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**THE ZOOSEMIOTICS OF SOCIALIZATION: CASE-STUDY IN
SOCIALIZING RED FOX (*VULPES VULPES*) IN TANGEN ANIMAL
PARK, NORWAY**

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INTRODUCTION

Scientists of animal studies have agreed that man is a universal enemy for *most* wild animals. For this reason, wild animals that encounter humans will always seek for an opportunity to flee. The wild animals living in captivity do not have this opportunity. Since fear of humans has developed over generations, it is genetically inherited, which means that even the animals born in captivity are often suffering from this fear, which results in stress and display of abnormal behaviours (Hediger 1950: 28–29). The goal of socialization of an *ex situ* wild animal with humans is to reduce the animal's fear of people as much as possible and thus improve the animal's welfare in captive environment. It is possible to achieve the goal by establishing a partnership-based human-animal relationship and reconstructing the animal's Umwelt (in terms of the meaning-carrier of humans). This is not an easy task as it needs more thorough comprehension in animal communication and requires orientation in various types of human-animal relationships, which reciprocal relatedness is still uncertain in animal studies.

Socialization of captive wild animals with humans is yet an emerging field of animal studies, whereas its benefits for the main purposes of the zoo (including animal welfare, education and research) are still relatively poorly covered in scientific literature. Also its contribution to other animal welfare programmes, such as enrichment and training, remains unclear. One could claim that studying biological subjects requires some practical experience (at least observation) with the study objects in order to make valid arguments. One of the advantages of this thesis is enabling to compare the semiotic theory of zoo studies with practice and, by doing that, develop a more sufficient conceptualization of socialization. Namely, a socialization process of Red Fox was conducted during the research. The practice was based on participatory observation and took place in Tangen Animal Park, Norway.

As a result of this thesis, a zoosemiotic approach to the subject is offered, enabling to better differentiate between various types of human-animal relationships and clearly position socialization in the field of animal welfare studies. An extra emphasis will be put on

investigating the communicative means used by both animals and humans in the process of socialization. The research itself is interdisciplinary, considering the main arguments of semiotics, zoology, animal welfare, animal behaviour, comparative psychology, and other relevant disciplines. Conclusively, a transdisciplinary theory will be suggested. It must also be mentioned that, in the following analysis, the concept 'socialization' is discussed in the context of (zoo) animal studies; its counterparts in the disciplines of human culture (including cultural anthropology, sociology, etc.) are not considered relevant for achieving the goals of the current thesis.

The thesis is divided in four main chapters. The first chapter offers a theoretical foundation for the subject in question, comparing different modern views on animal management and welfare as well as their overlapping with socialization. The second chapter will explain the research methodology, sources of information and motives for participatory observation. The third chapter will give an overview of the socialization project of Red Fox in Norway and compare the practical aspects with the theoretical standpoints of the first chapter. The fourth and final chapter is dedicated to suggesting a transdisciplinary theory of socialization and its positioning in the field of both human-animal relationships and animal welfare studies. Whereas the whole thesis is guided by the three following hypothesis, which will find their approval or disapproval in the final chapter:

- The processes of habituation, taming, imprinting and socialization have considerable differences in the effects on human-animal relationships, and man's position in the phenomenal fields of animal's Umwelt.
- Different ways of establishing human-animal relationships have either a contributive or contradictory effect on animal welfare in captivity. Whereas none of them should be developed with animals living in the wild.
- Socialization, enrichment, training, improvement of zookeeping routines, and other such programmes contribute to animal welfare, while each of their success is positively correlated with the success of the other programmes.

When considering sources of information, the theoretical part of the research relies most on the views of Geoff Hosey, Vicky Melfi and Sheila Pankhurst in their book *Zoo Animals: Behaviour, Management and Welfare*, published in 2009. Also multiple works of Heini Hediger and Thomas A. Sebeok are represented. Another important role could be admitted to

Umwelt theory which, in this thesis, is predominantly based on the works of Jakob von Uexküll and Morten Tønnessen. The practical part of the research relies mostly on the author's observations as well as the opinions of socialization experts among whom, Runar Næss deserves special featuring. Also, publications of the experts from Wolf Park (USA) were thoroughly analysed during the practice. The most important of those is the book of Jessica Addams and Andrew Miller (2007) *Management of Red Fox (Vulpes vulpes) in Captivity*.

Herein, the author would like to express her sincere gratitude for persons who made this work possible: the supervisors Timo Maran and Nelly Mäekivi for their patience and supportive guidance; Julian Brossé for his contribution to “puppy-parenting”; Steinar Næss for his kind assistance in language skills. Perhaps above all, the author is forever thankful for her mentor Runar Næss who altruistically dedicated to educating the author by sharing his priceless knowledge and providing the opportunity of practice. Last but not least, the author could not forget to thank the three foxes, Tuli, Johnny and Franklin, who offered the eye-opening experience of true friendship with another species.

1. THE THEORETICAL ASPECTS OF KEEPING WILD ANIMALS IN CAPTIVITY

The aim of this chapter is to provide an overview of these modern theoretical topics of keeping wild animals in captivity, that are relevant for better understanding of the current case-study. These topics include animal welfare, animal behaviour, human-animal relationships, animal communication and enrichment. A relatively new method of improving animal welfare – socialization – is introduced. Throughout the analysis, zoosemiotic perspective is prevalent, offering a rather novel perspective on the field of zoo studies. Beforehand, it should be mentioned that concentration is put on zoos and animal parks more than other types of captive facilities (such as circuses or farms). The following chapter will encompass the theoretical part of the thesis, offering a basis for further analysis of socialization that will be supported by a case study.

1.1. The main arguments on the ethics of keeping animals in captivity

Throughout history, the reputation of zoological gardens is often inclined toward that of an entertainment centre. Besides the methods of marketing (posters, flyers, mascots) and increasing income (gift shops, kiosks, attractions for children), this image might be supported by the fact that cooperation with academic institutions is not transparent or simply not strong enough even today (Hediger 1970: 59). During the past decades, this problem has been addressed more and more aggressively, which has led to zoos emphasizing more strongly on their real values. While entertainment and economical profit (necessary in order to maintain high standards of animal welfare) will always be an aspect of the zoo, the priorities of all accredited zoos are conservation, education, welfare and research. (Hosey et al. 2009: 38; Hutchins et al. 1995: 13-18; Kleiman et al. 1996; Young 2003: 5)

Zoos have made a great effort in helping to save various endangered species, from Partula snails (*Partula radiolata*) and white-clawed crayfish (*Austropotamobius pallipes*) to Amur leopards (*Panthera pardus orientalis*) and Ploughshare tortoises (*Astrochelus yniphora*). The World Association of Zoos and Aquariums (WAZA) has declared that out of 34 animal species currently announced as extinct in the wild, 29 are actively bred in zoos, aquariums and other animal propagation activities (The World Association of Zoos and Aquariums 2011). However, the priorities of conservation might not always coincide with the priorities of animal welfare. For example, conservation, while emphasizing on genetic diversity, may require the elimination of some animals from breeding groups. This is an aspect that might contradict the provision of high standards of animal welfare for individual animals (Hosey et al. 2009: 43).

Being one of the main problems of zoological gardens, the named conflict also brings up the difference between utilitarianists and animal rights campaigners – some of the most influential views in the field of zoo ethics. Utilitarianism prioritizes production of the greatest good (utility) for the largest number of individuals, considering the suffering of some animals acceptable provided that the benefits outweigh the costs (for example, laboratory experiments with rats and mice in order to find a cure for a human disease). The animal rights group equalizes the rights of animals to those of humans and does not recognize any justification for sacrificing the interests of one animal to the benefit of another. (Hosey et al. 2009: 42) Establishing balance between the often contradictory views on keeping animals in captivity is an immense task for zoos to accomplish.

Whereas the author of this thesis believes the best environment for an individual animal is the wild nature, it must be admitted (even by the animal rights campaigners) that there exist circumstances under which it is the best interest of an animal to be kept in captivity (Hosey et al. 2009: 41). One of those circumstances applies to the rescue animals. Many exotic pets, such as reptiles or big cats, confiscated from private owners are brought to zoos to avoid culling. Even more, zoos are the place of refuge for injured or orphaned wild animals. With excellent veterinary care, stable provision of food and shelter, zoos might sometimes be better for the survival of an animal. Rescue is a part of one of the three main arguments in defence of keeping wild animals in captivity announced by Stephen St. C. Bostock in his book *Zoos and Animal Rights* (1993) (— referred to through Hosey et al. 2009: 41).

Those three arguments are following (Hosey et al. 2009: 41):

- 1) “keeping wild animals in captivity has advantages for humans (education, conservation, recreation, scientific discovery) and sometimes for the animals themselves as well [conservation of populations, rescue]” (Hosey et al. 2009: 41);
- 2) life in captivity does not necessarily mean negative welfare (the concept of welfare is explained in subchapter 1.2.); in some cases, animals might even be better off than they would in the wild¹;
- 3) the adequacy of comparisons about the morality of captivity is questionable (often anthropomorphic) since animals are not sufficiently comparable to humans.

We have already covered some of the aspects of conservation, recreation and even advantages of a captive life over a wild one. It is also clear that public education and biological research benefit from zoos. However, the author has not yet mentioned that keeping animals in captivity has a significant research value for sociologists, semioticians and other scientists who study intra- and interspecific communication, animal behaviour or other subjects that would gain from various groups of related and unrelated animals living together (Wharton 2007: 178-190; Kleiman 1985: 93-98). In the context of today’s modern and infotechnology-based society, it might also be relevant to speculate that modern zoos with their interactive educational methods offer people opportunity to, at some level, reunite with nature and reassess their attitude towards it.

1.2. Modern viewpoints on animal welfare

Animal welfare is a wide and diverse concept that, over time, has changed considerably and still has little agreement as how it should be defined. While British animal behaviourist Christopher John Barnard has declared most attempts “relying on anthropomorphism, emphasising comfort, health, ‘normal’ behaviour or philosophical stances on ethics and animal rights” (Barnard 2004: 212); researchers Geoff Hosey, Vicky Melfi and Sheila

¹ Here, it is important to differentiate *captivity* from *confinement*. While confinement (e.g. small cages) restricts liberty in a way that damages the animal’s well-being and causes it harm, captivity *per se* does not (Hosey et al. 2009: 41).

Pankhurst defined animal welfare in their book *Zoo Animals: Behaviour, Management, and Welfare* (2009) as the study of an animal's quality of life (Hosey et al. 2009: 213). They explained that animal welfare is the subjective state of an animal, whereas this subjective state is independent of us and our social views about animal welfare (Hosey et al. 2009: 213).

Perhaps the most well-known guide to conditions necessary for sufficient animal welfare is the Five Freedoms stated by the British government Farm Animal Welfare Advisory Committee in 2012 (originally announced in 1965). These represent the basic needs of animals and, when they are satisfied, should guarantee an adequate level of welfare (Hosey et al. 2009: 245; Farm Animal Welfare Council 2012):

- 1) Freedom from Thirst, Hunger, and Malnutrition (every animal should be provided with fresh water and a proper diet to maintain full health);
- 2) Freedom from Discomfort (every animal should be provided with a functioning environment including shelter and resting area);
- 3) Freedom from Pain, Injury, and Disease (every animal should be provided with an adequate veterinary care through prevention or fast diagnosis and treatment);
- 4) Freedom to Express Natural Behaviours (every animal should be provided with sufficient space, appropriate facilities and company of conspecifics);
- 5) Freedom from Fear and Distress (every animal should be provided with conditions and treatment that prevent mental suffering).

The five freedoms are the minimum welfare standards of keeping animals in captivity. However, in order to reach higher animal welfare, one must implement further methods, which, unlike the five freedoms, vary greatly across different cultures. Indeed, one of the reasons why animal welfare is such an ambiguous concept, is the fact that cultural differences, in relation to our use of animals, have a great impact on what conditions we consider necessary for animal welfare (Fraser 2009: 10). For example cows in Hinduistic cultures, owing to their religious status, have considerably different living conditions than, for example, cows in European or American mass-production farms. Another extreme example would be the tradition of farming dogs for meat in Korea, China, Vietnam and Switzerland, which receives zero tolerance in almost any other country in the world. Although these examples are extreme, they illustrate the influence of human religion and culture on people's view on how sophisticated animals' perception of its environment is, what is the level of animal consciousness, what needs the animal might have, and how valuable an individual

animal's life is. To some extent, cultural and religious values influence all animals in captivity. In order to reach a more objective consensus about meeting the animals' needs for a good-quality life, an animal-oriented (rather than human-oriented) view would be necessary. Hosey, Melfi and Pankhurst have introduced four common approaches to welfare, which the author considers animal-oriented:

- animal minds – “considering animal's subjective experiences, including emotions and [...] consciousness” (Hosey et al. 2009: 218);
- animal natures – “considering the behaviours in wild animals as a template for good welfare” (Hosey et al. 2009: 218);
- animal bodies – “assessing the ability of animals to thrive and survive in their environment” (Hosey et al. 2009: 218);
- ourselves and other animals - “drawing analogies from ourselves about the needs and abilities of other animals” (Hosey et al. 2009: 218).

The first of these approaches is directly related to considering animals as subjects, not objects, which probably is not unequivocally agreed upon even today. The author agrees with the view shared by a major part of modern zoos – animals should be considered as subjects, whereas the existence of higher cognitive skills should be recognized in most animals (Griffin 2001; Hediger 1950: 76; Kleiman et al. 1996). This change of thoughts has had a great influence on what people believe the animals need, how aware the animals could be about their life conditions and what emotional effect that awareness might have on them, how important people evaluate animals' relationships with conspecifics and other creatures to be, etc.

The animal nature approach points out the fact that for an animal to have a good welfare, it needs to be provided with an opportunity for expressing behavioural diversity, whereas the more naturalistic behaviours it displays the better. The impact of behaviour on animal welfare will be more thoroughly discussed in the following chapters of this thesis, since it is highly relevant to the topics of the current research.

The view about animal bodies is related to what Barnard calls the traditional view on welfare (Barnard 2004: 213-214): it regards mostly the fitness of an animal; equating it to measures of growth, longevity, offspring production, health, etc; which are preserved by the organism's coping mechanisms, such as maintenance behaviours (e.g. feeding, grooming), immunological defences and body repair systems.

The last approach to animal welfare – adjusting analogies of human needs to that of animal's – is a controversial aspect. On one hand, there exist analogous functions between the homologous physiological and behavioural processes of humans and animals – we share many biological structures with other animals and we can all experience different states of welfare (Hosey et al. 2009: 225). On the other hand, it has a strong tendency for anthropomorphism.

When talking about animal welfare, it is relevant to mention that not just any negative subjective state means the animal is suffering. Barnard has distinguished suffering as “a causal mechanism that triggers adaptive aversive responses in the animal” (Barnard 2004: 213). He has also explained that negative functional consequences for the individual result in two ways: from “adaptive self-expenditure, where negative subjective states reflect adaptive cost-gauging” (for example fatigue while foraging or pain indicating an injury) or from “non-adaptive self-expenditure” (for example hunting fruitlessly in an inappropriate environment or mounting an ineffective immune response against a novel parasite) (Barnard 2004: 214). It is important to comprehend that only the non-adaptive self-expenditure qualifies as suffering (Barnard 2004: 214), whereas short-time stress could even be good for the animal.

Because of the reason that physiological and behavioural measures indicative of stress are not *necessarily* indicative of poor welfare (Hosey et al. 2009: 223), stress is yet another controversial topic of animal studies. In this thesis, the author has adapted the usage of the term stress only in case of the occurrence of pathology that implies negative welfare (Hosey et al. 2009: 223; Moberg, Mench 2000: xi). Additional explanation could be offered by saying that an extreme stressor, or the situation when the animal is not able to adequately adapt to its life conditions, may result in the animal entering an exhaustion phase. At that point, one could see the animal's biological functions are compromised and talk about the negative effects of stress on animal welfare. If this kind of stress lasts for a longer period, the animal is likely to die. (Hosey et al. 2009: 223) Most of the short-term (and not extreme) stress, however, does not compromise the biological functioning and welfare of the animal. This is the reason why in some special cases, stress might even be enriching for the animal.

1.3. Modern viewpoints on animal behaviour

In the previous subchapter, the author mentioned that behaviour is an influential factor of animal welfare, which deserves more attention in this thesis. It must be admitted that behaviour is yet another complicated and variously defined concept in animal studies. To begin with, classical ethologists, seem to have defined behaviour as patterns of responses, which are elicited and directed by specific stimuli, and which could be recognized and analysed according to their function, causation, ontogeny and evolution (Eibl-Eibesfeldt 1970: 1; Lehner 1996: 4; Tinbergen 1963: 410-433). Nowadays, animal behaviourists have been more precise in defining the unit of their discourse. For instance, Barnard offers one way to define behaviour: as “all observable processes by which an animal responds to perceived changes in the internal state of its body or in the external world” (Barnard 2004: 2). An even more precise is the view on behaviour as “the way an animal reacts to or interacts with its immediate environment; [whereas] some behaviours are voluntary, while other are involuntary physiological responses to environmental stimuli or stressors. To be considered “behaviour”, an action must be both observable and measurable” (Handelman 2008: xx). Owing to its accuracy, the author has considered the latter definition most appropriate when discussing the topics of animal behaviour in this thesis.

An important characteristic of behaviour is the fact that it is adaptive. Not only does it alter through learning during the animal’s lifetime, but it evolves genetically over generations by the processes of natural selection towards increasing the animal’s fitness (Hosey et al. 2009: 77). However learning, as well as life conditions, have an immense influence on shaping the animal’s behaviour. This is an aspect on which the author will focus further in the thesis.

Before presenting the methods of studying behaviour, it must be explained that genuine “natural behaviour” is commonly regarded as behaviour of animals that live in the wild, whereas a behaviour of an *ex situ* animal should be as *similar* as possible to that of a wild conspecific if animal welfare and educational values are concerned. The Swiss zoologist and zoosemiotician Heini Hediger has pointed out that natural elementary basic material in its full extent exists only in the wild animal, i.e. in all those animals which have developed in nature without man’s interference (Hediger 1968: 11-12). This argument does not mean that behaviour studies in zoos are inadequate or unnecessary. *Vice versa*, they are irreplaceable for learning about animals. However, the researcher must acknowledge that the behaviours

observed in the zoo are the behaviours of a *zoo* animal and not that of a wild one. As well as the fact that behaviours that are ‘normal’, ‘preferred’ or ‘unpreferred’ in the zoo, may not (and usually are not) so in the wild. (Perhaps, these arguments are invalid if the animals’ behaviour has been deliberately maintained or adjusted for purposes of reintroduction to the wild). From that perspective, as well as from other perspectives described later, behaviour is a very context-specific phenomenon.

Animal behaviour studies bring together quite a number of different disciplines, among them ethology, behaviourism, behavioural ecology, comparative psychology, etc. One of the most influential developments has been that of the modern ethology with its (abovementioned) four guiding questions about animal behaviour proclaimed by the honored ethologist Niko Tinbergen in 1963 (Tinbergen 1963: 410-433): what is the function of behaviour (how does it affect fitness), what is the cause of the behaviour (internal and external stimuli), what is the ontogeny of behaviour (development of the behaviour during the individual’s lifetime), and what is the phylogeny of the behaviour (how did it evolve throughout evolutionary history). An additional “fifth aim” for ethology was advocated by Gordon M. Burghardt, who emphasized that one also needs to consider organism’s private experience (including subjective perpetual world, mental states, and subjective responses) in order to understand its behaviour.

The fifth aim is nothing less than a deliberate attempt to understand the private experience, including the perceptual world and mental states, of other organisms. The term private experience is advanced as a preferred label that is most inclusive of the full range of phenomena that have been identified without prejudging any particular theoretical or methodological approach. (Burghardt 1997: 276)

Such consideration of animal’s Umwelt is of greatest value in this thesis, since previous experiences determine the animal’s behaviour and attitude towards people, as well as the effect that being surrounded by people has on the animal’s welfare. This fifth guiding question is, thus, embraced in the analysis of the following chapters.

1.3.1. Behavioural display and animal welfare

In a zoo environment, one must pay close attention to animal behaviour because of the multiple ways in which behaviour influences animal welfare. Firstly, it is necessary to take

into consideration the fact that a wild animal in nature is constantly pre-occupied with the impulses to avoid enemies and to seek food. Since both of these highly important behaviours are not relevant in captivity (unless the animal is being reintroduced into the wild), it is obvious that this change has far reaching consequences on behavioural display. “The captive animal’s most important occupations are taken from him. Enormous amounts of energy are thus released and must somehow be restrained” (Hediger 1950: 158). It has been proved that some percentage of this released energy in captivity is replaced by spending more time in grooming and social behaviour (Hosey et al. 2009: 117), but if failing to replace the missing occupation considerably, there is a high probability of excessive anti-social behaviour, dangerous sexual over-activity, and stereotyped movements (Hediger 1950: 158). This is the problem of all zoos and various enrichment methods have been worked out to compensate it, including the different possibilities for environmental enrichment, cognitive enrichment (e.g. training) and social enrichment (e.g. socializing, introducing different species). The mentioned behavioural compensations play a very influential role in animal welfare and are, at the same time, the reason why natural behaviour, in its true sense, can only be observed in wild animals.

Hosey, Melfi and Pankhurst have named even more reasons why maintaining behavioural expression as natural as possible is important:

- “Animals have evolved over many years to perform these behaviours and thus are highly motivated to express them” (Hosey et al. 2009: 231). Being unable to do so could possibly make them frustrated.
- “The performance of these behaviours is associated with positive affective experiences and long-term benefits such as enhanced adaptation to environmental stressors” (Hosey et al. 2009: 231).
- “A ‘void’ will be created in their absence and ‘abnormal’ behaviours will develop in their place, but it has also been argued that it is just as likely that behaviours of a negligible or beneficial nature could be performed instead” (Hosey et al. 2009: 231).
- “Animals will forgo cognitive stimulation if they are unable to express natural behaviours” (Hosey et al. 2009: 231).
- “Behavioural restriction indicates that environmental challenges of captivity have affected the animal and suggests that the animal has not been able to adapt to those challenges” (Hosey et al. 2009: 231).

At this point, it must be mentioned that apart from improving animal welfare, maintaining behavioural diversity – as naturalistic as possible, but adjusted to what is preferred for making the animal more suitable for life in captivity – is also essential for public education, determining how people interpret wild animals' behaviour and needs. Another important aspect influenced by behaviour is conservation, which has a slightly different approach. When conservation is set as goal, maintaining animal's natural behavioural diversity is aimed to adopt the animal to life in *in situ*, not to life in a human environment which is the case in permanently captive animals. To prevent possible confusion, it must be made clear that the following analysis (throughout the whole thesis) is concerned mostly with animals that are not candidates for release.

In the previous subchapter, an apprehension of animals as subjects was brought up when analysing the modern approaches to animal welfare. This approach has a direct impact on behavioural studies, providing an understanding that every animal's behaviour is at the same time species-specific and individual. Even more, there are multiple studies that prove the existence of animal personality traits and their genetic basis (Briffa, Weiss 2010; Freeman, Gosling: 2010; Van Oers et al. 2004; McDougall et al. 2006; Hansen, Møller 2001; Tetley, O'Hara 2012; etc.). This aspect is much taken advantage of by some zoo people, who are selecting animals to work with according to how well does the animal's personality fit the captivity. Scientists have acknowledged that this kind of selection, if the animals are to be reintroduced to the nature, may greatly influence conservation. Namely, it often happens that traits such as aggression or high level of activity are being excluded, because such animals do less well in captivity and would be more difficult to manage (Hosey et al. 2009: 86-87). This is one of the examples how animal welfare could be improved by changing the animals instead of the environment. However, since some degree of selective breeding might be involved, it could lead to genetical changes in the animal's behaviour, which might bring the animal species a step further to domestication. The author therefore argues that, in the zoo, instead of selecting animals to work with by their personality traits, a much more ethic way to make the animal's suitable for living in captivity would be working with *all* the animals by individuality-oriented methods. One example of such approach is socializing animals with humans (more thorough analysis will be provided in the following chapters of the thesis). However, it must be explained that the author admits both modifying the animal and the environment necessary in order to improve the welfare of captive animals.

