

Daily Differences in Bonobo Activities: More Sex in the Morning?

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Abstract

This technical note for field primatologists demonstrates that behavioral activities are not consistent throughout the day. In LuiKotale (DR Congo), a habituated group of bonobos (*Pan paniscus*) was continuously followed in 2010 and 2011 (38 and 124 entire days of analyzable data) for comparison of the morning and afternoon activities (mid-day=11:30). While group size, number of females, and feeding activity are similar, bonobos travel more in the afternoon. Furthermore, sexual activities show differences: bonobos copulate more in the morning and homosexual interaction between females (GG rubbing) seems to be consistent between morning and afternoon. This fact highlights the risk of bias in studies based on number of hours observation. Preliminary observation during entire days is a prerequisite for generalization of a behavior with bonobos and probably, other primates and animals.

Keywords: Behavioural data collection; Circadian; Congo; *Pan paniscus*; Sexual behaviour

Introduction

In behavioural studies, and particularly with primates, following free-ranging groups is always an adventure. Habituation is an important stage, allowing scientists to follow animal groups and collect relatively undisturbed behaviours. Often in remote areas with sampling effort limitations, continuous data collection embracing twelve hours of daily activities is challenging and unbalanced data can result from these logistical constraints. In primatology literature, observation hours are sometimes indicated without precision of time consistency, accepting the hypothesis that behaviours are similar and consistent throughout the day. However, if daily activities are not regular throughout the day, and if observations are mainly taken during a certain window of time, results will be biased: minored or majored. This note tests this last hypothesis: no difference between morning and afternoon behavioural activities; in a habituated group of wild bonobos in LuiKotale MPI field station [1-5]. Morning and afternoon activity budgets are compared through an examination of the following: 1) feeding session; 2) travel (average speed); 3) group size; and 4) copulation rate. Since 2007, several observers followed standardised methods of behavioural observation during bonobo daily activities (between 5:30 AM and 5:30 PM).

Materials and Methods

The study was carried out at the LuiKotale research site (S2°47'-E20°21'), located within the equatorial rainforest, South West of Salonga National Park (DR Congo) [6]. Field work with bonobos has been conducted since 2001 [7] with one habituated community of 35 bonobos (the Bompusa community) on a realm range of 60 km² crossed by 76 km of trails for access. Parties of bonobos were followed and observed on a daily basis. However, during fieldwork, logistical limitations reduced the data length on certain days and observations were stopped when the bonobos were lost. Only continuous observations from nest to nest were compared. In this equatorial area, sunrise varies minimally over the year, and bonobo activity can be split at midday, i.e., 11:30 AM.

For feeding activity, continuous feeding group scan observations were used [3]. For travel activity, GPS Garmin® 60CSX with track log (1 geo reference/5 min) recorded the bonobo position and average speed. Parametric data were tested by Student's paired t-test. The power analysis of the tests is specified when a difference is detected. Analyses were performed using R 2.11 [8].

Results and Discussion

Feeding session

Fifty-one complete days were analysed and do not show a significant difference in bonobo feeding activity, which represents more than half of the daily activities (i.e., 51%, Figure 1a). Paired t-test ($t=-1.4899$, $df=50$, $p\text{-value}=0.14$).

Travel (average speed)

A hundred and twenty four complete days were analysed and average speed is significantly different (Figure 1b) ($t=-3.7832$, $df=123$, $p\text{-value}=0.001$, test power=90%).

Bonobo travel

15% (+0.07 km/h) more in afternoon than in morning; from 0.40 ± 0.17 km/h in the morning to 0.46 ± 0.16 km/h in the afternoon.

Group size

Forty complete days were analysed and do not show any difference in group size with an average of 9 individuals per group (Figure 1c). Paired t-test: ($t=0.0058$, $df=39$, $p\text{-value}=0.99$). The proportion of females does not change neither during between morning and afternoon (Figure 1d) ($t=-0.1441$, $df=38$, $p\text{-value}=0.89$).

Copulation rate

Forty complete days were analysed and show a significant difference in copulation rate between morning and afternoon (Figure 1e).

