Parental Influences on the Behavior of a Juvenile Bornean Orangutan (Pongo pygmaeus)

Raechel McUmber  
*St. John Fisher College*

Sarah Robarts  
*St. John Fisher College*

Gregory B. Cunningham  
*St. John Fisher College*

Follow this and additional works at: [http://fisherpub.sjfc.edu/ur](http://fisherpub.sjfc.edu/ur)

Part of the [Animal Studies Commons](https://fisherpub.sjfc.edu/ur/collections/animalstudies), and the [Biology Commons](https://fisherpub.sjfc.edu/ur/collections/biology)

How has open access to Fisher Digital Publications benefited you?

**Recommended Citation**

McUmber, Raechel; Robarts, Sarah; and Cunningham, Gregory B. "Parental Influences on the Behavior of a Juvenile Bornean Orangutan (Pongo pygmaeus)." *The Review: A Journal of Undergraduate Student Research* 17 (2016): -. Web. [date of access].  
<http://fisherpub.sjfc.edu/ur/vol17/iss1/8>.

This document is posted at [http://fisherpub.sjfc.edu/ur/vol17/iss1/8](http://fisherpub.sjfc.edu/ur/vol17/iss1/8) and is brought to you for free and open access by Fisher Digital Publications at St. John Fisher College. For more information, please contact fisherpub@sjfc.edu.
Parental Influences on the Behavior of a Juvenile Bornean Orangutan (Pongo pygmaeus)

Abstract
Here we discuss the influence of the mother and father on the behaviors of a juvenile Bornean Orangutan (Pongo pygmaeus). This species is known for being solitary and asocial, in that males and females do not live together, while living in their natural environment. However, adults are usually housed together in zoo settings. We observed a juvenile and both of her parents in their zoo enclosure and recorded the play and parentally influenced behaviors, such as swinging and eating, performed by the juvenile. It was found that the juvenile played and performed parentally influenced behaviors significantly more while in the presence of her mother than with her father, and while in the presence of both parents than with a specific parent. Our study highlights the importance of looking at behavioral interactions within a species that usually has limited to no interactions in the wild. It is essential to compare the differences between members of the same species who have been either bred and kept in captivity or lived their entire lives in the wild because once those differences are discovered, zoo enrichment activities, food offerings, and housing structures can be changed so as to create the most natural conditions for these animals.

This article is available in The Review: A Journal of Undergraduate Student Research: http://fisherpub.sjfc.edu/ur/vol17/iss1/8
Bornean Orangutans (*Pongo pygmaeus*) are native to Asia and primarily exist in the lush rainforests of Borneo, Indonesia. However, due to current events such as deforestation and flash burning, habitat loss has significantly increased for these animals. Due to this, current research conducted in the wild environment has been extremely limited because the sample size of these animals has decreased dramatically and they are becoming harder to find. There are, however, earlier studies that illustrate the social systems of these animals. For example, Van Shaik & Van Hoof (1996) showed that Orangutans are a semi-solitary species that come together only to mate or gather food. Additionally, sexual selection acts more heavily on the males so they will attempt to mate as much as possible in order to pass on their genes, while females perform all of the parental care from start of pregnancy to the end of the seven-year maturation period for their offspring. This solitary lifestyle and heavy sexual selection on the males sets up the idea that the offspring of a pair of Orangutans will present behaviors that closely mirror those of the mother, since the mother is the only parent to provide any parental care.

Food sharing, particularly between the mother and her offspring, plays an essential role in the development of all Orangutan offspring. The informational hypothesis strives to explain this reasoning due to the fact that obtaining food from older individuals may allow the offspring to acquire the knowledge needed to make their own dietary choices as they age. On the other hand, the nutritional hypothesis states that food sharing allows increased growth rates and reduces the age at which weaning occurs. Research done by Jaeggi *et al.* (2008) shows that wild Bornean Orangutan mothers will food share with offspring a majority of the time, but only on when the offspring is the one to initiate the sharing event. Mothers were passive but tolerant actors throughout the process, only resisting the sharing attempt 5.1% of the time. This study found that the nutritional hypothesis was only supported in the sense that offspring would more often than not take food with a higher nutritional content. The informational hypothesis was supported by the fact that younger offspring solicited more food, the variety of the food solicited declined with age (demonstrating learning), and food items the offspring could not yet attain by themselves were solicited from the mothers. It can be concluded that the offspring rely more heavily on the mothers than the fathers, and form social relationships in that regard. Due to these observations of wild Orangutans, we were curious about food sharing and other interactions between captive Orangutans that have never lived in the wild.

