

## Project description research internship Veterinary Science

<b>Research plan</b> (description of minimally 2 and maximally 4 A4 pages in Times New Roman, 12 pts, single line distance.)  Consisting of: 1. Introduction / Background 2. Aim of the study / Hypothesis 3. Conduction of research : work plan, protocols, materials and methods 4. Time schedule
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<b>Subject and place of conduction</b>	
Title of the study:	Effect of intervention on abnormal behaviour of retired laboratory chimpanzees
Scheduled date of commencement:	1st of December, 2014
Department:	Animals in Science and Society
Supervisor of the faculty:	Dr. S.S. Arndt
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## Introduction

This study focusses on the behaviour of retired laboratory chimpanzees which were placed at the sanctuary of Stichting AAP, Rescue Center for Exotic Animals, the Netherlands. Stichting AAP is a sanctuary for exotic animals which were confiscated from circuses, illegal trade, laboratories, pet industry or badly managed zoos. Here they are provided with the professional care and knowledge in order to get them strengthened, rehabilitated and re-socialized. After their recovery, possibilities are explored to transfer the animals to more natural habitats like reserves or recommended zoos. All chimpanzees in this study are retired laboratory animals.

Many laboratory chimpanzees are kept in artificial living conditions, often kept in group compositions and enclosures showing few similarities with the living conditions of their wild conspecifics. As mentioned before, they have often been separated from their mother at a young age and are often socially deprived, two important features which increase the risk for the development of abnormal behaviour. Female chimpanzees wean their offspring at five years of age but their offspring is still dependent on their mother up to several years after weaning.<sup>1</sup> Maternal separation and lack of social interaction are some of the main causes of traumatized animals and they rob the individual from the possibility to learn appropriate behaviour.<sup>2,3</sup> Furthermore, rearing by humans can have persistent consequences, however, the impact of rearing seems to wane when individuals grow up in re-socialization programs with conspecifics. This indicates that negative effects of early experiences might decrease when individuals are housed in groups and consequently enjoy the opportunity to learn how to behave in social relationships.<sup>2</sup>

### Abnormal behaviour

Many chimpanzees in captivity display a wide variety of abnormal behaviour, such as stereotypies, inappropriate aggression or self-mutilation. Abnormal behaviour can be defined as behaviour which is absent or only occurring rarely in wild-living individuals. One study across forty individuals divided over different zoos showed that all investigated chimpanzees were engaged in at least some abnormal behaviour despite differences in group composition, housing, enrichment, etc. Secondly, there was a strong variety between individuals in the frequency and duration of abnormal behaviour, however, this could not be explained by sex, age, housing or history. Furthermore, abnormal behaviour might decrease chances of success in integrating animals into new or existing groups.<sup>2</sup>

The three most common forms of abnormal behaviour seen in the chimpanzees living at Stichting AAP are rocking, coprophagy and regurgitation and reingestion (abbreviated as R&R). Abnormal behaviours may indicate mental suffering. This is seldom considered directly, although these behaviours show high resemblance with psychiatric disorders in humans such as mood and anxiety disorders like depression and post-traumatic stress disorder (PTSD).<sup>3</sup> This field is barely studied in great apes, although the connection between captivity and pathological behaviours in primates has been well-known for decades. This connection between captivity and negative mental and physical effects has actually long been the foundation to create models of human psychopathology.<sup>4</sup>

Some abnormal behaviours may reflect the symptoms of underlying psychological illness such as depression and PTSD, as mentioned above. The persistent presence of abnormal behaviour in captive chimpanzees might therefore raise ethical questions, even about whether to keep this species in captivity at all. Especially since these animals are considered having high emotional and cognitive abilities but even so, they are relatively frequently used as laboratory subjects.<sup>2,4</sup> Due to their potentially traumatic experiences in early life of the

chimpanzees living at Stichting AAP, these animals probably suffer from problems that resemble mood and anxiety disorders in humans and consequently display abnormal behaviour. In addition, abnormal behaviour can be harmful, such as self-mutilation, or might interfere with normal behaviour patterns and should therefore be reduced whenever possible. Reduction in abnormal behaviour often leads to an increase in normal behaviour.

