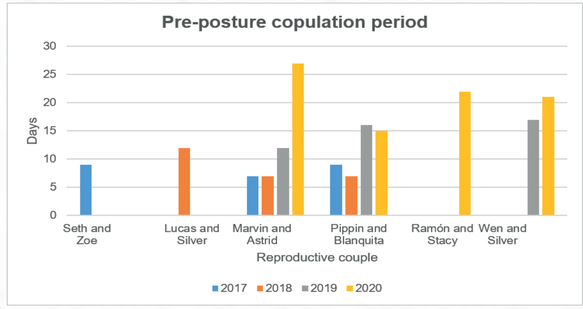
The natural Antarctic photoperiod was emulated through an automated system of LED lights, based on real data of the in-situ distribution of the species.

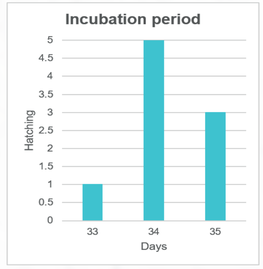
The reproductive couples were fed in the nest with various species of fish: capelin, herring, and anchovy, five times a day ad libitum, the females were supplemented with Calciosol and Neurobion (½ and ¼ tablet respectively) once they remained exclusively in the nest, after oviposition, the males began with the same treatment.

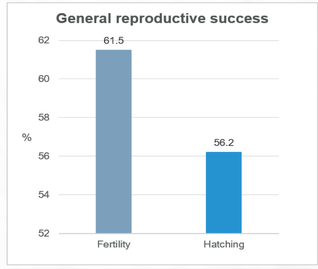
Results

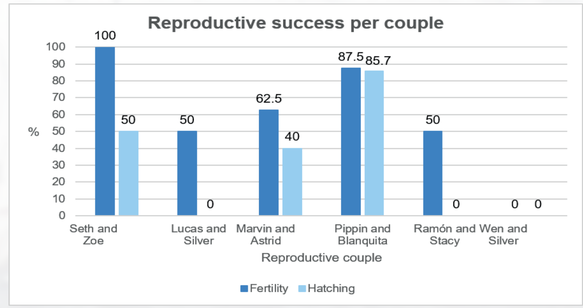
Since 2017 the reproduction of the species *Pygoscelis adeliae* has been achieved, through a total of four reproductive cycles successfully. At the moment there are four well-established reproductive couples and other new couples with potential mating.

We have been able to collect data on different reproductive stages within our enclosure, being: pre-posture copulation period, male-female permanence time in the nest, the incubation period, and first chick feeding. Generating percentages of reproductive success per couple and a general reproductive success.









Discussion

Every year the reproductive couples acquire new knowledge as well as more experienced in the care and breeding of their chicks. Twenty-four-hour monitoring through cameras allows us to get more accurate data for the reproductive period.

The period from the provision of rocks into the enclosure through the moment penguins begin the process of building their nest has decreased considerably due to the replication and improvement of the methods used by the keepers during the reproductive season year after year.

References

-Penguin (Spheniscidae) Care Manual Published by the Association of Zoos and Aquariums in association with the AZA Animal Welfare Committee. Original Completion Date: August 2014.

--National Oceanic and Atmospheric Administration. https://www.noaa.gov/, 2015.

Acknowledgements

Thanks to all the people who have collaborated in the care of these incredible animals in "Antarctica, The Kingdom of Penguins" at Zoo Guadalajara

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The Power of Peanut Butter: Desensitizing and Training 2.0 Mountain Bongo for Voluntary Preshipment Exams

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This poster will describe the process of desensitizing and training two male bongo to voluntarily participate in their pre-shipment health exams.

In order to reduce the stress and risk associated with having to immobilize two male bongo for their pre-shipment exam, the Naples Zoo Hoofstock and Veterinary Teams quickly developed a plan to desensitize and train them for the following medical procedures: blood draw, vaccinations, TB test and microchip scan. The poster will outline the steps we took from start to finish, challenges along the way and lessons learned.