Although the social systems of wild Bornean Orangutans are minimally understood due to a lack of research, the social systems of captive, group-living Bornean Orangutans are well understood. Some research has shown that the quality of the food provided and the social factors present may influence male Orangutan development, which is a top concern for those who care for these animals in zoo environment (Schürmann & Van Hoof 1986). Edwards & Snowdon (1979) found that male and female adult Bornean Orangutans living in captivity tend to become more social than their wild counterparts. In the wild, males and females
only meet to mate, but, in captive environments where males and females are housed together, mating attempts compose very few of the total social interactions adults have. The rest of these interactions are classified as being social or playful, and include using toys or swinging together. The housed juveniles are also extremely social beings, however, as they had been born and raised in captivity, constantly surrounded by other Orangutans, which is the complete opposite of what would happen in the wild. The juveniles show that they are easily adaptable to this social environment, and the solitary lifestyle Orangutans have in the wild may not be evolutionarily engrained.

All of the presented information, including the dependency of offspring on mothers, begs the question of how juvenile and adult Bornean Orangutans interact when housed together in captivity. We chose to address this issue. Specifically, we chose to research whether or not maternal influences would have a higher impact on a juvenile Bornean Orangutan than paternal influences. Based upon research done by Van Schaik and Van Hooff (1996), we predicted that maternal influences would exceed that of paternal influences, since the father would have no knowledge or experience caring for a juvenile.

**Methods**

*Behavioral observations*

During the fall of 2015, we travelled to the Seneca Park Zoo in Rochester, NY to observe behaviors performed by a captive two-year-old juvenile female Orangutan, Bella, who was housed with her mother, Kumang, and her father, Denda. Observations lasted for a total of 13 hours spanning multiple afternoons (12 pm – 4 pm) and were performed both inside and outside.

**Recording Behaviors**

To determine the type of behavior performed by the juvenile, we differentiated between parentally influenced behaviors and play behaviors. Parentally influenced behaviors included: eating, sleeping, interaction with the parent present, and “other” which consisted of vocalizations to the parents and social interactions with the zookeeper in the presence of the parents. Play behaviors included: walking, climbing, swinging, and interacting with the enrichment provided by the zoo. We also noted whether behaviors were performed in the presence of an individual parent, both parents, or alone. To record the total number of behaviors performed in the time period, we tallied each occurrence in the corresponding category.

**Statistical analysis**

We were interested in discovering whether parental and play behaviors based on Kumang and Denda’s influences on Bella statistically differed when Bella was in the presence of one parent or the other. Chi-squared tests were performed to analyze each of the four data sets we compiled after completing the data collection.

**Results**

We found that the offspring’s behavior was affected more by the presence of the mother than the father. The juvenile played significantly more while in the presence of her mother than her father (Fig. 1, Chi-squared=37.33, df=1, P<0.01). When the juvenile was in the presence of both parents, she played significantly more than when she was alone (Fig. 2, Chi-squared=8.258, df=1, P<0.01). The juvenile performed parentally influenced behaviors significantly more while in the presence of her mother than her father (Fig. 1, Chi-squared=17.921, df=1, P<0.01). While the juvenile was in the presence of both parents, she performed
parentally influenced behaviors significantly more than when she was alone (Fig. 2, Chi-squared=90, df=1, P<0.01).

Fig. I

Play behaviors performed by a juvenile Bornean Orangutan occurred more in the presence of the mother than in the presence of the father (P < 0.001). Parentally influenced behaviors were performed by a juvenile Bornean Orangutan more in the presence of the mother than the presence of the father (P < 0.001).