### Intervention strategies to reduce abnormal behaviour at Stichting AAP

#### **Diet**

Food related types of abnormal behaviour are coprophagy and R&R. Boredom, hunger and diet are considered to be important causes of various classes of abnormal behaviour.<sup>5</sup> These behaviours can be reduced by providing a more stimulating and satisfying diet. A diet richer in fibers and bigger in volume results in a higher level of satiation and a higher level of stimulation. As the animals need to eat a bigger volume in order to obtain the same nutritional value, they consequently have to spend more time on feeding. Another consequence is that the animals feel more satisfied as they simply have to digest more. Provision of browse, shoots and twigs of trees, and substitution of fruits by vegetables help accomplish to provide a more stimulating diet.<sup>6</sup>

#### **Enrichment**

As mentioned above, one cause for the presence of abnormal behaviour is boredom. Chimpanzees in captivity lack the need to forage and therefore have a big gap in their time budget. The extension of foraging time is an effective method of preventing abnormal behaviour. Scattering and hiding food motivates the animals to actively search for their food, as they would do in the wild. Also, providing small meals at several intervals during the day is beneficiary for chimps to explore the opportunities of food processing. Feeding bowls, frozen food and puzzle feeders are great examples of food-related enrichment. Providing bigger pieces of food stimulates the animals to bite, crack or slam it into smaller pieces. It increases foraging time and decreases abnormal behaviour. In the wild, chimpanzees use stones to crack nuts and use sticks and twigs to drag termites out of their holes. Both are stimulating and time-consuming actions which can be simulated in captivity. Environmental enrichment such as the usage of plateaus at different heights, re-arrangeable climbing facilities and provision of objects to play with or discover are important stimuli to promote curiosity in chimpanzees.<sup>7</sup> The size or construction of the enclosure may be of less importance than the number of companions and the amount of movable or stationary objects.<sup>4</sup>

#### **Pharmacological treatment**

Even despite optimized re-socialization programs, enrichment or diet changes, some of the most severe cases of abnormal behaviour may not show sufficient amelioration of abnormal behaviour. They may benefit from additional psychopharmacological treatment. However, not much is known about the effectiveness of psychotropic drugs such as anti-depressants in chimpanzees.<sup>2</sup>

In this study, some of the chimpanzees are treated with the Selective Serotonin Reuptake Inhibitor (SSRI) sertraline (Zoloft). SSRIs have become the most prescribed treatment for cases of mood and anxiety disorders in humans as they show fewer side-effects than other antidepressants like tricyclic antidepressants (TCAs) and monoamine oxidase inhibitors (MAOIs). As is noted in the name, SSRIs are highly selective: they act as strong inhibitors of serotonin reuptake and act as weak inhibitors for the reuptake of other neurotransmitters. Due to this selectivity, SSRIs show fewer side-effects than other antidepressants and only display side effects due to their effect on other serotonin receptors which are located for instance in

the gut wall. Sertraline inhibits serotonin reuptake transporters in the synaptic cleft thus increases the concentration of serotonergic transmission between neurons. This decreases the symptoms of depression but the exact mechanism is still unknown.<sup>8,9</sup>

Although there are many homologies between humans and great apes, it is not sure whether chimpanzees respond to SSRIs the same way as humans do and the adequate dosages are still unknown. Only a few case studies in chimpanzees and bonobos have been conducted. They showed an encouraging reduction in abnormal and stereotypic behaviour and an increase in social activity during treatment with sertraline. The effects outlasted discontinuation of the treatment. As observed in humans, the apes showed vomiting as a side-effect of sertraline.

## Aim of the study and hypothesis

The aim of this study is to compare the effects of the different types of intervention in the three groups of chimpanzees and possibly to find an effective treatment regime against abnormal behaviour in chimpanzees in order to improve their level of wellbeing. The observed animals in this research are all ex-laboratory chimpanzees and display a high level of abnormal behaviour. This might be caused by mental illnesses that resemble PTSD and depression in humans, due to their personal history of possible trauma.

