



# **Evaluating the Effects of Temperature and Time of Day on the Activity of Captive Western Lowland Gorillas (*Gorilla gorilla gorilla*)**

**Animal Behavior Gorilla Lab:**

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# Purpose for Research

“Research on captive animals reaps substantial benefits for conservation, education, and enrichment efforts. As more species become displaced in their natural habitats, it is the job of the researcher to better understand how these animals behave in captivity.”



Enrichment

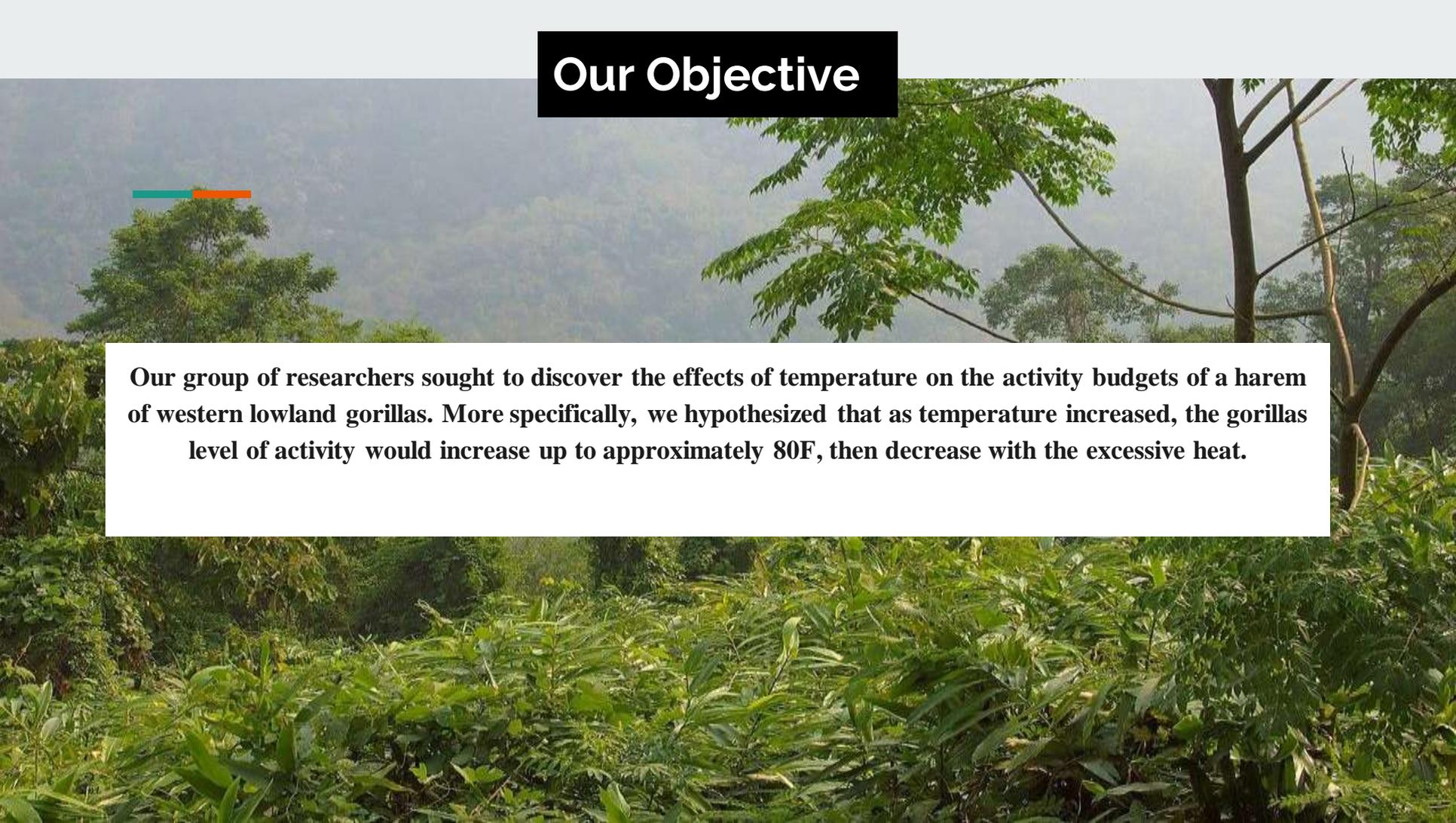


Conservation

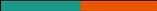


Education

# Our Objective



**Our group of researchers sought to discover the effects of temperature on the activity budgets of a harem of western lowland gorillas. More specifically, we hypothesized that as temperature increased, the gorillas level of activity would increase up to approximately 80F, then decrease with the excessive heat.**



## Meet the Family



**HONI**



**MOTUBA**



**KIRA**



**AJABU**



**AMANI**

# Literature Review

Stoinski, Hoff, and  
Maple (2002)

