

Behavioural aspects of tigers kept in captivity

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1.0 – Introduction:

This research area has investigated the effect of captivity on behavioural aspects of the Siberian Tiger subspecies, *Panthera tigris altaica*. This subspecies is the largest cat in the world, with an estimated wild population of 250¹. Its scarcity and highly protected status has impressed a need for greater investigation. All captive routes are considered, such as exotic owners, circus animals, zoos and safari parks.

The necessity of captivity is two-fold. Firstly, centres gain animals to continue the genetic line and offset species extinction through human-induced activity. In this instance, tigers are moved from the natural habitat to safe enclosures, usually Zoos or Safari Parks. The focus is on preserving the line through captive breeding programmes and effort is made to replicate, as far as possible, known behaviour. Secondly, in the interests of creating a gene bank, prime males may be required for continuing a genetically valuable line, from which semen samples can be collected and frozen as precaution against failed continuity in captivity². This scenario is highly possible, drawing on present estimates placed at between 360 and 406 animals

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Hongfei, Z. (1997) Recovery and development of Siberian tiger populations in China *Journal of Forestry Research* **8** (1) 36-38

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Tilson, R.L. and Seal, U.S. (1987) *Tigers of the World*. Noyes Publications: Park Ridge, New Jersey

world-wide³. As with most captive enterprises, programs aims to at some point reintroduced species into the wild⁴.

The effect of captivity upon Siberian tigers will vary in terms of display of normal behaviour. However, abnormal behaviours are noticeable when the human-made environment hinders natural or instinctive behaviours⁵. In view of this, a number of conservation centres have implemented management changes to enhance the lives of captive felids. This process of environmental enrichment, as it is commonly termed, is difficult to optimally manage due to difficulty in meeting natural hunting requirements within a confined space. Captive environments have difficulty providing behaviours like hunting (the "hide, stalk and chase") due to spatial constraints and negative human reactions to predatory behaviour. It is certainly necessary to develop more fully felid enrichment programmes based on understanding felid behaviours within set spatial parameters⁶.

What defines "normal behaviour" in *Panthera tigris altaica* depends upon numerous variables. It may however be broadly defined as Eisenberg's (1981) "the exhibition of a phenotypic trait within the environmental context for which primary selective forces have shaped it, the outcome of which being maximal, inclusive fitness"⁷. Captivity

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Tilson, R., J. Tilson, and A. Alden (2002) 5 Tigers: the tiger information center www.5tigers.org last day accessed 3/5/2011

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Hongfei, Z. (1997) Recovery and development of Siberian tiger populations in China *Journal of Forestry Research* **8** (1) 36-38

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Kleinman, D., Allen, M., Thompson, K. and Lumpkin, S. (eds.) (1996) *Wild Mammals in Captivity: Principles and Techniques*. University of Chicago Press, Chicago

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Sheperdson, D., Mellen, J.D. and Hutchins, M. (eds.) (1998) *Second Nature. Environmental Enrichment for Captive Animals*. Smithsonian Institution, Washington

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leads to increased incidence of abnormal displays of behaviour; the display of stereotypies, such as pacing⁸.

Panthera tigris altaica behaviour varies in captivity, according to variables such as age, social status, cage size, degree of environmental enrichment, water pool availability and degree of visitor interaction⁹. A study by Lyons *et al.* (1997)¹⁰ found positive correlation between cage size and degree of apparent movement based on the principle that adequate space encourages freedom of behavioural expression and the opportunity to practice the aforementioned "hide, stalk and chase". Secondly, degree of disease susceptibility in natural habitat has been analysed but this is beyond the scope of this essay.

Replacing the concrete pens in zoos or circuses with grass, wood chips of other more natural material is encouraged as far as possible, as is the inclusion of vegetation to mimic natural environments. Inclusion of sticks, pools, ledges or ice blocks will reduce frustration and boredom, and thus overall stress levels. Inclusion of complex stimuli and randomised feeding has also been shown to reduce stress with captive felids¹¹.

Eisenberg, J.F. (1981) *The Mammalian Radiations: an analysis of trends in evolution, adaptation and behavior*. University of Chicago Press, Chicago

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Carlstead, K, Brown, J and Seidensticker, J (1993) Behavioral and adrenocortical responses to environmental changes in leopard cats (*Felis bengalensis*) *Zoo Biology* **12** 321-331

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Pitsko, LE (2003) *Wild Tigers in Captivity: A Study of the Effects of the Captive Environment on Tiger Behaviour*: a thesis. Virginia Polytechnic Institute and State University, Blacksburg, Virginia

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Lyons, J., Young, R.J., Deag, J.M., (1997) The effects of physical characteristics of the environment and feeding regime on the behavior of captive felids. *Zoo Biology* **16** 71-83

11

van Rooijen, J., (1991) Predictability and boredom. *Applied Animal Behaviour Science* **31** 283-287

2.0 – The species of the tiger:

While studying the family of the tiger it has been suggested that there are five remaining subspecies of this interesting big cats' family. They live in a range of habitats being adaptable to the given environment. As table 1 shows, the remaining subspecies live in jungles and forests worldwide with each subspecies having different ecological and conservational needs which are supplied via their wild and free environment.

