

## **Animal behavior of the *Saimiri oerstedii* in the Osa Peninsula: eating, sleeping and traveling patterns**

**Cody Compton**

### **ABSTRACT**

Focal samples of individual monkeys are taken to better understand the behavior patterns of the subject being studied. Four individuals including myself were introduced into a pilot research program created by wildlife biologist Daniela Rojas, collecting behavioral data on troops of *Saimiri oerstedii*, or squirrel monkey. Our collection took place in forest near the town of La Palma, which is located on the Osa Peninsula of Costa Rica. The data collected focused on three acts: traveling, resting, and eating and was broken down into morning and afternoon times. Three contingency tables were created to show differences between: males and females, juveniles and adults, and morning and afternoon behavior. The data from the contingency table is used to calculate the chi-square value. From this value an estimated range of where the p value falls is found in the chi square table. Significant results from the chi-square vales calculated show males and females behave differently and activity differs from morning to afternoon. Data from the juvenile vs. adults is insignificant. Future research can include what food specific monkeys eat during what time of day as well as an attempt at a larger sample size.

Keywords: *Squirrel Monkeys, Costa Rica, Animal Behavior, Ethogram*

### **INTRODUCTION**

The *Saimiri oerstedii*, or the Squirrel monkey, is a primate that is widely studied in the Osa Peninsula region of Costa Rica. Tropical evergreen forests as well as primary and secondary forests are primarily where these primates are found, and is the type of habitat used in our research. Averaging from 28 cm to 45 cm in length depending on gender, these primates are given their name because of their usual small stature. Squirrel monkeys diets' mainly include leaves, fruits, and some nuts, if they are available. As a result, they do not have to expend much energy when obtaining meals. Squirrel monkeys are not solitary animals; they travel in troops that can number from seven to around sixty among larger populations (Strieter, 2011). The question being presented is: Do squirrel monkeys behave differently between males and females, juveniles and adults, and time of day in regard to eating, traveling and resting?

A study conducted in 1988 by Sue Boinski looks at the eating behavior of females and males. Based on a sample conducted over an 11-month period in Costa Rica, which was looking at foraging behavior between sexes during different seasons. Females were found to have looked for food more often and eat more food as well (Boinski, 1988). With the females eating more, the lack of time spent by males looking and eating food was spent on control of the troop or lookout for any predators in the area. There was little foraging difference during different seasons other than foraging for different types of foods, but the techniques stayed constant throughout the troop. Lastly, during foraging periods the troop as a whole was more spread out as opposed to different activities such as traveling or resting. When looking

at female behavior while foraging, it was found that females used different methods of communication. Another study by Boinski in 1990 looked at sounds the troops used for communication. Certain click noises, either single or double clicks, were used depending on how spread out the troop became while foraging (Boinski, 1992). Males commonly used certain howls or calls to move the troop forward. The howls and calls were also used as an alarm to warn others of any predators in the area. This study is a pilot program to determine the behavior of troops of squirrel monkeys involving eating, resting, and traveling during morning and afternoon times.

### **MATERIALS AND METHODS**

The materials used consisted of basic, inexpensive items needed to observe monkey troops in the forest. Items are: binoculars, stop watch/timer, waterproof paper with focal structure, waterproof pen. The subject being studied is troops of squirrel monkeys and all samples were taken during daylight hours. No flashlights were needed. The study looks at two independent variables: gender/age and time of day and a dependent variable: activity. To determine an independent variable we developed an ethogram. The ethogram goes as follows: M-male, F-female, J-juvenile for gender/age and VI- traveling, DE-resting, and CO-eating for activity. The method consists of five steps: (1) once a troop is spotted count as many as you see for five minutes, (2) starting from the front of the troop, sample one monkey at a time for one minute each, (3) after ten focal samples wait five minutes, (4) after the five minutes continue sampling one monkey one minute at a time for ten more

samples; if another ten samples are reached, wait another five minutes then continue same sampling, and (5) after all monkeys are sampled record your final sample, time, and any other observations that might affect animal behavior. No matter what the situation or time of day, these steps were followed. Correlations included gender/age versus activity as well as time of day versus activity.

**RESULTS**

A total of 97 individuals are observed doing one of three activities: eating, traveling, and resting as well as two different times of day: morning and afternoon. Three contingency tables are set up in order to find any significant difference in activity for males vs. females, juveniles vs. adults, and morning vs. afternoon. P-values are deemed significant if they fall less than .05 under the Table of Probabilities for the X distribution in Statistics: Concepts and Applications for Science (2012)

The male vs. female p-value which lies in between .05 < .025 shows significant evidence that there is a difference in behavior with regard to gender (Table 1).

