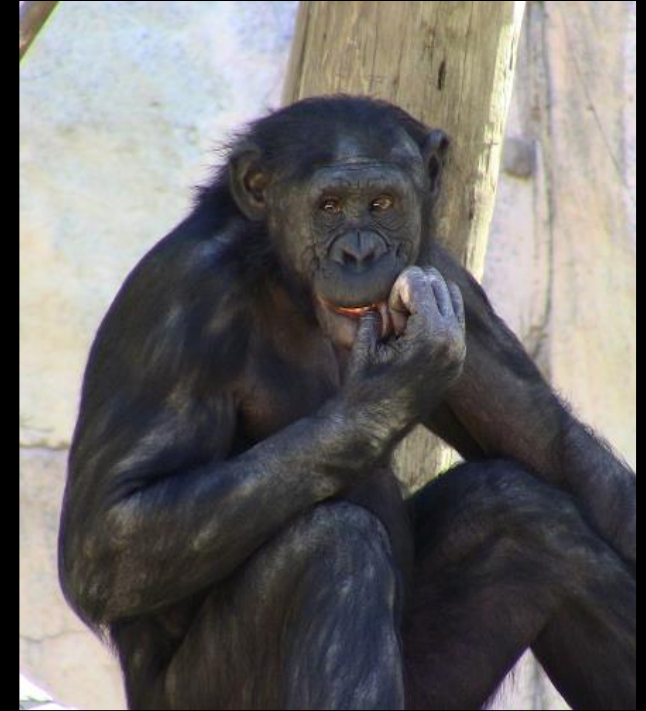


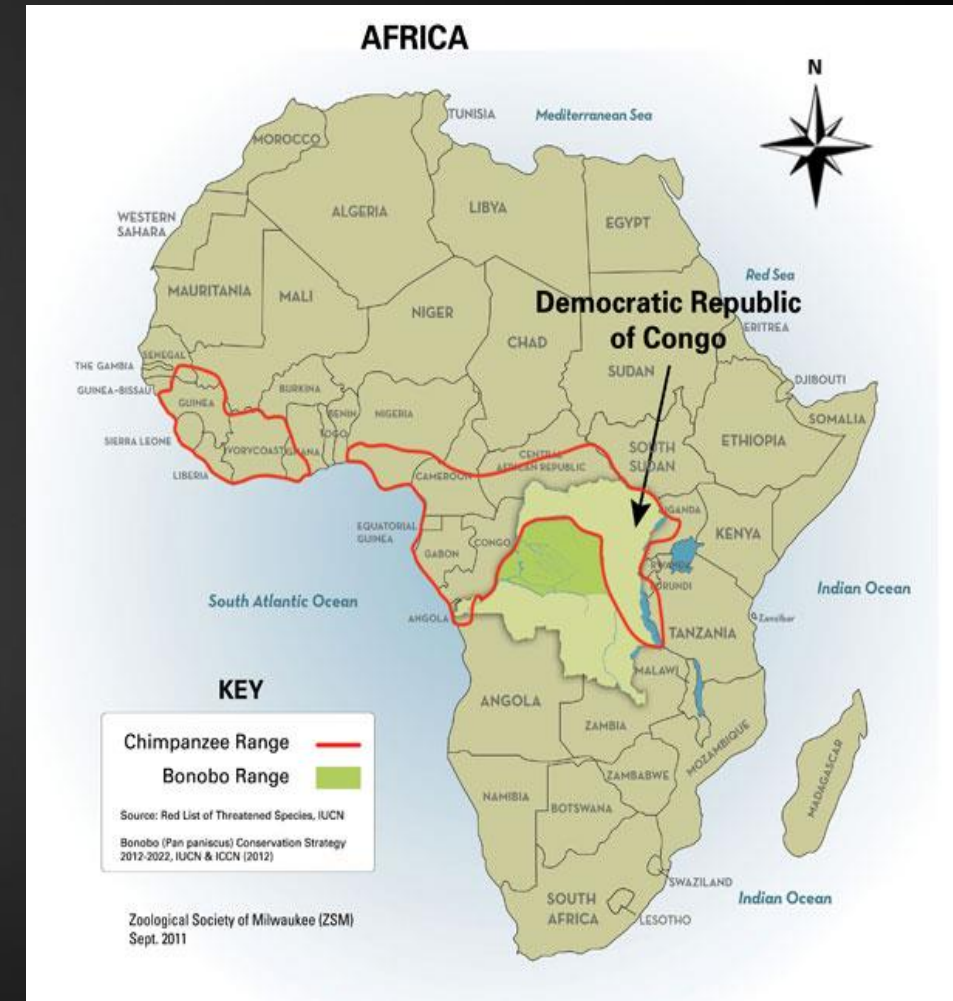
The Female-Bonded Nature of Bonobos: A Social Influence on Offspring