Three groups of ex-laboratory chimpanzees were subjected to different types of intervention. All groups consist of adult males and adult females, all at least 25 years of age. Group A acts as a control group and receives no treatment or enrichment and their diet consists of dry feed. Group B receives enrichment according to a protocol established by Stichting AAP and a change in diet, as it receives feed bigger in volume and richer in fiber but still contains the same amount of calories. Group C receives the same enrichment and diet as group B and in addition it receives medical treatment with sertraline, an anti-depressant.

Already collected data of other students will be used which cover periods both before and during intervention. New data of twenty weeks of observation will be collected and processed in order to investigate whether or not the special diet and/or medication had any effect on the amount of display of abnormal behaviour in the three groups, leading to two possible hypotheses:

Hypothesis<sub>0</sub>: There is no significant difference in the amount of abnormal behaviour in ex-laboratory chimpanzees observed between groups A, B and C.

Hypothesis<sub>1</sub>: There is significant difference in the amount of abnormal behaviour in ex-laboratory chimpanzees observed between groups A, B and C.

The conclusion of this study could be useful in the future when treating chimpanzees or other animal species which display abnormal behaviour. For veterinarians it is important to know how to monitor abnormal behaviour and to know which type of treatment might lead to the highest chance of success in reduction of abnormal behaviour in particular cases.

This study might give insight in the possible ways of reduction of abnormal behaviour in chimpanzees in captivity and a possible increase in natural behaviour. As they are kept in limited enclosures, often enjoyed little socialization, are placed in non-naturally build up groups, they cannot fully display their range of natural behaviour as they would in the wild. They have to adapt to new circumstances, which might lead to coping mechanisms to fail. This may result in abnormal behaviour like stereotypies and self-mutilation and finally resulting in poor levels of wellbeing. Organizations like zoos and Stichting AAP should always strive for the highest level of wellbeing possible for their animals.

## Conduction of research

### Work plan

After approval of this research proposition the research at Stichting AAP will begin. Literature research done in order to produce this proposition will form the basis at which observations will be carried out and analyzed. Four days a week will be spent on observations of the different groups of chimpanzees, with the latter day being used for literature research, data processing or other activities. The complete process will be supervised by the staff at the sanctuary initially, and by dr. Arndt at the faculty of Veterinary Sciences. After twenty weeks of observation, data will be processed and analyzed. Completion of the research report will be done within a reasonable time span. Presentation of the conducted research will take place at the faculty of Veterinary Sciences at Utrecht University and at Stichting AAP Almere.

### Protocols

Observations will be carried out according to the ethogram of Stichting AAP and will be done by the use of focal observations (this will be explained further below). According to the protocol at the facility, no contact between students or animals is allowed in order to observe the animals performing their natural behaviour without the influence of interaction with humans.

### Materials

All observations will be scored according to the ethogram used at Stichting AAP. The data will be entered on a computer tablet into software program Pocket Observer 3.2. Data processing will be performed in statistics programs like SPSS. Materials and equipment directly concerning the chimpanzees, such as their enrichment and pharmacological treatments, will be provided by Stichting AAP.

### Methods

Observations will be done four days a week. Each day only one group will be observed using thirteen focal observations of twenty minutes with continuous sampling on the different individuals in the group. Focal observations allow the determination of prevalence, frequency and duration of behaviour and thus provide a complete picture of the behaviour repertoire.<sup>2</sup>

Depending on the size of the group, an animal might be observed two to four times a day. As observations take place both outside and indoors, observed individuals are followed as they move. During the twenty minutes of observation, all behaviour of the specific individual will be recorded as well as the behaviour of other individuals towards the observed target.

All recorded behaviour can be divided into groups: activity, affiliative behaviour, agonistic behaviour, other behaviour and abnormal behaviour. Social or solitary states will also be recorded. Observed individuals moving out of sight of the observer will also be recorded as 'out of site'.

### Time schedule

The observation of the chimpanzees at Stichting AAP and their behaviour will take 22 weeks performed on working days from 8:30 a.m. to 5:00 p.m. Four days a week will be spent on observations according to an established time schedule and the remaining time will be used for data processing. Data processing and working on the paper will take place during and after the twenty weeks of research. Completion of the report will take place during week 21 and 22 and will be handed in within a reasonable timespan.

## References

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