1.4. The role of enrichment in animal welfare

When it comes to the animal's losses (compared to its natural lifestyle) when living in captivity, space restriction is not the only important disadvantage. In many cases, certain secondary consequences of diminution of space might have an even worse impact on animal welfare. For this reason, Hediger has distinguished direct and indirect effects of space restriction. Direct (i.e. primary) effects are restriction of freedom of movement or different possibilities of movement. Indirect (i.e. secondary) effects, on the other hand, include "lack of diversion and occupation; impoverishment of the subjective world; liberation of energies that were pent up in freedom (through avoidance of the enemy, etc.); impossibility of suitable differentiation of space; impossibility of free choice of food; hypersexuality; anti-social behaviour; impossibility of choice of optimum micro-climate; impossibility of avoiding members of its own species at will; and increase in danger from infection and re-infection" (Hediger 1950: 31-32). For all those reasons, it is of great importance to enrich the captive animal's environment and everyday life.

Enrichment is one of the most common ways for establishing behavioural diversity and compensating the other effects of space restriction in zoo animals. Already long ago it has been proved by scientific studies that enrichment increases brain plasticity and therefore improves the animal's learning and memory abilities (Hebb 1947; Sneddon et al. 2000). Besides the already mentioned benefits, enrichment can accelerate the animal's recovery from different traumas (Jadavij et al. 2006), ease stress, promote breeding, improve physical and psychological fitness (Carlstead, Shepherdson 1994; Jones et al. 1998), and reduce the animal's fearfulness of novel object in its environment² (Reed et al. 1993). Hence, enrichment enables (both directly and indirectly) the animal to express a diversity of desirable behaviours in the zoo, as well as it enables the caretakers to manipulate animal behaviour by promoting different behaviours (e.g. breeding, foraging or increase of general activity) found necessary at the particular moment of the animal's life. When enrichment is concerned, it must also be mentioned that for it to be effective, the animal's fear of humans should be as low as possible. Animals who have high fear level of humans and negative experience with human interaction tend to be too scared, not only to participate in the enrichment acts that involve human contact, but also to investigate novel objects in the environment (especially when it catches a human scent around it or is surrounded by visitors at the same time).

² Neophobia is negatively correlated to the animal's lifespan (Hosey et al. 2009: 214).

Enrichment can be provided for captive animals in numerous different ways. Additionally, different enrichment types are targeted at eliciting different behavioural categories. However varied enrichment styles might be, five categories can be recognized (Hosey et al. 2009: 259; Young 2003: 2-3):

1. Nutritional enrichment: these include enrichment styles which concentrate on food, providing it in a novel way or consisting of different ingredients. Great examples of food-based enrichment include carcass feeding, spreading food out in the enclosure or making the access to food moderately difficult (requiring physical or cognitive exercise).
2. Physical enrichment: this category includes any change to the animal's structural environment. These could be in form of climbing frames, toys, different underlayers, etc.
3. Sensory enrichment: "anything that stimulates the animal's senses, including what it sees, hears, and smells" (Hosey et al. 2009: 259). Examples of sensory enrichment include smells of other animals, reflecting light, rattle sounds, etc.
4. Social enrichment: "interactions with other animals and people" (Hosey et al. 2009: 259). These include neighbouring animals or enclosure mates of conspecifics or heterospecifics and/or human-animal interactions. However, it must be emphasized that human-animal interactions (as well as animal-animal interactions) are only enriching and enjoyable if the animal is not afraid of the partner or if the fear level is smaller than the level of curiosity.
5. Cognitive (occupational) enrichment: these methods include "additions to the environment that require problem solving of different degrees of complexity to stimulate the animal mentally" (Hosey et al. 2009: 259). Cognitive enrichment is provided, for example, with requiring the animal to use its navigational, tool-making, problem-solving or cooperative skills. In some cases, training and participation in shows could also be viewed as cognitive enrichment for animals. Although it has to be admitted that there is no sufficient scientific data about the enriching functions of training (Hosey et al. 2009: 271), it is considered an important part of animal husbandry and management (Forthman-Quick 1984; Reinhardt, Roberts 1997). Some

experts have even claimed that training is as essential part of high animal welfare as, appropriate diet for that matter (Ramirez 2013)³.

Based on the practical experiences of her own and that of many experts, it is the opinion of the author that training could be a very positive and enjoyable experience when it is founded on positive reinforcement and the animal's limits (both mental and physical) are taken into consideration. Because of the controversial essence of this argument, the author sees that training as a method of animal management deserves more attention in this thesis.

1.4.1. The essence of animal training in zoos

Animal training is becoming more and more common in modern zoos. The commonly held opinion (rooted mostly by circuses), according to which all animal training is unnatural, abusive and simply wrong, has changed by today. Excluding circuses, the author explains further in the case-study that training animals in positive reinforcement methods can, indeed, be enriching for the animal, as well as it facilitates animal management (reduces stress) and benefits human-animal interactions. Highly developed modern zoos train animals for various husbandry (e.g. measuring weight or moving to a different facilitation) and veterinary procedures (e.g. dental check, presenting of limbs, and sometimes even blood testing). Trained animals do not need to be sedated or captured for these procedures, which makes it less stressful for the animals and easier for the people working with them. Even more, Hediger explained already in 1950, that training does not exclude natural treatment of animals.

“Natural i.e. biological treatment does not mean a pedantic attempt at imitation, either in the matter of space, or food, or the animal-man relationship, but an adequate substitute for natural conditions and a sensible interpretation of them. This does not imply forcing the animal that lives in a confined space in captivity to be actively engaged in constantly avoiding its enemies and struggling hard to get food, as would be the case in freedom. It consists rather in substituting activities suitable to the conditions of captivity, and this means training.” (Hediger 1950: 159)

³ Ramirez 2013. Seminar in animal training by Ken Ramirez (Odense, Denmark, November 22-24).

In the zoo context, animals are usually not trained to perform unnatural actions (as might be the case in circus animals). The trained behaviours of zoo animals are natural to it (at least their elements are), although would never be released in freedom by the same stimuli or under the same conditions (Hediger 1950: 156). The author concludes that training is beneficial for the animals from both psychological and physiological perspective. No matter the results, training process itself can only be a positive aspect of the captive animal's life if it is based on positive reinforcement.

To explain the argument, the four main commonly-known learning mechanisms of operant conditioning⁴, pioneered by E. L. Thorndike (1898) and B.F. Skinner (1953), and used in animal training, should be introduced:

- 1) Positive reinforcement – “an increase in frequency of a response which is followed by a positive reinforcer. A positive reinforcer is an event which, when presented, increases the probability of the response it follows” (Ramirez 1999: 547). Basically, positive reinforcement training (PRT) means the animal is being rewarded when it exhibits the behaviours asked by the trainer. Usually, PRT results in the animal's own will to train, since it is motivated by a reward.
- 2) Negative reinforcement – “the frequency of the behaviour is increased by the subtraction of something the animal does not like, as an immediate result of the behaviour” (Ramirez 1999: 546). This means that, for example, physical pain is implemented on the animal and removed when the animal does the correct behaviour. The animal is willing to learn the right behaviour since it wants to be relieved from physical discomfort. Evidently, this type of training does not contribute to the improvement of animal welfare, since it rather increases its stress level.
- 3) Positive punishment – “in operant conditioning, the addition of an aversive stimulus – something the organism seeks to avoid – to the organism's environment following a response, thereby decreasing the frequency of that response” (Ramirez 1999: 547). It must be made clear that despite the name of the concept, there is nothing positive about positive punishment. In this training method, the animal gets physically punished every time it fails to exhibit the behaviour asked by the trainer. Positive punishment methods may result in the animal's increased fear of humans and negative

⁴ Operant (or instrumental) conditioning is based on association of the delivery of a reinforcer with the animal's performance of some activity (rather than with other environmental stimulus). (Barnard 2004: 278)

associations with training (as well as other human-animal interactions). In this form, training has a rather negative effect on animal welfare.

For better differentiation of negative reinforcement and positive punishment, one could keep in mind the rule that reinforcement always *increases* the behaviour, while punishment always *decreases* the behaviour (this rule applies also to positive reinforcement and negative punishment).

- 4) Negative punishment – “in operant conditioning, the removal of a positive stimulus – something the organism seeks to encounter – from the organism’s environment following a response, thereby decreasing the frequency of that response” (Ramirez 1999: 546). Negative punishment includes, for example, ignoring the animal or leaving the training area as a response for an undesired behaviour (this is only efficient if the animal enjoys the trainer’s company and work process). It should be elementary in its essence that this method is the least aversive way of punishment and, therefore, usually has the least negative influence on animal welfare. However, it must be understood that it is not a neutral method – for the animal, who is highly motivated for training and human company, being declined from it may lead to the animal expressing negative emotions.

Although positive punishment (and negative reinforcement) has historically been viewed as the method of disciplining animals, it is now a predominant approach that positive reinforcement training is the most adequate method of animal training in zoos. Since ‘false’ responses from the animal are inevitable in the process of training (especially in its early states), negative punishment is always included in positive reinforcement training. Still, if the trainer is good at his/her work, positive reinforcement will be prevalent. Thereafter, the training process will be could be a positive experience for the animal, and the human-animal relationship will be strengthened.

1.5. The importance of human-animal relationships in the zoo

Animals are often categorized by their social lifestyle – solitary or pack/herd animals. It does not matter which category the animal belongs to, the fact is that neither can any species

survive in isolation from other kinds of animals nor can any animal live outside of a social context. When living in a wild ecosystem or captive facility, social stimuli, both from conspecifics and heterospecifics, are always important in guiding the behaviour and welfare of the animal (Hosey et al. 2009: 91; Sebeok 1990b: 88).

When it comes to the zoo, an animal might have considerably different relationships than its conspecifics do in the wild. First, the neighbouring animals or, sometimes, even enclosure mates are from various different species that are rare to live in such close proximity in the wild. This fact brings along relationships and communications that all the zoo animals need to adapt to. However, the most radical difference between the lives of nearly all captive and wild animals, is the relationship with humans. When in the wild, animals have a good chance to avoid humans as enemies (see subchapter 1.7.1.) at all costs, then in the zoo, this opportunity is taken from them. The zoo animal is surrounded by people (the zoo staff, visitors, handymen, etc.) at all times, and this factor is an immense stress cause, which affects negatively the animal's welfare and modifies its behaviour. It often happens that all the behaviours of the animals, who are highly stressed by the company of people, are predominated by fear. For that reason and the fact that proper observation of an animal's life and behaviour can only succeed if different human-animal relationships are allowed (Hediger 1968: 14), it is important to focus on human-animal relationships in the context of the zoo. This topic has been covered relatively poorly and rather unclearly in the animal studies (Hosey et al. 2009: 483), which is the reason it will become the main focus of this thesis.

Man may encounter animals under a wide variety of circumstances and, therefore, be significant to animals in multiple different ways. American zoosemiotician Thomas A. Sebeok has developed the subject further, distinguishing eight different possibilities for man-animal contact:

- 1) "man is an animal's despoiler" (Sebeok 1990b: 89),
- 2) "man is an animal's victim", (Sebeok 1990b: 89)
- 3) "man is an animal's partner (unequal) of symbiont" (Sebeok 1990b: 89),
- 4) "man is a parasite on an animal [...], or the two exist in a state of commensalism" (Sebeok 1990b: 89),
- 5) "the animal accepts a human as its conspecific" (Sebeok 1990b: 89),
- 6) "the animal defines humans as inanimate objects" (Sebeok 1990b: 89) without differentiating them from the rest of the environment,

- 7) man subjects an animal to scientific testing and experimentation [...] in the laboratory or to performing in exhibitions [...], as in the circus (Sebeok 1990b: 89),
- 8) “man tames animals and continues to breed them selectively (domestication)” (Sebeok 1990b: 89).

As far as zoo is concerned, human-animal contact can occur in all of the ways mentioned by Sebeok. Here, it must be stressed that domestication is not a goal in zoos and is generally avoided, although sometimes some degree of selective breeding have been recorded (see chapter 1.3.1.). As was declared before, there exist enough analogous physiological and behavioural functions between humans and animals to be able to conclude that the best human-animal contact type for the animal’s welfare is perceiving humans as partners or at least neutral objects. Establishing a partnership between man and animal (especially with species that are dangerous to humans and have high fear level) is a complicated and arduous process, which unfortunately is not much developed yet as well as it is not common for most of the zoos’ routines. For this reason, it needs the biggest attention and will be concentrated on thoroughly in this thesis under the label of ‘socialization’.

1.5.1. The importance of Umwelt consideration

In order to understand animal’s perception of its individual universe and the role of humans in it, one must adopt one of the main concentration fields of semiotics – the Umwelt theory. Umwelt, as a concept first pronounced by Baltic-German biologist and semiotician Jakob von Uexküll, could be explained as the entirety of an organism’s perceptual and effector worlds, i.e. the sum of all sign processes, in which the organism participates as an interpreter (Uexküll 1982: 66-67). To put it simply, Umwelt is the semiotic world of an organism (Kull, Torop 2003: 414).

Uexküll explained that through every perception act “the neutral object is transformed into a meaning-carrier, the meaning of which is imprinted upon it by a subject” (Uexküll 1982: 62). Anything that the animal does not distinguish from its environment, does not carry a meaning and, therefore, does not exist for the animal (Uexküll 1982: 62-63). Umwelt is built

up by the animal's sense organs, everything in it is altered and reshaped until it has obtained a meaning. Even though the contents of the meaning-carriers are identical in their structures, they are different in the various *Umwelts*. (Uexküll 1982: 65) This refers to the fact that *Umwelts* differ not only across species (depending on species-specific sense mechanism) but also across individuals of the same species (depending on each individual's current and previous experiences). Therefore, the animals obtain a very selective and subjective view of the world around them.

The author has previously referred to the necessity of individuality-oriented approach to the welfare of zoo animals (see subchapter 1.3.1.). This requires comprehension of the animal's experiences, its personal perceptions. The effects of husbandry routines, human-animal interactions, and environmental conditions and situations (e.g. exposure to people, but also construction work, machinery, etc.) all have different effect on different animals. Being aware of the animals' perceptual and effector worlds, gives people a cue how to behave or what conditions to provide the animal with in order to reach the highest individual level of welfare. Even more, the *Umwelt* theory is crucial for understanding the variety of human-animal relationships, the animal's perception of human species, and, accordingly, how to interact with the animal in the safest, most positive, and most efficient way. This aspect makes *Umwelt* consideration of highest value in the process of socializing wild captive animals to humans. It will be the goal of the next chapters of the thesis to illuminate the topic of human-animal relationships and interactions (and its subjective effect on animal welfare) in the zoo.

1.5.1.1. The functional circle

How does a process of perception work? It works in the mechanism of functional circle, which basically means that every interpretation "begins by creating a perceptual cue and ends by printing an effector cue on the same meaning-carrier" (Uexküll 1982: 66). The phenomenon is also called 'the rule of meaning that joins point and counterpoint': the effector organs are formed contrapuntally to the properties of the respective medium (Uexküll 1982: 68-69). That means, for every perception organ, there exists an effector organ, for every

perception cue, there exists an effector cue. Even more, one could conclude that an animal is related to its environment in a way in which their properties are contrapuntally made for each other (Uexküll 1982: 68-69).

While Uexküll claimed the most important functional circles in most animals' Umwelts to be the circles of physical medium (i.e. the surrounding environment), food, enemy, and sex (Uexküll 1982: 67), it might be more adequate to adjust those circles as physical medium, food, enemy and *partner* (Tønnessen 2009: 54). This adjustment is important when considering the various kinds of social relationships besides the reproductive ones, that function as partnerships in the animal's Umwelt. At least in a zoo environment, these other kinds of partnership obtain a comparable value for the animal as the relationship with a potential breeding partner has.

Perhaps, the importance of Umwelt apprehension in the zoo animals is most adequately described by Norwegian philosopher and biosemiotician Morten Tønnessen. Tønnessen has brought out the concept of ontological niche, being inspired by Danish biosemiotician Jesper Hoffmeyer's theory of semiotic niche. While Hoffmeyer's semiotic niche involves all the interpretive challenges offered for the animal by its ecological niche (Hoffmeyer 2008: 13), then Tønnessen's ontological niche involves the set of the animal's active relationships at the current moment of the history of nature (Tønnessen 2009: 54). The ontological niche, therefore, determines the area in the phenomenal world occupied by the animal. Here, Tønnessen has depicted the ontological niche as phenomenal fields, where one animal's phenomenal fields overlap with those of the other animals with whom it is in interaction. (Tønnessen 2009: 54) Such ontological map sufficiently describes the possibilities of human-animal relationships (as well as animal-animal relationships). For facilitative reasons, it must be realized that in order to establish positive human-animal relationships, man has to "move" from the enemy phenomenal field (functional circle) of the animal to the partner phenomenal field (functional circle). It seems to the author that such Umwelt reconstruction is not as simple, but includes transition-phases of "rather negative significance", "neutral significance", "rather positive significance" of people, before people in general obtain a meaning-carrier of a partner in the animal's Umwelt. To make it even more complicated, it so happens that some people, who have a strong positive relationship with the animal, are considered as partners, where unfamiliar people could still, *by default*, carry a meaning of an enemy. The importance of Umwelt reconstruction (with a goal to change the meaning-carrier of people in general) is crucial for captive animal welfare, and, in the opinion

of the author, should be consciously aimed in zoos, where different human-animal encounters are inevitable. Socialization is the part of animal welfare programme, which predominantly solves this problem.

1.5.2. The effect of zoo visitors on animal welfare

It is hereby relevant, to briefly describe how human interactions may have a negative influence on animal welfare. Whereas many potentially stressful possibilities for human-animal encounter (for example in the situations of veterinary procedures or transport) are often left neglected, while the two most frequent ones – that of visitors and keepers – are paid attention to.

Beforehand, it must be explained that when talking about human-animal relationships, it is the opinion of the author that a visitor-animal relationship as such does not exist. Deceptive claims could be found in scientific literature, such as “if this way [*prioritizing good-quality keeper-animal relationships*] of looking at human-animal interactions is supported by future studies, it may help us to improve the relationships that zoo animals have with visitors as well as keepers” (Hosey et al. 2009: 487). While being principally valid, it should be specified that previous human-animal relationships influence the animals’ *perception* of zoo visitors as well as their *experience of interaction* with visitors, but the animal does not have a relationship with the public. A relationship requires that “the two individuals have a history of interactions between them that lead to a greater predictability about the outcome of future interactions; in other words, they get to know what each other is likely to do” (Hosey et al. 2009: 483). Therefore a human-animal relationship could be developed between an animal and its keeper or other people that, at least for some period of time, regularly spend time with the animal.

When talking about the influence of visitor-animal contact on animal welfare, a few important facts need to be presented. To begin with, the widely held view that zoo animals habituate with the public and no longer respond to their presence is now abandoned (Hosey et al. 2009: 479). Studies have shown that the effect of zoo visitors on animals is generally

negative, resulting in displays of behaviour that are associated with stress response, such as stereotypies, increased intraspecific and interspecific aggression, increased activity, and, sometimes, decreased affiliative behaviours (Hosey et al. 2009: 475-476). Therefore, one might conclude that in long term, being exposed to visitors might have adverse consequences on animal welfare. While this issue could be relieved by changing the zoo environment (e.g. providing animals with hiding opportunities or limiting the visitors' access), it would be much more effectively solved by modifying the animals Umwelt via methods of socialization. Reducing the fear of humans and thereby, modifying the significance of people in general to more positive (or to at least neutral level) will benefit both the visitors (by enabling to see animals better since the reduction of predator-avoidance behaviour, such as hiding) and animals themselves (as human encounters might become enriching).

The possibility of making zoo visitors enriching for animals is gradually becoming more relevant after researchers realized that low animal welfare resulting from being stressed by the presence of people is in conflict with the education, conservation, research and entertainment roles of the zoo (Hosey et al. 2009: 479). Therefore, finding ways to make human contact more pleasant for the animals has been a crucial task for zoos for decades. Some scientists have suggested that human visitors might be enriching provided that they give animals food (Hosey et al. 2009: 479). Here, the author finds it important to explain that while food is an easy and effective method of building trust with the animals that respond readily to food stimuli, there is a great risk of making the animals associate humans with food: instead of an enemy or partner, humans become a food source in the animal's subjective world. This change might result in unpleasant or, with some species, even dangerous experiences for humans. For example, one might tolerate the demands of small and harmless animals, but being associated with food by a large predator like a lion or wolf (especially when you do not have any food items), is definitely a situation to be avoided. Besides, having visitors feed the animals often results in animal obesity problem.

With these arguments, it is not aimed to claim that using food to improve human-animal relationships (and merely interactions) should be forgotten – on the contrary, the author herself has made successful progress using this method *for a short period* to build up trust (especially when an animal has had a previous negative experience with humans). However, for some species – depending on the zoo's priorities, how potentially dangerous the animals are, or how high is their species-specific fear of humans – there exist more effective methods of making people enriching. Hosey, Melfi and Pankhurst along with some other scientists

have asserted that these include increased opportunities for inter-specific interaction, and they supported the argument with the results of research on bottlenose dolphins that showed higher rates of behavioural diversity and play behaviour after shows and interaction events with humans (Hosey et al. 2009: 479).

While heading in the right direction, there seems to be an important point yet not made. Namely, being able to conduct human-animal interactions with visitors requires a lot of work preparing the animals for human visits (i.e. socializing them). When the animals are afraid of people, do not trust them and are not used to human contact, interaction with the public will most probably have an opposite effect on the attempt of reducing the animal's fear of humans. It must be understood that human-animal interactions, such as training or shows, are enriching for the animals who already have positive relationships with people (for example, keepers). Interaction with the public is mostly a method for maintaining positive or neutral perception of humans and a privilege of having them, but developing such significance requires much more work with various different methods of socialization, including establishing strong trust-based keeper-animal relationships.

1.5.3. The effect of keeper-animal relationships on animal welfare

How to properly establish strong and trust-based keeper-animal relationships is analysed thoroughly in the following chapters of the thesis. To understand the gravity of these relationships, a brief overview about the influence of keeper-animal relationships on animal welfare should be provided in advance. American zoologist Kathy Carlstead has made a valuable research on this topic. Her studies resulted in multiple important conclusions (Carlstead 2009: 605-606) that compose the basis of the following analysis of keeper-animal relationships.

- There exist at least two independent dimensions that describe animal relationships with their keepers: affinity to keeper and fear of people. Sociability/curiosity might be a third dimension involved in positive relationships. The essence of all those types of relationships (especially the first two) are species-specific. It is also important to

mention that being hand-reared and born in captivity may increase the animal's affinity to keepers, but might not reduce the fear of people. (Carlstead 2009: 605)

- Fear of people is most related to welfare as evidenced by independent welfare measures (Carlstead 2009: 606).
- Various zookeeping styles can be identified based on husbandry routines, housing facilities, and personal history of the keeper. In general, relationships with keepers are more favourable if the keeper interacts with the animal through a barrier rather than going into the enclosure with the animal. (Carlstead 2009: 606) Here it is relevant to explain that this might not be so in socialized animals where human encounters might be enriching.
- Being able to visually monitor the keeper is positively associated with affinity to the keeper no matter if the keeper goes in the enclosure or not (Carlstead 2009: 606).
- Certain zookeeping styles or habits, particularly among experienced keepers who go in with their animals, might diminish the well-being (increase fear) among their animals. In particular, delayed time of feeding may be a factor. (Carlstead 2009: 606) Here, it should be explained that the need for certain feeding time is different across species. For some species (especially carnivores), slightly irregular feeding may be an enrichment and more similar to the lifestyle in the wild, resulting in more naturalistic behavioural display. Moreover, it has to be mentioned once again that going in with socialized animals might be a positive experience for the animal, as well as it will facilitate the caretaking routines.
- Certain observed behaviours of keepers result in increased aggression or unconfidence in many animals. (Carlstead 2009: 606) Such behaviours concern the style of feeding, capture, locomotion of the keeper, noise made by the keepers, the roughness of handling the animal, enclosure cleaning, etc. Moreover, even the general noise and disturbance (e.g. from park maintenance), and capture or movement of neighbouring animals influence the animal's well-being and perception of humans (and, to some degree, keepers). (Hosey et al. 2009: 97) For a contrast, positive interactions with animals, for example patting, stroking, talking to the animals, and generally doing things rather slowly, result in positive keeper-animal relationships (Hosey et al. 2009: 483).
- The negative correlation of keeper job satisfaction with animal fear refers to the possibility that the emotional state of keepers might affect that of animals (Carlstead 2009: 606).