**Table 1.** Showing Statistical Data Analysis of Male vs. Female behavior

	Traveling	Resting	Eating	Total
Male	*Obs 17	11	12	40
	*Exp 13.2	9.44	17.2	p hat .55
	*X 1.09	.26	1.57	
Female	7	6	20	32
	10.56	7.55	14.454	p hat.44
	1.20	.32	2.13	
Total	24	17	32	73
	.33	.236	.438	
Total X =	6.57	P.05<.025		

\* Obs- observed number of individuals \* Exp- expected number of individuals calculated from the p hat \*X- chi-square value calculated

The juvenile vs. adult p-value which lies between .20 < .15 does not show significant evidence that there is a difference in behavior with regard to age/maturation (Table 2).

**Table 2.** Showing Statistical Data Analysis of Juvenile vs. Adult behavior

	Traveling	Resting	Eating	Total
Juvenile	*Obs 8	2	8	18
	*Exp 5.88	5.04	7.07	0.185
	*X 0.759	1.83	.122	
Adult	27	28	34	79
	29.1	24.92	34.97	0.814
	1.51	.381	.027	
Total	35	30	42	97
	.327	.28	.393	
X =	3.27	P.20<.15		

\* Obs- observed number of individuals \* Exp- expected number of individuals calculated from the p hat \*X- chi-square value calculated

Lastly, the morning vs. afternoon p-value which lies in between .02 < .01 shows significant evidence that there is a difference in behavior in regard to time of day activity (Table 3).

**Table 3.** Showing Statistical Data Analysis of Morning vs. Afternoon behavior

	Traveling	Resting	Eating	Total
Morning	*Obs 13	5	26	44
	*Exp 16.3	8.58	19.05	p hat 0.459
	*X 0.759	1.83	0.122	
Afternoon	23	14	16	53
	19.66	10.33	22.95	p hat 0.546
	0.151	0.381	0.027	
Total	36	19	42	97
Total X =	8.66	P.02<.01		

\* Obs- observed number of individuals \* Exp- expected number of individuals calculated from the p hat \*X- chi-square value calculated

**DISCUSSION**

Table 1 shows the data collected for male and female monkeys during both times of the day, 40 total males and 32 total females. The total chi square value added up to be 6.57, which falls in between the p values of .05 and .025. With a small p value falling under, .05 we can conclude that females and males act different from each other.

Table 2 shows the data collected for juveniles and

adults during both times of the day; adults include both male and female as well as any other monkeys that are unidentifiable but deemed not juvenile. Juveniles have a total sample size of 18 compared to adults who have a total sample size of 79. The chi-square value calculated is 3.27, which falls between the p values of .20 and .15. Such values are too high and thus the p value is insignificant meaning we are not confident there is any difference in behavior due to age. Also, the small sample size of the juveniles could have played a role in the small chi squared value calculated.

Table 3 shows the data collection for morning and afternoon behaviors, includes both juvenile and adult monkeys. The morning behaviors have a total number 44 samples, and the afternoon has a total sample size of 53. The chi-square value calculated is 8.66, which falls in between the p values of .02 and .01. This is our most significant chi squared value calculated meaning there is significant evidence that the monkeys observed act differently in the morning than in the afternoon.

Data for Table 1 concludes that males act differently than females; specific cells show females eat more often than males. Because Table 2 has insignificant values, we cannot conclude there is a difference. Table 3 shows significant evidence that the monkeys observed travel more in the afternoon and eat more in the morning. Further research could include longer sampling periods with the attempt at a larger sample size. Also, one could include the specific foods the monkeys were eating.

## ACKNOWLEDGEMENTS

I would like to acknowledge the DANTA association for setting up a wonderful trip. As well Daniela and her husband for taking our group in and treating us well and teaching us many things about a Costa Rican forest. To Emily Buck, Emily Frenz, Randy Rodriguez, and Sammi DeWald for helping with the data collection process. Also to Dr. Ayella, Dr. Wilgers, Dr. Frye, and Dr. Midgley for helping me through the analyzing process of my project.

## LITERATURE CITED

- Boinski, S 1988. Behavior Ecology and Sociobiology Volume 23, Number 3, 177-186, DOI: 10.1007/BF00300352
- Boinski, S. 1992. Olfactory communication among Costa Rican squirrel monkeys: a field study. *Folia Primatol* 59(3): 127-36.
- Strieter, Amy. 2011 "Squirrel Monkey." <http://www.anywherecostarica.com/flora-fauna/mammal/squirrel-monkey>
- David LeBlanc (2012) Statistics: Concepts and Applications for Science (2012) XanEdu Publishing, Inc