Paired t-test

$t=4.3071$, $df=39$, $p\text{-value} < 0.001$; test power= 90%). The mean

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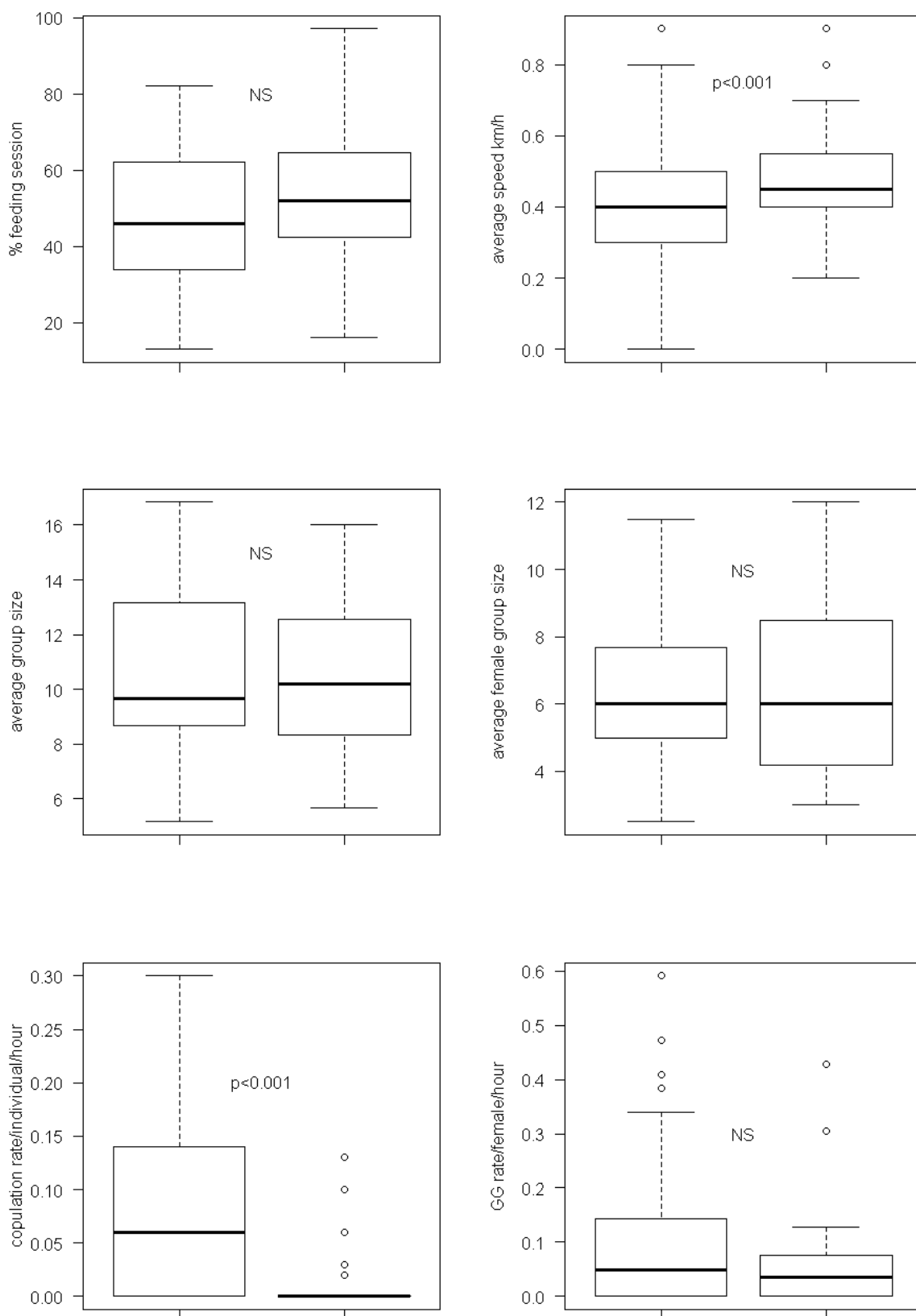


Figure 1: Graphs showing significant differences in a) Feeding activity; b) Average speed; c) Group size; d) Female composition; e) Copulation rate; f) GG rubbing rate (AM (left) and PM (right) comparison) [NS=Non-significant difference].

difference is 0.05 copulation/ind/hrs from AM to PM. The copulation peak occurs during the first hours of daily activities.

GG rate

Thirty eight complete days were analysed and do not show significant difference in GG rate between morning and afternoon (Figure 1f).

($t=1.6792$, $df=37$, $p\text{-value}=0.1015$)

Conclusion

Certain bonobo daily activities vary, such as travel or social activities. These data lead to two conclusions: First, we logically cannot announce a behavioural rate, percentage or average based solely on behavioural hours collection. Authors should assess the consistency of the behaviour over the day before making comparisons such as those between bonobos and chimpanzees because if the behaviour varies over the day, just recording hours of observation does not give an accurate representation of the rate of the behaviour. An example might concern the numerous debates about copulation rate comparison between bonobos and chimpanzees [9,10] or among ape's population. We can remark that some of these rates are based on observation hours without precision of daily consistency.

For the LK bonobo, the Bompousa community show a clear unbalanced copulation rate and a calculation of the copulation rate based on the morning observation would be overestimated and lead to numerous false hypothesis regarding the literature's rates (0.11, 0.13, 0.18, 0.19 copulation/hours [11]).

Secondly, behaviourists could improve their data collection effort by focusing their observations in the best behavioural window regarding their need. If the study concerns comparison (inter individual, inter communities) for example, researchers can focus on the best time period where maximal activities needed occurs. This time window has to be validated by preliminary daily collection. Similarly, if the behaviour of interest does not show daily change, researchers can acquire data hours without daily time constraint.

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