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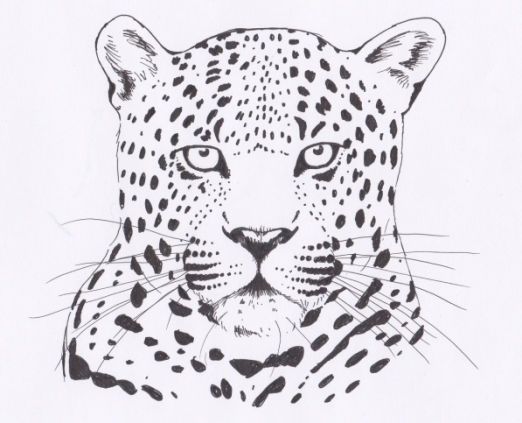
Matilda Apelqvist

Skara 2014

Etologi och djurskyddsprogrammet



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Studentarbete 557, Skara 2014

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ABSTRACT

The Amur leopard (*Panthera pardus orientalis*) is one of the most endangered species in the world, with only a few individuals left in the wild. Many Amur leopards are kept in captivity to help save the population. Abnormal behaviours or stereotypies are common in captive animals, especially carnivores. Stereotypies are repetitive behaviours without any evident goal or function. Pacing, where an animal is walking back and forth, is one of the most common stereotypies. The aim of this study was to compare two Swedish zoos – Nordens Ark and Parken Zoo – that both house Amur leopards and see whether or not there is a difference in pacing frequency between the zoos and what might cause this difference. Both zoos had one female and one male leopard. The animals were observed during one hour four times a day for six days. The results showed that the leopards at Parken Zoo did not pace at all but walked a lot, while both animals at Nordens Ark paced. The reasons for the pacing is unclear, but there might be a combination of many causes, for example the feeding routines, other animals and visitors.

INTRODUCTION

The leopard

The leopard (*Panthera pardus*) is found in both Africa and Asia, but the numbers are declining due to fragmentation, habitat loss and hunting (Henschel *et al.*, 2008). Genetic analysis has proved that there are nine subspecies of leopard; one of them is the Amur leopard (*Panthera pardus orientalis*) (Uphyrkina *et al.*, 2001).

The Amur leopard (Fig. 1), also known as the Far Eastern leopard, is one of the world's most endangered species; in 2007 there were only 14-20 adult animals and 5-6 cubs in the wild (Jackson & Nowell, 2008). It could originally be found in China, Russia and Korea, but today there is only a small population left in the area Primorsky Kray in Russia (Uphyrkina & O'Brien, 2003).

Figure 1 *- Amur leopard at Nordens Ark. Photo: Apelqvist M., 2014.*

Major threats against the Amur leopard are poaching and habitat loss (Uphyrkina & O'Brien, 2003; Jackson & Nowell, 2008), but also the fact that the levels of genetic variation are low in this subspecies (Uphyrkina & O'Brien, 2003). *P. p. orientalis* is closely related to the subspecies *P. p. japonensis*, North Chinese leopard, and interbreeding between the two should increase genetic diversity according to Uphyrkina & O'Brien (2003). Compared to other leopard subspecies, the Amur leopard is unique due to its adaption to snow and a cold climate, which makes it an important subspecies to protect (Uphyrkina & O'Brien, 2003).

Animals in captivity

Approximately 26 billion animals are kept in captivity all over the world, in zoos, farms, research laboratories, conservation breeding centers, and as pets (Mason, 2010). Captive animals are often healthier and live longer than their wild counterparts, since they get a sufficient amount of food and water, and veterinary care; they also do not need to defend themselves against predators (Mason, 2010). Despite this, not all animals thrive in captivity, chronic stress being one of the reasons (Mason, 2010). Some animals, like cheetahs (*Acinonyx jubatus*), also get more prone to diseases, for example they can get gastritis from a *Helicobacter* bacteria that seems to be non-pathogenic in wild cheetahs (Mason, 2010). Other carnivores, like clouded leopard (*Neofelis nebulosa*) and polar bear (*Ursus maritimus*) often develop abnormal behaviours in captivity and are hard to breed (Clubb & Mason, 2007). There are also carnivores, like snow leopard (*Panthera uncia*) and brown bear (*Ursus arctos*), who adapt well to a life in captivity (Clubb & Mason, 2007).

Stereotypic behaviour

A stereotypic behaviour is a repetitive behaviour and is often described as a behaviour without variation, and without any apparent purpose (Mason, 1991). Stereotypic behaviours are common in animals kept in captivity, more than 85 million individuals perform behaviours like pacing and body-rocking (Latham & Mason, 2010). Pacing is especially common in captive carnivores (Burgener *et al.*, 2008). These animals normally have vast home ranges (Swaisgood & Shepherdson, 2005) and walk long distances every day. Clubb and Mason (2007) mean that animals with large home ranges do not adapt well to captivity, and if the animal also is large it is more likely to develop stereotypic behaviours. There has however been much debate on how 'unvarying' a behaviour has to be to be considered a stereotypy, since there are behaviours, like over-grooming, that show quite a broad variation in motor patterns (Mills & Luescher, 2008). Mills and Luescher (2008) suggested that the term 'stereotypic behaviour' would include all seemingly functionless, repetitive behaviours, even the ones with flexible motor patterns. Stereotyped pacing indicates stress or anxiety; sources of stress might be limited movement, artificial lightning, aversive sounds, and/or the lack of retreat space (Morgan & Tromborg, 2007).