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Bonobo Quick Facts

- ▶ **Bonobo's scientific name:** *Pan paniscus*
- ▶ **Sister species to chimpanzees**
 - ▶ *Pan troglodytes*
 - ▶ 98.7% of DNA shared
 - ▶ *Pan* species are most closely related species to humans
- ▶ **Only found in central Democratic Republic of the Congo, south of the Congo river.**
 - ▶ Discontinuously distributed
- ▶ **Social Structures**
 - ▶ Mother-offspring: most stable social group
 - ▶ Peaceful, egalitarian, and female dominated
 - ▶ Females establish dominant relationships



Female Interactions

▶ “Female-Bonded”

- ▶ Captive females prefer female-female close-interactions within a group

▶ Female Migration

- ▶ Female bonobos migrate between groups
- ▶ Settle down to mate and produce offspring
- ▶ Typically not related

Female Interactions (cont.)

▶ Social Dominance?

- ▶ Females aggregate together, forming close social associations
- ▶ Active in mate choice
- ▶ Potentially high social status
- ▶ Controversial dominance rank

▶ Between Groups

- ▶ Stressful interactions result in female-female interactions
- ▶ Maintain peace between groups

The Mother-Juvenile Relationship

▶ Separation from the mother

- ▶ Spatially dependent on their mothers for longer periods of time
- ▶ Weaning occurs at a later age than chimpanzees

▶ Mimicry

- ▶ Juveniles are curious of mother's behavior
- ▶ Repeat mother's behaviors – playing and following

▶ Important to the juvenile's social competence

▶ Mother-reared benefits

- ▶ Higher standard of empathy and consolation for others
- ▶ Quick stress recovery
- ▶ Lower anxiety
- ▶ Likely to console others

Social Interactions in Juveniles

▶ Begin to playfully interact with other bonobos around 2 years of age

- ▶ Mother still protective
- ▶ Disallows offspring to travel more than a few meters (~4) away

▶ Aggressive Interactions

- ▶ Brusque movements
- ▶ Full speed pursuit/attacks
- ▶ High-pitched vocalizations

▶ Grooming Interactions

- ▶ Form bonds within groups
- ▶ Manipulating an individual's body surface (licking, nibbling, picking)

Social Interactions (cont.)