By sharing our process, we hoThis poster will describe the process of desensitizing and training two male bongo to voluntarily participate in their pre-shipment health exams.
pe to show what is possible with training, even within a short window of time. By prioritizing animal choice and control, we were able to eliminate the need for a full immobilization for routine pre-shipment testing, therefore minimizing stress to the both animals and staff.

The Power of Peanut Butter: Desensitizing and Training 2.0 Mountain Bongo for Voluntary Pre-shipment Exams

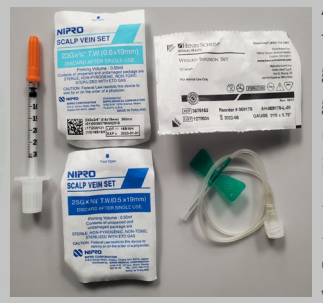
Rachael Cairo – Naples Zoo

Background

- 2.0 Bongo were being sent out due to up coming construction of their yard.
- We had limited time before they were being sent out- approx. 2 months each. We also only had access to our training chute once a day in the morning.
- Sebastian was 5 years old and Bakari was 2 years old, we did notice Sebastian was quicker to be desensitized to new sensations possibly due to his age.
- Sebastian was sent out in December 2020
- Bakari was sent out in April 2021

Examples of Tools Used During Training

Peanut Butter on a lid was used as continual reinforcement to keep their heads in place during behaviors. Due to time restraints teaching a hold with duration would have added to our challenges.



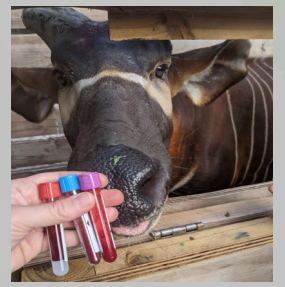
As we were training for blood draws we gradually increased the gauge of the needle used, starting with insulin needle-> 25g -> 23g -> 21g butterfly catheter with a vacutainer attachment

Steps for Training for Blood Draw and Vaccinations

1.Both Bongos had already established target behaviors using a stick on a tennis ball with a cue of “touch”. We began by targeting their heads outside the left corner of the chute window. After 3 successful targets we replaced the cue of “touch” with “head”. Our next step was to eliminate target and only use “head” cue. Once at this step, we began to use peanut butter lid for reinforcement vs produce.

2.Once “head” was established we moved on to touching their necks with a cue. We would first ask for “head” behavior. Once head was in proper position, peanut butter lid was given. We used verbal cue “neck” for whenever we were touching them. Once hands were removed, we would bridge and reward with produce. We used this cue when applying alcohol for injections or blood draws.

3.After neck we moved onto “poke” cue. We would ask for “head” -> “neck”->”poke”. When beginning “poke” , we started by just using the tip of our finger when cue was given. Bridging and rewarding once finger was removed. After 3 successful behaviors with zero reaction we moved to a capped syringe, then blunted needle. We repeated these steps working through approximations until we moved onto a real needle. During this time we also worked on duration of holding head in position.



4.We started with an insulin needle for BD. After using a needle the session, we would ask for behaviors again with blunted needle to have no negative reaction to cues. As we increased needle gauge size, if we had a reaction to a size, on our next session we would go back down to smaller gauge. If no reaction we would increase gauge. Once we were able to draw blood using the 21g with no reaction, behavior was considered complete. We used the same cues for blood draw as we did vaccinations.

Requirements for Pre-shipment Exams

- Physical examination including body weight and transponder confirmation.
- Bloodwork –
  Complete blood count/ Serum Chemistries/ Fibrinogen
- Infectious disease screening
  Brucella Serology
  Tuberculin testing(intradermal PPD Bovis)
  Fecal PCR for Johne’s disease
- Parasite screening –
  Ectoparasite and endoparasite exams
- Vaccinations –
  Rabies
  Tetanus toxoid
  Clostrdium (8-way)

*In order to preform TB test shaving as well as check for transponder we used “head” and “neck” behaviors to desensitize to clippers and transponder reader. Both bongo were already trained to step on scale for weights.

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Acknowledgments

Thank you to Dr.Murphy and especially Erin McNally for helping with training to complete both Sebastian and Bakari’s exams voluntarily! Thank you to the Naples Hoofstock team for helping with training sessions!