According to Swaisgood and Shepherdson (2005) stereotypies may not always mirror the animal's current situation; they might originate from previous housing. Stereotypic behaviour may be a way for the animal to cope with an aversive environment, and some animals that perform stereotypies in a non-optimal environment possibly have a better welfare than the animals that do not perform stereotypies in the same environment. (Swaisgood & Shepherdson, 2005).

Mason et al. (2007) mean that there are two types of stereotypic behaviour, the first one being caused by frustration. These behaviours may occur as a result of the animal trying to substitute a missing normal behaviour, or trying to escape (Mason *et al.*, 2007). The second type of stereotypic behaviour is malfunction-induced, meaning there is an abnormality in the C.N.S., the central nervous system, causing repetitive behaviour (Mason *et al.*, 2007).

Stereotypies in captive animals are important to identify because it may indicate poor welfare (Mason *et al.*, 2007). They are also important because they express a significant difference between the captive animal and its wild counterparts, and they may even be evidence of a C.N.S. dysfunction (Mason *et al.*, 2007). These facts might question the animal's role in conservation, for example its suitability for reintroduction (Mason *et al.*, 2007).

Stereotypies in leopards

In a study on time budget in Indian leopards made by Mallapur and Chellam (2002) they found that all 16 leopards included in the study displayed stereotypic pacing; they spent 2-11% of their time expressing this behaviour. The study also showed peaks in the leopards' pacing, these peaks corresponding to zookeeper activity, for example when the keepers were cleaning the off-exhibit enclosures and at feeding time. The authors think that these peaks were due to the leopards' crepuscular nature, meaning that they are active in the early mornings and late evenings, and not because of the zookeepers, since these peaks happened in the morning and afternoon (Mallapur & Chellam, 2002). In the same study, they also noticed that the pacing increased when there were many visitors present, while the general activity decreased. Burgener *et al.* (2008) conducted a study on two female

snow leopards at a zoo in Zürich and saw that temperature could affect stereotypic pacing; one of the snow leopards paced less towards the evening when it was cooler outside. One could assume that this might also be the case for the Amur leopards, since they – like the snow leopards – normally live in a cold climate.

PURPOSE OF THE STUDY

The purpose of this study was to examine the frequency of stereotypic behaviours, in this case pacing, in Amur leopards, and whether or not there was a difference between the two zoos in the study, and also if there were any individual differences in stereotypic pacing. The main questions were:

- What is the frequency of stereotypic pacing in Amur leopards in two Swedish zoos?
- Are there any differences in frequency in stereotypic pacing between the two zoos?
- Are there any individual differences in frequency of stereotypic pacing between the observed animals?

MATERIAL AND METHODS

Subjects

The study was conducted at two Swedish zoos, Nordens Ark's zoo, Hunnebostrand, and Parken Zoo, Eskilstuna. Nordens Ark is home to two Amur leopards, one male and one female (Fig. 2). The Male, Kitan, was born in 2009 in the Czech Republic, while the female, Bira, was born in 2009 in Finland. They both moved to Nordens Ark in 2010.

Parken Zoo also has a male and a female (Fig. 2). Boris, the male, was born in France in 2007, and Takara, the female, was born in Germany in 2010. Boris has been at Parken Zoo since 2008 and Takara since 2011.

All four animals are part of EAZA's breeding programme, the European Endangered species Programme (EEP) for Amur leopards.

Figure 2 *- Top left: Kitan, Nordens Ark. Photo: Apelqvist M., 2014 Top right: Bira, Nordens Ark. Photo: Apelqvist M., 2014 Bottom left: Takara, Parken Zoo. Photo: Ahlrot U., 2014 Bottom right: Boris, Parken Zoo. Photo: Ahlrot U., 2014*

Housing

The leopards at Nordens Ark were kept in separate enclosures but were still in sight of each other. Both enclosures had a varying environment with logs, small trees, bushes and rocks. They also had houses in which they could hide. Since there was a lot of straw bedding in the houses, the animals were sometimes not visible for the observer if they were lying down in one of them. It was also possible for the leopards to climb higher and overlook their enclosure and its surroundings. In Kitan's enclosure there was a pond, which was empty at the time of the study; they were filling it on the last day of observations. Across from the leopard enclosures, urials (*Ovis orientalis vignei*) were kept. The urials were visible from both leopard enclosures. Next to the male there were the snow leopard enclosures, which he could see from his own enclosure. Kitan's enclosure had a glass front and the rest was mesh fence, including the roof. Bira's enclosure was all mesh fence.

Between the two enclosures there was a transfer gate. It was divided into two, so that Kitan and Bira had one each. They were kept in there during feeding and when the keepers put enrichment in the enclosure. The enrichment could for example be cinnamon or hidden food.

At Parken Zoo the leopards were kept together in one enclosure. Normally they had access to two enclosures, but one was closed due to repairs. The front of the enclosure was all glass and the rest was walls. In front of the glass there was a moat. The ground was quite rocky and sloping slightly. A house was placed near the moat. There were also a few trees for the leopards to climb. They spent a lot of time in the trees. In the summertime, there was also a little stream in the enclosure, but it was dry at the moment of observations.

During feeding time, meat was thrown over the glass. Enrichment was also thrown into the enclosure.