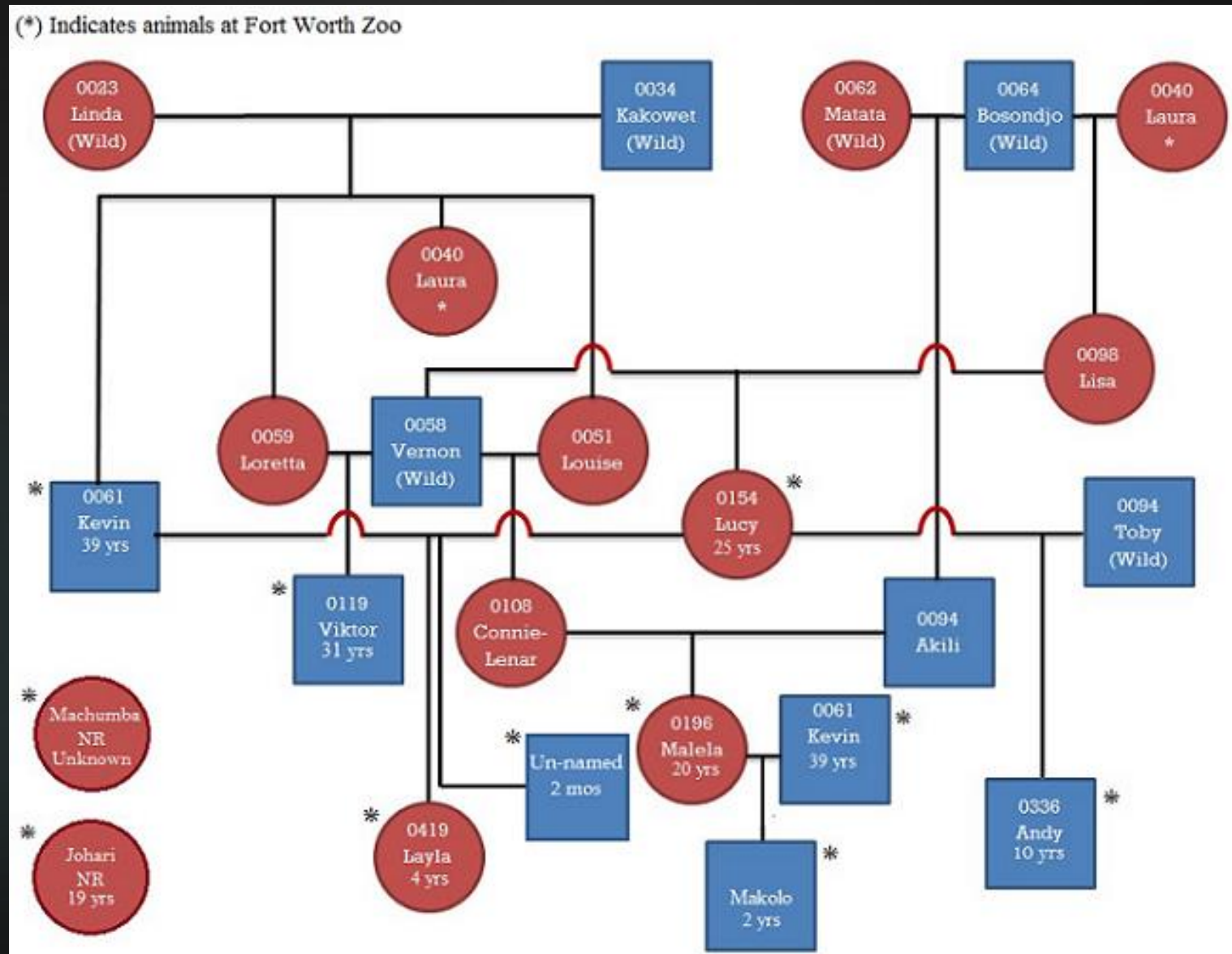
▶ Playful Social Interactions

- ▶ Wrestling
- ▶ Mouthing
- ▶ Chasing/running
- ▶ Playful facial expression
- ▶ Fighting
- ▶ Tickling

▶ Sexual Interactions – any contact between genitals

- ▶ Occurs as early as >2 years of age
- ▶ Play-like genital contact (rubbing/touching)
- ▶ Copulation-like genital contact (mounting/insertion)
- ▶ Inspections (smelling, licking, touching)

Fort Worth Zoo: Bonobo Family Tree



Research Question

- ▶ Mother-son interactions are the most prevalent, important relationship to female bonobos.
- ▶ If bonobos are observed as “female-bonded”, does this influence the interactions of their newly-interactive offspring?
- ▶ Is there social preference in the juvenile bonobo’s interactions?

Research Hypothesis

If the captive bonobos at Fort Worth Zoo follow a female-bonded social interaction pattern, the juvenile bonobo, Makolo, will interact most frequently with other female bonobos as he begins to increase in social interactions.

Methods/Experimental Design

▶ Video Recording

- ▶ 2-3 visits/week
- ▶ 1-2 hours of activity recorded/visit
- ▶ Collected a total of ~21.5 hours

▶ Interval Recording

- ▶ 30 second intervals observed
- ▶ Interactions between juvenile and all individuals
- ▶ Type of interactions

▶ Interactions Recorded

- ▶ Any interaction which occurs between Makolo and his peers will be recorded
- ▶ **Ex.** Grooming, social play, sexual contact/inspection, aggression, etc.

