

Effects of Artificial Enrichment on
Captive Western Lowland Gorilla
(Gorilla gorilla gorilla)
Activity Budgets

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Introduction

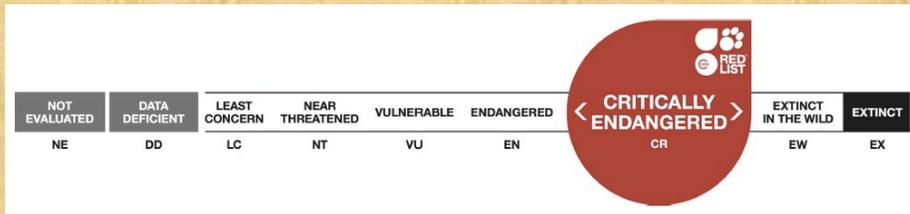


Photo credit: Maisels et al., 2018

PURPOSE

To evaluate captive western lowland gorilla activity budgets after the installment of enrichment and gaining an understanding of the mechanisms of enrichment's purpose and possible gorilla preferences for future enrichment items.

- Standard husbandry protocols for captive animals have larger effects than simple biological benefits, it can impact well-being.
- Cognitive capacities of gorillas require a more complex enrichment protocol (Russon, 1998).
- Evaluation of novel enrichment only allows a limited window of time before the animals become habituated to the enrichment.
- The International Union of Conservation for Nature (IUCN) recognizes gorillas as endangered species (on the red list).



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Smithsonian's National
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Lowland Gorillas & Activity Budgets



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The Guardian

- Formulating a narrative of typical developmental life stages shows how the environment can impact juvenile development and how precious the bonds can be between each member of the cohort.
- For example:
 - Infant mortality rate ~34% (Maple and Hoff, 1982).
 - Sexually active age in female gorillas ~7-8, for males ~16 (Watts & Pusey, 1993).
- Activity budget: Percentage a species will spend their day in regard to foraging, social play, mating, or sleeping.
- In a captive environment, the need or scarcity of food is not present, so the intensity of foraging behavior or aggression can be low (Masi, Cipolletta, and Robbins, 2009).
- Infants may spend the majority of their day exploring their environment, impacting the zoo's ability to create novel enrichment.



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Enrichment

- Enrichment: "A process to ensure that the behavioral and physical needs of an animal are being met by providing opportunities for species-appropriate behaviors and choices" (AZA, 2020).
- Enrichment should have:
- Natural habitat,
- Aspect of control, &
- Natural social groupings (Ogden et al. (1993)
- Quality of the enclosure is important, not the quantity (Ogden et al. (1993)



Photo credit: Philadelphia Zoo

Main Predictions



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- A. Increase overall usage of the outdoor enclosure (location of the climbing structure).
- B. Increase outdoor foraging.
- C. Decrease overall sedentary behaviors.
- D. Decrease regurgitation and reingestion.
- E. Preference in the juveniles for the climbing structure.



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Method



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Subjects

Captive population of five western lowland gorillas (*gorilla gorilla gorilla*) at the Philadelphia Zoo.

Motuba (Male, 36 years old)

Honi (Female, 28 years old)

Kira (Female, 21 years old)

Amani (Female, 4 years old)

Ajabu (Male, 3 years old)

Enclosure

Two primary enclosure areas, an indoor and outdoor space.

Indoor exhibit: 40' x 25' x 24' equaling ~785 sq ft.

Outdoor exhibit: accessed through a latch door, measures ~10,000 sq ft.

Climbing Structure

Installed July 25, 2019 and comprises two platforms each measuring 10' x 10'.

The structure 20'x 14'x 27'.

Data Collection

Observations were conducted by students of the Gorilla Behavior Lab at West Chester University.

Began in 2015, with long-term data and included data up until 2020.

Each student completed at least three 30-minute focal scans with 2-minute intervals.

Outdoor Enclosure Usage

Individual Gorilla	Percentage of Outdoor Use (Pre-Structure)	Percentage of Outdoor Use (Post-Structure)	Post-Pre
MO	21.1%	50.8%	+29.7*
HO	4.7%	72.3%	+67.6*
KI	17.2%	39.7%	+22.5*
AM	4.8%	41.9%	+37.1*
AJ	17.2%	45.5%	+28.3*

*indicates a large change in behavior, >15%.