The previous aspects are continuously kept in mind in the rest of the thesis, when keeper-animal relationships in socialization process are concerned. Although there are methods of socialization, which directly deal with improving the animal-visitor interactions, it is certain that keeper-animal relationships have a role in modifying the animals' perception of visitors, mostly by affecting their confidence with people and fear of humans (Hosey et al. 2009: 486). It has also been proved that positive human-animal relationships increase the animal's display of affiliative behaviours and decreases aggression and stereotypies (Hosey et al. 2009: 487). This is yet another reason to consider developing a good-quality human-animal relationship important for animal welfare (Hosey et al. 2009: 484), behaviour and research, as well as for the visitors' experience. Yet, as there exist many "transition-phases" of Umwelt reconstruction, human-animal relationships also can vary greatly in quality: from a strong social bond, to a rather positive and enriching relationship, to a neutral relationship, to a rather negative and stress-inducing relationship.

1.6. Explaining animal communication

Before analysing the methods of developing human-animal relationships, the basics of animal communication (and human-animal communication) need to be more thoroughly explained. The following analysis of animal communication does not attempt to be exhaustive, but to cover the most crucial aspects of the topic.

The facts that scientists believe there are born 'animal men' (Hediger 1950: 162) and animals discriminate between individual people (Hediger 1950: 162; Hosey et al. 2009: 483) refers to another factor than just the animal's previous experience of being handled and genuine pathic attitude towards man. In the author's opinion, this discrimination as well as the essence of human-animal relationships depends considerably on the success of interspecific communication between animal and man.

Hediger has explicitly confirmed that the greatest attention above all must be paid to the animals' expressions in the zoo, as "these provide an important factor in determining the animals' mental and physical well-being" (Hediger 1968: 140). To clarify, 'expressions' are

the variable non-pathological phenomena of the animal which may lead to a better comprehension of their situation. The factor 'non-pathological' is hereby a crucial (although often difficult to distinguish) point, since, for example, vomiting, abnormal excrementation, and increased glandular secretion, may sometimes count as expression phenomena (for instance, in a case of immense excitement/stressful event). (Hediger 1968: 143-144)

Paying attention to animals' expressions is a constitutional task for both animal communication and animal behaviour. How do we know whether we are dealing with one or the other? American researcher Adrian M. Wenner has explained the main difference between the two, saying that "animal behaviour largely concerns itself with an analysis of the activities of a sender or receiver, before and after signals (stimuli) pass". Animal communication, on the other hand, "concentrates on an analysis of those signals which produce certain types of activity and on attendant circumstances which contribute to the activity generated". (Wenner 1969: 113) To the author, this seems to be an adequate differentiation to use when separating the role of behaviour from that of communication in the process of socialization.

When it comes to animal communication, one might recognize three categories: intraindividual (considering the impact of internal signals on behaviour), interindividual (considering signal travels between two conspecifics or individuals from different species) and signal passing between the environment and an individual. By the latter, environmental signals which result in regulation of behaviour regarding to physical parameters are kept in mind. Examples of these regulations encompass biological rhythms, navigation, migration and other such mechanisms. (Wenner 1969: 113-115) One might also acknowledge that since perception of external objects always involves sign situations (Marler 1961: 256), environment signal passing possesses some qualities of communication.

The consideration of the aforementioned signal passing between the environment and an individual as communication is, however, negotiable. It must be admitted that not all scientists agree on this classification (Marler 1961: 253). Communication is more frequently considered as a signal or display by one individual which modifies the response of another, this way establishing a social unit from individuals by the use of language or signs (Barnard 2004: 534; Marler 1961: 253). It is quite a common belief of researchers that signallers must *intend* to influence the response of a recipient in order for the situation to qualify as communication (Barnard 2004: 534). This excludes the environment-individual category from the communication field. In zoosemiotic approach, it seems to be terminologically more

correct to view environment-individual signal passing as a *signification process* (environmental semiosis, i.e. interpretation process without the participation of a sender), rather than communication (Nöth 1998: 33). However, one crucial clarification must be made. Namely, messages sent from one individual to another *through* physical environment (e.g. territorial marking, scent-marking, etc.) would still qualify as communication. Interpretation of environmental phenomena and adjusting one's behaviour as a response to that environmental stimuli (e.g. photoperiodism, changing living areas according to environmental resources, etc.), on the other hand, is rather an individual's interpretation of an environmental sign than intended communication act.

The discipline of zoosemiotics embraces animal communication field regarding both the communication and other interpretation processes in the animal's life. From a zoosemiotic perspective, the components of a communication system include the sender, receiver, channel, signal, code, context, and noise (as background activity in the channel which is irrelevant to the signal being transmitted, noise is often included in the context) (Jakobson 1976: 113; Shannon 1948: 380). One way to illuminate how specialists in zoosemiotics have considered these aspects in animal communication, is by the following questions:

- 1) "How does the source animal successively formulate and encode its messages? How the signs they use signify some change in their inner or outer world or embody some instructions for action?" (Sebeok 1990b: 92-93).
- 2) "Once encoded, how is this message transmitted – through what channels, under what conditions? What rules determine how channels are to be combined?" (Sebeok 1990b: 92-93). Two main points could be brought out when communication channels are concerned. First, all animals species combined use more communication channels than humans. While humans communicate mainly via auditory and visual channels, much bigger role of additional channels can be seen in animal communication. For example, animals (depending on species) could, more than humans, rely on the sense of smell, UV-light, ultrasound, magnetic, electric, solar, lunar and other stimuli (Sebeok 2001b: 24). However, whether a certain animal uses more communication channels than humans or not, depends on its species-specific communication mechanisms (as the usage of different channels varies across species). A more often case is the second aspect – animals use channels in different intensity and they have an ability to perceive different (usually wider) range of signals through a particular channel than humans (Sebeok 2001b: 24). It is essential for an animal communication researcher to

be able to interpret (or at least recognize) signals conveyed via different channels. The argument is illustrated by the author's experiences in subchapter 3.3.2.2.

- 3) "How does the receiving animal successively decode and interpret the incoming message?" (Sebeok 1990b: 92-93).
- 4) "What is the total message repertoire in a given species? What form does each sign take?" (Sebeok 1990b: 92-93).
- 5) "What are the properties of the code used by each species? A code is a transformation, or a set of rules, whereby messages are converted from one representation to another; an animal either inherits or learns its code, or both" (Sebeok 1990b: 92-93).

Extra attention must be paid to codes in human-animal communication. In whatever circumstances a man and animal meet, they must learn, at least to some extent, the essential elements of each other's code (Sebeok 1990: 84). In order for the human-animal communication to be effective, more advanced mastering of the reciprocal's code and rationality⁵ is required (Lestel 2002: 56). It is a common understanding that a wild animal does not inherit human codes or rationality, neither does a human inherit animal codes or rationality by birth. These codes are learned by growing up together (Sebeok 1981: 115), which is made possible by the process of socialization that includes hand-rearing, increased social time and training.

- 6) How does context influence the receiver's interpretation process of the message? "An animal always interprets messages it receives in the light of two different variables: the incoming signal itself, and the specific qualities of the context in which the message was delivered" (Sebeok 1990b: 92-93). It is important to take into consideration that the information of a signal and the response evoked by it may vary radically in different situations even if the physical characteristics of a signal remain unchanged (Marler 1961: 267). Thus, 'context' should be understood as "not only whatever immediately precedes and follows the linguistic message itself but also whatever is emitted simultaneously through all the other available channels" (Bouissac 2010: 45). Context is therefore a broader concept than 'situation', which could be regarded as "the type of social interaction that is identified by the observer within a specified cultural domain, such as conversation between peers, confrontation between

⁵ „The rationality of the actors we are concerned with is further limited by the skills they have acquired or inherited for exploiting this information and, in particular, their semiotic abilities to produce signs and to interpret those produced by others or by the environments in which they find themselves.“ (Lestel 2002: 59).

rivals, ritualized testing of the affective bond between lovers, and so forth.“ (Bouissac 2010: 45).

- 7) How does a signal manage to be communicatively effective in spite of the background of environmental “noise” (Marler 1961: 260)? This question is often excluded from the main communication elements, or rather, included as part of the context. However, since context is considered in slightly narrower perspective in this thesis, the author finds it more accurate to separate the two. Besides, in a zoo environment, one type of noise – man-made noise (e.g. visitor crowds, vehicles sounds, construction site sounds, etc.) – is almost constantly present. Zoo animals have to both be able to communicate efficiently with each other despite that noise, and to be desensitized to most irrelevant but potentially irritating elements. (To be more accurate, it should be explained that “noise” does not embrace only auditory channel, but could occur in sign processes of any channels.)

Within the described physical characteristics of signals and communication acts, a few more dimensions must be considered when studying animal communication. These include the genetic influence on behaviour and the behavioural modifications by the relationship between the sender and recipient, by learning and past experience (Wenner 1969: 116-117).

It is apt to clarify the communication terminology by defining a couple of confusing concepts that will be occurring in this thesis – the signal and sign. For semioticians, a sign is basically something that stands for something else to someone in some capacity and context (Sebeok 2001: 156). While adjusted to animal studies as the unit of communication and interpretation processes, one might consider the semiotician’s ‘sign’ to be synonymous to the ethologist’s ‘display’ (which differ in involving behaviour patterns) (Sebeok 1990: 81). Signals, on the other hand, could be viewed as signs that “mechanically (naturally) or conventionally (artificially) trigger some reaction on the part of a receiver” (Sebeok 2001: 44). This distinction is something to keep in mind when talking about animal interpretation processes, as well as it is the reason why ‘signal’ is the key concept in animal communication. Communication, therefore, could be viewed as the act of deploying and responding to signals (Barnard 2004: 533).

One more important distinction must be made before closing the description of animal communication mechanisms. That is the distinction between human language and animal sign systems. While historically the difference have mostly been viewed in terms of articulation of

human sign systems and non-articulation of animals' (Darwin 1873: 44), this argument is not sufficient today. One way to differentiate the two is to claim that unlike human ones, animal sign systems are not languages since they generally do not have syntax (Kull, Torop 2003: 415). However, there exists a broader understanding of syntax, which recognizes zoosyntactics as a discipline that deals with "combinations of signs abstracted from their specific signification from their ecological setting" (Sebeok 1990: 83). For example, certain bird orders (*Passeriformes*, *Psittaciformes* and *Apodiformes*) have to *learn* to sing (not inherit their song skills) according to their species-specific "rule set", a phenomena that is often referred to as the phonological syntax of bird songs (Marler 1977). Still, owing to the absence of differentiation of sign categories into functional types (such as verbs and nouns), it would perhaps be more justified to name animal syntax as *prosyntax* and admit *syntax* in only human languages (Kull, Torop 2003: 415).

Another way of differentiating human languages from that of animals is by the features of "openness" and "displacement" first advocated by Charles F. Hockett (1960). He claimed that humans stand out for their ability to say new things for the first time and still be understood by other people speaking that language: "Language is open, or "productive", in the sense that one can coin new utterances by putting together pieces familiar from old utterances, assembling them by patterns of arrangement also familiar in old utterances" (Hockett 1960: 6). Another distinctive feature is the "displacement" of human language, that is the ability to "talk about things that are remote in space and time (or both) from where the talking goes on" (Hockett 1960: 6). Namely, most non-human species, at least as far as we know, communicate about a very limited set of things by a very limited repertoire of signals (Barnard 2004: 573, Sebeok 1990: 80). This argument gives yet another reason for not equalizing human language to animal sign systems. A third supportive point could be made by admitting that unlike human languages, the animal sign systems have not been identified to have the structural principle that linguists call 'double articulation' or 'duality of patterning' (Sebeok 1990: 40) and semioticians refer to as 'code-duality'.

1.7. Socialization – a method of improving welfare of captive animals

After previous implications, it is appropriate to explain the essence of socialization. Socialization is a method for improving captive animal welfare and the efficiency of other already described methods that are aimed to reach the same goal. Socializing animals is a rather recently pursued project that has not been represented enough in scientific literature. Even more, it is not yet known in many zoos, to say nothing of being practiced in them (Næss, personal conversation, 30.03.2012). However, the captive facilities, such as Wolf Park in USA (Indiana), The Kingdom of the White Lion in South Africa, or Polar Zoo in Norway, that do have a socialization programme, have made extensive progress with certain animal species which are generally difficult to manage in captivity due to their high fear level of humans.

Although the idea of socialization – that is, the understanding of the necessity to reduce captive animal's fear of humans (Hediger 1950: 19) – has been well-known for a long time, the concept of socialization as an animal welfare programme is relatively young. In scientific literature of animal studies, socialization is yet poorly covered, one could say the term has found a wider use among practitioners. It so occurs that the existing definitions in scientific literature are remarkably ambivalent, sometimes contradictory, and insufficient, whereas the differences of socialization and other human-animal relationships types are especially unclear. For example, Hosey, Melfi and Pankhurst have defined socialization as “the process, where animals routinely interact with people and become familiar with them, leading to changes in the human-animal relationship” (Hosey et al. 2009: 232). An American canine behaviourist Barbara Handelman defines socialization as “a systematic process of exposing a pup to a wide range of dogs, people, and places. There is a very narrow window for proper socialization of puppies, that ends when the pup is approximately twenty weeks old” (Handelman 2008: 243). The researchers of Wolf Park, who are very experienced and competent in socializing captive wild animals, have defined it as “the process of making an animal more suitable to live with humans” (Addams, Miller 2007: 70). In the opinion of the author, neither of the mentioned definitions is sufficient for understanding the diverse facets of the process in question. Nor do any of them refer to the main goal of socialization – reduction of the animal's fear of humans by changing the perception of humans in the animal's Umwelt.

1.7.1. The need for socialization

It has already been mentioned in the previous subchapters that man is the universal enemy for nearly all wild animals⁶ (Hediger 1950: 19) – i.e. for animals, who are able to differentiate man as an ecosystem's top predator from their surrounding environment. As an enemy, man is the focus of the wild animal's escape reaction – "it must flee from him above all others, until it is completely exhausted if necessary, and until heart and lungs fail" (Hediger 1950: 28). The fear of humans in wild animals is not only learned during life experience, it has developed over thousands of generations and is, therefore, genetically encoded in the animal. Bringing an animal to live in captivity, does not *per se* abolish the animal's fear of humans – a long process of domestication is required for it. However, it is possible to, at some extent, *reduce* the animal's fear.

Hence, the main task with captive animals, as also suggested by Hediger (Hediger 1950: 28), is the reconstruction of its Umwelt by fitting man into new phenomenal field – from the negative significance of an enemy to the positive significance of a partner. Here, it must, once again, be emphasized that a positive significance does not automatically mean a positive human-animal relationship. As explained before, positive relationship requires a history of previous positive interactions between the particular human and animal. With visitors, who the animal has never met before, it has no relationship whatsoever. Nevertheless, the visitor could have a positive *significance* in the animal's Umwelt if the animal – based on previous interactions with visitors (e.g. for example while visitors have been taken into the enclosure for guided sessions) – is expecting a positive experience with the person. Since there are so many different possibilities of visitor-animal interactions, as well as there are so many different attitudes of visitors, this state of positive significance is extremely difficult to accomplish, requiring a certain level of socialization. Positive significance of *some particular* humans, who the animal encounters more often (e.g. keepers), is much easier to achieve. For some species, a positive keeper-animal relationship could be enough for the animal to not be too negatively affected by the influence of general public, but for other species, it is hardly the case.

⁶ A wild animal (as the opposite of a domestic animal) is a representative of a species of animal, which has developed without the help or interference of man. The term 'wild animal' is not synonymous to the term 'beast of prey'. (Hediger 1950: 155)

Namely, the animal's fear of humans is species-specific (Carlstead 2009: 600), whereas large carnivores (who, throughout centuries, have been extensively hunted by humans) seem to be particularly prone to be afraid of people. For these animals, fear dominates curiosity to such a level that the animal cannot adapt to life in captivity and could therefore be considered as suffering. In many cases, such animals cannot be helped even by any kind of enrichment, since they are too fearful to participate in it (or they gain more negative than positive experience from the enrichment acts). Experiences show that usually such stress result in the animal hiding from people (to the extent that it is hardly ever seen by visitors), exhibiting stereotypical behaviour, performing persistent attempts of escape (which are often successful in case of real excitement), and sometimes even in the animal's death. This situation is common for foxes, wolves, big cats and other animals with similar fear level of humans. Even more, with animals potentially dangerous to humans (e.g. wolves and big cats), this kind of stress may result in severe aggression towards people (including keepers) derived by fear of people and inability to flee from them. For these reasons, socialization of such species is essential for providing safety and good animal welfare in the zoo.

1.7.2. The basic mechanisms of socialization

There are two main complementary mechanisms to concentrate on when socialization of captive wild animals with humans is concerned: the reduction of flight distance (in menas of reducing fear of humans) and the reconstruction of significance of humans in the animal's Umwelt.

The flight distance⁷ is a characteristic escape reaction – specific for sex, age, enemy, and surroundings – that the animal shows when the enemy approaches within a definite distance (Hediger 1950: 19). That means flight distance is the distance that, when crossed by the enemy, makes the animal flee. If the possibility to flee is eliminated, the animal's

⁷ "Flight distance occurs in every wild animal, or in an animal adapted to captivity, whenever man [*or another potentially dangerous animal*] approaches to within the characteristic flight distance of that animal. With animals born in captivity, or accustomed to it, the flight distance is considerably less than under normal conditions of freedom" (Hediger 1969: 123).

alternative response is aggression⁸. In the zoo, inability to flee is exactly the case. Therefore, it is crucial to lessen the animal's flight distance in order to adapt the animal to captivity. "Adaptation thus means reduction of the original tension caused by the presence of man; it means the breaking down of the physical and psychological state of nerves resulting from the constant need for flight without any hope of that need being satisfied" (Hediger 1950: 155).

While reduction of flight distance could even be achieved by training, the other mechanism of socialization – changing man's significance as enemy to that of partner – is a task much more difficult. French zoosemiotician and philosopher Dominique Lestel has explained that a relationship based on partnership has two requirements: shared codes and rationality between different species (Lestel 2002: 56). It has been explained in previous subchapters what is meant by this argument. Even though learning the reciprocal's codes and rationality can, to some extent, be done at any age of the animal, it is most successful if the possibility to grow up together is provided for the animal and man involved. The more interactive time is spent together, the better the different species master each other's code and rationality. The result is not only effective interspecific communication, but also (if the experiences of human communication are maintained positive for the animal) positive human-animal relationships. The latter, as already analyzed, has great effects on improving animal welfare, making various kinds of enrichment effective, and thus enabling the animal to display a large variety of different behaviours.

The further methodology and principles of socialization; the ways in which socialization is processed in practice; the benefits of socialization for animals, humans, and the zoo; and the conceptualization of socialization in the context of human-animal relationships – these are the topics concentrated on during the rest of the thesis.

⁸ "Critical reaction occurs whenever the man approaches a wild animal (or one accustomed to captivity), which is prevented from escape, to a distance less than its characteristic "critical distance". [...] The critical reaction consists of a change from flight to attack, never with the character of an active offensive, but always of a defensive, emergency nature" (Hediger 1969: 123-124).

2. THE RESEARCH METHODOLOGY OF A ZOOSEMIOTIC APPROACH TO SOCIALIZATION

This chapter will introduce the material and methodology of studying socialization of captive wild animals to humans in the context of the present thesis. Before proceeding, it must be explained that while interdisciplinary theoretic research has been conducted, a zoosemiotic approach has been kept prevalent. The theoretic views are supported by a case study of socializing captive Red Fox, which is the basis for approving or disproving the hypotheses made in the theoretic part of the research. The thesis will result in a transdisciplinary theory and terminology of socialization as an animal welfare programme (and the aspects of human-animal relationships associated to it).

2.1. Thick description of socialization

The methods of collecting and analysing research material is derived from the goal of offering a thick description (analysis) of socialization, including its origins and motivations, purposes and goals, content, consequences, methodology, its realization in practice, etc. ‘Thick description’ is a concept suggested by American anthropologist Clifford Geertz in frames of his theory of interpretive anthropology based on ethnographic practice. By thick description, he means that in addition to the methods of thin description (such as choosing informants, keeping a diary, describing the research object, telling the story, etc.), extra attention should be paid to the *meanings* of the phenomenon, its origin, reasons, content and consequences. Thick description attempts to find out how a phenomena in question is generated, perceived and interpreted. Therefore, the hierarchy of meaning structures could be considered the objects of ethnographic research. (Geertz 1973: 6)

The same approach is adjusted to the present thesis, whereas the author would say that interdisciplinary theoretic approach together with practical experiences offer a context of multiple perspectives that enable diverse opportunities for thick description of the process of socialization. These disciplines include biology; zoo studies; comparative psychology; animal welfare, communication and behaviour studies; semiotics and, implicitly, even cultural anthropology. Namely, studying animals is somewhat similar to studying a foreign group of people. Apart from thorough theoretic analysis, “a view from the inside” is required in order to achieve an understanding as objective as possible. This is the reason why ethnographic fieldworks are an essential part of anthropology. Such methodology is taken as a model also for the current research, within which a special sort of ‘ethnographic practice’ is conducted by socializing three Red Fox kits in Tangen Animal Park (Tangen Dyrepark), Norway. Thereat, the practice is based on participatory observation, which the author considers the best possible way for learning both about the animals involved and gaining practical experiences of socialization process. While the importance of the practice will be explained later in this chapter, it should be mentioned that having conducted a socialization process from ‘A to Z’ (and being familiar with its possible difficulties) is here viewed as a necessary qualification of the author for suggesting a novel theoretical conceptualization of socialization process and human-animal relationships in the zoo.

In addition to the previously mentioned aspects, the diversity of perspectives and objectivity of conclusions is also provided by the involvement of different specialists in the socialization process of the three Red Fox. Throughout the practice, the author (for whom it was the first practical experience of socializing captive wild animals) was supervised by Runar Næss – Norwegian animal behaviourist and expert in wolf socialization. Næss has been one of the main sources of the theory of socialization during the past three years that the author has been studying this subject. Additionally, Runar Næss is the owner of Tangen Animal Park. In the socialization process itself, apart from the author, another person was involved as a ‘puppy parent’ (i.e. the main conductor of socialization) and hence included as a source of opinion, knowledge and skills. This person was Julian Brossé – Danish expert in canine behaviour and wolf socialization, also a long-time student of Næss. Less directly, the knowledge and opinion of other experts in fox socialization, including specialists from Wolf Park in America and Polar Zoo in Norway, was taken into consideration.

When examining the relationship between theory and practice, the author is inclined to think that, in this research, the first is built upon the latter. Socialization is based on an *ad hoc*

method, where different aspects of the process (e.g. hand-raising, training, enrichment, or housing) as well as different subjects (depending on the individual characteristics of the animals) determine the application of different theories or the necessity for a new one. In reality, this mechanism is more complicated and is rather a cyclical process, where the evaluation of the theory determines the improvement of practice, which, in turn, enhances the theory, and so forth (Edmonds, Candy 2010: 471). The described mechanism enables the convergent development of practice and theory, which will hopefully result in a transdisciplinary theory of socialization. This transdisciplinary theory would combine the knowledge gained from practice and different theoretical disciplines by solving (or refraining) their controversies and maintaining the terminology (or its possibility) of each discipline (McDonell 2000: 27, 29) in order to enable the different views to contribute to the better comprehension of socialization.