Methods: Data Collection Sample

Interval	Physical Play	Facial Play	Touch	Groom	Sexual Contact	Clinging	Food
215						>Ma	
216			>Ma				
217						Ma>	
218			>Ma				Ma>
219						>Ma	Ma>
220	>La					>Ma	
221	>La		>Ma				
222	>La		>Ma				
223			>Ma				
223			>La				
224	>La		>Ma			>La	
225			>Ma			>La	
226			>Ma		La>		
227			>Ma		La>		

Figure 1: Sample of interaction data collected for juvenile bonobo at Fort Worth Zoo. Each 30-second interval is separated into the interaction columns and indicated who initiated or received the interaction.

Results

Table 1. Table of absolute interactions between juvenile bonobo and group members.

Individual	Physical Play	Facial Play	Touch	Groom	Sexual	Cling	Food	Total
Layla	285	36	50	2	42	28	0	443
Malela	213	3	917	136	22	890	15	2196
Lucy	1	4	30	0	0	0	0	35
Viktor	0	0	0	0	0	0	0	0
Johari	3	0	13	0	13	0	0	29
Andy	40	4	21	3	1	0	0	69
Kevin	0	0	0	0	0	0	0	0
Machumba	38	1	27	1	11	0	0	78
Baby	0	0	3	0	0	0	0	3
TOTAL	580	48	1061	142	89	918	15	2853

Results

Table 2. Relative interactions between juvenile bonobo and group members according to exposure/observability constants.

Individual	Interactions	Intervals	Observability Constant	Relative Interactions
Layla	443	2232	0.045	19.85
Malela	2196	2567	0.039	85.55
Lucy	35	2232	0.045	1.57
Viktor	0	189	0.53	0
Johari	29	924	0.11	3.14
Andy	69	953	0.10	7.24
Kevin	0	100	1.0	0
Machumba	78	1147	0.087	6.80
Baby	3	1494	0.067	0.20