The enclosure at Parken Zoo was bigger than the ones at Nordens Ark, but on the other hand there were two leopards in the same exhibit.

Behavioural observation

Since this study was part of a larger project on wild cats in captivity, the observation method and time were chosen by the project managers. The observation method used was focal animal sampling paired with continuous observation. The leopards were studied during one hour four times a day during six days; every hour was also divided into ten minute intervals. Observation times were 08.00-09.00, 10.00-11.00, 12.00-13.00 and 14.00-15.00. There was a schedule so that the observer knew which individual to look at. Two observations were made of each leopard every day. The leopards at Nordens Ark and Parken Zoo were observed simultaneously by two different observers.

An ethogram was designed to include a number of behaviours that the leopards might perform (Table 1). The observer watched the animals from the visitors' path outside the enclosures. If the animal moved, the observer followed slowly so as not to disturb the animal. A behaviour was recorded every time it was performed. If two behaviours were performed at the same time, for example sitting and grooming, both behaviours were recorded. The duration of behaviours was was not recorded.

Table 1 *- Ethogram with behaviours and definitions*

Behaviour	Definition
Running	Movement where, during some periods, no paw touches the ground. There is no obvious prey that the individual is hunting. Trot/gallop.
Walking	Movement where at least one paw is touching the ground at all times. Slow pace.
Stereotypic pacing	The animal walks (or runs) the same distance over and over again (more than two turns). If the animal stops or performs another behaviour for at least three seconds, it counts as if the pacing has stopped and is then marked as a new behaviour once it starts again.
Resting	No movement. Lying down with eyes open. On the back or stomach with support from the legs.

The original ethogram consisted of 19 behaviours, but I chose to focus on only four of them – 'running', 'walking', 'stereotypic pacing' and 'resting' – and therefore I did not include the rest. These behaviours were analysed closer since they were the most relevant behaviours for this study.

Processing of data

All data was processed and compiled in Microsoft Excel 2010. No statistical analysis was made since the study was made during six days only, and only four individuals were observed.

It was counted on how often the animals performed a behaviour in average, with extra focus on 'walking' and 'stereotypic pacing'. The average between both individuals and parks was compared. The data will be shown as a frequency of each behaviour.

RESULTS

There were differences in frequency in some of the selected behaviours. The average frequency of 'walking' was 4.77 in the Amur leopards at Parken Zoo, while it was only 1.44 in the animals at Nordens Ark (Fig. 3). On the other hand, the leopards at Nordens Ark spent more time pacing, with an average frequency of 0.99, compared to the Parken Zoo leopards, who did not pace at all (Fig. 3). The Amur leopards at Parken Zoo also spent more time running, with an average frequency of 0.87 compared to 0.14 at Nordens Ark (Fig. 3). The leopards at both zoos spent roughly the same time on resting, 1.25 at Nordens Ark and 1.37 at Parken Zoo (Fig. 3).

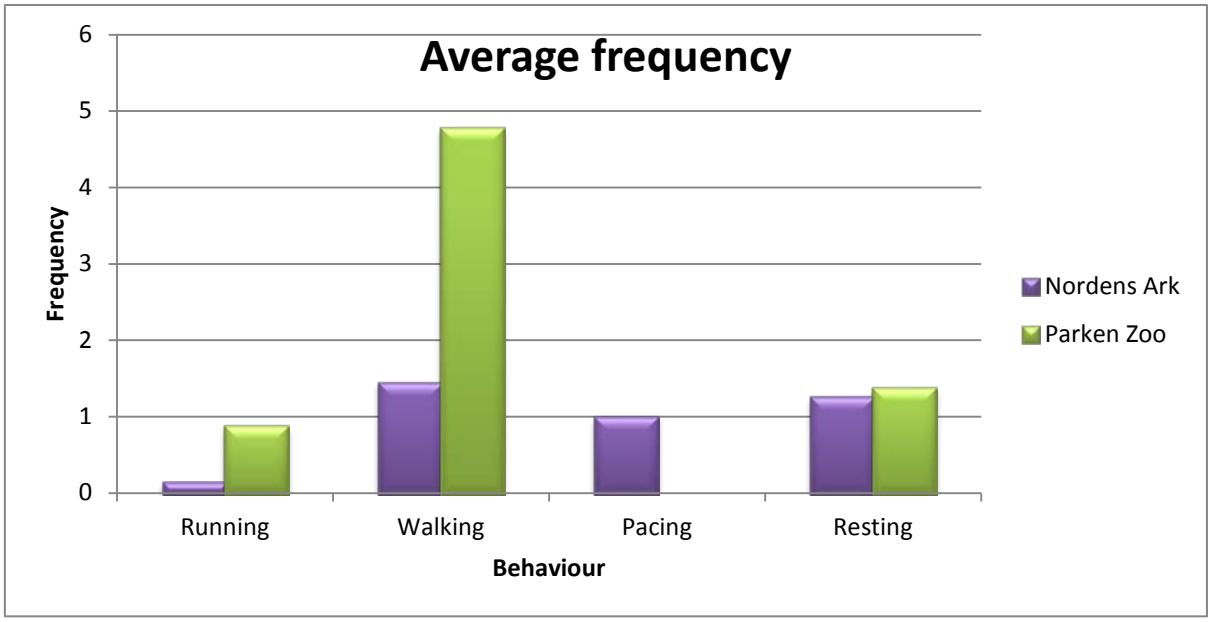

Figure 3 *- Average frequency of all behaviours, a comparison between Nordens Ark and Parken Zoo.*

Walking

It is clear that the male Amur leopard, Boris, at Parken Zoo, was the one who walked the most of all four individuals, with a peak on the fourth observation day with an average frequency of 14.25 (Fig. 4); his total average was 7.77, which was a lot higher than for the other three leopards. The lowest frequency had the female leopard, Bira, at Nordens Ark; it was only 1.47.

