

Henri Julius · Andrea Beetz · Kurt Kotrschal
Dennis Turner · Kerstin Uvnäs-Moberg

Attachment to Pets

An Integrative View of Human-Animal Relationships
with Implications for Therapeutic Practice



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Attachment to Pets

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From H. Julius, A. Beetz, K. Kotrschal, D. Turner, & K. Uvnäs-Moberg: *Attachment to Pets* (ISBN 9781616764425) © 2013 Hogrefe Publishing.

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Library of Congress Cataloging information for the print version of this book is available via the Library of Congress Marc Database

Cataloging data available from Library and Archives Canada

The present volume is an adaptation of H. Julius, A. Beetz, K. Kotrschal, D. Turner, and K. Uvnäs-Moberg, *Bindung zu Tieren* (2013, ISBN 978-3-8017-2494-8), published under licence from Hogrefe Verlag GmbH & Co. KG, Germany.

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<http://www.hogrefe.com>

PUBLISHING OFFICES

USA: Hogrefe Publishing, 875 Massachusetts Avenue, 7th Floor, Cambridge, MA 02139
Phone (866) 823-4726, Fax (617) 354-6875;
E-mail customerservice@hogrefe-publishing.com

EUROPE: Hogrefe Publishing, Merkelstr. 3, 37085 Göttingen, Germany
Phone +49 551 99950-0, Fax +49 551 99950-425,
E-mail publishing@hogrefe.com

SALES & DISTRIBUTION

USA: Hogrefe Publishing, Customer Services Department,
30 Amberwood Parkway, Ashland, OH 44805
Phone (800) 228-3749, Fax (419) 281-6883,
E-mail customerservice@hogrefe.com

UK : Hogrefe Publishing c/o Marston Book Services Ltd, PO Box 269,
Abingdon, OX14 4YN, UK
Phone +44 1235 465577, Fax +44 1235 465556,
E-mail direct.orders@marston.co.uk

EUROPE: Hogrefe Publishing, Merkelstr. 3, 37085 Göttingen, Germany
Phone +49 551 99950-0, Fax +49 551 99950-425,
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Format: PDF

ISBN 978-1-61676-442-5

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Foreword

In recent years, the ancient symbiosis between humans and their pets has entered a new phase, marked by the burgeoning clinical specialty of human–animal therapy. This therapeutic approach applies the intuitive understanding between humans and their (mainly) mammalian pets to support the growth of emotion regulation, social skills, and mental health in children, adolescents, and adults. It takes no special knowledge to appreciate the promise of this approach: Just ask any child who ever yearned for Lassie to find her way home or wished that “Nana,” the nursery pet of the Darling children, could keep guard over their sleep too (to name just two of the many stories that celebrate the special bond between children and animals). It is a simple fact, almost a commonplace, that our companionships with animals not only bring pleasure, but also promote our emotional health and well-being.

The authors of this important new work go far beyond this basic appreciation to ask “why?” What makes it possible not only for members of different species to develop close bonds, but also for animals to have a therapeutic effect on their human companions? The authors of this book represent a rare collaboration of biologists and psychologists and an equally rare integration of sophisticated biological and psychological knowledge. Together they create a comprehensive, scientific foundation for human–animal therapy, a foundation that will facilitate the development, implementation, and evaluation of effective new interventions.

Fittingly, the book is organized in terms of the classic framework of ethology. Ethology is the field, established by such great zoologists as Niko Tinbergen, Konrad Lorenz, and Robert Hinde, which explores the biological roots of behavior. It was Tinbergen who proposed that in order to fully comprehend a behavioral phenomenon we must address four types of causality – adaptive function with respect to reproductive fitness and natural selection, evolutionary history, development of the behavior, and the physiological and psychological mechanisms required for its production and control. At its best, the ethological approach permits us to bridge the complexity of human experience, including the experience of the human–animal relationship, with our biological heritage.

