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Final Project Summary & Annotated Bibliography

Key Scientific Concepts

1. Why do bonobos engage in same-sex behaviors?

Same-sex sexual behaviors are used to strengthen bonds amongst females and relieve tensions surrounding resource and hierarchical competition. Females and males will engage in non-reproductive sex for similar reasons. "GG rubbings" decrease the stress hormone cortisol and promote cooperation amongst several female partners which is beneficial in their fission-fusion structured societies in which groups are constantly dividing and forming new ones.

2. How have bonobos become a matriarchal species?

Females use sex as a means of socially bonding with each other and because of this, females can form same-sex socio-sexual coalitions to create their hierarchy. Frequent sexual interactions in a coalition lead to joint suppression of male aggression/other third parties which guarantee priority access to resources over males as well as protect themselves from unwanted sexual advances from male bonobos.

3. How do bonobos engage with each other through sex?

Engaging in same-sex sexual activities for bonobos includes females "GG rubbing" and males "penis fencing". These actions (vagino-cervical stimulation and intensity of orgasm) cause an increase in oxytocin levels in their urine (only observed after same-sex sexual behavior amongst females) which leads to closer physical proximity among females as well as support in intra-sexual coalitions (females forming bonds with other females, creating a society that prioritizes female access to resources). "GG rubbing" is performed face-to-face (mutual gaze) which promotes communication and trust through eye contact as well as increases oxytocin levels.

Final Project Summary

Bonobos and chimpanzees are humans closest cousins and although they make look similar, they could not be more different in terms of behavior. Bonobos inhabit the forests of the Congo Basin in the Democratic Republic of the Congo whereas chimpanzees are more widely spread across eastern Africa. Both species live in fission-fusion group structures that cause the rapid formation and dissolution of groups. This leads to members of these groups, particularly females, needing to form relationships quickly and efficiently in order to bond with new groups

(3). The structure of these groups and the way in which members bond with each other is vastly different. For my project, I will be focusing on the differences in hierarchies between bonobos and chimps, specifically how males and females occupy different roles in each of the communities. Bonobos use non-reproductive sex as a way of strengthening bonds and creating female-dominant society whereas chimps use grooming in a similar manner but live under a male-dominant society. The creative aspect of my project is a short story book that highlights the difference of roles that females play in bonobo and chimp social structures.

Bonobos live in matriarchal societies which are formed through strong female bonds. When it comes to resources and suppressing male aggression, females turn to same-sex sexual interactions as a method of building trust and social bonds among themselves. Sexual interactions, specifically female same-sex sexual interactions, cause an increase of oxytocin which can be observed through urine samples (8). The hormone oxytocin, also known as the “love hormone”, plays an important role in forming social bonds. For example, in order to gain access to new groups, young females will approach older, higher-ranking females and initiate tension-relieving sex. Female bonobos engage in a position called “GG rubbing” in which the two partners face each other and rub their genitals against each other (4). This position allows for eye contact between the partners which is a crucial step in the formation of social bonds because it plays a major role in the production of oxytocin (1). During the creation of new bonds, females have been observed to make more eye contact with each other as they engage in “GG rubbing”.

Chimpanzees also form fission-fusion bonds. Like bonobos, mothers and sons have life-long bonds in chimpanzee society, meaning that males stay with their natal groups while females, after reaching sexual maturity, leave to join new groups (8). Bonding between chimpanzees occurs during grooming sessions. Female chimps have offspring every three to five years and raise them without paternal help (9). Physical touch, similar to how bonobos interact with each other sexually, eases tensions and is used to communicate and build trust (8). In chimpanzee society, males are the ones to form coalitions. Their hierarchy consists of one dominant male, a few subordinate males who stay with their mothers, and several adult females (8).

Female chimpanzees face aggressors from both sexes. Access to and quality of food is based on rank. Therefore high-ranking female chimps are often aggressive towards incoming females and often engage in infanticide. By killing the offspring of other females, high-ranking female chimpanzees secure better resources for herself and her offspring. During the timeframe in which females exhibit sexual swellings, females will try to mate with as many males as possible. Females choose to mate with several partners to avoid infanticide, as males will often kill offspring that are not related to them to ensure that their genes are the ones that are carried on (9). If female chimpanzees mate with several partners, the males may assume the offspring is theirs and are less likely to kill it.

Female bonobos are sexually receptive even in times that do not sync with their ovulation cycles which is a part of the reason why sex is such a large part of their society (10).

This “concealed ovulation” is thought to be one of the reasons that male aggression is much less common in their societies compared to their closest cousin, the chimpanzee. Because of the frequent matings and confusing nature of the female swellings, male bonobos are unable to distinguish their own offspring from the offspring of another male. This confusion surrounding the paternity of offspring can prevent infanticide from occurring (5). Male chimpanzees know when females are ovulating which leads to sexual aggression and, in some cases, infanticide. Therefore the females may benefit from mating with as many partners as possible in order to ensure the survival of their offspring (8).