Results

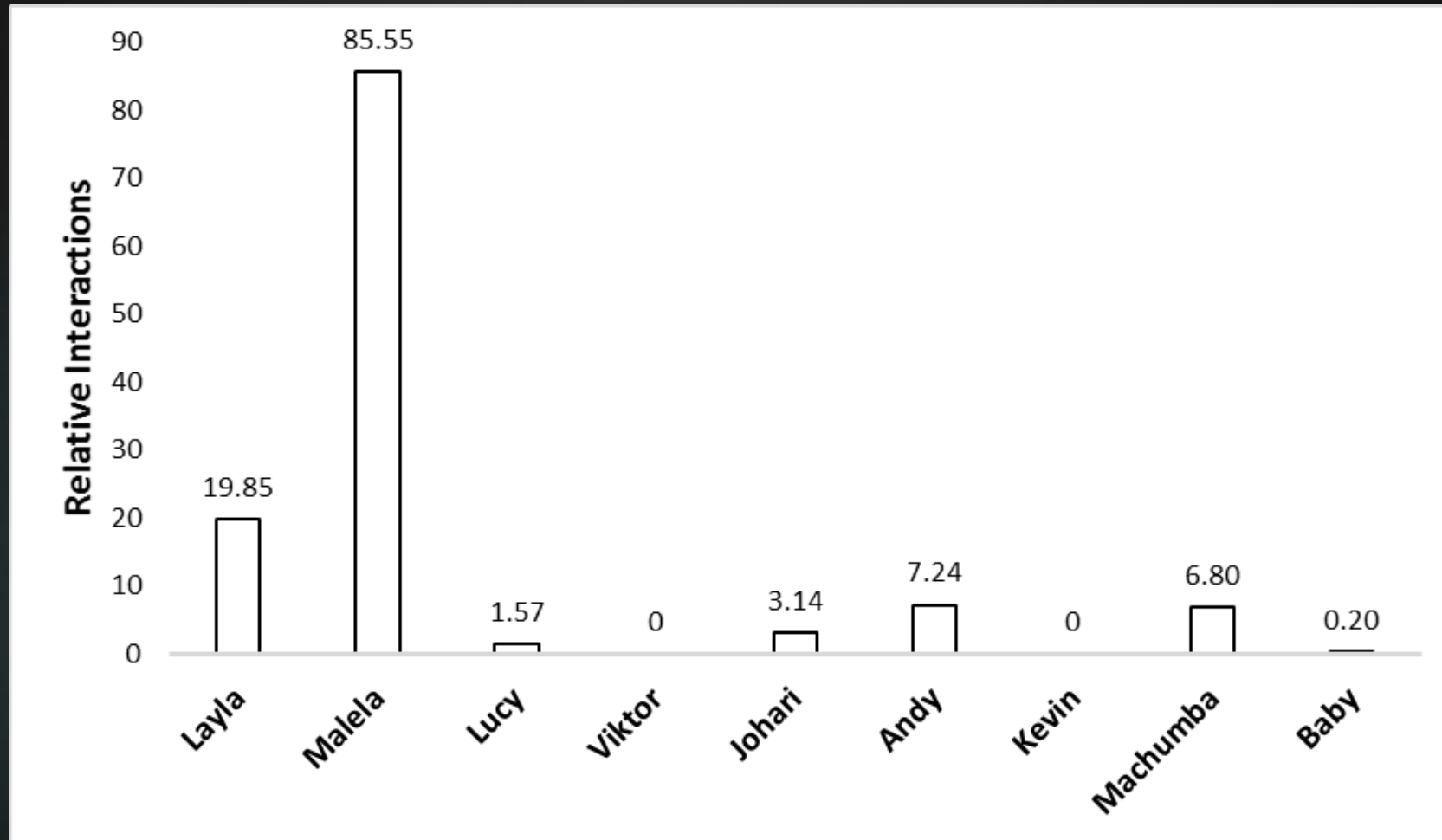


Figure 2. Relative interactions present between juvenile bonobo and group members. Relative interactions calculated using an observability constant according to observability.