2.2. Actor-orientedness of the research

Biosemiotics, along with zoosemiotics, has set a goal to promote the fact that semiosis and interpretation processes are natural parts of every organism's existence (Favareau 2010: 588). A semiotic approach is not based on experiments but searches for meanings and explanations. Therefore it is of the utmost importance to consider the objects studied (in this case – animals) as subjects with their own subjective interpretation of the world and the sign processes in it. From this perspective, zoosemiotic studies should always be oriented to the actor. Actor-orientedness in anthropological (or zoological) research means that descriptions should be in accordance with the actor's (pre)cultural context (Geertz 1973: 17-19). That is, the experiences of an animal should be described as identically to its actual subjective experiences as possible. Providing a possibility of comprehension of the animal's perspective, is where the Umwelt theory becomes inevitable to be applied.

Since the goal of socialization is reconstruction of a captive animal's Umwelt (repositioning man from the animal's phenomenal field of enemy into that of partner), concentration on the actor's perspective is crucial. It requires comprehension of the animal's social reality, which depends on the ability to sufficiently master the subject's sign systems

(communication and precultural context, including inherited and learned sign systems) (Geertz 1974: 45). However, it must be understood that, when it comes to studying animals, a truly experience-near interpretation is ontologically impossible due to the mutual untranslatability of animal and human sign systems⁹.

2.3. Participatory observation

For the reason last mentioned, the author finds participatory observation the most adequate method for studying the socialization of Red Fox in Tangen Animal Park. Namely, a partnership-based relationship between man and animal (as was the goal of the case study of the foxes) requires shared codes and rationality between the different species (Lestel 2002: 56). It is possible by growing up together (i.e. hand-raising the animal, spending time together) and experiencing various common activities. This, in turn, enables learning to master (at least to some extent) each other's communicative abilities, including codes, channels and perception of context. As a result, a mutual adaptation occurs, within which interspecific communication becomes more effective.

It is important to understand that participatory observation, in the context of this thesis, is not aimed for being 'part of the pride'. For obvious welfare reasons, the position of the author was that of a human partner for the animal – a heterospecific social companion, who the animal has a primary relationship (a 'bond') with, but who it is able to differentiate as a member of different species (this perception is expressed by the animal's behavioural and communicational differences in interactions with people compared to interactions with the animal's own kind). On one hand, this fact enabled to maintain the distance necessary for objective analysis. On the other hand, learning to efficiently communicate with the subjects by participatory observation, offered better opportunities to contextually (and with genuine empathy) comprehend the meaning structures of behaviour considering the animals' possible perspective (Geertz 1973: 13, 30; Geertz 1974: 44).

⁹ Experience-near description is based on concepts that could naturally and effortlessly be used by the subjects themselves for understanding and describing what they see, feel or think. On the contrary, experience-distant descriptions rely on concepts used by the specialists of the field (researchers). (Geertz 1974: 27)

One could conclude that participatory observation provided the author with two priceless perspectives on the animals' socialization process: the perspective based on theory (tertiary interpretations) and the immediate perspective based on her own experiences (secondary interpretations).

2.4. The dimensions of interpretations presented in the thesis

It is now the appropriate moment to comment the consequences of the author's position in this research. As has been explained, the author has two roles in the research: a zoosemiotician, who offers a new perspective on animal welfare issues (especially socialization), and the role as one of the conductors ("puppy parents") of the socialization of the three Red Fox (by whom the author is perceived as a social partner the animals have a primary relationship with). This double role of the researcher has some extra advantages.

It is a common knowledge in culture studies (and humanities in general) that researcher's description is only an interpretation, even more, it is an interpretation of interpretations. In this case-study, the author offers two different types of interpretations of the animals' own (primary) interpretations of their experience in the socialization process: tertiary and secondary. More precisely, the arguments based on theoretical research (including the works of other scientists or the knowledge gained from experts) are, in their essence, the author's interpretations of other researchers' interpretations of the animals' interpretations about what they had experienced in reality. Realizing that the animals' own interpretations are primary, explains that the author's are merely tertiary. (Geertz 1973: 9, 15) The arguments based on the author's experiences during participatory observation, however, are interpretations of the animals' own interpretations and, thus, are secondary.

Taking this aspect into consideration, the possibility of total objectivity is eliminated (Geertz 1974: 26) – total objectivity requires the animal's genuine interpretations of its Umwelt and this is something that no human is able to convey. Every decision of the researcher, about what is worth noting, what should be considered important or what should be left without attention, is biased by the researcher's subjective and cultural values. By thick

description and by admitting the issue of subjectivity (derived from her position), the author attempts to reach the maximum objectivity possible in understanding the effects of socialization on the animals' welfare (including the changes in their Umwelt). Additionally, it should be reminded that the case study of Red Fox does not give a sufficient information about socializing any other animal species. While this case study offers a ground for suggesting a general socialization theory applicable for most of the animals (and a particular guide for socializing foxes), it must be noted that every animal has its own species-specific (as well as individual) behavioural and communicational characteristics, and should therefore be approached to with another *ad hoc* method of socialization that includes behaviour-based details. As explained in subchapter 3.1., the theoretical principles of socialization offered by this thesis will, nevertheless, be generally applicable.

3. CASE-STUDY OF THE SOCIALIZATION OF RED FOX (*VULPES VULPES*)

The third chapter of the thesis concentrates on the methods and results of socialization. While, in some aspects, general information applicable across species (or species categories) is offered, detailed information is based on the socialization of three Red Fox kits in Tangen Animal Park (Norway). The analysis of practice, i.e. the effects of socialization, is provided on all aspects of keeping animals in captivity presented in the first chapter of the thesis. These include the effects on animal welfare, behaviour, enrichment, training, management, human-animal communication, and the educational purpose of the zoo. Throughout the analysis, the hypotheses suggested in the end of the first chapter are implicitly kept in mind.

3.1. General methods of socialization

The methods of socialization depend both on the goals of the zoo and on the characteristics of the animal species. Additionally, detail methodological variations will be necessary for different animal individuals – these will become relevant during the process of socialization. In this subchapter, however, general socialization methods are introduced.

3.1.1. The main levels of socialization

There exist three alternative levels of socialization, although only two of them should be recommended in zoos when high animal welfare is set as a goal. The three levels are following (Næss, personal conversation, 30.03.2012):

- 1) Socialization to one person (e.g. the keeper): the animal will be socialized to one person only, it will still have a relatively high fear level of other keepers and visitors, which makes the beneficial effect of socialization rather low.

In this thesis, socialization to only one person is not considered beneficial to animal welfare due to the high risk of sexually imprinting on humans and the difficulties that will occur should the keeper suddenly quit working in the zoo. The latter would result in stress of the animal (derived from lack of social interaction with its trusted person) and difficulties for animal management staff (derived from the animal not accepting other keepers).

- 2) Socialization to the zoo staff: the animal will be socialized to the workers of the zoo. Stronger primary relationships – i.e. relationships, where there exists a strong bond between the animal and human – are developed with the main caretakers (“puppy parents”) of the animal during its “critical period”¹⁰. Secondary relationships – i.e. positive relationships without the bond of imprinting, but still enabling various successful human-animal interactions – could be formed with zoo workers regularly visiting the animal after its “critical period” (the introduction must be conducted in the presence of a person with primary relationship). Additionally, anyone wearing a zoo uniform could be formed to have a positive or neutral (depending on the success of socialization) significance in the animal’s Umwelt. The latter could appear useful, for example, during a veterinarian’s visit. Nevertheless, the animal could still be fearful of the general public.
- 3) General socialization: the animal will be socialized to people in general. In this process of socialization, primary relationships are developed between the animal and its “puppy parents”; secondary relationships are developed between the animal and multiple zoo workers (introduced to the animal within regular visits after the “critical period”); also, zoo visitors are frequently taken in with the animals for guided human-animal interactions. In case of successful socialization, the latter results in the positive significance of people who come in with the animals, as they could be perceived as enriching. People behind the fence usually maintain a neutral significance in the animal’s Umwelt. Although the most difficult to achieve, it is the most highly

¹⁰ Critical period is “a period of development [...] during which an animal develops a familial bond with whatever species with which it is in primary contact. Also known as *socialization window*” (Addams, Miller 2007: ix).

recommended method of socialization in the context of zoos as it reduces the animal's fear of people to the greatest extent and enables human-animal interaction enriching for the animals and educational for the visitors.

At this point, it must be specified that in order for socialization to be successful (i.e. in order to succeed in reducing the animal's fear of humans and improving the significance of its perception of humans), all human-animal encounters should be carried out as positively for the animal as possible. Negative human-animal interactions should be avoided at all costs, whereas the amount of positive interactions should be increased. It is scientifically approved that mammals do discriminate between individual people, positioning them differently in their Umwelt on a scale of negative to positive, or simply perceiving them sympathetic or antipathetic (Hosey 2008: 107; Hosey et al. 2009: 483; Hediger 1950: 162). Even more, this kind of discrimination could be, in its essence, dynamic, changing in time from negative to neutral, from neutral to positive or back to negative, etc (Næss, personal conversation, 14.05.2014). This knowledge should be kept in mind when socializing wild captive animals. A relationship with a non-domestic animal is exceptionally fragile, depending on mutual trust and positive interaction experiences. Any negative experience with humans could possibly damage the relationship and the animal's perception of people.

3.1.2. Species-specific methods of socialization

There exist multiple species-specific characteristics (as well as individual characteristics) that determine the methods of socialization. While individual characteristics can only be analyzed in frames of a single socialization project of particular animals, it is nevertheless possible to present a few examples of the many relevant aspects common for the species (or categories of species).

Without hesitation, the author would claim the most important species-specific characteristic relevant to socialization to be the animal's natural fear of humans. Depending on mostly how valuable (e.g. as a food source, as a merchandise for fur trade or ivory trade, etc.) or how potentially dangerous (e.g. wolves, lions, tigers) the animals are to humans, people have been hunting and killing animals over generations. Responsively, most animals

have evolved a natural fear of humans. Additionally, humans are the ecosystem's top predators, which gives ground to assume that most animals' general survival mechanisms make them avoid people even when actual contact with humans has hardly occurred. The level of fear of humans significantly varies between species (Carlstead 2009: 605), derived from man's different emphasis as a predator or enemy during the history of the certain species, and from the animal's ability to differentiate man from its environment (as a top predator.) In zoos, it is therefore a priority to socialize species known by their high fear level of humans (e.g. wolves, foxes, lynx, zebras, moose, etc.). Furthermore, when socializing different species, it is explicit that the socialization intensity and methodology depend on the animal's natural species-specific fear level. For example, in terms of mechanisms, it is much easier and quicker to socialize a moose than a wolf (Næss, personal conversation, 14.05.2014).

Another important aspect to take into consideration prior to socialization is whether the animal species has solitary or social lifestyle. For example, one might agree that social animals (such as wolves, lions or chimpanzees) are usually easier to generally socialize with people, since they are prone to establish multiple primary relationships within their packs or herds. Therefore, it is possible to establish more than one primary human-animal relationship during the "critical period" of the animal's life. On the contrary, animals of solitary lifestyle, e.g. bears, tigers or foxes, require much more effort in socializing to avoid human-imprinting or cooperation with one keeper only. In nature, solitary animals usually bond only with their mother (to some extent, littermates also, if they exist) and even this bond is meant to fade when the animal reaches maturity and disperses. From then on, the animal has to be cautious of all other conspecifics. Therefore, solitary animals tend to develop only one (rarely two) primary relationships and when this is a relationship with a human, there is a high risk of imprinting on one keeper only¹¹. When human-imprinting (in its sexual sense) could be avoided by socializing multiple animals at once and introducing adult conspecifics, developing multiple primary relationships is a task of much more difficult nature.

Even more, interaction with pack animals requires the human to be constantly aware of the hierarchical relationships between the animals in order to not cause unnecessary tensions between the pack members during his/her interactions with the animals. The author feels the need to strongly emphasize that, in the methods and purposes of socialization

¹¹ The essence of imprinting and its effects on animal's life is explained in subchapter 3.1.3.

suggested in this thesis, humans should not be perceived as pack members (or members of the same species) by animals. This is so because the status as a pack member brings along responsibilities that human species is naturally not prepared for. For example, when reaching maturity, the animals will start addressing their sexual and aggressive behaviour to the human, which is dangerous for both man and animals (Bouissac 2010: 45-46).

As Runar Næss has explained (personal conversation, 20.04.2014), even the most stable hierarchies (e.g. a wolf pack) are, in its essence, dynamic and require the members to prove their suitability for the position. A pack member, whether human or animal, should expect being constantly challenged by other members and having to protect his/her status (usually by aggressive or adverse methods). Many serious and often fatal accidents prove that, in case of physically dangerous animals (such as wolves, lions or even dogs), this is a responsibility people are not prepared to take. In order to avoid becoming a pack member, Næss has suggested a few main principles that should be applied from the very beginning of socialization. These include, teaching the animal not to bite or attack humans (or exhibit any other behaviour people might wish to discourage), and not getting involved in any dominance behaviours (Næss, personal conversation, 14.05.2014). The latter indicates to the necessity of expertise in the behaviour of the animal species worked with. The author suggests that following the aforementioned principles should enable the animal to differentiate between human and its own species, as well as develop proper communication skills for interacting with both of them.

Additionally, both physical and behavioural species-specific characteristics determine the socialization methods. Bears could be brought as an example to explain this argument. According to Næss's experience with socializing bears, there arise a couple of difficulties, which require special socialization methods. Firstly, even though bears are overwhelmingly solitary, they stay with their mother usually for two and a half years before dispersal. This means bears have a tendency to develop an exceptionally strong bond with one person (mother figure), making it risky for the zoo as far as animal welfare is considered. Secondly, when a bear reaches a certain age, it is of high danger for people to go in and physically interact with the animal – an “innocent touch” from a bear could result in painful injuries for the human. Even more, bears tend to express their frustration or hunger by biting, which is yet another complication to consider in human-animal interactions. Thirdly, bears are extremely difficult to socialize with people in general, since bears as solitary animals tend to be highly discriminative of people (or conspecifics) and dislike strangers. (Næss, personal conversation, 14.05.2014) In the opinion of the author, this proved to be a sufficient example for illustrating

the ways in which methods of socialization (including the methods of training, handling and interacting) depend on species-specific characteristics.

3.1.3. Human-animal relationships and interactions required in socialization

Socialization aims to establish a partnership-based relationship (whether it is of primary or secondary nature) between animal and human, and to reconstruct the animal's Umwelt so that humans in general are perceived by the animal on a scale from neutral to positive. With most wild captive animals, it is a complicated and long process, due to the aforementioned fact that they are prone to flee from man. The author suggests certain types of human-animal relationships and interactions that should be required for successful socialization: hand-raising, social imprinting and taming.

According to Wolf Park's (Indiana, USA) manual of "Management of Red Fox (*Vulpes vulpes*) in captivity" (2007), hand-raising is the rearing of a young animal by humans, whereas it only makes the animal less fearful of humans, but does not, by default, produce the bond of imprinting (Addams, Miller 2007: 70). Hand-raising itself is not a relationship, but rather one method of interaction. One could hand-raise an animal after its species-specific "critical period" has passed, but in that case, the animal will not bond with the human in a way it could if hand-raising started earlier. That means, in order to establish primary relationships, hand-raising needs to start before the animal's "socialization window" closes. The author finds it relevant to explain that primary relationships are necessary for establishing a strong, trust-based foundation for human-animal relationships. The animal who has no primary relationships (i.e. bonds developed by imprinting) will never feel very confident and comfortable in the presence of humans. The latter argument is also supported by Wolf Park's decades of experience (Addams, Miller 2007: 71). Therefore, not only does the animal need to be hand-raised, it also needs to be imprinted on humans in order to properly socialize it.

The concept of human-imprinting has appeared to be controversial and confusing – the author has claimed it negative for animal welfare, yet necessary for successful socialization. Thorough explanation of the essence of this concept is, hence, indispensable.

Human-imprinting has been adequately defined by Wolf-Park as "the exposure of a juvenile animal to humans during the "critical period" when it is primed to bond easily with

any living thing”¹² (Addams, Miller 2007: 70). Unlike Wolf Park, the author would like to specify two different types of imprinting: sexual (i.e. imprinting species identity as was originally suggested by Konrad Lorenz) and social (i.e. accepting the other as being a natural part of its family/friends group, a social companion). The validity of this differentiation is supported by the experience that animals who, during their “critical period”, were hand-raised by people together with littermates do not usually exhibit sexual behaviour towards people, but seem to clearly discriminate between conspecifics and extraspecifics (humans). However, those animals do accept certain people as members of their social group (make no mistake, the notion of a “social group” is not synonymous to that of a “pack”).

For this very reason it is of utmost importance to start the process of socialization at the early age of the animal and, as cruel as it sounds, remove the animal from its mother. Namely, all animals have an internal tendency to imprint on their biological parents or somebody who most resembles the biological parents (Addams, Miller 2007: 70). It is theoretically possible to socialize animals in the presence of their mother in case the mother is socialized to people. However, practical experience reveals that the bond with humans will, in that case, be significantly weaker and the animals will never be fearless of humans and enjoy their man-made surroundings in a relaxed, stress-free manner (Addams, Miller 2007: 70).

The author would think of three “deadlines” when imprinting and hand-raising in the aim of successful socialization. First, the young animals should be removed from their mother not only before their “critical period” passes, but before the animals develop fear response (the exact age animals begin to exhibit fear response differs across species). Second, when removing the animal from its mother after the “critical period” has passed (the length of which also differs across species), the animal will no longer bond with humans properly. And third, when removing the animal from its mother too early (e.g. at birth), the animal will not get all the antibodies and other vital ingredients of colostrum (the mother’s first milk) necessary for a well-functioning immune system. (Addams, Miller 2007: 22) Keeping those “deadlines” in mind would facilitate bonding and reducing the animal’s fear of humans while still enabling the young animal to benefit from at least the vital effects of mother’s first milk.

No matter if the animal is of solitary or social species, in case the animal is totally separated from its conspecifics, there is always a risk of sexual imprinting on humans

¹² Some authors have claimed that young animals could also imprint on a first moving lifeless object it sees, in case no living organism is present (Ramul 1972: 99–100).

resulting in the animal being more interested in human company than that of its own species. This, obviously, will not result in animals suitable for species-specific behavioural display and social skills of educational value. Wolf Park specialists have claimed that baby animals are “hard-wired” to bond preferentially with conspecifics (Addams, Miller 2007: 65), even when they are hand-raised by humans. Therefore, socializing multiple baby animals together usually eliminates the problem. In cases of species which produce only one offspring a season, and socializing a single animal is therefore inevitable, occasional interactions with adult conspecifics, or, in extreme cases, using a dog (or any other suitable animal) as a foster parent would be suggested to avoid sexual imprinting on humans and enable the animal to acquire more proper social skills (Næss, personal conversation, 30.03.2012). Even in this scenario, humans should be the main food and security providers in order to properly bond with the animal.

To sum it up, the author finds it necessary to emphasize one more time that two kinds of imprinting should be involved in proper socialization: intraspecific, i.e. sexual imprinting with littermates, and interspecific, i.e. social imprinting with human caretakers. Raising young animals together in conspecific groups allows them to imprint both on humans and conspecifics. This will result in remarkably natural species-specific behavioural display, as well as reduced stress-affected behaviour (derived from being exposed to people), which is a great advantage for the zoo’s educational and research purposes. Even more, it will offer a wide range of opportunities for human-animal interaction, including easier handling, less stressful veterinary procedures, and guided sessions of meeting visitors. However paramount the concept of imprinting is, the author has to admit its ambivalence and confusing connotations. For this reason, Næss, has suggested that in order to avoid misunderstandings, it might be easier to abandon the term “imprinting” and justify the necessity of starting the socialization process in the early age of animal’s life by explaining that it is simply easier to reduce the animal’s fear of humans when the socialization starts before the onset of fear as well as it is easier to bond with the animal when the mother is not present (Næss, personal conversation, 20.04.2014).

Another form of human-animal relation present in the process of socialization is taming. Taming is a concept that is very variously defined in the scientific field; a consistent understanding of the concept practically does not exist. However, there is one aspect that seems to be unanimously agreed on: taming means the intentional (man-influenced) reduction of an animal’s flight distance from humans to zero (Addams, Miller 2007: 70; Handelman

2008: 266; Hediger 1950: 156; Sebeok 1990c: 125). Yet the means of achieving this result and the essence of the relationship between man and a tamed animal is not fully comprehensible in scientific literature.

While some authors have not discussed the methods of taming any further (Sebeok 1990c: 125), the others have mainly concentrated on the positive methods of taming (the methods resulting in positive human-animal relationships) (Hediger 1950:156). For example, American canine behaviourist Barbara Handelman tried to enlighten the concept by saying that “taming essentially involves socialization, where the animal develops an attachment or social bond with its handler” (Handelman 2008: 266). At this point, the author would like to use the opportunity to disagree. Namely, by an example of taming elephants using bullhooks and the well-known method of “breaking their spirit”¹³, it should not be impossible to comprehend that taming does not necessarily create a positive human-animal relationship or any kind of bond between the two (Næss, personal conversation, 25.06.2013). In fact, when taming is processed by positive punishment or negative reinforcement methods (using fear to motivate the animal to cooperate), a tame animal quite possibly despises its trainer and is afraid of him/her. On the other hand, when following the methods of positive reinforcement and keeping the human-animal interactions positive, a positive (or neutral) significance of man in the tame animal’s Umwelt may indeed develop. Here, it must be emphasized that taming could be done at any age of the animal, but it does not produce the social bond of imprinting unless it has started during the “critical period” of the animal’s life (and hence involves imprinting) (Addams, Miller 2007: 70-71). Therefore, the author would suggest that instead of thinking that taming essentially involves socialization with bonding, it would be more correct to claim that socialization essentially involves taming, i.e. reducing the animals flight distance from humans to zero. Taming is in tune with socialization only if it is conveyed by positive reinforcement. Since alternative methods such as taming by fear (by positive punishment or negative reinforcement) are existent, one must admit that taming *per se* does not determine the nature of human-animal relationship.

To summarize the types of human-animal relationships and interactions involved, it must be repeated that socialization requires hand-raising, imprinting, and taming by means of positive interactions and positive reinforcement. Taming on the other hand, might include

¹³ “Breaking the spirit” is a method that is rapidly becoming public knowledge. An overview of this method could be found on webpages such as <http://kimpluscraig.com/2014/01/10/phajaan-breaking-the-spirit/> (15.05.2014) and <https://www.youtube.com/watch?v=eDMYEHY6ELs> (15.05.2014).

hand-raising after the animal's "critical period" has passed or might not include hand-raising at all, since the reduction of animal's flight distance from humans to zero is possible at any age of the animal. Even more, taming does not require a positive human-animal relationship or interaction. With those comparisons in mind, it is easy to understand that a tame animal will not have as high welfare in a zoo as a socialized animal. This is so simply because a socialized animal has a positive imprinted bond with humans, allowing it to be much more comfortable around people, than a tame animal (Addams, Miller 2007: 71).

Before finishing the topic, an additional mentioned form of human-animal encounter must be cleared out – habituation. Habituation could be defined as "a form of learning in which the animal reduces its response to a constant or repetitive stimulus" (Hosey et al. 2009: 544). Even though it is beyond the scope of this thesis to properly explain the mechanisms of learning, according to Runar Næss, habituation could be considered as passive learning about humans (and the animal's environment in general), whereas socialization would be active learning about humans. Habituation does not involve any relationship between a human and animal (and should therefore not be considered as a type of relationship but rather an encounter or interaction). Habituation results in man's neutral significance in the animal's Umwelt. The author would explain that habituation of some form is implicitly always present in the process of socialization: whether the animal is habituated to the other zoo animals or the noises and elements of its environment that are not actively desensitized. In case a socialized animal perceives the general public as neutral, one could say this animal is habituated to strangers but socialized to certain people and, possibly, to visitors that come in the enclosure.