Table 1: The five remaining subspecies of the tiger and their free range habitat

Sumatran	Moist tropical jungles of Indonesia
Indochinese	Forests of Indochina
South Chinese	South China forests
Bengal	Indian/Bangladeshi forests
Siberian	Harsh, cold climate of Siberia

As it can be seen there is a wide range of climates which tigers are adapted to; therefore, this essay will only focus on one particular subspecies of this huge family as it is difficult to cover all habitats, the Siberian tiger. Lots of research has been done about this particular subspecies which can be found in the frigid climate of Russia and North China.

3.0 – The Siberian tiger and its environment:

Before getting deep into the behavioural aspects of Siberian tigers in captivity, the scope of this essay, it will be vital to introduce this subspecies and give some basic information about its normal behaviour while existing in the wild. The Siberian tiger is the largest subspecies weighing around 230 kilograms and being 3 meters long. As all cat families it is a territory animal and more specifically it territories of up to 500 square kilometres with the male territories overlapping the female territories. They are predators and their usual prey includes various types of deer, elk and wild boar¹².

4.0 – Factors affecting behaviour:

The behaviour of animals kept in circus and zoos has been concerned since a long time due to the abnormal behaviour expressed by the species. The type of this abnormal behaviour is the stereotypy which is defined as the repetitive behavioural pattern without any apparent goal or function. The studied species is known to express this type of abnormal behaviour in the form of pacing when kept in circuses or zoological/safari parks. The factors that stimulate stereotypic behaviour in tigers can be the limited space given to the captive individual. In addition, the complexity of the cage and the isolation from conspecifics are more serious reasons in influencing stereotypic behaviour. Boredom is also a critical factor which may also elicit such abnormal response. It has been suggested though that stereotypic behaviour can be a result of stress¹³.

Krawczel *et al.* (2005) observed pacing of circus tigers before and following their performance and suggested that this may be a result from the differences in the location as well as the tigers' living conditions (temperature i.e. air-conditioned and housing i.e. indoor versus outdoor). The crowd and any other stimulus prior the show initiate pacing and overall abnormal behaviour. A very high percentage of the studied tigers appeared to display pacing on the edge of the cage with their bodies oriented to look out of their enclosures.

A separate unpublished study by Nevill *et al.* which was cited by the previous mentioned authors strongly suggests that pacing was held in a very high percentage in their enclosure while being observed for 72 hours. It can be concluded that pacing in tigers is not only affected by the physical activity resulting from performance on any particular day but also from the overall stress of the animal and boredom in captivity.

Hongfei, Z (1997) Recovery and development of Siberian tiger populations in China. *Journal of Forestry Research* **8** (1) 36-38

5.0 – Caretaker interaction:

The degree of nervousness, the extent to which they are socially confident as well as the aggression levels are the three foremost important traits while studying the personality of captive cats¹⁴. The study between the personality in tigers and their keepers resulted that keepers were able to assess tiger personality from adjectives describing their normal behaviour. In addition, the keeper's personality also plays an effective and very important role in the tigers' behaviour.

Angry keepers were more likely to treat tigers with an incorrect way like patting them. Another group of keepers did not spend the appropriate time to play with the tigers as well as having a closer and friendlier contact with them; leading to boredom and the exhibition of the tigers' abnormal behaviour. Finally, neurotic keepers had almost no interactions with the tigers. The keepers in this case were only trying to achieve the least of the goals for the better well-being of tigers in captivity such as pushing them while resting and forcing them to move. From the study of Phillips and Peck (2007) it can be concluded that keeper's personality influences tigers' interactions which as a result have a great impact on the captive tigers' well-being and as a result exhibiting its normal behaviour.

The study of Krawczel et al., (2005) beyond its scope (the stereotypic behaviour of circus tigers) also observed the relationship between the presence of a keeper and the increase of stereotypic behaviour. When the keepers were close to the tigers' enclosures, stereotypic behaviour was occurring; the same was observed in the presence of keepers as well as the return of the keeper the following morning. This suggests that the presence of keepers stimulates stereotypic behaviour and more specifically pacing.