The story follows a young female chimp who gets lost in the jungle and comes across a group of bonobos. The chimp explains the male-dominant society that she lives in as well as how having non-concealed ovulations causes tension and infanticide. The bonobo then compares how bonobos live in a female-dominated society that thrives through engaging in sex frequently to relieve tensions and how their coalitions lead to less violent male behavior. She also explains that bonobos have concealed ovulation so their male partners do not know which female is having their child which leads to less infanticide. In the picture book, there are several depictions of the different ways in which bonobos have sex. These images follow the page that explains that interacting with each other in this way enables them to form tighter bonds and strengthen coalitions. The pages that follow specify this behavior also calms tensions and plays a large role in the concealment of their ovulations. These pages include the faces of angry bonobos becoming happy representing the easing of tensions, a confused male bonobo for concealed ovulation, and the coalition of females kicking a male out of the group as a representation of the relationship between the females.

Annotated Bibliography

1. X, Science. “New Insights Help to Explain Why Same-Sex Sexual Interactions Are so Important for Female Bonobos.” *Phys.org*, Phys.org, 10 Sept. 2019, <https://phys.org/news/2019-09-insights-same-sex-sexual-interactions-important.html>.

This article outlines the differences between the societal and social structures of chimpanzees and bonobos. It discusses different types of sex that bonobos engage in, specifically how same-sex relations work. It also touches on the chemical composition of their urine as well as how sex relates to cooperation within their social circles.

2. Waal, Frans B. M. De. “Bonobo Sex and Society.” *Scientific American*, Scientific American, 1 June 2006, <https://www.scientificamerican.com/article/bonobo-sex-and-society-2006-06/>.

This article discusses the history of the study of bonobos, especially in the wild in African countries as well as in captivity. The author explains how their environment has affected their

evolution and how their psychique and diet play a key role in their sexual behavior. This article also contrasts chimpanzees and bonobos because of their close ancestry.

3. Samuni, L. (.1,2), et al. "Characterization of Pan Social Systems Reveals In-Group/out-Group Distinction and out-Group Tolerance in Bonobos." *Proceedings of the National Academy of Sciences of the United States of America*, vol. 119, no. 26, June 2022. EBSCOhost, <https://doi.org/10.1073/pnas.2201122119>.

This source was used for information about the social structure of Bonobo societies as well as a comparison of bonobo and chimpanzee hierarchy.

4. "Bonobo (*Pan paniscus*) Fact Sheet: Behavior & Ecology." LibGuides, 28 February 2023, <https://ielc.libguides.com/sdzg/factsheets/bonobo/behavior>. Accessed 4 April 2023.

This source explains the mating behaviors of bonobos, specifically how their anatomy affects the way in which males and females interact with each other. It also discusses their social groups, territorial behaviors, and their communication through vocalizations as well as body language.

5. Angler, Natalie. "In the Bonobo World, Female Camaraderie Prevails." *New York Times*, 10 September 2016, <https://www.nytimes.com/2016/09/13/science/bonobos-apes-matriarchy.html>. Accessed 4 April 2023.

This source discussed the interactions between female coalitions and male aggressors, both positive and negative. It also gave an overview of their social hierarchy as well as how their hypersexuality helps maintain order in their societies.

6. Kyoto University. "'Big mama' bonobos help younger females stand up for themselves: Female bonobo coalitions more easily defeat aggressive males." *ScienceDaily*. ScienceDaily, 19 July 2016. <http://www.sciencedaily.com/releases/2016/07/160719105718.htm>.

This source went in depth on how female coalitions deal with male aggression. Older females will defend young females or females that are new to the coalition in order to give their own sons better chances of mating.

7. Moscovice, Lisa, et al. "The cooperative sex: Sexual interactions among female bonobos are linked to increases in oxytocin, proximity, and coalitions." *ScienceDirect*, 16 November 2008, <https://www.sciencedirect.com/science/article/pii/S0018506X19301503#section-cited-by>. Accessed 4 April 2023.

This study explains the scientific method in which researchers tested the urine of bonobos after having sex. The researchers found that the oxytocin levels in the urine of female bonobos increased after engaging in sex with other female members of their coalition but did not increase after sex with males.

8. "Chimpanzee Society | Chimpanzees." Project R&R, <https://releasechimps.org/chimpanzees/chimpanzee-society>. Accessed 11 April 2023.

This source explains the culture, family life, the social communities of chimps. It also included the intricacies of their relationships such as how they groom and kiss each other.

9. Bohannon, John. "Domestic Violence in the Jungle." science.org, 16 November 2008, <https://www.science.org/content/article/domestic-violence-jungle>. Accessed 10 April 2023.

This source explained the rate at which female chimpanzees give birth, how long they raise their young, and social dynamics between males and females.

10. Demuru, E., Caselli, M., Guéry, JP. *et al.* Female bonobos show social swelling by synchronizing their maximum swelling and increasing bonding. *Sci Rep* 12, 17676 (2022). <https://doi.org/10.1038/s41598-022-22325-7>

This source explains the connection between social bonding and sexual swellings of female bonobos. The synchronization is formed through their bonds and also acts as a means of further connection between the females in their coalitions.