3.2. Introducing the Red Fox (*Vulpes vulpes*)

Since the socialization of Red Fox was conducted in the process of this thesis, and since socialization methods partially depend on species-specific characteristics, it would be appropriate to briefly introduce the species under question. Before proceeding, it must be explained that the following description is not exhaustive as it concentrates on the topics most relevant to socialization. The main information sources will include the book of R. Burrows

(1968) “Wild Fox: A Complete Study of the Red Fox”, J.D. Henry (1986) “Red Fox: The Catlike Canine”, and J. Addams, A. Miller (2007) “Management of the Red Fox (*Vulpes vulpes*) in captivity”.

Foxes (*Vulpes*) belong to the family of *Canidae*. Today, twelve subspecies of *Vulpes* are recognized (Encyclopedia of Life 2014; Smithsonian National Museum of Natural History 2014), among which the Red Fox, *Vulpes vulpes* (Linnaeus, 1758). The taxonomic hierarchy becomes increasingly perplexing when it comes to dividing *Vulpes vulpes* into subspecies. Historically red foxes were divided into two species – *Vulpes vulpes* in Europe and *Vulpes fulva* in America; nowadays, they are considered the same species (Encyclopedia of Life 2014; Smithsonian National Museum of Natural History 2014). Whether red foxes should be divided into further subspecies, is not yet agreed on. While some authors claim that *Vulpes vulpes* have numerous subspecies (Burrows 1968: 66), the others do not accept this view (Addams, Miller 2007: 24). However, according to both the Encyclopedia of Life and Smithsonian’s taxonomy, 45 different subspecies of *Vulpes vulpes* are recognized (Encyclopedia of Life 2014; Smithsonian National Museum of Natural History 2014).

Dividing red foxes into subspecies relies on many characteristics, including habitat, behavioural and physiological particularities (including fur colour), and multiple morphological variations. Perhaps it would be enlightening to introduce the two most common wild Red Fox subspecies: *Vulpes vulpes vulpes* (also known as “Scandinavian fox”) in Europe and *Vulpes vulpes regalis* in North America. Acknowledging these possible subspecies could be useful in this thesis since the three foxes socialized were obtained from two different litters in a fur farm, whereas two of the red foxes have a wild-type red colour and the third is silver. It is worthy of attention, because it is a well-known fact that silver fox is a melanistic form of North American Red Fox, but introduced to Europe owing to the escape of farm foxes imported in frames of fur trade (Burrows 1968: 73; Encyclopedia of Life 2014; Smithsonian National Museum of Natural History 2014). The particular silver fox of this case study is the sibling of a golden-red coloured specimen, whereas their mother was referred to as a “Golden fox” by the farm owner. Since North American Red Foxes are known to appear commonly in golden-red colour (Encyclopedia of Life 2014; Smithsonian National Museum of Natural History 2014), there is a ground to assume that these two foxes belong to the subspecies of *Vulpes vulpes regalis*. The third fox of a wild-type red colour is from a different litter and is labelled as *Vulpes vulpes vulpes*. The latter argument is supported by the fact that it is considered a Scandinavian fox and it has notably larger body measurements,

which is also recognized as a difference between Scandinavian and North American red foxes (Encyclopedia of Life 2014; Smithsonian National Museum of Natural History 2014).

At this point, it is important to note that silver colour is not a mutant result of selective breeding occurring in fur farms. Genetically, the allele responsible for silver colour is of recessive type, whereas the colour will only be expressed in double-recessive individuals (Addams, Miller 2007: 24). Along with the wild-type red and the cross (a mix of red and dark/black) fur colour, the silver (or black) colour type belongs to the standard colour phases found in the wild (Addams, Miller 2007: 2; Henry 1986: 21). Whereas the cross is more common (appearing in 30% of wild foxes) and silver phase is less common (appearing in about 10% of wild foxes) (Addams, Miller 2007: 2). All the other red fox colour phases (including white, spotted and mottled) are the product of selective breeding and therefore heavily man-influenced mutations (Addams, Miller 2007: 2, 24).

Nevertheless, the author must admit that the previous division of the three socialized red foxes into subspecies was based on rather subjective judging. Exact categorization requires professional zoological analyzing and is beyond the capabilities of the author. Apart from being interesting, the speculations were provided with the aim of explaining the obvious physiological differences between the three foxes, especially considering their size and colour (potential behavioural differences deriving from colour will be explained below). Accordingly, in order to avoid confusion derived from possible mislabelling, the possible subspecific origin will, further on, be discounted and all three foxes will be referred to as red foxes (*Vulpes vulpes*) of different colour. Whereas the main characteristics common to *all* Red Fox are considered most influential when choosing the right socialization methods.

Before proceeding to presenting the species-specific characteristics, an interesting effect of fur colour to socialization must be explained. The results of Russian scientist D. K. Belyaev's experiment of breeding foxes for their ability to tolerate humans are widely known. Namely, he found out that the genes which determined the animal's friendliness towards humans also affected the physical appearance of the animal. Belyaev's breeding for friendliness produced "odd-coloured" foxes with smaller adrenaline production and increased dopamine and serotonin production (both are calming hormones which play a role in

friendliness). (Additional “side-effects” were floppy ears, curly tails, underbites and overbites.)¹⁴ (Addams, Miller 2007: 25, 71; 2012: 68-69)

Not only does Belyaev’s study explain various important mechanisms of domestication and selective breeding, but it also reveals the connection between hormonal production, friendliness and physiological characteristics such as fur colour. In other words, the genes controlling the production of dopamine, serotonin and adrenaline are linked to the genes responsible for colour expression. Derived from Belyaev’s discoveries, scientists concluded that “odd-coloured foxes will naturally turn out more people-friendly than the wild-type foxes”. (Addams, Miller 2007: 25)

Whether or not this theory is applicable for natural colour phases, such as silver, is highly speculative – even though silver, as it appears in the wild, is not an “odd colour” in foxes, specialists have admitted it to be a more “derived” colour compared to the most common wild-type red and associated it with changes in hormonal production (Addams, Miller 2007: 25). Practical experiences tend to support the speculations. Not only does the author admit remarkable differences in the friendliness of the red- and silver-phased foxes she herself worked with, but Wolf Park’s many years of experience also approve the hypothesis. Namely, they noticed that silver-coloured foxes tend to have a smaller flight distance from humans than wild-type foxes, pearl-coloured foxes have a smaller flight distance than silver foxes, and amber-coloured foxes have the smallest flight-distance from humans (Addams, Miller 2007: 25). In fact, in year 2000, Wolf Park obtained two fox kits of a same litter, one silver-phased and one wild-type red fox. “The wild-type vixen, as an adult, was shy of unfamiliar humans and avoided them. The silver, as an adult, was also shy, but much more willing to tolerate handling, by familiar and unfamiliar humans alike, and was known to climb on people in search of treats” (Addams, Miller 2007: 25, 97). Remarkably, the exact same results were witnessed with the foxes socialized during the current research.

When it comes to species-specific behavioural, physiological or lifestyle characteristics, a few things about foxes should be kept in mind when socializing. First, foxes are predominantly solitary animals. Therefore, great care should be taken in order to avoid

¹⁴ This phenomenon is often referred to as “neoteny” – “retention of juvenile characteristics in the adults of the species” (Handelman 2008: 171). In mammals, the mechanism of neoteny is basically the elongation of an organism’s ontogenetic development, which results in sexually mature adult animals exhibiting certain structural, proportional and functional characteristics common to the juveniles of their ancestors (Viikmaa 2011).

bonding with one keeper only. Also, in order to enable the fox to develop adequate species-specific social skills, company of conspecifics should be required. Since the average fox litter size is from two to six (maximum twelve) kits (Addams, Miller 2007: 6), raising multiple baby foxes at a time is usually not a problem. Bonding with multiple caretakers (human foster parents) is more difficult, but not impossible.

As Hediger has said, “very few creatures live truly solitary lives, and then only during certain phases of their life. Many need the company of their fellows or some substitute for it” (Hediger 1950: 104). This is also the case with foxes. Even though the majority of foxes live alone, they are also known to live in pairs, or in small family groups (Addams, Miller 2007: 4); some researchers even claim that foxes mate for life (Burrows 1968: 127), although this is an aspect not unanimously agreed on. The social lifestyle variation is derived from the breeding characteristics. Namely, both vixens and dog foxes (i.e. females and males) share responsibility to take care of the kits (Addams, Miller 2007: 6), which is a foundation for developing a strong monogamous pair bond (Henry 1986: 36).

By eight or nine months of age foxes reach maturity and young males usually disperse to new territories (minimizing the risk of inbreeding) while young females may choose staying with their mother instead (Addams, Miller 2007: 6). The latter is more often a case if food resources are plentiful. As a matter of fact, related female red foxes have been known to either share one resident male fox or help raise their mother’s following litter (Addams, Miller 2007: 5-6), in that way implicitly increasing their own fitness. All this considered, it should not be too complicated to have captive red foxes living in family groups and even bond with more than one caretaker. However, it seems to the author that owing to their general solitary lifestyle, foxes do not tend to develop as strong bonds (primary relationships) as do animals of social lifestyle. Foxes do not seem to seek for affection and contact as much as wolves, for example. Also, they are less welcoming to strangers (either humans or conspecifics). This seems to make it rather difficult, although not impossible, to change the general significance of people to positive in the fox’s Umwelt.

Unlike many bigger carnivores (such as wolves, hyenas, lions or bears), foxes are not life-threateningly dangerous to people. An attack from a fox might cause painful injuries but fatality is highly doubtful. This feature facilitates the socialization and training process significantly, eliminating the stress and extra effort derived from anticipatory precautions against fatal accidents. It is interesting to note that foxes are actually omnivorous (although

meat forms a larger part of their diet). This is a fact necessary to keep in mind when contemplating ideas of food-based enrichment or methods of training. Omnivorous diet enables the Red Fox to be opportunistic and therefore adapt to large variety of habitats. Adding into consideration their relatively high intellectuality and small body size, it is not surprising that the Red Fox is the most widespread member of the family Canidae (Addams, Miller 2007: 3-4).

In behaviour, red foxes are particularly interesting. As mentioned before, they are a member of the family Canidae, possessing all the diagnostic morphological as well as many behavioural characteristics of this family (Henry 1986: 70). Canadian mammalogist and wildlife conservationist J. David Henry has made a thorough research on the behaviour of *Vulpes vulpes*. To exemplify behavioural traits shared with canids, he names the foxes' well-developed caching behaviour, certain lunging-based and chasing-based (over considerable distances) hunting strategies, a possibility of a well-developed pair bond and the cooperative effort of raising the young (Henry 1986: 70). Yet Henry has suggested a hypothesis that deriving from the fact that the prevalent part of foxes' prey animals overlap with that of small cats, foxes have developed many behavioural and physiological aspects common to felines (Henry 1986: 74). He recognizes quite some feline behavioural traits in foxes, including lateral threat display, stalking-based hunting strategies and quick reactions (Henry 1986: 72). The physiological catlike features of foxes encompass the vertical-split pupil which enables good nocturnal vision, long vibrissae, proportionately long canine teeth, a fine sense of balance and soft foot pads required for successful stalking (Henry 1986: 60, 70, 71, 73). For all those behavioural and physiological resemblances of felines supported by many researchers, the red fox has a reputation of "the catlike canid" (Addams, Miller 2007: 1-2; Burrows 1968: 63).

The mentioned behavioural and physiological species-specific peculiarities are important to acknowledge when socializing foxes. For example, the fact that foxes are crepuscular, i.e. dawn and dusk animals (Addams, Miller 2007: 11), explains many relevant aspects of their behaviour and interaction with humans, contributing to arranging training or provision of enrichment, as well as relaxed "cuddling-time" or visitor interactions. Also, the fact that foxes are known for hunting, scavenging and immense caching behaviour (Henry 1986: 31), offers a ground for food-based enrichment in order to encourage natural behaviours for educational and animal welfare reasons. Lastly, it is inevitable to emphasize that foxes (as historically vastly hunted by people) have a relatively high natural fear of humans. Although

one might argue that foxes that occupy an urban habitat seem to be quite habituated to people, it is a fact that most wild foxes flee from man before he even sees them. As a matter of fact, “a very slight human scent [...] even a glimpse of a stationary human, [...] will cause flight” (Burrows 1968: 65).

3.3. The socialization of three Red Fox in Tangen Animal Park

In spring 2013, Tangen Animal Park (Norway) decided to obtain Red Fox and start their socialization project. For this reason, two Red Fox offspring were purchased from a Norwegian fur farm. The kits were born on April 30, 2013 and they were removed from the mother at 10 days of age. The author herself arrived at Tangen Animal Park on June 7, 2013 in the purpose to participate in the full process of socialization as one of the “puppy parents” (i.e. main caretakers of the foxes) (see subchapter 2.1.), while being personally involved in carrying out all the elements of socialization. (Until June 7, hand-raising was conducted by Julian Brossé.) As a result of coincidental circumstances, another fox kit from a different litter of the fur farm was brought to the park on June 9 and was involved in the socialization program. In terms of the three aforementioned levels of socialization, the park decided on socialization with people in general. The aim was to reach the highest possible level of animal welfare by reducing the animals’ fear of humans and enabling the animals to more efficiently adapt to life in human environment. A secondary goal was that of an educational one – learning about the animals’ most diverse and naturally species-specific behavioural display. Perhaps a tertiary goal was easier handling and management that becomes possible with cooperative and fearless animals. Before proceeding, it must be mentioned that the author is still actively involved in the project as maintaining the socialization level requires continuous work throughout the animals’ lives.

3.3.1. The socialized foxes and their social relationships

The three foxes were briefly mentioned in subchapter 3.2. where the effects of fur colour on socialization were analyzed. Following, the author will provide a more personal introduction of the foxes and their socialization process. Out of the three, there were two male foxes and one vixen. One male – the fox named Johnny – stands out for his silver-phased fur colour. Johnny’s sister, a wild-type red vixen, is called Tuli. The second male, Franklin, is the fox with a wild-type red colour, who arrived to the park later (around six weeks of age). He is about the same age as the other foxes (a few days to a week older). However, the socialization of Franklin started five weeks later than the socialization of Johnny and Tuli. This fact results in quite some differences in terms of human-animal relationships and interactions. Additionally, all three of them have significant differences in personality traits.

Johnny is no doubt the boldest and most fearless of the three. He is the most eager to seek human contact and most persistent to demand people’s attention, making interaction and training on fair premises difficult. His affinity to the “puppy parents” is more evident than that of the other foxes and he is also more interested in contact and attention of the public. Johnny has no problem eating from people’s hands (familiar or unfamiliar) and he occasionally jumps on people’s backs in search of treats. From the author, who the foxes have a primary relationship with, Johnny likes to receive full-body scratching, and on rare occasions (such as meeting for the first time after a longer period of separation) Johnny shows his affinity by lying down on her stomach. Johnny has always been the easiest to handle when it comes to physical contact or unusual situations (e.g. picking the fox up, veterinary routines, changing enclosures). Johnny has never exhibited any aggressive behaviour against humans and seems to be the least affected by “scary” behaviour (such as sudden movements or loud noises) of the human visitors. All this supports the hypothesis described above, according to which silver fur colour may indicate decreased adrenaline and increased serotonin and dopamine production resulting in more friendly and overall calmer conduct. The author finds it correct to claim that it is easier to socialize silver-phased red foxes than the wild-type red foxes due to their natural genetic differences of hormonal production. (The difference is even more significant with man-influenced fur types, such as white-phased or other “odd” colours. However, selective breeding for friendliness leads to the process of domestication which is not the goal of socialization.)

Johnny's sister Tuli is the only vixen and also the most shy of the three. Although she eats treats out of visitors' hands, is interested in training and occasionally enjoys slight strokes under her chin (or even more rarely, tender scratching behind her ears) offered by the "puppy parent", she is known for keeping her distance. Her flight distance from humans varies significantly in different situations. Tuli's flight distance from familiar people is usually zero, depending on her current motivation¹⁵ for social contact. Yet, when it comes to people she has not met before, her flight distance could rise up to 4 or 5 metres, although she stays around and seems genuinely curious about people. When being encouraged by the presence of other foxes, or motivated by treats, she gradually loses her flight distance and grows confidence. Tuli used to jump on people's backs as a kit, but as an adult, she usually keeps physical contact to a minimum. However, special attention will be paid to training and increasing Tuli's confidence in physical contact with people during further socialization process. Additionally, Tuli is the fox who is the most prone to "fall back" after being frightened by something or after a longer separation from people. Therefore, maintaining the level of socialization by frequent and regular human contact is paramount with Tuli. Another aspect one needs to keep in mind when interacting with the vixen is the need for slower and smoother locomotion, lower sounds, and her higher sensitivity to direct eye contact and reaching hands. When these criteria are fulfilled, she generously offers her much appreciated company.

The third fox, Franklin, has a unique relationship with humans when compared to the other two socialized foxes. As mentioned before, Franklin was separated from his mother at around six weeks of age. That means, even though he was exposed to people to some degree, he was never imprinted on human caretakers during his "critical period", which, in foxes, ends at approximately three or four weeks of age (Addams, Miller 2007: 69). When Franklin arrived at the park, big effort was put on trying to bond with the kit as much as still possible (see Appendix 1). However, Franklin does not have as deep primary bonds with the "puppy parents" as the other two foxes have. He has a relatively strong, yet secondary relationship with the author (who has been his main caretaker) and positive relationships with a few other familiar people. Observations of his behaviour prove that Franklin perceives visitors as

¹⁵ "Individuals vary from occasion to occasion in the likelihood that they will undertake particular behaviours, including learning tasks. This variability also occurs between individuals and is often referred to as 'motivation'. Motivation is generally thought of as some kind of internal process that influences the likelihood of whether or not the animal will do the behaviour" (Hosey et al. 2009: 85).

positive enrichment and people in general as neutral – this fact enables him to tolerate being surrounded by people which is inevitable when living in a zoo environment. Franklin is a hand-raised animal, whose flight distance to humans is zero and who has rather positive experience with people. Hence, one could consider him a positively tamed animal, yet not quite as socialized due to the absence of true social imprinting on humans. Consequently, Franklin will never be as confident and naturally comfortable around humans as, for example, Johnny who has a much deeper imprinted bond with people (Addams, Miller 2007: 71). Luckily, this disadvantage does not express itself explicitly owing to the fact that Franklin has been raised with two socialized (and imprinted) foxes and has seemingly learned to trust people by the mechanisms of social and observational learning¹⁶. The behavioural differences of the three foxes illustrate the role of each individual animal's personal traits and previous experiences in the process of socialization, as well as in every human-animal interaction. Even though the principle methodology of socializing the foxes has been the same for all of them, the confidence and behaviour of each fox may vary in context (or situation) and refer to the necessity of individual-oriented interaction.

It must be specified that all three foxes are sexually imprinted on their conspecifics and possess proper species-specific social skills and drives. However, one more than the other, they naturally accept certain humans as extraspecific members of their social group and enjoy human company (especially that of people they have a relationship with). This aspect is proved by the intense excitement and greeting behaviour¹⁷ exhibited by all three foxes should a familiar human visit them. Even though they are more shy with unfamiliar people and tend to not maintain physical contact with them for more than a brief moment, all foxes (Tuli the least) appear to perceive incoming visitors as positive enrichment, expressing genuine

¹⁶ Social learning – learning from other individuals about how to behave or about skills associated with food-obtaining, predator avoidance, and communication (Barnard 2004: 290; Hosey et al. 2009: 83). By social learning, “an animal can save time and energy that it would otherwise have to invest in learning the task for itself” (Barnard 2004: 290).

Observational learning – “learning by observing another individual [a model] engaged in a behaviour. To learn from a model, the observer need not perform the behaviour nor receive direct consequences for his or her performance. A type of learning in which the behaviour of another organism is observed and imitated” (Ramirez 1999: 546). One could say that observational learning is a part of social learning.

¹⁷ Greeting is a friendly (submissive) behaviour towards a conspecific or another companion, whereas it is distinguishable by certain features: ears folded back or held parallel to the ground (“airplane ears”), body held low (in case of great excitement, the foxes even lie down), tail-wagging, open mouth, lips drawn back in a grin, audible panting, emitting loud and shrill shrieks. It sometimes happens that a greeting fox “flips over onto its side or back, [...] then immediately flips back up and runs off, as though inviting a chase”. (Addams, Miller 2007: 5, 7) The author has noticed a high tendency for excitement-driven urination when the foxes are being visited by familiar people.

excitement and curiosity towards them. As a result, the foxes do not seem to be stressed by being surrounded and observed by visitors. Compared to unsocialized foxes, this ability provides them with better welfare when living with humans in a man-made environment.

By visiting different animal parks, one could notice that unsocialized foxes spend a considerable amount of time hiding or exhibiting stress-related stereotypical behaviour. Even more, foxes are known as “escape artists” and unsocialized captive foxes (stressed by fear of people and/or boredom) could often express their urge to escape in a self-destructive manner (Addams, Miller 2007: 11). The foxes of Tangen Animal Park prove that properly socialized foxes are cooperative in training and enrichment programs, take full advantage of the different functions of their enclosure and exhibit great diversity of their species-specific fox behaviour. No stereotypic behaviour or escape attempts have been registered during this case study. When it comes to aggressive behaviour towards people, perhaps the behaviour that is most often mistakenly perceived as aggressive (or agonistic) is mouthing¹⁸, which in case of these foxes has been either food soliciting or motivated by social play. Another potentially confusing behavioural particularity is Franklin’s and Tuli’s rare tendency to mildly bite people’s hands. However, when communication context is taken into consideration, the biting has either been related to re-directed excitement (in Franklin’s case) or approach-avoidance conflict¹⁹ (in Tuli’s case). There is no indication of real social aggression towards people.

When considering intraspecific aggression, no serious incidents have been registered. No permanent hierarchic relationships of the group are evident, instead the dominant-submissive traits seem to vary according to situations. It is interesting that this rather temporary dominance seems to be influenced (amongst other factors) by the success of socialization. Namely, when it comes to interaction with people and receiving people’s attention (whether in the context of training or just during social time), Johnny tends to dominate over the other foxes. This seems to be the case due to his lower fear of humans and higher eagerness for human company, which give him an advantage for obtaining the resource

¹⁸ Mouthing behaviour – “to hold with the mouth, repeatedly changing grip. To manipulate with the mouth.” Mouthing could be motivated by sex-related aggression, food-related behaviour, agonistic play, or social play. (Goodmann et al. 2002: 20)

¹⁹ Approach-avoidance conflict – “a situation in which an organism wants something but is afraid of obtaining it; opposition between the two incompatible response tendencies of desire and fear. A conflict in which the individual has a single goal with both desirable and undesirable aspects, causing mixed feelings” (Ramirez 1999: 535). Tuli, having the highest fear of humans compared to the other foxes, yet having a desire to approach the hand, might sometimes give a quick bite as to make sure the person is safe to approach, or as a consequence of confusion about how to behave. This biting is, however, rare to happen.

of human contact. However, when it comes to introducing novel objects, Franklin is usually the first to inspect it. Franklin seems to have a much stronger urge to explore his environment, encouraging him to scrutinize novel objects (including objects belonging to people such as pockets, bottles, accessories, etc.) in search for any possible useful resources. During the mating season, Franklin seemed to be the dominant male, persistently chasing the vixen, while Johnny was obviously not as motivated to breed. However, the motivational differences could have been biased by the fact that Tuli was on birth control pills in order to avoid inbreeding. In terms of food-obtaining, no clear social rank could be recognized: although Johnny tends to be the one who most often gets the food first, his success depends highly on the motivation of the other foxes. All three of them (Franklin the most and Tuli the least) enjoy the “fun” of stealing each other’s caches. Perhaps Tuli might be considered the lowest in rank owing to the facts that she is a vixen and she has the highest fear level of people as well as novel objects, however she has no trouble obtaining the food or fighting for it, when she seems motivated to.