The authors present and explain key constructs, theories, and up-to-date findings from an extraordinarily wide range of topics relevant to human–animal relationships. From sociobiology come hypotheses about the general adaptive function and ubiquity of exclusive bonds. Generically, enduring bonds or relationships promote reproductive fitness by allowing one individual to monopolize the attention and resources of another and to reject competitors. That is, the building blocks of psychological reciprocity and altruism have their origins in competitive processes. Sociobiologically speaking, human–animal bonds should be all but impossible, but instead they have clearly been selected for the mutual advantage of both partners. Natural selection has been augmented by the intentional selection by humans to the benefit of both species. Indeed, as the authors point out, dog breeds have in part been developed for variations in this very capacity for establishing exclusive relationships: Whereas “working” and “hunting” dogs must accept many masters, “guard dogs” must be highly exclusive if they are to repel intruders.

The possibility of establishing a human–animal bond – or any enduring bond – rests upon brain features and functions derived from our remote, common ancestry with dogs. We share the phylogenetically very ancient network of loci in the fore- and midbrain that generate hormones and regulate social behavior and responses to stress. Indeed, as research has increasingly made clear, social relationships are both major sources of stress in the life of animals and also essential coregulating mechanisms for moderating and coping with stress. In addition, we appear to share with our pets the neuropeptide oxytocin, which may be thought of as the essential “lubricant” for social bonds of all types – those between parents and offspring, between mating and other social partners, and between humans and their pets. Oxytocin has receptors throughout the central nervous system, and it serves key social functions (in addition to its role in labor and breastfeeding). These include facilitating proximity to and social interaction with various partners, reducing anxiety and inducing calm, and increasing pain thresholds. Notably, oxytocin is released in both humans and animals as a consequence of stroking, skin-to-skin contact, and, possibly, shared gaze. This effect is enhanced between humans and their trusted pet dogs.

The scientific study of human attachment and caregiving bonds has its origins in ethology as well. Attachment theory was first proposed in the 1960s and 1970s by the psychoanalyst John Bowlby and operationalized by Mary Ainsworth to provide a sound scientific basis for the “nature of the child’s ties.” After more than 50 years of research derived from this theory, attachments in infancy and throughout the life cycle are now generally understood to have their basis in neurobehavioral systems, a construct well established in ethology and borrowed by Bowlby. The theory of the coadapted caregiving behavioral system, posited by Bowlby and elaborated by Solomon and George, was similarly founded on ethological principles. A behavioral system permits the individual to organize behavior flexibly around a goal that has an important adaptive function. In the case of attachment, the hypothesized internal goal is “felt security,” usually achieved through maintaining proximity to a particular caregiver. In the case of caregiving, the goal is “felt child security,” usually achieved through proximity to and, if necessary, retrieval of the child. The brain pathways described above are now known to form key elements of these behavioral systems.

Completing an intellectually satisfying circuit, the authors go on to apply what we know about attachment and caregiving in humans to elucidate the human–animal bond, including why these bonds have potential therapeutic action that human–human relationships do not always have. Contemporary attachment theory has progressed quite far in understanding how human attachment–caregiver relationships reflect both the history of dyadic interaction and the parent’s and child’s mental representations (internal working models) of their mutual relationship. Mental representations facilitate behavioral efficiencies and stability of relationships, but they can also lead to behavioral rigidity and maladaptation. This occurs when the child’s representation of the parent–child relationship is generalized to new relationships, such as when the maltreated child brings expectations of abuse or abandonment to relationships with teachers, friends, and marital partners. The authors suggest that pets, adapted for relationships, but lacking the cognitive complexity and needs of human partners, can provide “set-breaking” experiences for both children and adults, resulting in profound psychological change.

The integration of knowledge from the biological and psychological domains that is achieved in this work has great potential to improve communication between usually distinct specialties and to inspire new kinds of research and practice. How, for example, might we assess an animal's representational models of relationship and what other apparently human cognitive features might guide the behavior of pets? Can we do a better job of matching the needs of a particular human with the capabilities of the animal so as to improve the therapeutic effects of these relationships? What more can we learn about human behavioral disorders from observing symptomatic children or adults with a particular disorder in their interactions with certain animals? The synthesis achieved in this volume has equal value for those who focus mainly on human relationships: There is no better or more complete summary of the biological basis of human bonds available. We know from past experience how fruitful the collaboration between biologists and psychologists can be. We have every reason to expect the present volume to have an equally profound effect on both fields in years to come.