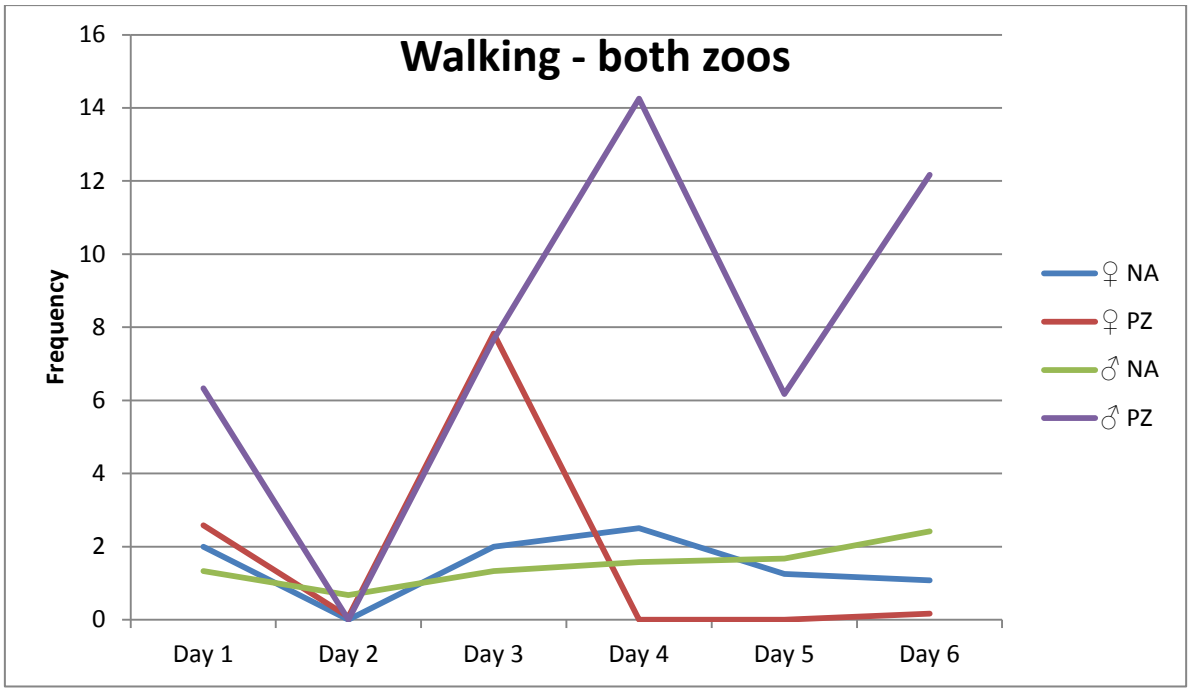

Figure 4 *– Differences in walking frequency between the four individuals during the six days of observation (n=4).*

The leopards at Parken Zoo did most of the walking in the morning, during the first observation hour, 8.00-9.00 (Fig. 5). They walked the least during observation hour number three, 12.00-13.00 (Fig. 5). On the contrary, the leopards at Nordens Ark walked the most during hour number three, but at a much lower frequency than the individuals at Parken Zoo (Fig. 5).