None of the examples are legitimate signs of permanent hierarchic relationships that would provide priority access to all resources. It does happen that the foxes guard their resources (whether it is food, toys, or people) and claim their “ownership” by urinating on or near the objects, but the “ownership” could change rapidly. Besides, all animals “own” and guard their resources no matter their rank – what determines the hierarchy is who gets priority access or the privilege for better resources, especially that of sexual partner (Runar Næss, personal conversation, 14.05.2014). In fox society, it seems to be the case that whoever finds a resourceful object or reaches it first, owns it, even if it is previously marked by another fox. Although observations of wild family groups of foxes have given a reason to assume that foxes do set a pecking order, wherein females generally seem to be lower in rank than males (Burrows 1968: 124, 128), experiences with captive red foxes have proved this assumption inaccurate as the dominance of captive foxes have been found to vary with contexts (Addams, Miller 2007: 9). In the viewpoint of the author, this conflict of opinions might be derived from the fact that *if* the foxes live together in the wild, they live in *family* groups where age, gender, and family relations naturally determine the hierarchic relationships (e.g. kits being submissive to the parents). In captivity, on the other hand, foxes are often not family-related and therefore do not live in family groups but rather artificial groups. Age and gender might have certain influence to their relations (especially, when younger foxes are introduced to older animals). However, it is the author’s opinion that the “dominance” in captive foxes

living in artificial groups is highly situational depending on the fox's motivation to obtain a resource and its confidence (fear level) in a certain situation.

When discussing hierarchy and dominance, one might be concerned about the question of human's dominance over animal (or perhaps even their hierarchic relationships). Beforehand, it was explained that in establishing a successful human-animal relationship and communication, people do not have to be perceived as the "alphas" of the pack (see subchapter 3.1.2.). Another reason for this is the fact that, contrary to the former wide-spread belief, people (that the animals are not sexually imprinted upon) cannot dominate over animals nor can strange animals, who have never met before, dominate over each other. This is so because dominance is a quality of relationship within a stable social hierarchy (Handelman 2008: 4, 84). "It assumes a long-standing, consistent relationship between individuals – one of whom "wins" in ritualized aggressive displays, while the other regularly and voluntarily submits" (Handelman 2008: 84). Submission and dominance is, hence, rather a survival strategy than a forced power-relation.

Even more, dominance is prevalently about breeding rights (to the extent that dominance over other resources, if it exists at all, simply contributes to the success of breeding) (Næss, personal conversation, 14.05.2014). Therefore, some scientists have claimed that dominance does not cross gender lines, so that (at least in canines) there are three hierarchies in a family group: one amongst adult females, one amongst adult males and one amongst sexually immature offspring (Hallgren 2006: 33). That means, according to the modern view of dominance, even a male animal does not dominate over a female or *vice versa*. "Disputes that occur between genders in a group of canines are not dominance-related but attempt to access food or similar resources, meaning a competition [*not dominance*] over a resource" (Hallgren 2006: 33).

All this considered, it is generally inaccurate to talk about the dominance theory in the context of human-animal relationships. Nowadays, some scientists have suggested adopting a more proper concept – "leadership" (Handelman 2008: 84). "Leadership is the ability to influence others to perform behaviours that they would not necessarily perform on their own" (Yin 2007: 415). It is crucial to understand that a strong human leader modifies the animal's behaviour by bestowing or withholding resources, not by using aggression and the dominance theory (Handelman 2008: 85; Yin 2007: 415). The author hereby agrees that a human is not (and should not be) perceived by the socialized animal as dominant. Dominance requires

behavioural displays that humans are not capable to neither perform nor receive (see subchapter 3.3.2.2.). Also, humans do not compete with captive animals over any resources. Attempting to dominate over the animals would most probably be confusing, dangerous and frustrating for both the human and animal, and result in severely damaged relationship (bond) between the two. Whether the human should be labelled as a “leader” or not, is negotiable. Although it is doubtlessly more proper than “dominant”, it has a connotation of controlling a situation. Control itself is always illusionary when working with animals, as animals have no innate “interest” in being controlled by humans; they rather act according to their situational motivations. Nevertheless, the author emphasizes that when positive human-animal relationship and high animal welfare are set as priorities, it is required that aggression and the dominance theory be abandoned, and positive reinforcement and negative punishment (i.e. bestowing or withholding resources) used instead.

3.3.2. The methods of Umwelt reconstruction in socializing Red Fox with humans

It is herein explained that the primary and secondary relationships between humans and socialized animals are based on qualities like partnership and companionship, not dominance. The partnership should be based on continuous positive experience of interactions, whereas negative experience should be kept to the minimum. The same rule applies to the animal’s encounters with strange people (e.g. zoo visitors). Although the animal will have no relationship with the people who it only meets once, it will get an experience with the visitors and these experiences have a heavy influence on forming the significance of the human species in the developing animal’s Umwelt. Only in means of positive experience is it possible to move man’s meaning-carrier from the phenomenal field (or functional circle) of enemy to the phenomenal field of partner in the animal’s Umwelt (Tønnessen 2009: 54).

How does this theoretic statement manifest itself in practice – how is it possible with captive animals, whose natural species-specific behaviour often contradicts human views on comfortable and pleasant interaction? The author would suggest two main mutually contributive methodic categories that assure a trust-based human-animal partnership and positive significance of people in general: proper methods of animal management and

efficient human-animal communication. It must be understood that efficient human-animal communication determines the success of management methods and is, therefore, the foundation of positive human-animal relationships. In the aim of clear argumentation, the author maintains the rather deductive approach and begins with analyzing the role of management methods.

3.3.2.1. The main principles of animal management in the process of socialization

As has been explained above (see subchapter 3.1.3.), socialization requires hand-raising commenced before the end of the animal's "critical period" when it is prone to imprint. However, the association with people has to be kept positive also *after* the hand-raising period when the animal moves out from the safe environment of the nursery and starts living in its permanent enclosure exposed to the public. This requires frequent and regular social time with the keepers (in order to maintain the strength of the imprinted bond) and occasional enriching interactions with visitors. In both of them, certain methods are suggested in order to keep the experience favorable.

One method that both depends on and contributes to the success of socialization is the provision of environmental enrichment. Enrichment, if done properly, triggers the animal's different behaviours, enabling it to exhibit wide variety of natural behavioural display. Additionally, to some extent, enrichment depends on the success of socialization: an animal, who is not constantly suffering from fear of people, is more likely to take part in different enrichment activities and investigate man-made enrichment objects, since it does not associate the objects innately with a meaning-carrier 'partner'. In other words, there are more options of enrichment for socialized animals as well as there is higher probability of the animals actually using the enrichment provided for them. The contribution of enrichment to socialization, on the other hand, relies on the fact that it reduces stress and favours the development of proper activity levels as well as more natural and healthy (as opposed to stereotypical and abnormal) behavioural displays. Animals benefitted from enrichment are more likely to enjoy social interactions and exhibit normal social behaviour, including that with humans. This is so since, if the animals have positive experiences with enrichment they

associate with people or perceive man-originated, it contributes to changing the significance of humans more positive.

As explained in the first chapter of this thesis, there are many ways to enrich the lives of captive wild animals. However, enrichment (as all other methods of animal management) depends on species-specific characteristics. Herein, the author will provide a brief overview of the enrichment used in the socialization process of Red Fox.

Foxes as omnivorous carnivores enjoy food of various kinds – from berries to insects to small birds and mammals. Further, foxes are known to obtain food by hunting, scavenging and digging up previously stored caches (Henry 1986: 31). This offers a wide variety of options for food-based enrichment. The three red foxes in Tangen Animal Park enjoyed tearing up carcasses; searching for dog kibble or cheese cubes that had been thrown all over the enclosure; licking off cream cheese or liver pâté spread on grass, rocks or higher tree branches; and fishing for ice-covered pieces of raw salmon (“fishicles”, i.e. fish in ice cubes) floating in a basin (see Appendix 4). All of these activities have been associated with many behavioural benefits in zoo animals (Hosey et al. 2009: 263). Even more, it seems to trigger extra nuances of intraspecific social behaviour, for example, since “in vulpine society, there appears to be no hesitation about stealing another fox’s caches” (Henry 1986: 98). In the authors perhaps not so scientifically appropriate but rather subjective opinion, foxes sometimes seem to enjoy just the excitement of caching, guarding their own caches and stealing caches of other foxes’. In more than few occasions, the author witnessed one of the foxes running around looking for opportunities to “steal” the other foxes’ caches (while constantly exhibiting signs of playful excitement) and after succeeding in doing so, redirecting its attention to other activities, without actually eating the food or being bothered when the others ate it. Food-based enrichment encourages different natural behaviours related to food obtaining (which is difficult to establish in captivity, where food is always provided by people and there is no necessity for the animal to put any effort in getting it). However, food-based enrichment also intensifies intraspecific social behaviour and, when food is plentiful, in a positive way. All these food-based enrichment elements were explicitly provided by humans and the author’s observations prove that the foxes associated these elements with the presence of people.

Physical enrichment is another way to encourage behavioural activity and physical exercise and keep the animals in a healthy physical condition. Tuli, Johnny and Franklin

performed their exercise by using hammocks, ladders, multifunctional furniture, reaching out for treats set on higher tree branches, toys, and other elements provided by their keepers. Physical activity was also encouraged by positive reinforcement training, which, along with various kinds of toys, was the prevalent part of cognitive enrichment for foxes. In training the foxes, food-based primary reinforcers (e.g. cheese cubes, dog kibble, cream cheese) were mainly used as rewards. To a lesser degree, the “puppy parents” succeeded in introducing the foxes to a couple of secondary reinforcers, such as clicker and the praise “Good boy!”²⁰. No outright punishment (i.e. positive punishment) was used with the animals as it “tends to result in a frightened, resentful, and possibly aggressive animal, ruining the bond of trust we are trying to build” (Addams, Miller 2007: 73) as well as it has an adverse effect on the significance of people. For discouraging undesired behaviours, the methods of negative punishment – an alternative concept with better connotations would be “non-reward” (Addams, Miller 2007: 73) – were used. Such methods included ignoring the behaviour; removal of rewards, petting or scratching; and in extreme cases, quitting the training process (or other sessions of interaction) and leaving the enclosure (also called a “time-out”). Throughout the socialization, training was a crucial contribution to enhancing human-animal relationships (Hosey et al. 2009: 478, 487, 490) and the author’s observations confirm that it, indeed, had a strong enriching effect on the foxes’ everyday life, as the animals expressed obvious signs of positive excitement during the process (see Appendix 5 and 6). Training added yet another positive association to the meaning-carrier of man.

Apart from training, other elements of social enrichment for the foxes included the change of neighbouring animals, but also encouraging intraspecific social interaction by providing surplus of food, shared toys, or activities requiring cooperative behaviours. Naturally for socialization, an extensive part of social enrichment was provided by fox-visitor interaction (see Appendix 7). However, fox-visitor interaction can only be considered (positively) enriching for the animal if it does not elicit fear (see subchapter 1.4.). This requires certain ways of controlling the humans’ effect on the animals, but also an immense effort to previously prepare the animals for human visits. The latter can be done in the process

²⁰ A primary reinforcer is a reinforcer that the animal finds inherently rewarding. It is usually a stimulus that satisfies the animals biological drives such as hunger or thirst. (Ramirez 1999: 548). A secondary reinforcer is “any stimulus that acquires reinforcing properties through association with a primary reinforcement”. An event becomes a secondary reinforcer by being paired with events that are already reinforcing (e.g. primary reinforcers). (Ramirez 1999: 550)

of desensitization which, in this socialization project, was also the major part of (predominantly man-associated) sensory enrichment for the animals. (The rest of sensory enrichment of the foxes consisted of the other park animals' feces, feathers or fur that were occasionally brought in the fox enclosure by keepers.)

Living in a human environment and meeting people can involve experience (for example, loud or aversive sounds, arousing odours, unnatural or synthetic materials, human handling) that are very unusual in the animal's natural lifestyle and can therefore be frightening and stressful for the animal (Addams, Miller 2007: 74-75; Hosey et al. 2009: 227). Such strange elements are yet more factors that make it difficult for a wild animal to cope with life in captivity. Even more, in the process of socialization, it is not favourable for human-animal relationships (or positive human significance in the animal's Umwelt) if the animal is afraid of elements associated with people. Therefore, desensitization is an essential part of socialization and captive animal management in general.

Desensitization is a concept rarely represented in scientific literature. Yet desensitization is a relatively simple concept as it means safe and nonthreatening introduction of novel experience (Addams, Miller 2007: 74-75). The most efficient way to safely introduce animal to different and potentially stressful experiences is to start during the "critical period" of the young animal's development, when it "has no inbuilt knowledge of what is and is not "normal" and is inclined to accept novelty rather than fear it" (Addams, Miller 2007: 75). As mentioned before, in foxes, the "critical period" lasts up to three or four weeks (see subchapter 3.3.1.). However, it is doubtful that an animal could be prepared to *all* possible future experiences during its first month of life. For this reason, the author agrees with the opinion that desensitization process could be extended up to approximately three months (12-14 weeks) of age (Beaver 1999: 138). The practical experiences reveal that it could be proceeded according to the "rule of twelve" – a guideline originally used in dog training (Hughes 2002), but adapted to the practice of socialization of wild captive animals across species (Næss, personal conversation, 25.06.2013).

"The rule of 12" in the context of socialization stands for the suggestion that during the first twelve weeks of life, the animal should be desensitized to a minimum of 12 different sounds, 12 different tools, 12 different surfaces, 12 different clothings worn by people, 12 very different "types" of people, 12 different eating bowls, 12 different toys, etc. Næss, personal conversation, 25.06.2013). To explain, it is crucial that the animal imprints on its

caretakers during its “critical period”, however, during the first twelve weeks of age, the animal needs to be introduced to as many different *strange* people as it allows without getting frightened. (The people could differ in age, gender, body size, clothing, hairstyle, etc.) (See Appendix 3) The main keyword for desensitization (and working with animals in general) is “gradually” – forceful and overwhelming approach may prompt the animal to panic or get aggressive, and may result in further fear of any new situation (Addams, Miller 2007: 57). Another aspect worth remembering is that socialization does not end after the first three months have passed. “The lessons of socialization will need occasional reinforcement during the juvenile period and afterward, or they can be forgotten in 6 months” (Beaver 1999: 140). The same rule applies to desensitization, which is an important part of socialization. To avoid another possible confusion, the author discriminates desensitization from habituation by the difference that while the latter is a passive way of losing fear and reducing flight distance, desensitization is actively conducted by the guidance of human caretakers.

Desensitization plays an important role in reconstructing the animal’s Umwelt in a favourable way for developing positive human significance. Desensitization is yet an example of changing the meaning-carrier’s occupation in the animal’s phenomenal world, without changing the structure of the meaning-carrier (Uexküll 1982: 70). Hence, it is one way to “change” the animals (instead of the environment) in order to adapt to life in captivity (see subchapter 1.3.1.). When the animal finally learns that different sounds, smells, materials and other such elements are not followed by negative experience, they might lose their quality of meaning-carrier “dangerous” and obtain that of “interesting/enriching”. Concurrently, it contributes to changing the “enemy” meaning-carrier of man to that of “partner” or at least to something neutral.

If desensitized experiences (for example, handling) could be further on associated with positive consequences, then it will not only improve animal welfare by providing sensory enrichment, and reducing the animal’s fear and aversion towards the experience (for example, handling); but it will also help to set up positive (or at least neutral) keeper-animal relationships (Hosey et al. 2009: 487). Consequently, the author finds it accurate to claim that desensitization is an important part of foundation (preparation) for animals’ interaction with visitors. As previously claimed, another important part of making interactions with humans (whether keepers or visitors) positively enriching for the animal includes some certain aspects that must be kept in mind when taking visitors in with animals.

The presence of the “puppy parent” or a familiar keeper could be considered the first rule of animal-visitor interactions. When the animals are still young, it is essential that “puppy parents” would offer their support as the animals experience new situations or meet new people (see Appendix 2). It is the “puppy parent’s” task to ensure the animal’s experience with visitors is positive (Addams, Miller 2007: 57). As the animal has reached maturity, the presence of the “puppy parent” could be replaced by that of an educated (socializationwise) person who has a secondary relationship with the animal. Experiences with the foxes suggest that this replacement itself, if carried out successfully, does not damage the significance of human interactions. Instead, other factors, described below, are more prevalent.

Tangen Animal Park followed the same recommended protocol for visitors as suggested by Wolf Park (Addams, Miller 2007: 81) with some additions of their own. Namely the visitors were asked not to wear any items that the foxes might desire (e.g. dangly jewellery, leather or fur, strong perfumes or heavily scented items). Grown-ups were asked to keep some space between each-other in order to provide foxes with sufficient room to move between people (and to anticipate the animal feeling trapped). The visitors were asked to move slowly and quietly, without following the foxes or otherwise restraining them (e.g. by trying to hold or pick them up), but letting the animals approach people on their own terms. Except for the keeper, everybody was suggested to mostly sit rather than stand as it has been proved to have a less intimidating effect on animals (Hosey et al. 2009: 477). The visitors were also asked not to feed the foxes unless instructed so by a keeper. In unpleasant situations (e.g. when the animal started chewing on clothing, fingers or hair), people were asked to ignore the fox, walk away, or wait for the keeper to resolve the situation. Additionally, the author found it useful to explain to the visitors some more common facts about animal communication (see subchapter 3.3.2.2.), in order to avoid people sending mixed (and potentially aversive) signals to the foxes.

As explained in the first chapter of the thesis (see subchapter 1.6.), the keeper needs to be constantly aware of the situations experienced by both animals and humans. It is necessary to anticipate any aversive contact by means of distraction²¹ or substitution²². If the situation is

²¹ Distraction – preventing behaviour before it happens by distracting the animal from undesired acts. An animal could be distracted by using something that would draw its attention, e.g. velcro, car keys, crinkle of plastic wrap, a cardboard box, movement in leaves, touching its leg or tail, waving with some object, etc. (Addams, Miller 2007: 76-77)

²² Substitution – offering the animal a better object to trade with or training the animal to perform an incompatible behaviour on demand. For example, when the animal has taken hold of a person’s glove, a keeper

of more serious kind and none of the previous methods seem to have an effect, the keeper could resolve the situation by using cut-off signals. According to Wolf Park experts, cut-off signals signify a disliked behaviour. When working with canines, a cut-off signal could consist of, for example, calmly saying the word “Mine” or intensively staring into the animal’s eyes while gently grasping the animal’s muzzle from above and pushing it (using little or no actual pressure) away off whatever object the fox is obsessed with. The cut-off signal itself is not “punishment” but a sign that indicates that a “punishment” is coming. The actual “punishment” would be the “time-out” (i.e. depriving the fox from enjoying human interaction for at least five minutes) that follows every cut-off signal and links that “punishment” with the undesirable behaviour. Introducing this cut-off signal to the animal at an early age, and using the signal persistently and consistently, usually results in the animal discontinuing the unapproved behaviour. (Addams, Miller 2007: 78-79) Though controlling the animal’s behaviour by using cut-off signals and “time-outs” is consistent with the principles of negative punishment (“non-reward”), it is still an aversive method. In order to not damage the keeper-animal relationship, it should later be made up by spending some good “quality-time” – in this way, positive experience with humans would remain prevalent.

By following the described precautions and options of solutions for communication problems, it is possible to solve critical situations without damaging the animal’s perception of humans, and yet maintain the experience of both the animal’s and visitors positive (or at least as positive as possible). From then on, it should not be difficult to enhance the experience of interaction. First of all, for socialized animals who have been properly desensitized against novel experiences, people are mostly interesting and appreciated visitors. People provide the socialized animals with many enriching sensations and wide opportunities to investigate the “novelties”. To make the significance of people even more positive and encourage the animal to approach people closer, the keeper may allow visitors to offer treats for the animal. This is an especially effective way of reducing the animal’s fear of humans when done during early puppyhood (by allowing people to bottle-feed the animals). However, the author must remind what was explained in the first chapter (see subchapter 1.5.2.) – when visitors offer treats to adult animals too frequently, there is a risk of people obtaining a meaning-carrier of “food” instead that of “partner”. This unfortunate case may result in

might offer the animal an attractive branch, ask it to run to a specific place to receive a treat, give it a cue to roll over and sit, or use another effective option. However, in order to avoid reinforcing the undesired behaviour, the animal should not be given treats as a trade item. (Addams, Miller 2007: 77)

obnoxious food begging behaviours that are unpleasant for people and do not allow the animals to benefit by the social enrichment.

A much more efficient way of treating the animal during visitor sessions is training. The author trained her foxes to lean on people (step on people's laps with their forelegs), to jump on people's shoulders or backs if given a cue²³, and to stay there to pose for a photo. This offers a positive experience of physical contact to both the animals and people. Keeper talks, direct contact with the animals, and emotions experienced during mutual play or perhaps even grooming, provide people with more efficient learning opportunities (Hosey et al. 2009: 468; Woollard 1999). Additionally, it tends to increase people's interest in nature and in protecting it, which is yet one of the goals of zoos. However, it must be emphasized that the animals should never be forced in physical contact. The animals do discriminate between people and feel more confident with some people than the others. Also, the animals themselves differ from each other in terms of confidence. For example, when Johnny mostly feels confident in physical contact with people (to the extent that he sometimes jumps on their shoulders without being given a cue), Franklin usually keeps the contact "discreet" by not getting further than leaning on people, whereas Tuli, if at all, only briefly sniffs unfamiliar people's hands (unless food is involved). In order to not damage socialization, the animal should always be allowed to approach people on its own terms. Training with visitors should be conducted only when the animal exhibits evident confidence and eagerness to cooperate. When working on animals' terms, interaction with visitors may be enriching and therefore contribute to improving animal welfare by changing people's significance in the animal's Umwelt more positive, and enabling diverse behavioural display.

²³ In this thesis, the concept 'cue' is predominantly used accordingly to the tradition of animal training and learning psychology, representing "a signal which will elicit a specific behaviour or reflex as a result of learned association" (Ramirez 1999: 538).

3.3.2.2. The main principles of establishing efficient human-animal communication in the process of socialization

It has been claimed that the success of management methods in socialization depends on the efficiency of human-animal communication. Hand-raising, visitor interactions, training and enrichment can only result in changes of the animal's Umwelt when it is based on positive interactions and partnership. The latter depend essentially on efficient human-animal communication: in learning each other's codes, rationality and communicational abilities (see subchapter 1.6.). In other words, the partner (consciously, the human) must take into consideration the characteristics of the communication channel and code the sender uses (and whether they are possible for the receiver to perceive at all). Additionally, it is important to understand the animal's (and human's) personal traits and previous experience of interactions or other related situations. And finally, it is crucial to realize that the general communication context plays an important role in the messages transmitted and meanings of signs conveyed.

To illustrate the gravity of these theoretic aspects, it must first be explained that animals are generally more skilled observers and accurate interpreters of signs than humans (Sebeok 2001b: 23). "The animal can learn more about man from his expression than man about the animal, provided the higher animals and man without any special equipment are concerned" (Hediger 1968: 153). Animals are more accurate interpreters predominantly for their ability to perceive a wider range of signs through most of the communication channels (Sebeok 2001b: 24).

For example, when it comes to foxes, the olfactory channel plays a much more important role in their everyday communication than it does in humans. Though foxes don't seem to use their sense of smell for hunting as much as they use their acute sense of hearing, they do rely on their nose for finding caches, carcasses and fruits (Burrows 1968: 55, 58). Even more, their olfactory communication is enhanced by intensive usage of endocrine glands²⁴. Namely, foxes have scent glands on their tail, near their anus, and between their toes, and the pungent odor is also present in their urine (Addams, Miller 2007: 5). Foxes use

²⁴ "Endocrine glands secrete chemical messengers, or hormones, into the circulatory system in response to various internal and external stimuli. Together, the rapid responses of the nervous system and the more sustained influences of hormones complement one another in controlling the animal's actions" (Barnard 2004: 144).

these chemical messages for marking their territories and resources, for attracting mates, and as warning signals for avoiding conflicts with other foxes or animals (even with humans). In order to avoid conflicts in human-animal interactions, it is essential (among other signs and factors) to pay attention to the foxes' pheromone-based messages, especially when they are responses to human stimuli.