Results

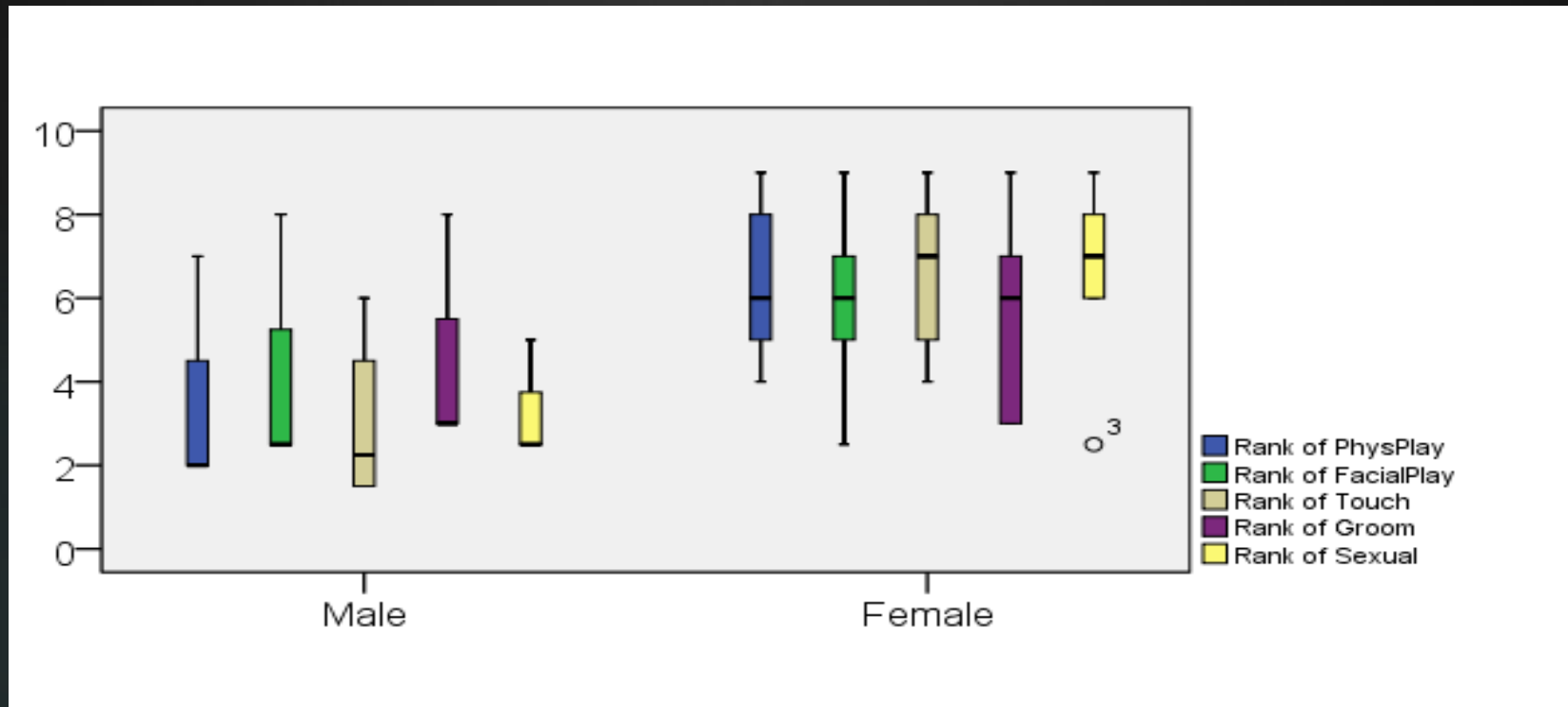


Figure 3. Overall interaction of male versus female one-tailed $t=2.02$, $p<0.05$. Across all category interactions, significant difference is seen in touch ($F=0.037$, $p<0.05$) and sexual interactions ($F=0.045$, $p<0.05$).