Fig. II

Play behaviors performed by a juvenile Bornean Orangutan occurred more in the presence of both parents then when the juvenile was alone (P < 0.001). Parentally influenced behaviors were performed by a juvenile Bornean Orangutan more in the presence of both parents than when alone (P < 0.001).
Discussion

We sought to discover whether or not maternal influences had more of an effect on a juvenile Bornean Orangutan than paternal influences, when all members of the family were cohoused in captivity. This was studied since one of the largest concerns when it comes to captive Bornean Orangutans is how their social interactions change compared to wild behaviors.

The analysis of our data shows that in situations where the mother is present, her influence has the greatest effect on a juvenile Bornean Orangutan compared to when the father is present. For example, the juvenile performed both play and parentally influenced behaviors more in the presence of the mother than the father to a significant degree (Fig. 1). However, when the juvenile was alone, she was observed performing these behaviors also, indicating possible maturity (Fig. 2). In the wild setting, an offspring will rely on the mother for breast milk nutrients until around the age of four, and still be dependent on the mother until around the age of seven (Van Schaik & Van Hooff 1996). While performing our observations, we witnessed a large decrease in breast feeding activity by the juvenile, and a greater reliance on solid foods such as fruit and lettuce, which was interesting given Bella’s young age of two. This decrease in weaning age and increased levels of independent activity could be due to the cohabitation of the juvenile with both parents, facilitating increased learning and maturity rates. Interestingly, we observed Kumang attempting to manipulate Bella’s sleep and the amount of time she spent both alone and with her father by trapping Bella in her arms and refusing to let her up, or by taking her and swinging her into the other side of the enclosure when her father would enter. This suggests that Bella’s development has been altered by the zoo environment.

Concerning behaviors related to play, including climbing, swinging, walking, and interacting with zoo enrichment, while it was observed that Bella performed these behaviors more in the presence of the mother, we witnessed an overall higher rate of play with the father than parental care, indicating that Denda may be more of a play mate to his daughter than a parent. Additionally, we noticed more interaction of Bella with the zookeeper when the father was present, possibly due to the lack of protectiveness normally seen in a parental figure. We did witness this protective behavior in the mother when she defended Bella against the father when he became aggressive over food.

There are multiple hypothesized reasons why Orangutans are solitary creatures in the wild, foremost of which is the fact that they require so
much caloric intake per day. If the sexes were to all cohabitate, the food levels would drastically decline, which could lead to constant emigration in the species (Van Schaik & Van Hooff 1996). In the zoo setting, although there is food provided multiple times a day to allow for the necessary nutrient requirements, the mother’s attempts at stopping Bella from terminating breast feeding could be due to her instinct that Bella was not ready to stop and still needed the additional nutrients. We also witnessed the mother taking food from Bella, and handing her only small amounts, which might indicate teaching her which foods to eat, the topic described in the informational hypothesis (Jaeggi et al. 2008).

Research performed by Weingrill et al. (2011) sought to determine if hormone levels in zoo-living Orangutans differed from those in the wild, specifically concerning glucocorticoid (GC) and androgen levels. Close bonds in the wild only exist between mother and offspring, with male aggression directed towards females when outside of mating season. Glucocorticoid levels are often indicators of stress, while androgen levels are concerned with the development of male characteristics. The results of the study concluded that there was an increase in GC levels of both males and females correlated with an increase in group size, which is seen in zoo environments. Additionally, the levels of androgen were higher in Bornean males when compared to the levels in other species. It is possible that both Denda and Kumang had increased levels of the GC hormone from being housed in a small enclosure in close proximity with each other and their daughter, and this is the reason why we witnessed aggression events between both parents and offspring.

In conclusion, we witnessed that the relationship between a mother Bornean Orangutan and her offspring is more stable and important concerning the development of her child than the relationship between offspring and father when all family members are housed together. Additional research needs to be conducted in which the offspring can be isolated with each parent individually for the same amount of time to see what behaviors they will perform when solely around one parent.
References