Outdoor Foraging

Individual Gorilla	Percentage of Outdoor Foraging (Pre-Structure)	Percentage of Outdoor Foraging (Post-Structure)	Post-Pre
MO	23.1%	14.2%	-8.9
HO	35.7%	23.8%	-11.9
KI	48.6%	17.8%	-30.8*
AM	2.3%	12.4%	+10.1
AJ	4.2%	9.5%	+5.3

*indicates a large change in behavior, >15%.

Overall Sedentary Behaviors

Individual Gorilla	Percentage of Sedentary Behaviors (Pre-Structure)	Percentage of Sedentary Behaviors (Post-Structure)	Post-Pre
MO	71.2%	80.9%	+9.7
HO	65.6%	55.3%	-10.3
KI	75.3%	42.6%	-32.7*
AM	28.0%	35.5%	+7.5
AJ	28.6%	39.4%	+10.8

*indicates a large change in behavior, >15%.

Regurgitation & Reingestion



Photo credit: Tom Hartman

Climbing Structure Usage



Photo credit: Tom Hartman

Individual Gorilla	Percentages of Outdoor RR (Pre-Structure)	Percentages of Outdoor RR (Post-Structure)	Post-Pre
HO	16.7%	29.6%	+12.9
KI	0%	25.0%	+25.0*

Individual Gorilla	Frequencies of Climbing Structure Usage
MO	8
HO	12
KI	10
AM	38
AJ	44

*indicates a large change in behavior, >15%.

Discussion

Outdoor Enclosure Use

- HO may be influenced by her perception of the novelty of the climbing structure or by other elements present in her surroundings.
- HO had the greatest frequency of outdoor foraging.
- Exploratory behaviors were limited to primarily the climbing structure.
- This suggests the addition of a climbing structure may not necessarily translate to the gorillas physically using it.

Outdoor foraging

- KI had contradicted the original prediction.
- KI may no longer be comfortable using the outdoor space in the presence of the climbing structure.
- Foraging requires vulnerability within that animal.



Photo credit: Tom Hartman

Sedentary Behaviors

- KI decreased her overall sedentary behaviors, insinuating that she may be practicing more productive behaviors. Which is found in her RR behaviors.
- It brings attention to the necessity of providing individualized stimulation for captive animals that may become sedentary or develop routines.

Discussion

Regurgitation & Reingestion

- KI increased her outdoor RR by 25.0% and decreased her indoor RR by 14.5%, suggesting she may have become more stressed after the installment of the structure or she was spending more time outside, thus enacting negative behaviors outside.



Photo credit: Tom Hartman

Climbing Structure Usage

- The highest number of climbing structure usage was in AJ with 44 instances, validating the original prediction.
- The structure may be a more interesting item for the juveniles than the adults, because they are constantly developing and growing and are venturing outdoors, but their activities are not increasing while outdoors.
- Looking at the overall increase in basic outdoor use, the juveniles increased by 32.7%. This suggests that they may be going outdoors more based on the placement of the structure.
- Besides the climbing structure, there was no other shelter or physical structure thus, exploratory behaviors may have been limited to primarily the climbing structure.

Implications

The data suggested the troop collectively:

- Increased their outdoor enclosure use
 - Decreased sedentary behaviors and RR
 - Showed a preference in the juveniles use of the climbing structure.
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- Prior to the installment of the climbing structure, the outdoor enclosure space was barren, so there was a need to create a visually pleasing habitat.
 - The troop increased the most basic and simplest species-specific behavior, going outside.
 - Raises a concern for zoological facilities in examining enrichment, because animals do not have to be physically using it to achieve its goal.
 - This study also gains a greater understanding of how a troop of gorillas that have been housed in captivity can have individual differences.
 - Enrichment is not a one-size fits all approach.



Photo credit: Cincinnati Zoo & Botanical Garden

ACKNOWLEDGMENTS

My advisor and professor, Dr. Rebecca Chancellor. Without finding her at West Chester University, I would not have pursued something I was passionate about and would not be following my life long goals of working in the field of animal behavior & psychology.