Similarly to humans, auditory is one of the most important channels in fox communication. Not only are foxes credited for their extremely wide range of vocal calls – to the extent that one can say “foxes do everything but howl and meow” (Addams, Miller 2007: 7) – they are also able to hear sounds outside the frequency range detected by human ear (Burrows 1968: 56, 84). Even more, within the visual channel, foxes rely extensively on body language (including a wide variety of facial expressions and body postures) (Addams, Miller 2007: 7). It is important to be constantly aware of human body language and its potential significance according to the communication codes of foxes. For example, holding a direct eye contact might be considered aggressive, fast movements, high body postures (e.g. standing up) and wide body movements (e.g. waving hands) can be perceived threatening by the foxes. However, the author does not believe that the significance of revealing one's teeth (e.g. smiling in humans) is essentially threatening. *Vice versa*, foxes do not seem to be much affected by people smiling. It might be related to the fact that, at least in canine communication, the exposure of teeth has different significances depending on context. For example, foxes pull back their lips and expose their teeth during greeting behaviour or in other cases of excitement. Perhaps it is also interesting to know that some authors believe that fox's tail movements are not as significant as in dogs, wolves or other canids (Burrows 1968: 93). However, the author's observations suggest that tail-rising in foxes could be associated to aggression, and tail-wagging is present in greeting behaviour as well as excitement in general.

When it comes to physical contact, humans must keep in mind that foxes are extremely sensitive to touch. They depend to great extent on the tactile channel when gathering information about the surrounding environment. For example, foxes have long catlike whiskers – extra sense organs that they use to assess the proximity and potential meaning-carriers of the environmental elements. (Whiskers are an especially useful aid in the dark (Burrows 1968: 64).) Therefore, it should not be surprising that people have to be very careful about where and how to touch a fox. The foxes the author worked with usually enjoyed getting scratched under their chin or, on more rare occasions, on the side of their muzzle. Scratching the back, on the other hand, was accepted only if received by the “puppy

parents”. Attempts to touch a fox’s tail or paws succeeded only a few times when the foxes were so relaxed that they seemed to be sleeping. (The situation was, of course, different during puppyhood, when the animals had not yet developed their full fear response to human touch.)

Exceptionally, some of the handling methods used in socialization do vaguely resemble the animals’ conspecific codes – e.g. the cut-off signals that are similar to the ones exhibited by another animal if it wants to express that further interaction is not desired (Addams, Miller 2007: 79, 87; Handelsman 2008: 69). However, it is of utmost importance to understand that being aware of the species-specific communicational aspects does not mean that people should try to “speak the animal’s language”, i.e. communicate prevailingly by codes similar to codes in animal’s intraspecific communication. Humans are not able to produce all the species-specific signs used by the animals, and trying to imitate them could result in confusion and frustration for both communication partners. Such inefficient communication would most probably damage the human-animal relationship rather than benefit it.

For example, when foxes try to avoid fighting, they threaten each other with various warning signals (both consciously and subconsciously transmittable): lateral display²⁵, facial expressions, vocalizations, piloerection²⁶, pheromone signals, erected whiskers, etc. (Addams, Miller 2007: 8, 85). Humans are not competent enough (if capable at all) in communicating with such signals through such channels. In this example, the human’s attempt to dominate the fox and, by doing so, avoid fighting, would instead increase the animal’s fear of humans and potentially result in an actual attack by the animal (Addams, Miller 2007: 87). In that case, the human-animal relationship (as well as the whole socialization process) would be severely damaged.

The author therefore suggests that knowledge about the animal’s aforementioned species-specific communicational aspects should predominantly be applied for appropriate

²⁵ Lateral display – a behaviour when the fox “walks side-on to their intended targets, displaying their largest dimension, with their back and tail arched, [...] legs extended, [...] ears held parallel to the ground, [...] and their fur piloerected” (Addams, Miller 2007: 8).

²⁶ Piloerection – “the raising of fur by muscles attached to the hair root, most often seen in the back of the neck, the shoulders, down the back and occasionally on the tail. This raised line of hair is commonly called the “hackles”. An autonomic reaction, and therefore a good indicator of an animal’s mood, as the animal cannot consciously control whether its hackles are up or down” (Addams, Miller 2007: xi)

interpretation of the animal's signs, not for producing the signs. As a matter of fact, human-animal communication (as well as the translation between Umwelten) could, first and foremost, be seen occurring on the level of a whole "text" (perhaps, in this case, behaviour), not the level of single signs (Kull, Torop 2003: 416). However, being familiar with the main principles of animal codes is also essential for being able to adjust one's behaviour as to prevent sending possible threatening signals to the animal (e.g. coughing or sneezing towards the animal, clapping near its ears, etc.). Once again, it is the goal of hand-raising and "growing up together" to enable the animal to learn to interpret human signs, i.e. learn human codes and rationality. As explained in the first chapter (see subchapter 1.6.), it is rather a cohabituation to each other's communication methods that makes it efficient.

The latter argument suggests that the process of animals learning human communication codes is also present in socialization. Besides concurrently occurring during hand-raising and frequent interactions, human codes are also taught to the animal by means of desensitization (at least in the socialization context). For instance, the foxes were desensitized to loud speaking, laughing, singing and whispering, and so learned to accept these behaviours as natural and non-threatening part of human communication. This kind of learning by the aid of desensitization does not only apply for the auditory communication, but could be used for signs conveyed through any human channels.

Even when all the previously explained communicational aspects are successfully taken into consideration, there are elements that can not be entirely controlled but yet have a considerable influence on human-animal communication. This mainly concerns the elements of context, including environmental noise, the animal's previous experience, and the circumstances of situation. The human should be aware that there exist context-specific signs – which indicate that other signs do not mean what they usually mean – as well as there exist context-specific behaviours. Both are part of metacommunication, i.e. the communication about communication. (Barnard 2004: 538; Bateson 1987: 24-30; Haraway 2008: 239) A common example about the presence of metacommunication is that of play behaviour or ritualized aggression. Perhaps an even more relevant example could be that of the author's experiences with foxes. Namely, during some time of the fox's puppyhood, the foxes were daily transported between the outdoor and indoor enclosure. Once there occurred an incident where, due to unfortunate circumstances, Tuli was chased and caught for transportation. Ever since, Tuli started to avoid humans (especially reaching hands) whenever she suspected possible transportation. However, Tuli was mostly fearful of reaching hands when other

contextual elements were concurrently occurring, such as the time of dusk, the presence of transport cages, sound of a car engine, and many indicative signs of human behaviour. None of the elements alone provoked the vixen's fear.

Previous example supports the argument, presented in the first chapter of this thesis, that context does not consist only of situational elements, but situation is rather a part of context (Bouissac 2010: 45). Apart from actually transmitted signs and the current situation, context involves factors such as previous experience; exterior noise; seasonal, ecological and life history factors; the presence of strangers; etc (Barnard 2004: 165; Hediger 1968: 3; Hosey et al. 2009: 476). Whereas, it is necessary to acknowledge, when working with animals, that context is perceived as highly subjective – the illusion as if the context would be totally shared between a human and animal is the cause of the most serious accidents where an animal attacks a human (Bouissac 2010: 53). It is not therefore difficult to understand that the human caretaker should always keep in mind the effects of unfamiliar visitors, environmental elements, time of day, current condition (and “mood”) of the animal, as well as many other contextual factors that influence human-animal communication.

Conclusively and inductively – if the abovementioned aspects are acknowledged, efficient human-animal communication is possible. Efficient human-animal communication enables the proper management methods (described in subchapter 3.3.2.1.) to keep human-animal interactions enriching for both animals and people. These positive human-animal interactions offer opportunities for partnership-based primary and secondary relationships and general positive or neutral significance of people. Thereafter, the reconstruction of the animal's Umwelt – and the process of socialization – has succeeded.

4. DISCUSSION: SOCIALIZATION IN THE CONTEXT OF HUMAN-ANIMAL RELATIONSHIPS AND ANIMAL WELFARE PROGRAMMES

In the following chapter, the author will combine the theoretical analysis (offered in the first chapter) with the results of practice (introduced in the third chapter). The goal of this synthesis is to approve or disapprove the hypotheses suggested in the introduction of the thesis. Additional goal is to summarize (repetitively where necessary) *the main aspects* of different human-animal relationship categories and socialization theory that were discussed in the previous chapters of the thesis. By this summary, the author intends to offer a more clear terminological field for such a complicated and ambivalently interpreted study as that of human-animal relationships. The offered terminological differentiation will be the author's interpretation of the concepts in question (i.e. habituation, imprinting, taming, and socialization) – further scientific dialogue on this topic would be both necessary and appreciated. In the second part of the chapter, the process of socialization and its potential will be analyzed in the context of animal welfare programmes. As a result, a transdisciplinary theory of socialization as one possible category of human-animal relationships and an essential part of animal welfare programme will be suggested.

Before proceeding, the three hypothesis proposed in the introduction should be reminded:

- The processes of habituation, taming, imprinting and socialization have considerable differences in the effects on human-animal relationships, and man's position in the phenomenal fields of animal's Umwelt.
- Different ways of establishing human-animal relationships have either a contributive or contradictory effect on animal welfare in captivity. Whereas none of them should be developed with animals living in the wild.
- Socialization, enrichment, training, improvement of zookeeping routines, and other such programmes contribute to animal welfare, while each of their success is positively correlated with the success of the other programmes.

4.1. Different categories of human-animal relationships in captivity: a transdisciplinary field of terminology

Herein it will be explained that habituating, taming, imprinting, socializing, and even domesticating are not different levels of socialization but vary greatly in terms of human-animal relationships. Some methods of these processes may be mutually contributive and inclusive, while the other methods are contradictory and exclusive. In all these phenomena, man has different significance in the animal's Umwelt. Therefore, semiotic approach is essential for telling these processes apart and understanding their variability in the effects on animal welfare. The following analysis is based on both theoretical literature and practice of different authors, however, due to the ambivalence and obscurity in literature, practice is perhaps prevalent.

Beforehand, it must be explained that unlike in some other scientific studies, in this thesis, hand-raising and training are not viewed as human-animal relationships but rather as methods of management. However, the methods of hand-raising and training play a significant role in the *development* of human-animal relationships.

When it comes to habituation and its position in the field of human-animal relationships, it must be made clear that habituation is actually the absence of relationship, i.e. the absence of history of interactions between a man and animal that would lead to a greater predictability of each other's behaviour (see subchapter 1.5.2.). Habituation might be confused with the concept desensitization, but it is necessary to understand that desensitization is a conscious and purposeful way of reducing the animal's fear (and therefore flight distance) of a novel experience. Habituation, on the other hand, is a phenomena that happens even without the conscious interference of humans, as it is simply "the loss of an animal's fear response to people [*or an environmental object*] arising from frequent non-consequential encounters" (Smith, Stahler 2003: 5). Therefore, habituation could occur even with the animals living in the wild (who share their habitat with humans). However, it is not a favourable phenomenon neither for the animals nor humans, because it increases the risk of conflicts between the two. Explanation will be offered subsequently.

Habituation does not involve any kind of relationship between a man and animal nor has the 'enemy' meaning-carrier of man changed into that of 'partner' in the animal's Umwelt. Habituation simply results in man's *neutral significance* for the animal. A socialized

captive animal who has positive relationships with certain people and who might be enriched by visitors who come in the enclosure, could, at the same time, be habituated to the general public outside of the enclosure. This habituation – the public's neutral significance for the animal – would then be the result of non-consequential exposure. At this point, one might be wondering about the reasons that habituation is not sufficient for zoo animal welfare and socialization is necessary at all. As Runar Næss explains, the answer lies in the fact that habituation requires non-consequential (i.e. non-changing) encounters. Once an encounter with people has a negative consequence for the animal (which could easily happen in the dynamic zoo environment), the animal will either get stressed or exhibit aggression towards people (the latter could often result in an attack).

This is the reason why [*absolutely unsocialized but only*] habituated animals are the most dangerous animals to go in with – since they have a shorter flight distance from humans than wild animals do, they are more prompt to attack should they not approve your behaviour. What makes the situation even worse, is that since there is no social relationship involved, there will be no social communication – the animal will either flee or attack immediately. A tame animal, who has a negative relationship with people, would at least give warning signals first. (Næss, personal conversation, 14.05.2014).

When it comes to the categories of human-animal *relationships*; taming, imprinting, socializing, and domesticating could be compared as the main different relationship-establishing processes, whereas only the first three are relevant in working with permanent zoo residents. The main aspects of each of these processes are following.

Taming means the intentional reduction of animal's flight distance from humans to zero. Whereas it does not, *per se*, determine the methods of reducing the flight distance or the essence of human-animal relationship. Taming could be done to an animal at any age. Additionally, it could be accomplished by using aversive methods, such as positive punishment and negative reinforcement, or interactions and communication methods built on the dominance theory. This type of taming would result in a negative (often fear-based) human-animal relationship and *not* in the change of the meaning-carrier of humans in the animal's Umwelt. In this case, taming would have an unfavourable effect on both animal welfare and the process of socialization.

On the other hand, taming an animal by positive interactions (such as social play, social grooming, positive reinforcement training, etc.) can produce positive human-animal relationships and result in positive changes of the *significance* of humans in the animal's Umwelt. Hence, taming via positive methods is always an essential part of socialization.

However, taming alone does not produce the strong social bond of imprinting – an animal, who is tamed after its “critical period” has passed and therefore does not have any primary relationships with people, will never have as strong positive relationship with humans as a properly imprinted socialized animal. Therefore, achieving a firm change of the position of humans in the phenomenal fields of the animal’s Umwelt (from the ‘enemy’ field to that of ‘partner’) is hardly probable with a merely tamed animal. Although positive ways of taming have an increasing effect on animal welfare and simplify animal management, a tame animal will never feel as comfortable in human surroundings as a fully socialized animal. It is also important to understand that taming must be repeated on the animal’s offspring (Addams, Miller 2007: 70) and is therefore not genetically inheritable.

Imprinting is the phenomena occurring in the “critical period” of the animal’s life, when the newborn animal develops a primary bond with the objects it comes in contact with, whether these are the animal’s mother, siblings, another animal (might also be from another species), a human or even a lifeless object. Imprinting is a process “in which young animals learn about their species identity, sex identity, or relatedness to other individuals” (Hosey et al. 2009: 79-80). One way to understand imprinting is to divide it into two sub-elements: sexual imprinting (determining the animal’s species and sex identity, i.e. “family members”) and social imprinting (determining the members of its social group, i.e. “friends”).

Animals are prone to imprint with their conspecifics, especially with their mother or anything that most reminds of their mother. In order to develop an imprinted bond between a human and an animal, it is necessary to remove an animal from its mother and hand-raise it. However, sexual imprinting on humans should be avoided for many reasons. First, it reduces the animal’s sexual interest in conspecifics and makes it seek for a potential breeding mate from the human species instead – in the animal’s Umwelt, human would have a meaning-carrier of a *sexual* partner. Second, the animal will be addressing all his behaviours towards humans, which means that humans may become the objects of even mating and rivalry – these could be dangerous for both animals and humans, especially when considering the humans’ inefficient skills for such “intraspecific” type of communication with the animal (mainly due to the lack of overlapping channel- and code-using abilities). Third, animals who do not relate properly to conspecifics are not exhibiting natural species-specific behaviours and are not therefore suitable for educational display. Even more, inability to exhibit natural behaviours, satisfy (sexual) drives and communicate efficiently may cause frustration, increase stress, and reduce animal welfare. For these reasons, the author finds it difficult to agree with those

scientists' who claim that the increased interest in people and the reduced stress in crowd situations exhibited by a single-raised (i.e. sexually human-imprinted) animal would even out the drawbacks (e.g. occasional misdirected courtship behaviour, frustration caused by unsatisfied social needs, etc.) on animal welfare (Addams, Miller 2007: 23).

In the process of socialization, sexual human-imprinting is avoided by raising multiple baby animals together or by offering the occasional company of an adult conspecifics (in a more unfortunate case, that of another animal species). In the majority of cases, the animals will be sexually imprinted on conspecifics (or at least other animals) and will be able to adequately relate to them. Humans are imprinted on socially, enabling the animals to consider these certain people as innate members of their social groups, yet differentiating people from their own species. That means the humans obtain a meaning-carrier of a *social* partner in the animal's Umwelt. As practical experiences have proved, this will result in remarkably diverse behavioural display, offering many opportunities for behavioural research as well as human-animal interactions (especially if relevant interspecific communication skills, including codes and rationality, are being learned during the concurrently conducted hand-raising). Imprinting enables the development of a primary human-animal relationship. If followed by favourable taming, management and interaction methods, a strong trust-based and positive human-animal partnership will develop. The process of imprinting provides the necessary strong foundation for changing man's position in the phenomenal fields of the animal's Umwelt. It will be much easier and more likely to positively change the significance of people in general, if the animal has primary relationships (the more the better) with some of the members of human species. Imprinting is not genetically inheritable and must be repeated on the animal's offspring (Addams, Miller 2007: 70).

Socialization is the process of reducing the animal's fear of humans as much as possible by reducing the flight distance from humans to zero and by establishing positive partnership-based human-animal relationships. One could consider the intentional goal of socialization as changing the meaning-carrier of man from the phenomenal field of enemy to that of (*social*) partner in order to increase animal welfare in captivity. An animal could be socialized with one human caretaker, with multiple people or all zoo staff, and with the general public, whereas the latter is the most favourable for animal welfare, since it changes the significance of people in general (i.e. even that of unfamiliar people) more positive. The properly socialized animal's relationships with humans – both primary (i.e. imprinted) and secondary (i.e. developed after the animal's "critical period" has passed) are positive, and based on

mutual trust, partnership and efficient communication, not dominance and fear. However, the significance of unfamiliar people could vary from neutral to positive, depending on the level (or success) of socialization. The more positive the significance of unfamiliar people, the more relaxed and comfortable the animal feels in the zoo environment.

Successful socialization needs to start before the animal begins exhibiting fear response, and requires a human-animal bond as strong as that of imprinting. For this reason, socialization has to start during the animal's "critical period" and involve social imprinting on humans. Since it is much easier to bond with the animal if the mother is not present, socialization requires hand-raising. Hand-raising is also necessary for learning each other's codes and rationality that would enable efficient communication and, therefore, positive human-animal interactions and (primary and secondary) relationships. Concurrently, the animal imprints sexually on conspecific littermates (or other animals who it is raised together with) and therefore possesses the requisite species-specific communication skills. One could also claim that since the reduction of animal's flight distance from humans to zero is relevant, taming in positive methods is essentially present in socialization. (However, the argument can not be turned around as any kind of taming does not essentially include socialization.)

Even though the primary relationships have to be developed during the "critical period", also, during that period it is easier to desensitize animal to all possibly stressful and frightening aspects of zoo life, it is important to note that socialization has to be continued during the animal's whole lifetime. Namely, socializing animals to general public (or to zoo staff) requires contributive management methods, development of secondary relationships, and continuous positive human-animal interactions with both familiar and unfamiliar people even in the animal's adulthood²⁷. Only then it is possible to produce an animal who does not suffer from fear of humans and "feels free to exhibit its full range of behaviour in human presence" (Addams, Miller 2007: 10). Unlike some other scientists (Addams, Miller 2007: 10), the author would like to emphasize (even more explicitly) that a successful socialization produces an animal who is able to tell the difference between human species and its own. The

²⁷ "Many people confuse socialization with socializing" (Handelman 2008: 243). In that sense, socializing would not be a process but an event, during which the animal is spending time with others (whether the others include people, conspecifics, or other animal species). In the context of socialization, this kind of event is merely an interaction, and does not have any more influence on animal welfare or the significance of humans. "Maintaining a dog's [*or wild captive animal's*] socialization is a lifelong process" (Handelman 2008: 243). This contextual differentiation is evident throughout the thesis, although the verb-form ("socializing") of the word socialization is not entirely avoided.

results of the case-study strongly approve that humans will be considered as social partners in the animal's Umwelt, not as conspecifics – this leads to the development of different (appropriate and not dominance-inclusive) communication and behaviour towards people and conspecifics. This claim is supported by the behaviour of the foxes socialized during this research.

Another argument that was approved during the case-study is the fact that socialization is not genetically inheritable and has to be repeated on the animal's offspring (Addams, Miller 2007: 71). Namely, during the period from September 25, 2013 to January 31, 2014, the author was living in Estonia and the animal park (that was closed during the off-season) was heavily understaffed. This led to unavoidable changes in priorities, including the decrease of human visits in the fox enclosure. As a consequence of the lack of human-animal interactions, the foxes became increasingly fearful of humans. This fear resulted in prevailing hiding and avoidance behaviour when encountering people, proving that a socialized animal can easily drift back to their "wild state" (i.e. high fearfulness of people and discomfort in the zoo environment). The fact that a socialized animal can easily fall back from its socialized state indicates that socialization itself does not lead to permanent genetic changes. Fortunately, once (socially) human-imprinted and socialized animals are relatively easy to rehabilitate to their socialized state. By virtue of gradual increasing of positive interactions (including positive reinforcement training) that soon evolved into daily social time, the foxes eventually lost their fear and began enjoying human company again. By March 18, the foxes' confidence in the presence of unfamiliar people was boosted to the level of voluntary physical contact. Additionally, this experience illustrates the importance of proceeding with socialization during the animal's whole lifetime.

When talking about socialization in the context of human-animal relationships, it is relevant to explain its difference from domestication. Domestication is the selective breeding over the animals' generations aimed to produce offspring which are *genetically* more adjusted to living with humans (Addams, Miller 2007: 71; Barnard 2004: 265). Socialization as well as taming may result in domestication if, and only if, selective breeding is processed. Socialization or taming alone *do not* influence the animal's genetics and *do not* produce domestication. Neither does the sexual variation of human-imprinting result in domestication – such an animal usually will not even reproduce due to its lack of sexual interest in conspecifics. If the processes of socialization or taming are aborted, the animal "will turn wild and the one trained eventually [will] forget its accomplishments" (Hediger 1950: 156). The

fact that the foxes socialized in this case-study originated from a fur farm (that may or may not have selectively bred the animals) could arise confusion. However, it is important to know that the socialization process of zoo animals itself does not (and will not) encompass selective breeding.

It can not be emphasized enough that none of the methods of increasing zoo animal welfare, suggested in this thesis, involves selective breeding and, therefore, none of them leads to the domestication of animals. A tame or socialized (even a habituated) animal is genetically still a wild animal and, under certain circumstances, can have a full wild behavioural repertoire. “Being ignorant about this aspect and expecting a wild animal to act like a domesticated animal, may result in accidents causing bodily harm or even death” (Næss, personal conversation, 14.05.2014). Domestication results in the birth of a new subspecies (Hediger 1950: 155), which has its own (usually man-influenced) behavioural repertoire, including “behavioural paedomorphosis, [...] perpetuation of infantile behaviour patterns into adulthood, and the [inbuilt] absence of fear of strangers” (Handelman 2008: 266). Socialization, taming or imprinting (without selective breeding) occur only on the level of individual. Additionally, it seems to the author that contradictory to animals living in the wild, domesticated animals are prone to view humans as partners not enemies, whereas there are studies that suggest the efficient communication skills of domesticated animals (for interpreting human signs) are the result of convergent evolution (Hare, Tomasello 2005; Miklósi et al. 2003). However, individual man’s significance in a domesticated animal’s Umwelt could change according to the animal’s experiences with people during its lifetime.

At this point, it is explicit that neither flight distance from humans, fearfulness of humans, nor applied management methods are sufficient to adequately explain the difference between habituated, tamed, human-imprinted or socialized wild captive animals. Instead, it is the essence (or absence) of human-animal relationships and the signification of man in the animal’s Umwelt that have to be included into consideration in order to clarify this question. Therefore, the author suggests the following transdisciplinary terminology (that relies deeply on a semiotic approach) for working with *wild captive* animals. (Domestication is, hence, excluded from this terminology, especially since none of the following processes lead to it.)

- Habituation – the passive (i.e. non-intentional) reduction of an animal’s fear of people or an environmental object resulting from persistent non-consequential encounters. Habituation reduces the animal’s flight distance, but it does not determine to what

extent the flight distance is reduced. The neutral significance of humans depends on maintaining the non-consequential effect of human presence. Between a man and habituated animal, there is no such relationship that would enable predictability in communication or change of man's meaning-carrier in the animal's Umwelt.