Once there was a lost baby CHIMP...



who ran away from home...

She came across
a band of
BONOBOs



The friendly matriarch



welcomed her with
open arms!



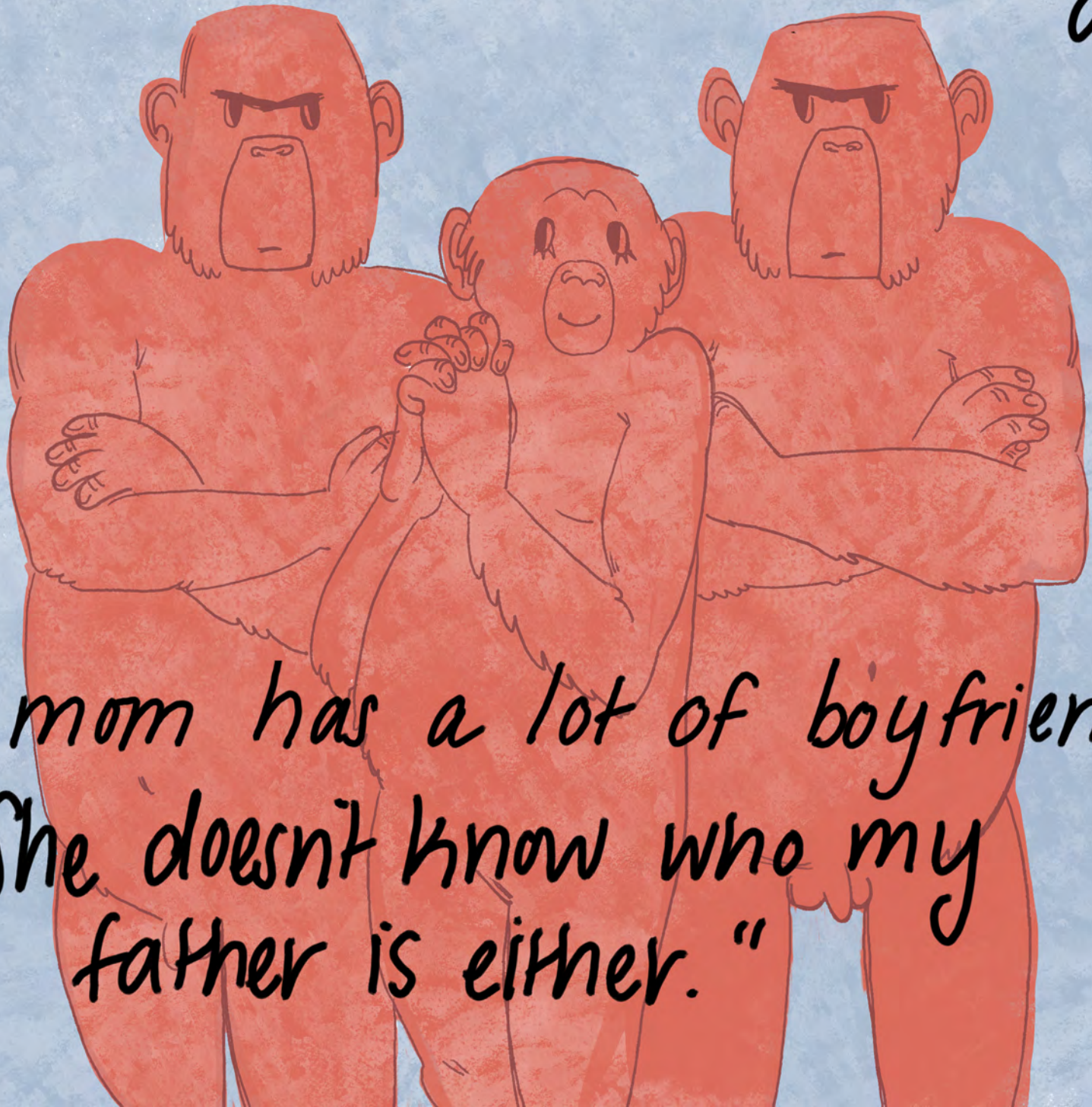
And so the CHIMP told them her story...

"I come from a scary
place ...



The males will
kill babies who
aren't their own."

"Males can tell when females are ovulating..."



So my mom has a lot of boyfriends.
She doesn't know who my
father is either."

"Sometimes dominant females kill babies too



so they can have the best food
all to themselves and their babies."

"Well here..." said the
matriarch



"Females are in
charge! We form
strong bonds with
other females..."



By having lots of SEX with each other!



If there is tension...

We solve it with

Sex!

It is linked
to an
increase in
oxytocin!



We have lots of sex
with males too.

BUT!

They can't tell when we
are ovulating. They'll
never know if sex
leads to a baby or not!

So no baby killing
here!



"Coalitions kick males out if they are mean!"



"Gals protect gals!"

"Wow!"

said the
CHIMP.



"Can I stay with you?"



And they all lived

happily

ORGY - after