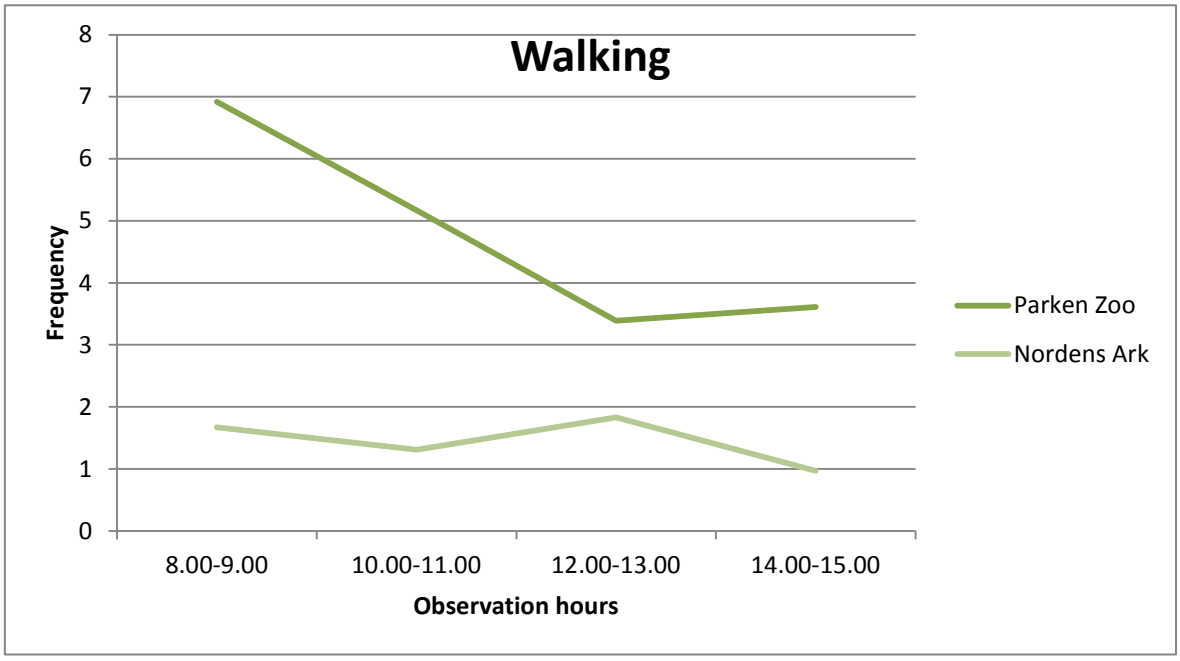

Figure 5 *– Differences in walking frequency during the six observation days, divided into four hours (n=2/zoo).*

Pacing

It is obvious that the Amur leopards at Nordens Ark paced more than the animals at Parken Zoo, who did not pace at all. The female paced more than the male, with an average of 1.06 to his 0.9 (Fig. 6).

Both leopards at Nordens Ark sometimes paced when they saw the keepers, or when one of their four-wheelers passed by. If the keepers came to the enclosure, the leopards would walk, or sometimes run, over to a spot from where they could see the keepers, and there they sometimes started to pace. Occasionally, they would also pace when keepers arrived at the urial enclosure. The male would also pace where he could see the snow leopard enclosure.

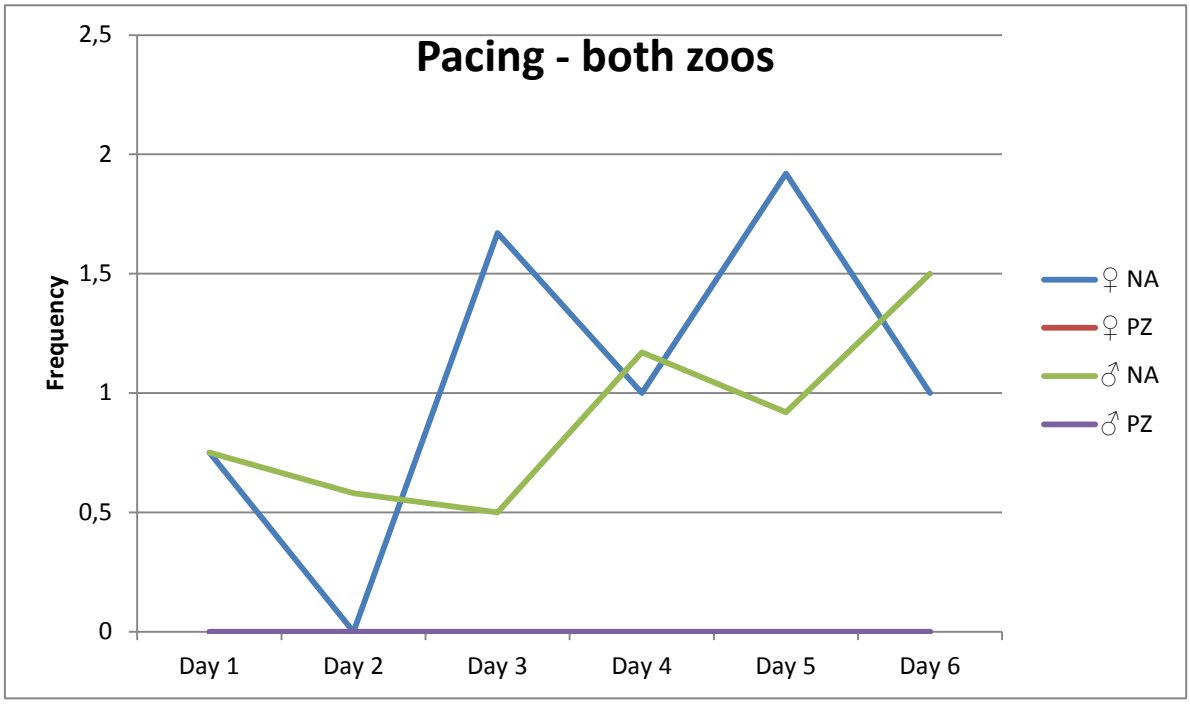

Figure 6 *- Differences in pacing frequency between the four individuals during the six days of observation.*

As said before, the leopards at Parken Zoo did not pace at all, which they did at Nordens Ark. They paced the most during hour three, 12.00-13.00 and the least during the last hour, 14.00-15.00 (Fig. 7). The first two hours did not differ so much from one another (Fig. 7).