- Taming – the active (i.e. intentionally conducted by humans) reduction of animal's flight distance from humans to zero. Taming itself does not determine the methods of management, and therefore the animal's fearfulness of humans, or whether the human-animal relationship is positive or negative. Accordingly, taming influences but does not determine the significance of man in the animal's Umwelt or the welfare of a captive animal.
- Imprinting – the process of bonding and, consequently, of learning about one's species identity and relatedness to other individuals, occurring during the “critical period” of the animal's life. It includes sexual imprinting (determining the species identity) and social imprinting (determining the social group members). Imprinting, by default, produces a strong positive bond.
- Socialization – the lifelong process of making the animal feel more comfortable living in captivity by establishing strong human-animal relationship(s) based on social partnership. Socialization has the most favourable effect on the animal's welfare if the animal is generally socialized so that the process includes reducing the animal's fear of unfamiliar people. Socialization involves social imprinting on humans, hand-raising and taming through positive interactions. As a result of general socialization, reconstruction of the animal's Umwelt is accomplished: the man's meaning-carrier of “enemy” changes into meaning-carrier of “partner”, whereas the significance of individual people could vary from negative to positive.

4.2. Socialization as a contributing component of an animal welfare programme

In this subchapter the validity of the third hypothesis proposed in the introduction will be discussed. Socialization will be analysed in the context of other animal welfare programmes,

and its contribution to improving animal welfare will be discussed. Additionally, the secondary benefits of socialization – the benefits for *humans* – will be introduced.

4.2.1. The benefits of socialization on animal welfare

Both the theoretical and practical analyses support the fact that socialization is one of the possible modern animal welfare programmes, whereas all these programmes mutually depend on and contribute to each other. For example, it has been claimed that positive reinforcement training improves human-animal relationships and therefore strengthens the process of socialization. At the same time, it depends on socialization, since efficient human-animal communication (including shared codes and reality) are required for cooperative and successful training. Proper socialization enables human-animal interactions to be a positive experience for the animal and opens opportunities for cognitive (e.g. training) and social enrichment (e.g. visitor interactions). Methods of enrichment (including desensitization, training and social enrichment) are an essential part of socialization process. Additionally, a socialized animal is more eager to participate in any kind of enrichment due to its reduced fear of people (and novel objects related to humans). Therefore, socialization contributes to the beneficial effects of enrichment (including training), including improvement of learning and memory abilities, enhancement of physical condition, reducing neophobia, accelerating the animal's recovery from different traumas, easing stress, and enabling the animal to exhibit a wide diversity of behavioural display.

Even more, socialization increases the possibility of positive interactions with people (especially with keepers). This would contribute to the success of zookeeping methods, such as patting, stroking, talking to animals, etc. Socialization offers knowledge about the individual animal and its species-specific communication aspects, which enable the keeper to adjust his/her behaviour, handling and working methods according to what the animal perceives as least stressful or aversive. And *vice versa*, these methods of positive interaction are themselves crucial components for establishing positive human-animal relationships. Together, socialization and parallel keeper-animal interaction methods reduce the animal's

fear of people, and increase the affinity to keepers as well as sociability or curiosity towards incoming visitors (or even people in general).

One could say socialization makes handling methods less stressful for the animal and easier for keepers. This is owing to the strong trust-based keeper-animal relationships. Also, a socialized animal is more willing to cooperate with humans. For example, “socialized foxes can usually be picked up by a familiar handler and held for minor procedures like nail-clipping or vaccinations” (Addams, Miller 2007: 43). Even though the author’s foxes did not tolerate being picked up, they were willing to cooperate in many other handling procedures. First of all, basic veterinary observations did not require catching of the animals – instead, the animals were willing to come investigate the veterinarians as they were curious about the doctors. Secondly, people with strong positive relationships with the foxes were allowed to perform unpleasant routine procedures, such as cleaning an inflammatory eye or applying antibacterial medicine on a wound. Offering a reward for such voluntary cooperation made these procedures significantly easier and enabled it to become a positive experience for the animal. No stressful or traumatizing methods, such as tranquilizing, catching, restraining the animal, or any other way of forcing the animal to cooperate were necessary. This fact reduced the negative effect of such handling routines on animal welfare to a minimum.

Socialization is contributive also when one considers the behaviours in wild animals as a template for good welfare. Positive human-animal relationships, and neutral or positive significance of visitors, releases the animal from the stress deriving from fear of people. Positive human-animal relationships are known to decrease aggression, dangerous sexual over-activity, anti-social behaviours in general, stereotypies, and attempts to escape (Addams, Miller 2007: 22; Hediger 1950: 53; Hosey et al. 2009: 117). Instead, a wide diversity of intraspecific and interspecific affiliative social behaviour arise. For instance, foxes (similarly to any other animals) have various inbuilt devices for avoiding enemies: these include mainly running away from humans (even from a human baby), hiding, and shamming sleep or death (Addams, Miller 2007: 10; Burrows 1968: 58). For this reason, unsocialized foxes living in captivity are usually either hiding, exhibiting stereotypical behaviour, or are generally inactive. A socialized fox does not perceive humans as enemies owing to the reconstruction of the animal’s Umwelt. Naturally active as foxes are, a socialized fox is instead “out and about displaying its full range of behaviours” (Addams, Miller 2007: 22). Not only is this fox unbothered by being observed by people, it might even be interested in closer investigation through the fence. Additionally, although depending on the individual, a socialized fox

usually enjoys being groomed and petted by incoming visitors, offering an opportunity not only to see the animal, but also to engage in physical contact.

The practice [*of socialization*] fosters a bond between the animals and their human keepers. This can make the difference between having a frightened animal performing stress-related stereotypical behaviours as it avoids its human keepers and a relaxed, happy animal displaying its full range of behaviour in harmony with its man-made world. (Addams, Miller 2007: 69)

Such freedom to exhibit behaviours is crucial for good animal welfare, especially when considering the fact that inability to perform the behaviour that the animal is highly motivated to (whether it is caused by approach-avoidance conflict or any other constraint) induces frustration. If an animal is frustrated over a long period, it will have adverse effects on the animal's welfare (Hosey et al. 2009: 85). Taking all benefits into consideration, one could admit that socializing wild captive animals to humans has direct and influential benefits for all aspects of animal welfare, including the aspects considering animal's mind, body, nature, needs and abilities. This view is also supported by the elevating effect of positive human-animal relationships on reproduction rates (Hosey et al. 2009: 232).

Perhaps the only aspect of socialization that has an adverse effect on animal welfare is removing baby animals away from their mother. During this thesis, it has been made clear that the physical and psychological needs of baby animals are covered by foster parents, whereas the advantages of being socialized by far outweigh the disadvantages of being removed from the biological mother. However, one could question the ethics of socialization when it comes to the welfare of the biological mother. There are some ways to justify socialization from this perspective. To begin with, in the zoo, an unsocialized animal who is suffering from fear of people, often exhibits over-exaggerated care of its young, that may sometimes be fatal for the offspring. For example, predatory animals might be found occupied with continuous and unsuccessful attempts to hide their offspring from people, often to the extent of hurting or killing their young. This phenomena could also be described as partial hypertrophy of the maternal instinct. (Hediger 1968: 90; Næss, personal conversation, 25.06.2013).

Such a phenomena is yet another reason why reducing the zoo animals' fear of humans is important, whether it is done by taming or socialization. However, it has been explained beforehand that a merely tame animal will never feel as comfortable in captivity and as free to display its full range of behaviours in the presence of people as a socialized animal would. In the opinion of the author, the lifelong advantages of socialization outweigh

the temporary negative effects on the mother animal's welfare after its offspring have been moved from her. In fact, practical experiences reveal that mother animals turn back to their normal behaviour in the matter of days (or up to a week) (Næss, personal conversation, 25.06.2013), giving a ground to assume that the wide-spread negative connotations associated with the separation of a mother and its newborn, are often anthropomorphic. However, the situation would be different with the animals whose species is known for their extraordinarily strong mother-offspring bond (e.g. elephants and giraffes). In that case, the human caretakers should seriously consider socializing the young animal in the presence of its mother (even though creating a strong human-animal relationship would be very difficult). This is yet another example of how species-specific characteristics determine the methods of socialization.

4.2.2. The secondary benefits of socializing zoo animals

Above, it was briefly mentioned that not only could human-animal interactions with socialized animals be enriching for the animals, but also for people, who can enjoy mutual social play, grooming, petting, and other kind of physical contact with the animals (see subchapter 3.3.2.1.; 4.1.). According to the author's experience, keeper talks generated far more questions from the public when the public was actively in contact with the foxes rather than observing behind the fence. This enables us to safely assume that human-animal interactions enhance people's interest in learning about animals. Keeper talks and demonstrations, voluntary training and other activities possible with socialized animals, increased activity level of the animals themselves, and other benefits of socialization have proved to be effective ways of active formal learning for the visitors (Hosey et al. 2009: 468; Woollard 1999) (see subchapter 3.3.2.1.). Even more, socialization offers generous research opportunities in many fields, including animal behaviour, human-animal communication, and human-animal relationships.

It is a common knowledge that many (one might also say the majority of) zoos aim to reach the highest possible number of visitors for financial reasons. The number of zoo visitors is directly related to the visitor's experience in the zoo. Studies have shown that visitor's

experience depends, among other things, on the visibility of animals, the activity of exhibits and involvement of the public. For example, active animals, training sessions and keeper talks have proved to increase the visitors' attendance time at exhibits, compared to that of passive observing. (Hosey et al. 2009: 465) Socialization is therefore known for improving visitors' experience and could potentially result in the increased income of the zoo. Nevertheless, it must be made clear that the priority of socialization is improving animal welfare. If by these means larger crowds of people are attracted, then that is simply a doubly beneficial accompaniment and hopefully could be used to improve animal welfare and the zoo's educational devices even further. Also, this could compensate the problem of extra expenses (on qualified staff, facilities and equipment) that the socialization project requires and which is an excuse for many zoos to exclude socialization from their animal welfare programmes.

In conclusion, the author would say that socialization helps to achieve all the main purposes of the zoo: animal welfare, education, research and, indirectly, even conservation if experiences with socialized animals increase people's interest in nature and wildlife conservation.

SUMMARY

This thesis offers a synthesis of interdisciplinary theoretical analysis and conducted practical research in order to comprehend the concept of socialization of wild captive animals with humans. In the research, the need for socialization, the practical methods of socialization, its main goals, and its benefits for the welfare of captive animals (who are not candidates for release) are explained. However, the theoretical analysis of human-animal relationships reveals the fact that no unequivocal and commonly agreed upon conceptualization exists in scientific literature (and perhaps even among practitioners), when it comes to different categories of human-animal relationships and interactions, as well as their effects on animal welfare. For this reason, the author's decision to obtain her own immediate practical experience in socialization, and to consult with already experienced practitioners, turned out to be a remarkably valuable and irreplaceable method of gaining knowledge parallelly with trying to reach competence in theoretical viewpoints.

As a result of the research, the goal of the thesis was achieved and a transdisciplinary theory of socialization was provided while considering both the field of human-animal relationships and the field of animal welfare studies, whereas all three hypotheses suggested in the introduction were approved during the research.

First, it was explained that socialization is a process of reducing animal's fear of humans by establishing positive partnership-based human-animal relationships that result in changes of the meaning-carrier of humans in general in the animal's Umwelt. By socializing animals with humans, animal welfare is significantly improved. Methodologically, there exist three main levels of socialization of captive wild animals with humans: socialization to one person, socialization to the zoo staff, and socialization with the general public. The latter level proved to have the best effect on animal welfare as well as on the zoos educational purposes. Additionally, the methodology of socialization appeared to depend highly on both the animal's individual characteristics, and its species-specific characteristics, including fear of humans, solitary or social lifestyle, and physical and behavioural traits.

The general (i.e. applicable across species) methods of socialization are based on the understanding that positive human-animal relationships are built on positive human-animal interactions. Practical experiences revealed that two main mutually contributive methodic categories – proper methods of animal management and efficient human-animal communication – are required to assure a trust-based human-animal partnership and positive significance of people in general. The favourable management methods include many elements recommended by the modern viewpoints of zoo studies, such as frequent and positive social interactions with the keepers and various provision of enrichment.

A zoosemiotic approach revealed that these management methods are only contributive to animal welfare, as well as to the development of positive human-animal relationships, if the human-animal communication is efficient. Derived from that argument, it was concluded that learning each-other's codes and rationality is a crucial requirement in the process of socialization. Whereas such competence in interspecific communication is developed through management methods that offer opportunities for various positive interactions (including hand-raising, positive reinforcement training, social play and grooming, etc.) as well as all kinds of enrichment (including desensitization). Hence, both practical experiences and theoretical knowledge approved the hypothesis that socialization, enrichment, training, improvement of zookeeping routines, and other such programmes contribute to animal welfare, while each of their success is positively correlated with the success of the other programmes.

None of these management methods alone seemed to explain the difference of socialization when compared to the other human-animal relationship types occurring in the zoo. Even more, previously used definitions based on flight distance from humans or fearfulness of humans were not sufficient either. Only when combining the previous knowledge with a zoosemiotic perspective (especially in terms of Umwelt theory), a clarification was finally reached. As a result, the terminology was provided, approving that the true differentiative essence of the processes of habituation, imprinting, taming, and socialization rely on their effects on human-animal relationships and the subjective perception of humans by the animal. Further, successful socialization includes (and depends on) certain mechanisms of imprinting and taming (i.e. imprinting on humans as social partners, and positive methods of taming), while the additional ways of imprinting and taming should be avoided if abovementioned reconstruction of animal's Umwelt is set as goal. Therefore, the hypotheses, according to which different way's of establishing human-animal relationships

have either a contributive or contradictory effect on animal welfare in captivity, was additionally approved.

The theoretical viewpoints about the correlation of animal welfare and other purposes of the zoo led to assume that increasing animal welfare by socialization might contribute to the educational work and research conducted in the zoo. Indeed, the author's case-study approved the existence of such advantages: socialization resulted in the animal's more diverse behavioural display, increased number of opportunities for human-animal interactions, and visitor's showing higher interest in learning about the animals. Additionally, implicit financial benefits for zoos were safe to expect.

These results refer to the many advantages of socialization that zoos could benefit from when applying this process as a routine animal welfare programme. Therefore, in the future, the author would like to see scientists and zoo managers willing to invest both human and financial resources in socialization as an elementary animal welfare programme.

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RESÜMEE

“SOTSIALISEERIMISE ZOOSEMIOOTIKA: JUHTUMIUURING PUNAREBASTE (*VULPES VULPES*) SOTSIALISEERIMISEST TANGENI LOOMAPARGIS, NORRAS”

Ex situ tingimustes elava metsiku looma sotsialiseerimine inimestega on suhteliselt uudne ja vähe praktiseeritud loomaaialooma heaolu suurendamise programm. Vajadus alaliste loomaaialoomade sotsialiseerimise järele tuleneb tuntud tõsiasi, et inimene on ökosüsteemi tippkiskjana *enamike* loomaliikide universaalne vaenlane. Selliste loomade loomuomane hirm inimese vastu tingib nende tendentsi viimast igal võimalusel vältida. Kuna loomaaias elavatel loomadel niisugused põgenemisvõimalused puuduvad, on paljud loomad (liigiti varieeruvalt) inimeste pidevast kohalolust tulenevalt stressis (Hediger 1950: 28–29). Sotsialiseerimise eesmärk on nimetatud probleemi leevendada, üritades loomaaias elavate loomade hirmu inimese vastu vähendada. Sellise geneetiliselt päritava hirmu vähendamine pole aga sugugi lihtne ettevõtmine: vajalik on partnerlusel põhineva tugevalt positiivse inimese-looma suhte loomine ning paralleelselt looma omailma ümberkonstrueerimine (seda inimese tähenduskandja osas). Taoline ettevõtmine eeldab aga loomade interpretatsioonimehhanismide (s.h kommunikatiivsete võimete) põhimõtete mõistmist ja orienteerumist erinevate inimese-looma suhtetüüpide vallas.

Käesoleva magistritöö esimese peatüki raames läbi viidud teoreetiline analüüs tõi esile mitmesugused sotsialiseerimise põhimõttelist mõistmist takistavad probleemid. Esiteks, ei ole teaduskirjanduses ühemõttelist selgust ei sotsialiseerimise kui potentsiaalse looma heaolu suurendamise programmi põhimõtete, meetodite ega tulemuste osas. Teiseks, erinevad inimese-looma suhtetüübid on teadusmaastikul (aga ka praktikute seas) ambivalentselt ja kohati üksteisest eristamatult defineeritud. Sellisest probleemistikust tulenes autori soov käesoleva magistritöö raames välja pakkuda transdistsiplinaarne käsitlus sotsialiseerimisest nii looma heaolu programmide raames kui inimese-looma suhete kontekstis.

Oli ilmne, et säärase kompetentsuse saavutamiseks ei piisa ainuüksi teaduskirjanduse läbitöötamisest. Seetõttu on autor uurimistöö protsessis täiskoormusega osalenud kolme punarebase sotsialiseerimise projektis Norras Tangeni loomapargis. Autori enese praktikakogemustele lisaks, on analüüsis arvestatud ka kogenud praktikute seisukohti.

Sellegipoolest oli ilmne, et inimese-looma suhtekategooriate eristamine ei saanud võimalikuks enne, kui varasematele teadmistele looma inimeste eest põgenemisdistantsi ja inimhirmu suurusest lisati arvestused inimese ja looma kommunikatsioonist, interaktsioonide märgilisusest ning eelkõige inimese positsiooni erinevustest looma omailma fenomenoloogilistel väljadel.

Magistritöö tulemusena toodi esile sotsialiseerimise eesmärk, erinevad võimalikud tasandid ja nii liigiülesed kui liigispetsiifilised meetodilised mõhimõtted. Seejuures võrreldi kaasaegseid loomaaiateaduslikke seisukohti praktika tulemustega ning kinnitati hüpotees, mille kohaselt sotsialiseerimine funktsioneerib efektiivse looma heaolu programmina, mille tulemuslikkus on positiivses korrelatsioonis teiste looma heaolu suurendamise programmide edukusega (s.h erinevad rikastamise võimalused, treenimine, talitajarutiinide arendamine jne). Veelgi enam, nii teoreetilise uurimistöö kui praktika tulemused lubasid arvata, et sotsialiseerimine pakub mitmeid võimalusi loomaaiade haridusliku ja teadusliku eesmärgi täitmisel.

Töö teiseks oluliseks tulemuseks oli terminoloogilise välja loomine, mis pakub võimaluse eristada selliste keeruliste protsesside, nagu kohanemine (*habitation*), taltsutamine (*taming*), vermimine (*imprinting*) ja sotsialiseerimine (*socializing*) olemust ja omavahelist suhestumist loomaaiade kontekstis. Uurimistöö tulemuste zoosemiootiline analüüs kinnitas hüpoteesi, mille kohaselt on igal nimetatud protsessil erinev efekt inimese-looma suhetele, kusjuures varieeruvad need ka inimese positsiooni poolest looma omailma fenomenoloogilistel väljadel. Samuti leidis kinnitust arvamus, et inimese-looma suhete arendamise erinevatel viisidel on kas soodustav või vastuoluline efekt loomaaialooma heaolule.

APPENDICES

1. “Bonding-time” between Franklin and the author
2. Runar Næss (an assisting caretaker) supporting Franklin during his first interaction with the other foxes
3. Desensitization: elements of the “rule of 12”
4. Franklin enjoying food-based enrichment
5. Tuli enjoying cooperative training as social enrichment
6. Positive human-animal interactions as part of social enrichment
7. Positive fox-visitor interaction as enriching for both foxes and visitors

Appendix 1

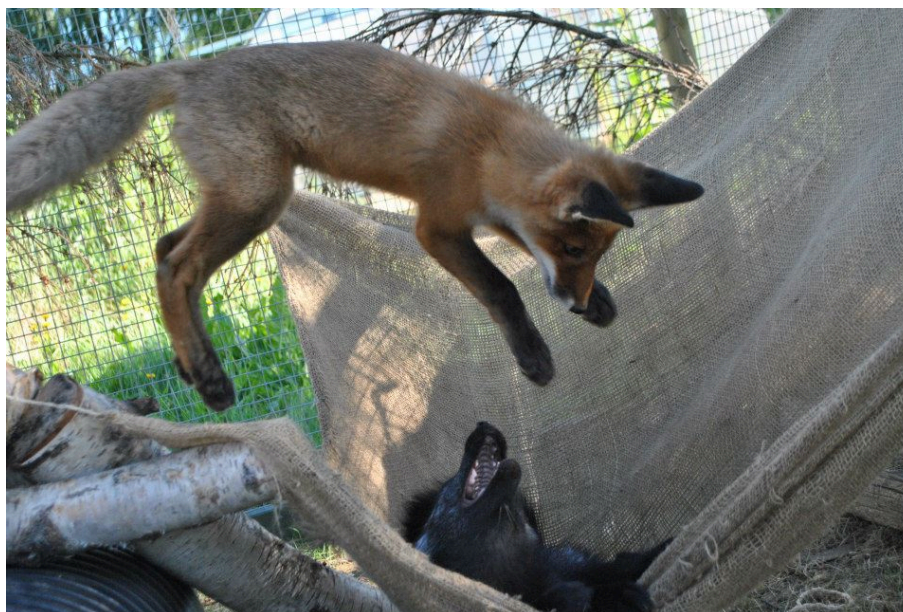
“Bonding-time” between Franklin and the author



Runar Næss (an assisting caretaker) supporting Franklin during his first interaction with the other foxes



Desensitization: elements of the “rule of 12”



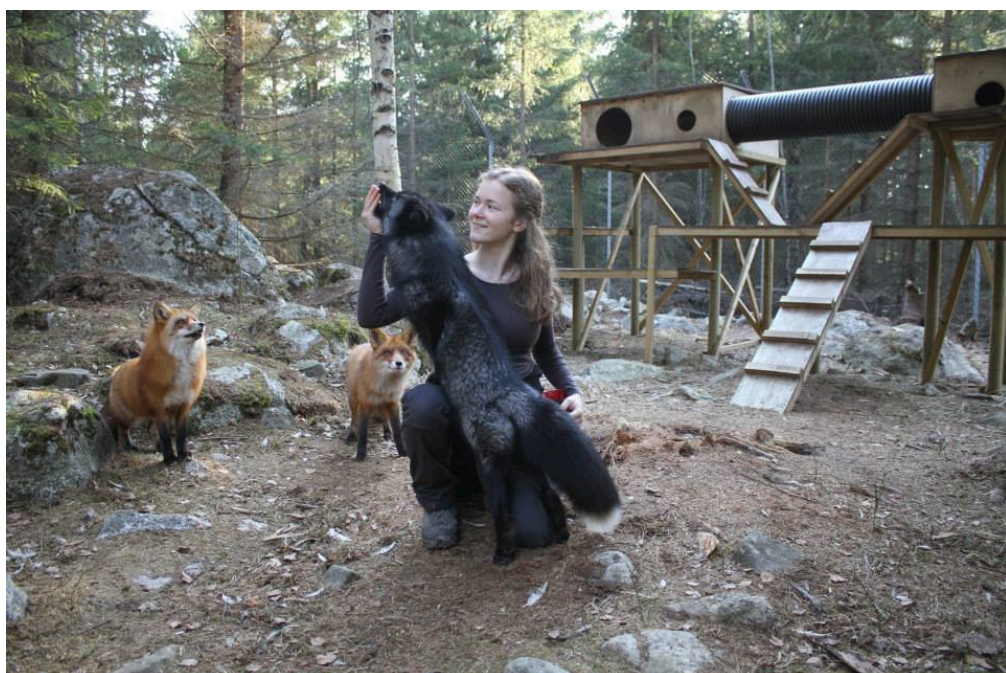
Franklin enjoying food-based enrichment



Tuli enjoying cooperative training as social enrichment



Positive human-animal interactions as part of social enrichment



Positive fox-visitor interaction as enriching for both foxes and visitors



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