Judith Solomon
Oakland, CA, March 2012

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Foreword

Humans – with some notorious exceptions – love their pets. The exact character of a loving relationship is the theme of this excellent book, but nobody could deny the intense grief felt by most human pet owners when their animal companions die. Given the longevity of most pets relative to that of humans, such grief is almost inevitable. The role of the animal's early experience in forming a reciprocal relationship with humans has been known for years, but the necessary conditions for its establishment have been more controversial. Initially, the view was that a window of opportunity for establishing an attachment is opened and then closed by endogenous growth processes. The so-called critical period was regarded as having sharp boundaries. However, work on behavioral imprinting in birds led to a revision of these views. Not only was the concept of a one-shot process, strongly implied by the imprinting term, found to be incorrect, but also the period in which the learning process takes place is much more flexible than had previously been thought. Restricting the animal's experience, for instance, was found to lengthen the period of susceptibility. The term "critical period" was replaced, therefore, by "sensitive period."

The change in thought gave rise to the concept of competitive exclusion, the idea being that as the animal formed a preference for one companion, the likelihood of it forming a preference for another readily distinguishable potential companion steadily diminished. These ideas transferred over to research on dogs and cats. In dogs, the period over which exposure to humans is an effective means of socialization extends to well after the puppies start to take solid food. The precise amount of contact is not critical – little exposure and often from early on is an effective way of establishing a bond. If that is not possible, much more contact after weaning is an acceptable alternative. However, leave the contact too late – roughly 12 weeks after birth – and the puppy will generally not make a good pet. Under special conditions dogs that have not been socialized to humans early in life may subsequently become deeply attached to their human companions – but usually after a period of chronic stress.

These general conclusions also apply to cats. My wife and I have bred pedigree cats in a small way for many years. When we had large litters (six or more), some of the kittens were very small, particularly the last ones to be born. These small members of the litter had difficulty in competing for a good nipple when faced with the scrabbling of their bigger siblings. In these cases we gave them artificial cat's milk through a syringe. They soon became so adept at sucking milk powerfully from the syringe that we did not need to press the plunger. When these kittens became more active, they would come out of the nesting box when we were close by and cry for their extra feed. Unsurprisingly, these kittens made wonderful pets later in their lives.

Some aspects of the human–animal relationship reflect more on the oddities of human behavior than those of the animals. Some pet owners want to care for animals that are prone to walking difficulties, epileptic fits, heart disease, eye deformities, breathing difficulties, infected skinfolds, and many other exaggerations of conformation or poor health resulting from misguided breeding practices. For some breeders, but by no means

all such owners, the interest in breeding dogs and cats lies in their animals doing well at shows. Others fall in love with a breed, and caring for an animal with health or welfare problems is an expression of that love. Whether such behavior on the part of the humans is justifiable is another matter.

However, this book is not about welfare issues but about the attachment processes in the animals that can give humans so much pleasure and help; and how knowledge about such processes can be generalized. Much has been learned from the formation of attachments in humans stimulated by the work of John Bowlby, Robert Hinde, Mary Ainsworth, and many others. The necessary hormonal conditions for mammalian bonding have also been revealed. The importance of oxytocin in the formation of human–animal attachments is central. Such knowledge feeds into the therapeutic uses of animals and their roles in helping humans. These advances form the core of this extremely welcome book.

Sir Patrick Bateson
Cambridge, UK, February 2012

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1

The Mysterious Relationship Between Humans and Animals

We start our book with a set of true stories that demonstrate how intensely humans may relate to animals and how these relationships may, in a mysterious way, be beneficial for these humans.

Pomai, a 2-year-old girl, lived in a big city. Every day when her dad took her out in the stroller she was exposed to many different sights. She rarely reacted to these cues. However, when Pomai saw a pigeon or a dog she became very excited and agitated. She pointed her finger at the animal and called “doggie, doggie, doggie” or “birdie, birdie, birdie” while she smiled at her dad.