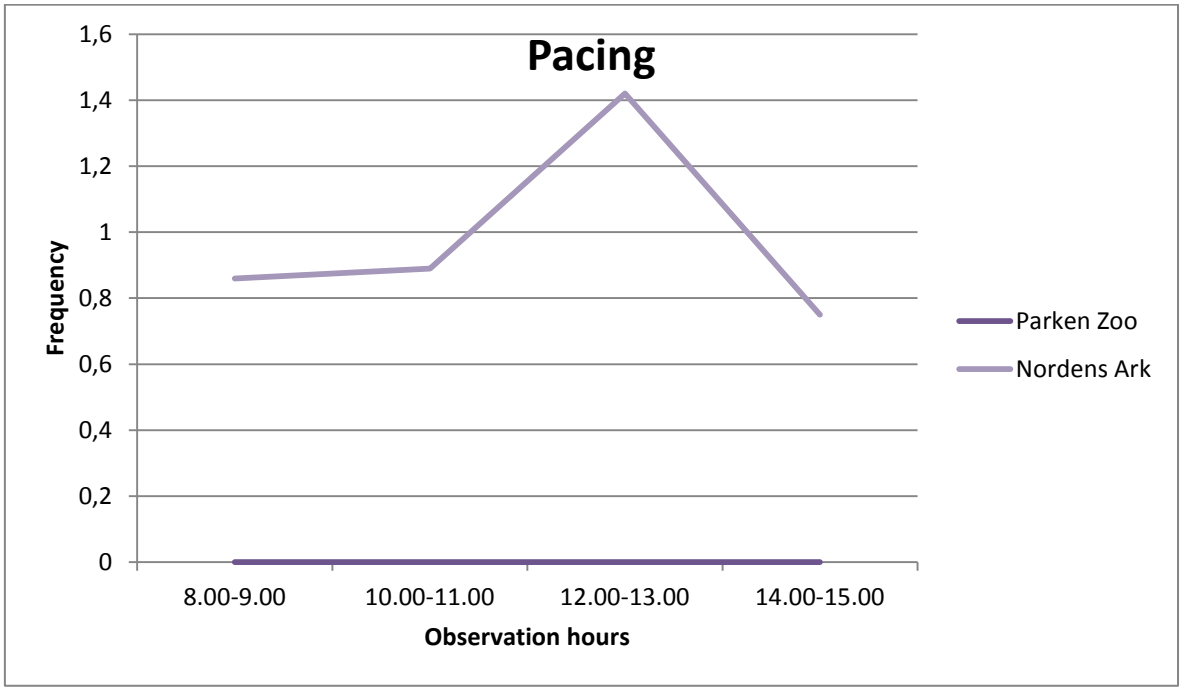

Figure 7 *- Differences in pacing frequency during the six observation days, divided into four hours (n=2/zoo).*

DISCUSSION

The frequency of stereotypic pacing in leopards differed between the two parks observed in this study. At Nordens Ark the leopards displayed a higher pacing frequency than at Parken Zoo, while the leopards at Parken Zoo showed a much higher frequency in walking.

Stereotypic pacing

It was difficult to tell what was possibly causing the pacing at Nordens Ark; there could be a few different reasons. For example, the size of the enclosure might be one problem, since animals with large home-ranges are more prone to stereotypies according to Clubb and Mason (2007).

Sometimes the female, Bira, started pacing when visitors arrived at her enclosure; if she was resting she suddenly got up and started pacing back and forth where the visitors were standing. At other times she did not seem to care about the visitors at all. She also had a quite clear view of the urial enclosure and sometimes she would see the urials and start pacing while keeping her eyes on them. The leopards always paced when put in the transfer gate prior to feeding or enrichment, but it was difficult to determine if they paced more before or after feeding. She also paced in the end of the enclosure that was closest to Kitan. Sometimes if she saw him, she ran over there and started pacing.

There might be many reasons to why the leopards at Nordens Ark spent so much more time pacing while the leopards at Parken Zoo did not pace at all. On the other hand the Parken Zoo leopards walked a lot more than the leopards at Nordens Ark. Perhaps this walking in fact was pacing, even though the observer decided to mark it as ‘walking’. The male at Parken Zoo, Boris, often disappeared out of sight while walking, which made it difficult to judge whether he was walking or pacing, and therefore the behaviour was defined as ‘walking’, while ‘stereotypic pacing’ might have been more accurate, though it is hard to know for certain.

Macri and Patterson-Kane (2011) conducted a study on snow leopards and found that solitary housed individuals paced more than ones kept in pairs. Some of the solitary snow leopards also included what the authors call a ‘stand and observe’ in their pacing routine (Macri & Patterson-Kane, 2011), much like the leopards observed at Nordens Ark, who sometimes paused in their pacing and then continued. Macri and Patterson-Kane (2011) believed that the pacing could be due to the fact that the snow leopards were unable to satisfy some of their motivations, for example finding a partner. If this is also applicable to Amur leopards, perhaps this was the case at Nordens Ark where Bira and Kitan were kept separately. They were often pacing where they could see each other. The fact that a total of 18 animals were observed in Macri and Patterson-Kane’s study makes it convincing since, in my opinion, it is a quite large number, and I think that the more animals you use, the more credible is the result.

Individual differences

Kitan, as mentioned before, often paced over where he could see the snow leopards. I do not know if that was the reason for his pacing; it is difficult to tell. From there he could also see the urials; he sometimes stopped to look at them. He also paced a lot in the other end of the enclosure where he could see Bira. Kitan had a bad limp during the first observation days. Perhaps he would have paced even more if he had not been in pain.