Creative Perching Makes All the Difference

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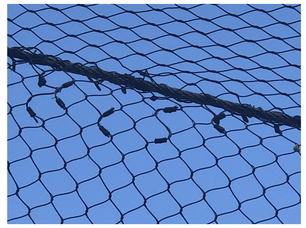
As we are all too aware, zoo enclosures show progressive wear the longer they are inhabited. Here we report on the changes we made to reduce the weakening/breakage of enclosure netting used in a free-standing howler monkey habitat which had been constructed in 2014. Specifically, we aimed to reduce the amount of time the 2.2 black howler inhabitants spend hanging from the netting used to enclose the habitat. As the netting is suspended from poles outside the enclosure our challenge was to find supports to which perching could be attached inside the enclosure. We erected upright poles within the habitat, added 360 feet of horizontal or oblique perching, 120 feet of horizontal fire hose, 2 cloth hammocks, and 2 starboard platforms. These additions increased areas above ground/below netting that can be used for rest and travel by more than 480 square feet. To document the effects of providing the additional areas, we conducted a 70 hour before/after observational study. Prior to exhibit modification the howlers spent 17% of their day suspended from the netting. We are pleased to find that now they are spending less than 3% of their time suspended from netting and considerably more time on the additional perching.

Creative Perching Makes All the Difference

Jonathan E Silsby[1], Jill Werner[2], Peggy Wu[2] & Cathleen R Cox[2]

[1] Enrichment and [2] Research Divisions
Los Angeles Zoo and Botanical Gardens



Introduction/Background

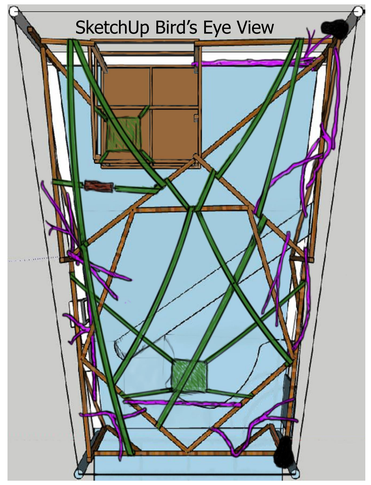
As we are all too aware, zoo habitats show progressive wear and tear the longer they are inhabited. The free-standing black howler enclosure in our rainforest area had been constructed in 2014. The howlers frequently suspended themselves from the netting that formed the ceiling and sides of their habitat which increasingly required repairs. We aimed to provide more perching that was placed so that it would provide alternative locations for play, locomotion and rest. This was particularly challenging as the netting was hung from supports that were outside the enclosure. We designed our perching to be self-supporting and visitor views would remain unobstructed. To be able to assess the success of our modification we observed the howlers before and after changes were made.

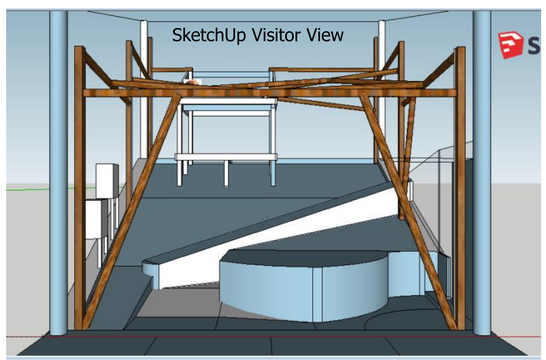
Perching/Platforms in Habitat before Additions

Existing "House" Structure:
Floor 67 sq ft
Upper deck 34 sq ft = ~101 sq ft in total
Molded vines ~ 50 linear ft

Work Done in December 2020

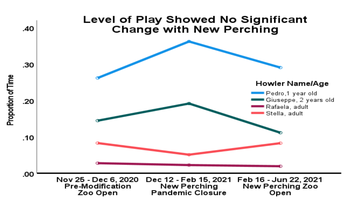
One Month Before: SketchUp, prep and prebuilding
Day 1: Moving Day ~1,400 lbs of lumber, tools and equipment
Day 2: Holes dug and jackhammered
Day 3: Learning curve - 2x Posts and 3x beams
Day 4: 3x Posts and 5x beams
Day 5: 1x Post, 3x beams & pentagon (5x beams) Grounds Maintenance hauled in ~750 lbs gravel
Day 6: 5x Perching, ~60 ft of firehose, 2x hammocks, 8x devices; safety check, clean and remove gear
Weekend Observations: Identified 5 areas of concern!
Day 7: 10x Perching & ~60 ft of firehose
Day 8: 2x Starboard platforms & 2x perching; safety check, clean and remove gear - done!!!