Tim, a 7-year-old boy, had lost both of his parents to a heroin overdose 6 months before he entered play therapy. During the first 2 months of treatment, Tim was extremely withdrawn. Although he was able to recall what happened he seemed emotionally numb. This changed dramatically when the therapist’s dog, Toto, was present during a session. Toto greeted Tim enthusiastically when he entered the room and Tim reacted positively. First he stroked and then he hugged the dog. Tim, who had never asked about anything during a session, persuaded the therapist to bring Toto again the next time. During the following sessions, Tim stroked and hugged the dog much of the time. Once, Toto licked his cheeks and Tim began to cry. He hugged Toto and continued to cry for almost half an hour while he told the dog about the death of his parents. In the subsequent sessions the therapist was able to establish a trustful relationship with the boy, which allowed him to work through the trauma of loss.

Eva and Olle had been married for 20 years. Olle had held a high position in the textile industry, but he had retired 10 years previously. Eva, who was 10 years younger, worked as a therapist and was still very active. She worked long hours and travelled a lot. Olle was bored and felt lonely and useless. He complained all the time and wanted Eva to stop working and to spend more time with him. This annoyed Eva because she loved her work and had no intention of quitting. Their relationship became tense and they quarreled all the time. In an attempt to solve these problems, they bought a puppy dog. They both loved taking care of the little schnauzer, which brought out the nurturing and loving side in both of them. One year later, Olle found himself enjoying good company during the day and he no longer tried to keep Eva at home. After a while, the loving behavior he shared with their dog started to spread to his partner and the atmosphere between them became more pleasant.

Mrs. Bray’s health started to deteriorate when she lost her husband and her two closest friends within 4 years. She had difficulties walking and also became rather forgetful. Her three children and her grandchildren all lived in other towns. On her 76th birthday she decided to move to an assisted-living facility close to her oldest daughter, Pam. However, already rather depressed, her feeling of loneliness worsened after she moved.

She missed her home and her old neighbors, and she did not befriend the other residents. One day, a group of researchers from the university met the residents and informed them about an experiment, asking who would be willing to participate in a study and would like to have a parakeet. Since Mrs. Bray had kept pets when her children were little, she volunteered and was selected to receive a bird. Fritzi changed her life. Caring for him and talking to him made her realize how much she had missed being needed. It became easier for her to get up in the morning, and she even went out to get a book on birds. Mrs. Bray got to know the other bird owners, and they talked about the health, the behavior, and the feeding habits of their small companions. Mrs. Bray could not believe how much joy a little bird like Fritzi had brought back into her life.

Learning to read was difficult for Bill, a 7-year-old second-grader. Every time he had to read in front of his teacher or his classmates he expected to fail. His heart beat faster and got tense. He often mixed up the letters, stuttered, his classmates laughed, the teacher shook his head, and Bill experienced a mental block. He could not read anymore, not even a single word. In the meantime, Bill also refused to practice reading at home. Then, Bill attended an animal-assisted reading program for 6 weeks. Instead of reading to a teacher or in front of a class, he read a story to therapy dog Scooter every second day. When Bill read to Scooter, he was very motivated. Every evening before meeting the therapy dog at school, he chose a story from his own books to read to Scooter the next day. When Bill read to Scooter, he sat next to the dog and stroke him. Thereby, Bill calmed down and did not feel tense anymore. After that, he made good progress in reading.

Pauline was a first-grader who liked to attend school. However, when her parents asked her how she was doing in school, Pauline only answered “good.” To get more information, Pauline’s dad regularly invited his daughter for a horse ride. While Pauline sat on the horse and her dad walked next to her, she started, unprompted, to tell him what had happened at school the previous days.

Connor, 25 years of age, had spent the previous 2 years of his life in prison. Growing up in the suburbs he had got involved in gang activities, sold drugs, and one day got into a fight. He had been sentenced to 10 years in prison for severely injuring his opponent with a knife. This had come as a wake-up call, and Connor managed to observe the rules in prison. Because of this he was allowed to participate in a program where prisoners work with mustangs to make the animals more gentle and suitable for riding therapy for disabled patients. He had had no contact with horses before, but when he was first introduced to Peppermint he immediately felt a connection to this once wild horse that he was supposed to train to be reliable and gentle. Teaching Peppermint not to be afraid of sudden movements, strange noises, and unusual objects was difficult at the beginning because Connor was impatient and became loud and aggressive with Peppermint. However, with the help of the trainer, he learned to understand Peppermint’s fear, and to help the horse relax in different surroundings, also by controlling his own impulses. Connor especially liked to take care of Peppermint after the training, brushing him, feeding him a treat, and sometimes just leaning against his strong friend. Even though having a job and working hard had not been a part of his previous life, it became very important for him to take good care of Peppermint within a few weeks. Connor had to stay in prison for many more years, while Peppermint moved on to the task he was

trained for, working in hippotherapy with children with disabilities. Connor wept when he had to say goodbye to his friend with whom he had spent a month and to whom he had grown close.

