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The functional significance of grooming behaviour in higher primates: the case of free-living chimpanzees

by

Kerry Slater

Submitted in partial fulfilment of the requirements for the degree of

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in the Faculty of Natural & Agricultural Sciences

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"Out of clutter, find simplicity, from discord, find harmony. In the middle of difficulty lies opportunity"

Albert Einstein

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The functional significance of grooming behaviour in higher primates: the case of free-living chimpanzees

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Summary

As a contribution to the existing knowledge of grooming in primates five and a half years of grooming data were examined from a group of free-living chimpanzees (*Pan troglodytes*) in the Budongo Forest, Uganda, to investigate various functional significances of grooming behaviour within the context of social reinforcement. The fission–fusion social structure of chimpanzees results in group members not moving around as a single unit, but forming temporary units as the need arises. This reduces

opportunities for individuals to groom others and therefore, based on time and association constraints alone, grooming was as expected found to be unevenly distributed among group members. Grooming patterns found among this group of chimpanzees were comparable to those observed in other free-living populations with variations possibly being attributed to resource base, population numbers and differences in age-sex class composition.

One of the suggested social benefits of grooming is that it is used to enhance reproductive success, either by allowing males to enhance their proximity to oestrous females, or by influencing female choice through the development of affiliative relationships with males. Grooming was found to increase between males and females, whilst females displayed sexual receptivity through the presence of anogenital swellings and grooming may be a strategy used by males to increase their access to copulation opportunities, whereas females may use grooming to increase protection from harassment by less preferred males during swollen periods and also increase the likelihood of copulation with preferred partners.

Based on the availability of oestrous females, copulations between males and adult females occurred significantly less frequently than expected, whereas copulations between males and subadult females occurred significantly more frequently than expected. Overall a positive correlation was found between grooming of females by males and frequency of copulations.

Due to concerns regarding the validity of different sampling methods, scan-focal and *ad libitum* sampling methods were compared to establish if results from different sampling methods were similar. Results from the scan-focal and *ad libitum* sampling methods had

very few discrepancies, and it is suggested that a*d libitum* sampling methods which record behaviour types whenever they occur, may be more beneficial for species which don't move around as a single unit and live in environments where visibility is reduced, therefore increasing the possibility of recording individuals or behaviours that are observed infrequently. Scan-focal sampling may be more beneficial in studying species which move around together in habitats which are conducive to greater visibility, therefore allowing all or most group members to be observed simultaneously.

Keywords: Chimpanzees, *Pan troglodytes,* grooming, oestrous, copulations, scan sampling, focal sampling, *ad libitum* sampling

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Disclaimer

The present study forms part of a larger long term study on the dynamics and management of the Budongo Forest, Uganda. This study focuses on one of the groups of free-living chimpanzees within the forest (known as the Sonso group) and its main objective is to increase the knowledge base of the chimpanzees as a component of the management plan for the forest as well as towards the understanding of this species. This dissertation consists of a series of chapters that have been prepared as "stand alone" manuscripts for subsequent submission to specific scientific journals for publication purposes. Consequently, unavoidable overlaps and inconsistencies with regards to format and layout may occur between chapters.

Although throughout this dissertation the study site is referred to as the Budongo Forest Project (BFP), it has recently been changed to the Budongo Conservation Field station.

I declare that although I did not collect the data used in this study myself, all the ideas, extraction of data from the database, analysis and write-up thereof is my own work.

Constraints to this dissertation:

The influence of rank on grooming interactions was not included in this study, but has been investigated for this group of chimpanzees in other studies referred to in the text.

At the time that this dissertation was written up, the paternity of the chimpanzees in the group was not certain and although maternal kin were controlled for where necessary, paternal kin were not.

Investigation into the difference of age effects is limited due to classification of different age classes being subjective. It is acknowledged that although the distinction between age classes is not clear cut, the method of age classification is appropriate in the context of this study.

It is further acknowledged that the different stages of female ovulation cycles as well as early stages of pregnancy may influence grooming interactions and female choice of copulation partners. The data for these variables were not available and therefore not included in this study.

Statistical power is always dependant on sample size. With chimpanzees, it is difficult to achieve samples as large as could be achieved with smaller animals which have shorter generation times, such as mice or insects. This presents the problem that statistical tests will have a limited power in detecting relatively weak effects, especially when data is broken into subcategories. If a test is not significant, it must not be excluded that the sample size was too small to detect a real but weak effect. Therefore, some results may show a tendency only and not a statistical significance (p-value <0.05).

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