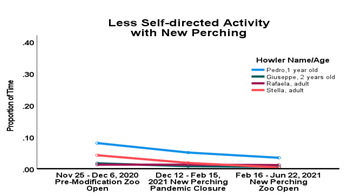




Linear and Square Feet Added

2x Hammocks add 18 sq ft
2x Starboard Platforms add 8 sq ft
120 Linear ft firehose adds ~40 sq ft
196 Linear ft of Lodgepole horizontals adds ~82 sq ft
In total of ~148 sq ft added which more than doubles prior aerial space
Note: This does NOT include local deadfall installed throughout the habitat





Behavioral Observations

Scanning at one-minute intervals using our "Zoo-Wide" protocol (Cox et al., 2017) we documented activity, location and supports utilized by the 2.2 black howlers, *Alouatta caraya,* residing in the habitat. Our pre-modification observations were done in November and early December when the Zoo was open to visitors. In the midst of the renovation the Covid-19 pandemic intensified, and the Zoo was closed to visitors until mid-February. The closure impacted our study in that the initial post-renovation observations had to be done without visitors present. As the presence of visitors can impact animals, we extended the study once the zoo re-opened. Each observation was of 30-minute duration; morning and afternoon data collection was counter-balanced. In total 74 hours of observation were completed; 23.5 hours pre-renovation, 24.5 hours following renovation but without visitors present, and 26 hours once the Zoo re-opened.

Data Analysis

Multilevel mixed-effects negative binomial regressions for 4 variables, proportion of time spent on new perching, proportion of time suspended from enclosure netting, proportion in time spent in exploration and play (social and nonsocial), and proportion of time in self-directed activity, were done using Stata, version 17. Because multiple tests were run $p < .01$ was used to determine if results were statistically significant.

Results/Use of Supports

Preference for the new perching was immediately apparent and significant. This preference is persistent and continues now that visitors are present. Use of the netting also declined significantly.
Pedro, the youngest howler, had been spending 22% of his time on the netting prior to renovation. In recent months he has been spending just 4% of his time there .

Results/Activity

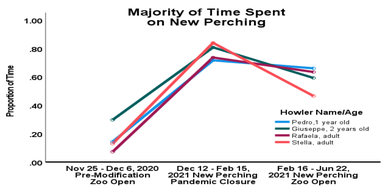
Prior to modification solo exploration/play together with social play was the single activity in which the younger howlers spent the most time and this has not significantly changed. Encouraging is the significant decrease in the amount of time the howlers spent in self-grooming and/or scratching. Self-directed activities are thought to be a reflection of discomfort or stress (Maestripieri et al, 1992) and their reduction provides encouraging support for the success of the habitat modification.

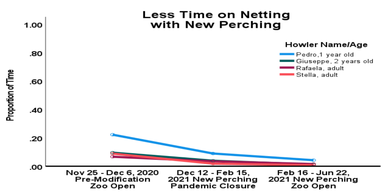
Conclusion

The modifications made were successful in both reducing the time the howlers spend on the netting and in increasing their comfort. Our work has increased the safety of the monkeys and will increase the longevity of the habitat.

References

Cox, C R and Yakushiji, R. 2017. Zoo-wide comparative studies: a widely applicable protocol used to assess effects of zoo surroundings. Poster presentation at annual meeting of International Society of Comparative Psychology, Los Angeles.
Maestripieri D, Schino G, Aureli F, Troisi A. 1992. A modest proposal: displacement activities as an indicator of emotions in primates. Anim. Behav. 44, 967–979.





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