Another study which was looking at the abnormal behaviour in the circus tigers during transportation concluded that a wide range of behaviours occurred allowing

increased variation in coping strategies¹⁵. Such a study impressed the authors to do so as captive life in the circus is defined by travel which can occur weekly or not daily. Once again, in such cases captive tigers are kept in small cages to allow easy movement and transportation to several destinations. Some tiger trainers though provide their animals with exercise pens at each stop; therefore, they are allowed time to play and interact with other tigers. In captivity, like all animals, tigers must compromise, truncate and allowed to exhibit their normal activity patterns as they do so in their wild environment, resulting in a reduced behavioural repertoire. As a result, the above mentioned trainer's movement reduces later on the stereotypic behaviour of the tigers during transportation due to the exhaustion of the animal at play. In addition to the stereotypic behaviour during transportation, it has been stated that in the presence of work crews or tractors tigers react by growling or swiping with their paws. This occurs due to the stress of the animals during transport. In the wild, such interactions were surely avoided by the tigers but in these cases wildlife is forced to undergo the limited space and the stress.

6.0 – Keeper enrichment:

There is a huge number of animals living in captive conditions worldwide. As already mentioned some of the captive environments can be zoos and safari parks, rescue shelters and laboratories. In such settings, the welfare of animals is under a considerable amount of attention in order to improve their social and physical enclosures. The most common term for improving the captive environment of the studied felids and improving its biological functioning as being similar to the wild one is called environmental enrichment. The enrichment strategies are of high importance to encourage the way of the species' typical behavioural patterns. This includes the increase of the challenging ability, the enhancement of the behavioural repertoire, the increase of the given environment's use as well as the elimination of the stereotypic behaviour¹⁶.

Many studies have taken place throughout the years and concluded that the cage size, social contacts, and the introduction of furniture and toys achieved on a high

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Nevill, C.H., Friend, T.H. (2003) The behavior of circus tigers during transport. *Applied Animal Behaviour Science* **82** 329–337

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Wells, D.L. (2009) Sensory stimulation as environmental enrichment for captive animals: A review. *Applied Animal Behaviour Science* **118** 1–11

degree the goals of environmental enrichment^{17 18 19 20}. As Wells (2009) suggests, auditory, olfactory and visual stimulations can be ways of environmental enrichment for captive tigers. Auditory stimulation includes sounds specific to the species' natural habitat. However, the olfactory stimulation takes into account the odours specific to the species' natural habitat and pheromone stimulation. Finally, the visual stimulation includes television and videos, computer games, mirrors and colour. From this review it can be concluded that such stimulation results in changing the biological functioning of animals in an either enhanced physical or/and psychological welfare. In this respect, auditory, olfactory and visual stimulations meet the majority of the suggested goals of environmental enrichment. From these three types of stimulation it was difficult to ascertain exactly which of the three is the most appropriate to employ in a given situation. Each case has its own way of management, therefore, a number of factors such as sex, age and housing conditions are considered individually. The personality of the captive tiger is equally important, too, as the enrichment for one animal in a group may well be aversive to another and vice versa. However, it is vital to consider that introducing any enrichment programme, a careful cost-benefit analysis, weighing up the advantages and disadvantages of the environmental enrichment should be made before it is put into practice. Significantly, such strategies should be done with the ultimately aim to improve the biological functioning of the species under scrutiny²¹.

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Shepherdson, D.J., Mellen, J.D., Hutchins, M. (1998) *Second Nature: Environmental Enrichment for Captive Animals*. Smithsonian Institution Press, London.

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Young, R.J., 2003. *Environmental Enrichment for Captive Animals*. Blackwell Science Ltd., Oxford.

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Wells, D.L., 2004. A review of environmental enrichment for kenneled dogs, *Canis familiaris*. *Applied Animal Behaviour Science* **85** 307–317.

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Lutz, C.K., Novak, M.A., 2005. Environmental enrichment for nonhuman primates: theory and application. *ILAR News* **46** 178–191.

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7.0 – Conclusion:

Although there should be greater in depth observation in the species of tigers and especially for the *Panthera tigris altaica*, an additional and further research in the area is unquestionably needed. Individuality and limitations with tigers conditioned to captivity should be taken into account as current studies strongly indicate that welfare is tied to expression of natural behaviour, reduced incidence of disease, lowered stress levels and improved temperament.

From the whole research and reading throughout subject of the behavioural aspects of tigers kept in captivity, it can be concluded on the one hand that captive tigers can be helped since there is an elimination of the challenges that tigers face, such as weather and food. In addition, there is a sustainable gene pool project which can preserve the continuation of the species. On the other hand, there is a decrease of the environment and altitude since it cannot be fully replicated in captivity. The width of diet is limited, artificial enrichment in order to keep the animal healthy mentally and physically is needed, lonely lifestyle is unachievable and increased lifespan may rise the risk of age related diseases.