John, a 37-year-old successful and busy stockbroker on Wall Street, lived with his wife and two children in their privately owned house in New Jersey. He had worked hard for 2 years, paying off the mortgage, but having little time for his family. On his way home one day, he collapsed with strong chest pain. It took him several weeks to recover from this heart attack. Even though it did not seem to be the ideal time to acquire a pet, he and his wife decided to fulfill their daughters' wish and they adopted Spot, a dalmatian mix from a shelter. Although John had owned pet dogs as a child, he was surprised at how much he enjoyed spending time with Spot, playing with him and the girls, and going for walks. After a while, John observed that he felt more relaxed, despite having started work again (although in a different position). After 4 months, he had also become more relaxed about Spot's training, allowing him to be on the couch and even at the foot of the bed in the mornings. John's health stabilized and his blood pressure was nearly normal, as the regular doctor visits documented.

Martha, a 9-year-old girl, was referred to special education because she displayed severe behavioral problems. Martha lived at a children's home because her parents had neglected and physically abused her. She was aggressive toward her peers and rejected all adult caregivers, also in this special education setting. Martha became increasingly withdrawn in the presence of the special education teachers. One day a teacher brought her dog, Willy, with her because her mother, who usually cared for the dog in the mornings, had had to go into hospital for a few days and she did not dare leave the dog alone at home or in the car. When Martha first saw Willy, she bent down and called to him. He ran up to the girl and began licking her in greeting. For the rest of the morning Martha stayed close to Willy. The girl – who had never approached her teacher before – asked if she could feed the dog. At the end of the school day she even dared to ask the teacher whether she could bring Willy with her again the next day. Luckily the special education teacher realized that it might be easier for her to reach Martha when the dog was present. In the course of the next few weeks, Martha became a real caregiver for the dog. She fed Willy, brushed him, and also walked him during recess. The teacher could now approach Martha without being rejected, especially when the girl was close to the dog. As the teacher later stated, this was the beginning of a trusting relationship between Martha and herself.

These case stories are very different, but they have something in common. In fact, they illustrate the multitude of effects often associated with human–animal relationships. Most humans seem to have a keen interest in animals that often manifests itself in a relationship that has the potential to reduce anxiety and stress (including blood pressure and other autonomic functions), to positively affect dispositions toward aggression and depression, and to facilitate social communication, access to one's own emotional states, trust in others, and learning.

To investigate whether such potentially beneficial and even curative effects can be attributed to the relationship between humans and animals, it is first necessary to discuss whether humans and animals can form “true” relationships at all, that is, relationships that meet at least the fundamental, biopsychological criteria of close social relationships

between conspecifics. A behavioral biology and evolutionary view in chapter 2 reveals that humans and animals share brain and physiological structures and mechanisms that underlie social behavior. This is the base and prerequisite for humans and their companion animals to be able to establish true relationships.

If humans can indeed engage in true social relationships with their companion animals, the next question would be whether the curative effects reported above can be attributed to these human–animal relationships. A review of potential effects that have been associated with human–animal interactions in chapter 3 reveals that this is probably the case.

In chapter 4, we discuss whether the curative effects associated with human–animal relationships can be attributed to a deeper structure that connects these effects. We have identified the oxytocin system as one such fundamental structure. Oxytocin is produced in the hypothalamus and acts both as a hormone and as a neurotransmitter. Oxytocin has been demonstrated to be involved in similar ways in the social interactions and behavior of different mammalian species. A widespread distribution of oxytocin-containing nerves allows for an integration of different oxytocin-mediated effects when this system is activated. Results from studies on humans and on nonhuman animals show that oxytocin release is triggered by certain kinds of social interactions and touch and may, in turn, induce a multitude of effects, particularly in the social domain. In connection with the topic of this book, it is of particular interest that oxytocin (a) decreases anxiety, stress, aggression, and depression, (b) stimulates and facilitates social interaction and communication, (c) increases trust in others, and (d) facilitates learning and access to emotional states. Since all these effects have been associated with human–animal relationships, the oxytocin system will be introduced and discussed as the central neurobiological structure behind these effects.