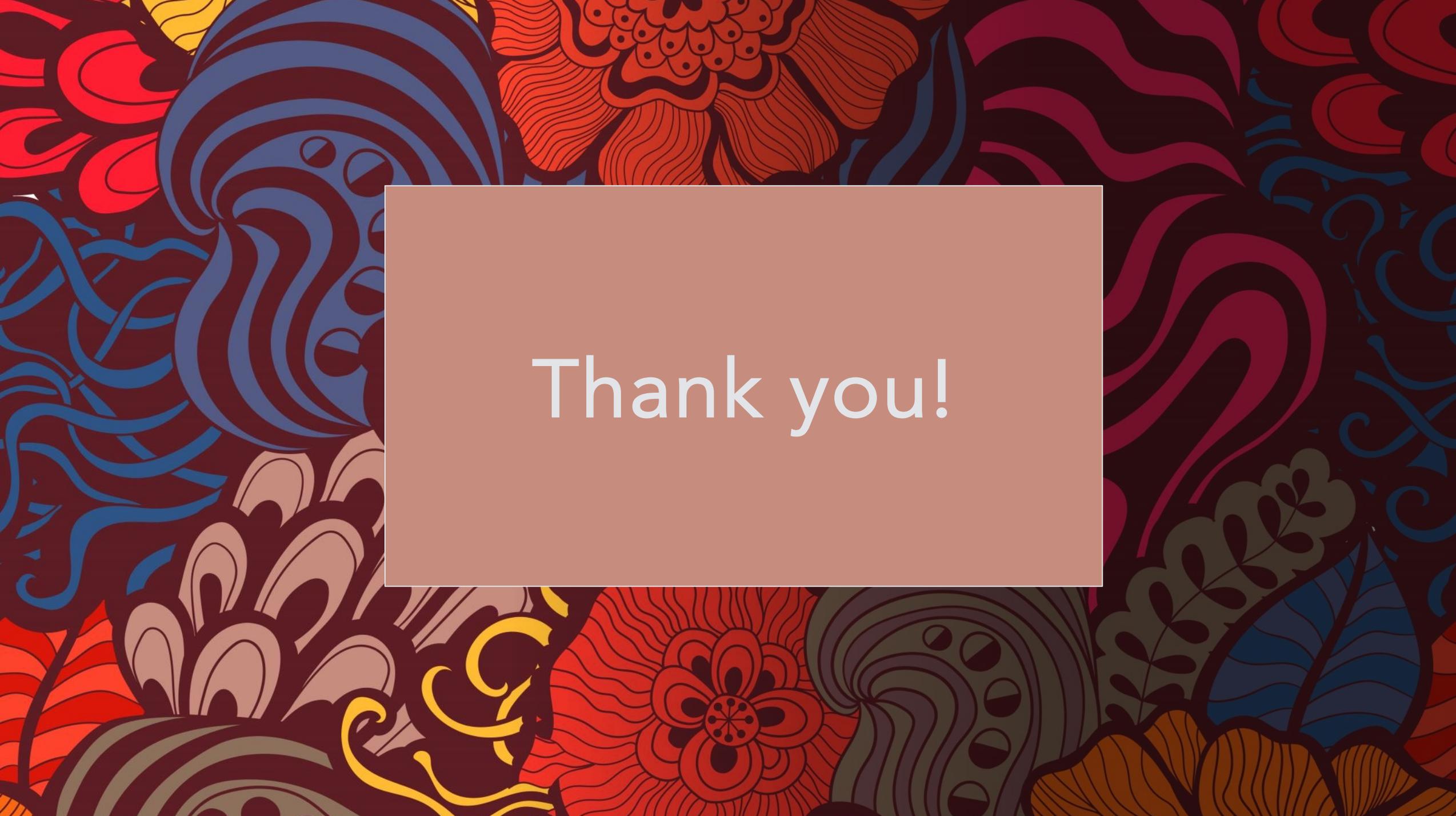
My thesis committee, Dr. Kumar & Dr. Rundus. When I needed extra support in statistics and an outside source of inspiration they both were there.

Fellow past and present gorilla lab students: Madeline Vandevere, Christina Pavia, Mackenzie Holm, Taylor Stuart, Sarah Kilburn, Jennifer Ryan, Lorri Fechtman, Maxwell Herbst, Billy Volpe, Samantha Bobst, and Madison Billings.

One large aspect of this research was due to the kind and generous support from the Philadelphia Zoo.

Lastly, I need to acknowledge the one individual who has pushed me to pursue graduate education even though things may not have always gone how I intended for them to go, and that is Matt Price. Without his support, encouragement, and stability I would not have made it this far. Thanks so much for being there for me when I needed someone the most.





Thank you!