As explained earlier, both leopards at Nordens Ark sometimes paced when they saw the keepers or their vehicles. The leopards would sometimes also pace when keepers were in the urial enclosure. According to Bashaw (2000), both tigers (*Panthera tigris*) and lions (*Panthera leo*) at Atlanta Zoo seemed to pace more in areas where they could see another cat or human through the fencing. Hosey (2008) on the other hand says that it seems like felids are not easily disturbed by the presence of people, or it might just be that they do not express it. Bashaw (2000) also discovered that a visual barrier did not decrease the frequency of pacing, it actually increased. That is quite interesting due to the fact that there was a visual barrier in Bira's enclosure, perhaps so she would not see Kitan. This was one of the spots where she paced the most. Kitan also had a visual barrier, but on the snow leopard side. This was where he paced the most. He sometimes stood on his hind legs against the fence to look over the barrier (Fig. 8); if he was looking at the snow leopards or visitors, I do not know.

Figure 8 *- Kitan looking over the visual barrier. Photo: Apelqvist M., 2014.*

Bashaw *et al.* (2007) suggest that the social stimuli of other conspecifics, other animals or humans might not be the source of stress, but the animals' capability to control the access of these stimuli. This study was conducted on lions and tigers, but I suppose it could be applicable to leopards as well, since they are closely related. The ability to control one's environment has been shown to have an important effect on an animal's response to different events, both negative and positive (Bashaw, 2003). In one study, auditory enrichment was successfully tested on an African leopard (Markowitz *et al.*, 1995). The leopard in the study could use the device, which was making bird sounds, when she felt like it; it was controlled by the keepers. When using it, she got a food reward (Markowitz *et al.*, 1995). Being able to control the device on her own gave the leopard more control over her environment (Markowitz *et al.*, 1995). The results of the study were positive, but I do question the accuracy of the study since there was only one animal used. Perhaps the result would have been different if the study had been conducted on more individuals.

In a study made on Amur tigers (*Panthera tigris altaica*), the authors believe that the cause of the stereotypic pacing is permanently frustrated appetitive foraging behaviour (Jenny & Schmid, 2012). This is because the tigers are used to being fed on the same time and place every feeding opportunity, hence every foraging attempt is unsuccessful (Jenny & Schmid, 2012). The same authors think that if the tigers always fail at foraging, except at feeding time, they might start pacing in the enclosure, because the motivation to forage is still strong. Since tigers and leopards are closely related, it is possible to assume that the leopards at Nordens Ark pace for the same reason. If one also assumes that the 'walking' performed by the leopards at Parken Zoo is in fact 'stereotypic pacing', this might be the case for them as well.

At times, the leopards would start pacing without any apparent reason. Bira was often resting on the ground close to the front of her enclosure. She could suddenly get up and pace for a while and then go back to resting. It is possible that my presence could have disturbed her.

How to reduce stereotypies

In the study conducted by Jenny and Schmid (2002), the pacing was reduced by using electronically controlled feeding boxes which offered the tigers food at random times. Instead of pacing, the female tiger slept more, both when housed solitary and with the male; the male did not react to the feeding box when housed by himself, but directed a lot of attention to it when confined with the female (Jenny & Schmid, 2012). I believe that feeding boxes or some other kind of randomized feeding might decrease the pacing in leopards as well. I know that the leopards at Nordens Ark were fed on the same days every week, but not on the same time. At Parken Zoo the leopards were fed every second afternoon, the time differing a bit from day to day. Perhaps also randomizing the days would reduce the pacing and walking.

Many authors seem to be arguing wheter to regard stereotypies as an indication of poor welfare, or not. Mason and Latham (2004) suggest that some stereotypies might be a form of 'do-it-yourself enrichment' and therefore improves the welfare of the animal. For these types of stereotypies it would be counter-productive to try and prevent them (Mason & Latham, 2004). If this is the case, it might be of importance to first find out wheter or not an abnormal behaviour is beneficial for the animal, but it is also important that it is not used as an excuse to not take proper care of animals.

Quirke and O'Riordan (2011) made a study on cheetahs in captivity, and found that suitable enrichment for them was olfactory enrichment and variation in feeding time and place. Cheetahs are quite different from leopards and other cats in many ways, for example in the way they hunt, but this is probably applicable to many different felid species, just like Jenny and Schmid's (2004) study made on tigers.

Apart from changes in feeding regime, I belive it is essential to activate the leopards more. Westlund (2014) means that formal training can be enriching for the animals; for example it gives them control and helps them deal with environmental challenges. Melfi (2013) says that training is essential for some animals, but should be avoided in others.

The fact that potential rivals – snow leopards – and prey animals – urials – are kept so close to the Amur leopards might affect them negatively. Though it is hard to know for certain if these animals have any impact on the leopards. Moving the snow leopards and/or urials is a lot of work and it might not even have any effect on the pacing. There is also potential for making Bira's enclosure bigger at Nordens Ark. Albeit, this requires both work and money, and it might not have the desired effect.

During one observation, Kitan was enriched with cinnamon that was placed on the ground, but he showed no interest in it. In a study by Yu *et al.* (2009), different types of olfactory enrichment was tested on six Amur leopards at Beijing Zoological Garden, all leopards displaying behaviour problems. The different enrichments used in their study were nutmeg, feces from roe deer (*Capreolus capreolus*) and urine from Amur tiger. Yu *et al.* (2009) discovered that the leopards used all scented objects by for example scratching them and rubbing their cheeks against them. Based on this, they suggested that olfactory enrichment should be used as a complement to other types of enrichment. They also noted that the leopards seemed to lose interest in the scents with time (Yu *et al.*, 2009), and therefore I think it is important to vary what kind of olfactory enrichment is used. I think that the

leopards at Nordens Ark had gotten cinnamon before, and perhaps it was not interesting anymore.