The release of oxytocin is not caused by just any social interaction. Rather, oxytocin release, including the oxytocin-mediated effects, requires a certain relationship quality. We suggest that such a relationship quality can best be described and differentiated via the psychologically defined concepts of attachment and caregiving. These concepts have been developed over the past few decades in the domain of interpersonal human relationships. Therefore, we first introduce these concepts in chapter 5 in the framework of their original scope before applying and extending them to human–animal relationships.

“Attachment” originally referred to a persistent emotional tie between a child and a caregiver. More recently, the concept of attachment has been expanded to include other types of relationships, such as romantic love. The function of the attachment system is to maintain or establish proximity between a child and its attachment figure, particularly when the child is stressed or in danger. In so-called securely attached children, fear and stress are reduced by proximity to the caregiver. Therefore, the attachment system serves to protect the offspring, ensures caregiving, and reduces stress, particularly on the part of the dependent. Since the attachment system is flexible, it adapts not only to supporting conditions, but also to a suboptimal or even negative environment. If a child is exposed to parental neglect, to inconsistent parental care, or even to abuse, this child will not be able to develop a secure attachment pattern. In fact, three different types of insecure attachment representations have been identified: insecure-ambivalent, insecure-avoidant, and disorganized. Children with insecure attachment styles hardly experience

relief of fear and stress in the company of their parents, and children with a disorganized attachment pattern may even be stressed by their caregivers. These children in particular display a wide range of psychological symptoms.

The most important factor for the quality of a child's attachment is the caregiving behavior of his or her attachment figure, including maintaining proximity through retrieval, calling, seeking eye contact, smiling, comforting, and body contact (e.g., carrying, stroking). The quality of caregiving can be measured along the dimensions of sensitivity and responsivity. Sensitivity refers to the caregiver's ability to correctly perceive and interpret the child's signals for proximity. Responsivity describes the degree to which the caregiver responds adequately to these signals. Four model types of caregiving have been identified that correspond to children's secure and insecure attachment patterns.

Considerable evidence supports a connection between the oxytocin system and attachment and caregiving. This link is the topic of chapter 6. Here, we discuss the fact that close contact between mother and infant is associated with oxytocin release and the expression of oxytocin-related effect patterns in both mother and infant. Thereby, social interaction is facilitated and anxiety and stress levels are reduced. We assume that later in the child's development, oxytocin is released not only in the presence of the mother but also in the presence of other caregivers. Since the down-regulation of stress is one of the central functions of the attachment system, securely attached children seem to have developed a good tone or function in their oxytocin system from their relationships with their primary and subsequent caregivers. Complementary to that, a mother or father who displays adequate caregiving probably also has a good tone or function in the oxytocin system, while maladaptive caregiving is likely to be associated with an imbalance in the oxytocin system.

In insecurely attached children the attachment figure does not trigger an adequate oxytocin release and, hence, will fail to calm the child and reduce its stress. Primary caregivers of children with attachment disorganization – who often have experienced domestic violence or neglect – may even activate the children's flight-or-fight system, which is triggered by stress and associated hormones. Thus, these caregivers are not only incapable of relieving fear, anxiety, and stress in the children, but rather activate the opposite neurobiological systems. This is adaptive, as it alerts the child and readies the organism for potential danger. It also makes sense that these children do not trust their caregivers anymore – their attachment system has adapted to pathogenic conditions and this adaptation ensures their prevailing psychic survival, the children thereby make the best of a bad situation. This is, however, a dearly purchased adaptation because children who associate their primary caregiver with rejection or even danger will have learned not to turn to alternative sensitive, supportive, and trustworthy caregivers or social partners in emotionally stressful situations. This severely jeopardizes the further social development of such children.