## Hypothesis:

- Sought out to help exhibits improve design quality by observing how environmental and social variables alongside visibility in western lowland gorillas (*gorilla gorilla gorilla*) effected the visitor's experience overall

## Results:

- Test Run: ANOVA
- Found that when temperatures increased, gorillas were not as visible

## Method:

- Their research revolved around four harem groups (Zoo Atlanta)
- Four enclosures containing: Grass substrate, rock outcroppings, bushes, and trees

## Discussion:

- Authors studied the specific structures and how the Zoo can recognize structure preference and when temperature plays a role in which are selected

## Execution:

- Temperature was recorded at the beginning of the day (by quadrant)

## Raising Questions:

- Socially one gorilla can affect the entire harem
- How much effect does one individual have, in terms of all occurrences or is it only at select times?

# Literature Review Con.

Sha, Du, Deng, Chen, Wu, and  
Chen (2020)

## Hypothesis:

- wanted to explore the way that five species of primates would react in climates that had a wider temperature range than their naturally occurring habitat and how it affected their activity level
- Specifically those that belong in colder climates being able to adapt better to temperature changes than those who are from warmer climates.

## Method:

- Five species observed
  - Pig-tailed macaque
  - White-headed macaque
  - Lion-tailed macaque
  - De Brazza's monkey
  - Ring-tailed lemurs.

## Execution:

- A two-way ANOVA
- Saw how much activity occurred when there were temperature changes in the enclosure.

## Results:

- Three out of five species showed a significant effect regarding temperature and activity.
- It was concluded that throughout the season that activity levels decreased during the extremes of the cooler and hotter months.

## Discussion:

- Ring-tailed lemurs would sunbathe more when exposed to direct sunlight as well. This is important since it suggests that even in captivity their thermoregulatory traits remain consistent to the wild.

# Methods

## Subjects:

Five captive 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)

## Collection/Analysis:

- Data was collected longitudinally and included data from Feb 2018-June 2019
- The total amount of hours of observation was 54.66 hours.
- Gorilla Behavior Lab Students collected at least 2-3 separate 30-min focal scans with 2-min intervals over a period of 4 semesters during their visits to the zoo.
- Data was collected on individual gorilla activity budgets
  - Foraging
  - Laying down
  - Sitting
  - Moving, traveling, etc.
- Activities were categorized as either:
  - Low (laying down, sitting, standing) or
  - High (foraging, moving traveling, grooming, playing)

# Methods Con.

- **Temperatures at the beginning of each 30-min focal scan were recorded using Google weather applications from the student's cell phone.**
  - **Temperature was divided into 7, 10-degree increments (e.g. 30-39, 40-49, 50-59).**
- **Additionally, time of day was recorded at the beginning of each focal scan.**
  - **AM (9:00 am-12:00 pm)**
  - **PM (12:01 pm-4:00 pm)**

- **Data was analyzed for correlation between the gorilla's individual activity budgets and the temperature.**
  - **Linear regression in SPSS version 24.**
- **Additionally, time of day was tested for correlation between activity budgets.**
  - **Independent t-test in SPSS version 24**

# Results

- All analyses were performed with data from 2018 - 2019, statistical testing and was done in the computer program SPSS to determine if correlations were present between the variables, and a 0.05 confidence level was used.
- Using a linear regression to compare activity level and temperature, no correlation was found
  - $F_{(1,79)} = 0.059$ ,  $p = 0.8$ ,  $R_2 = 0.001$
- Using a t-test to compare time of day and activity level, no correlation was found
  - $t_{(79)} = 0.637$ ,  $p = 0.5$
- The results suggest that the gorillas activity is unaffected by both time of day, and temperature.

# Discussion

- Our data suggests that the gorilla's were not affected by the temperature or time of day in regard to their activity levels.
- Here are some reasons why that may have occurred:
  - Captive environment
    - Adapted to restricted, controlled indoor lifestyle
    - Crowd size could influence the gorillas decision to seek shelter or active play
    - Lower social complexity of troupe
    - Adapted to zoo keepers routines, no need to forage or worry
  - Captive-born gorillas
    - Never learned wild behaviors such as hunting, foraging, protection, limited troop size could reduce passed down social behaviors
    - The gorilla's may be accustomed to non-native temperature range

# Limitations and Future Research

- **Limitation:**
  - Gorillas chose / were not allowed to go outside in extreme cold and extreme heat
- **Future research:**
  - Record if gorilla's are seeking shade or warmth
  - Record their behavior in regards to crowd size
  - Investigate activity levels vs. temperature on an individual gorilla scale
- It is important to note that there was not much research to be found on this specific topic so it goes to show that this should be looked at more and the effects it can have on primates or other animals as well.



## Acknowledgements



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Resources