Results

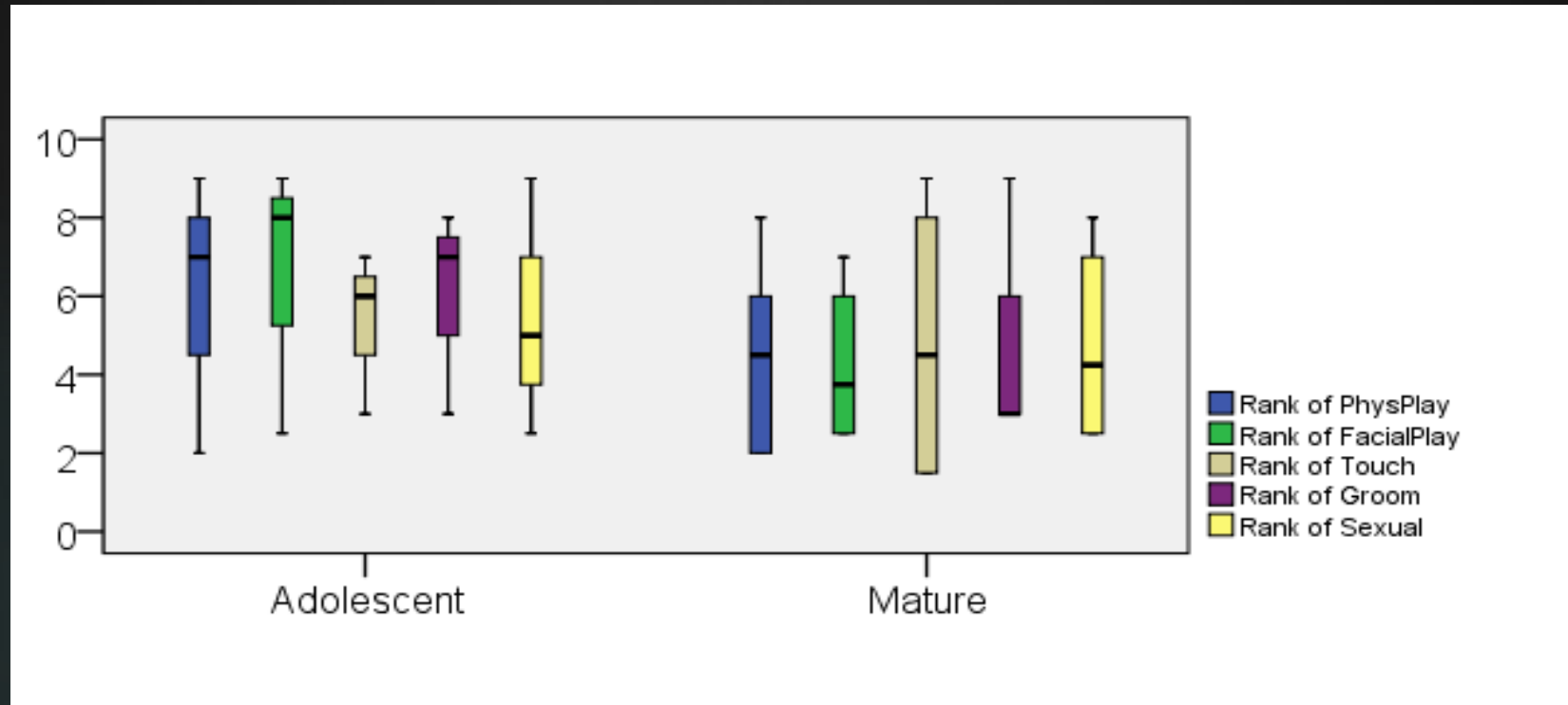


Figure 4. Across all categories of interaction, there is no difference between adolescent interaction and mature interaction ($p > 0.05$).

Conclusions

- ▶ **Hypothesis:** Makolo will interact most frequently with other females due to the female bonded nature of bonobos.
- ▶ Data was collected from **10** captive bonobos, over **~22** hours, and **2,853** absolute interacting intervals.
- ▶ **In conclusion:**
 - ▶ Makolo showed significant difference in interactions of touch and sexual contacts in males versus females.
 - ▶ Makolo showed no significant difference in any interaction categories based on age.
 - ▶ Makolo's interactions suggest female-preference, which could account for his mother's social influence, or due to his own preference.

Literature Cited

- Altman J. Observational study of behavior: sampling methods. Behavior [Internet]. 1974 [cited 2014 December 4]; 49(3/4):227-267.
- Clay Z, de Waal FBM. Development of socio-emotional competence in bonobos. PNAS [Internet]. 2013 [cited 2014 September 18]; 110(45):18121-18126.
- De Lathouwers M, Van Elsacker L. Comparing infant and juvenile behavior in bonobos (*Pan paniscus*) and chimpanzees (*Pan troglodytes*): a preliminary study. Primates [Internet]. 2006 [cited 2014 September 18]; 47(4):287-93.
- Furuichi T. Female contributions to the peaceful nature of bonobo society. Evol Anthropol [Internet]. 2011 [cited 2014 September 18]; (4):131-42.
- Hashimoto C. Context and development of sexual behavior of wild bonobos (*Pan paniscus*) at Wamba, Zaire. International Journal of Primatology [Internet]. 1997 [cited 2014 September 18]; 18(1):1-21.
- Maestriperi D, Ross SK. Mother-infant interactions in western lowland Gorillas (*Gorilla gorilla gorilla*): spatial relationships, communication, and opportunities for social learning. Journal of Comparative Psychology [Internet]. 2002 [cited 2014 September 18]; 116(3):219-227.
- McElroy, Blair. (2013). Bonobo Alloparenting. Texas Wesleyan University.
- Palagi E, Cordoni G. The right time to happen: play developmental divergence in the two *Pan* species. PLOS ONE [Internet]. 2012 [cited 2014 September 18]; 7(12):1-9.
- Stevels JMG, Vervaecke H, De Vries H, Van Elsacker L. Social structures in *Pan paniscus*: testing the female bonding hypothesis. Primates [Internet]. 2006 [cited 2014 September 18]; 47:210-217.
- Woods V. Bonobo but not chimpanzee infants use socio-sexual contact with peers. Primates [Internet]. 2011 [cited 2014 September 18]; 52(2):111-6.