The method and sources of error

It was easy to observe the animals, since I used focal animal observation and only had to keep track of one animal at the time. Also, at Nordens Ark it was easy because the animals were kept separately. Since I looked at the animals continuously, I could register every behaviour and therefore get a frequency. On the downside, I could not tell how long time the animal spent on performing one behaviour, something that might be a bit misleading. For example, I might register the behaviour 'walk' five times, but 'stereotypic pacing' only once, even though the leopard spent more time pacing than walking. To get a more accurate result, filming the animals would probably be the best method. In that case it would also be interesting to film the animals in the evening as well, since leopards are known to be most active in the morning and in the evening (Mallapur & Chellam, 2002). That way it would be possible to get a percentage of how much time was spent performing every behaviour.

It was sometimes hard to determine whether a behaviour had ended or not. If the animal was pacing and stopped for a minimum of three seconds, the observer regarded it as a new behaviour. The same was done for the behaviour 'walking'. It was also difficult to distinguish between 'sleeping' and 'resting' since the animal was sometimes too far away for the observer to see whether its eyes were closed or not.

Some of the observation days were quite rainy, which might have had an impact on the leopards' activity.

Future research

Many studies have been conducted on the subjects of stereotypies and enrichment, but there are still many animals expressing abnormal behaviours. For me, zoo animals are important for education purposes, especially when it comes to endangered species. Therefore it is also key that the animals we display in zoos show a 'normal' set of behaviours. It is my personal opinion that visitors do not appreciate stereotyping animals, for example a bear that is just walking back and forth in its enclosure. Visitors want to see animals that play, feed and do things that are species-specific.

Many of the sources used in this study have been conducted on only one or a few felid species, which might be misleading, even though a lot of the information can be applied on many species. More research is needed on this subject and on more species. Even though many felids are alike, what works for one does not necessarily work for another, and individuals also answer differently to different types of enrichment. It is also important to include many zoos to get more reliable data.

I think my study, even though it is small, is of importance when it comes to the welfare of zoo animals, and especially Amur leopards. The Amur leopard is, as said before, an important subspecies to conserve because of its uniqueness compared to the other subspecies. Barely any studies have been made on Amur leopards and their behaviour either in captivity or in the wild, and therefore my study is an important contribution. For future research, I think it would be interesting to investigate wheter the Amur leopards express more stereotypic behaviour when kept solitary or in pairs, much like the study conducted by Macri and Patterson-Kane (2011) on snow leopards.

Conclusion

The leopards at Nordens Ark paced with a higher frequency than the leopards at Parken Zoo. If one assumes that the 'walking' expressed by the leopards at Parken Zoo is instead 'stereotypic pacing', then the frequency would be higher at Parken Zoo than at Nordens Ark. The difference between the male and the female at Nordens Ark were not that big with an average frequency of 1.06 for the female and 0.9 for the male. It is hard to tell what was possibly triggering the pacing and it might be the result of many different causes.

There is no easy solution to the problem, but I suggest changes in the feeding routines, and more enriching and training of the animals.

POPULÄRVETENSKAPLIG SAMMANFATTNING

Amurleoparden är ett av världens mest hotade kattdjur med endast några få individer kvar i vilt tillstånd. Den hålls i fångenskap världen över i ett försök att rädda den vilda populationen. Tyvärr utvecklar många djur i fångenskap onormala beteenden, eller stereotypier. Detta är beteenden utan uppenbar funktion eller mål. Stereotypier är särskilt vanliga hos stora rovdjur som normalt rör sig över vidsträckta områden. En av de vanligaste stereotypierna hos dessa djur är stereotypt vandrande, vilket innebär att djuret vandrar fram och tillbaka.

Syftet med den här studien var att jämföra Amurleoparder på två svenska djurparker – Nordens Ark och Parken Zoo – för att se om det förekom stereotypt vandrande och om det i så fall fanns några skillnader mellan parkerna, samt vad som skulle kunna vara orsaken till vandrandet. De leoparder som användes i studien var två honor och två hanar, en av varje på båda parkerna.

Resultaten visade att båda leoparderna på Nordens Ark vandrade, medan ingen av leoparderna på Parken Zoo gjorde det. Dock registrerades beteendet ”går” väldigt ofta hos leoparderna på Parken Zoo, särskilt hos hanen. Eftersom han ibland var svår att se då han gick är det möjligt att detta beteende i själva verket var stereotypt vandrande. Om så är fallet vandrar han med högre frekvens än leoparderna på Nordens Ark.

Det finns många möjliga orsaker till vandrandet hos Nordens Arks leoparder. Hanen, Kitan, ser snöleopardernas hägn, vilket skulle kunna vara en anledning till att han vandrar, eftersom han ofta vandrar på den kortsida där han kan se deras häng. Bira, leopardhonan, vandrade ofta vid hägnets framsida där hon hade översikt över stäppfårens hägn, vilket också skulle kunna vara en orsak till vandrandet. Även faktorer som besökare och utfodringstider kan påverka.

Jag tror att det viktigaste är att ändra utfodringsrutinerna så att de inte är regelbundna. Detta är något som har minskat förekomsten av stereotypt vandrande på andra djurparker. Jag tror också att det är viktigt att träna djuren så att de känner att de har kontroll över sin omgivning.

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