Since attachment and caregiving are closely linked with the oxytocin system and since the positive effects of oxytocin overlap with the positive effects of human–animal relationships, we ask in chapter 7 whether human–animal relationships may be conceptualized as attachment or caregiving relationships. Empirical evidence suggests that humans establish attachment as well as caregiving relationships with animals. Research also suggests that insecure attachment and caregiving patterns, rooted in human–human

relationships, do not correspond to the attachment and caregiving patterns humans develop with their pets. In groups at risk for developmental and psychological disorders, the prevalence of secure attachment and flexible caregiving to pets is four times higher than that of secure attachment and flexible caregiving to humans! This indicates that disadvantageous attachment and caregiving patterns established in human–human relationships may not be transmitted to relationships with pets. Such results are of great interest because attachment or caregiving patterns are normally transferred to all other close human–human relationships. This is particularly tragic for children with a disorganized attachment pattern, since this puts their further development at great risk.

If humans can form secure attachment and flexible caregiving relationships with companion animals, independently of their attachment pattern to humans, then it can be assumed that such relationships will be mirrored in a good tone or function of the oxytocin system, including its positive effects. Thus, the human–animal relationship could promote an adaptive and healthy social development. Evidence in support of this hypothesis is introduced and discussed in chapter 8.

If animals are indeed suitable agents for bypassing insecure and disorganized attachment and caregiving experiences, this can provide great therapeutic potential for human therapists or other health care professionals to slip into the relationship with the individual while the animal is close by. This therapeutic gain is discussed in chapter 9. We assume that the positive neurobiological effects facilitate the development of adaptive relationships to humans. The neuroendocrinological effects triggered by a close relationship to an animal seem to promote approach behavior and trust in others and to minimize aloofness. Thereby, forming relationships to other humans may be facilitated. Under such conditions, the insecure child's, adolescent's, or adult's attachment system can be confronted with new experiences in human–human relations, allowing the attachment system to adapt to conditions that support the development of mental and physical health. This is particularly important, since an insecure or disorganized attachment toward humans is a risk factor with regard to mental health.

The book closes with a summary and an outlook containing practical applications of the model presented. Since this book integrates psychology, behavioral biology, physiology, and neuroendocrinology, we provide boxes in each chapter that define or explain central concepts of these disciplines.

2 Why Humans Are Willing and Able to Relate to Animals: The Perspective of Evolutionary Biology

This chapter provides an evolutionary framework for the question of why humans are generally interested and able to engage in relationships with companion animals. Comparative biology reveals that there is a series of fundamental structures and mechanisms at different levels of behavior, physiology, and the brain that are relevant in a social context and are shared between humans and animals, either because these were conservatively maintained during evolution or because they evolved in parallel. This catalogue includes an evolutionary ancient “social network in the brain,” comprising a series of nuclear areas that host, for example, the bonding mechanism, emotional systems, and probably even the neural base for empathy and altruistic impulses. Decisions for behavioral output are reached by crosstalk between these basic systems and higher cognitive centers, such as the mammalian prefrontal cortex. Further, important biological faculties influencing communication and socializing between species include stress systems, which are shared over much of the vertebrate pedigree, as well as similar principles of variation of personalities in the different species. Hence, the base for eminently psychological phenomena such as bonding, attachment, caregiving, and the management of social relationships in general is profoundly biological. These biopsychological and behavioral systems are evolved to function within a certain social context, but are inherently flexible to adapt to varying conditions that an individual might encounter.

The Comparative Biologist Approach

The case stories at the beginning of this book convey the message that humans are capable of and willing to relate to nonhuman animals in a similar way as to human social partners. However, there is not simply a superficial resemblance of animal companionship and interpersonal relationships in humans. In fact, the same basic behavioral, neurological, and physiological mechanisms that are active in interactions between humans seem to also be involved in interactions with animals. Particularly relationships with our major companion animals – dogs, cats, horses, etc. – are seemingly not one-way interactions. Usually, the animals involved are not merely passive receivers of human social attention, but are responsive and can act as social partners if prepared by their genetic background and by proper socialization.

This book explains the mechanisms and theoretical basis of human–animal relationships from the human perspective. Particularly with that goal in mind, a comparative and evolutionary perspective may be revealing. Hence, the focus of this chapter is twofold:

First, it is not trivial that humans – seemingly much more than all other species – show explorative and even social interest in nature and in animals in particular. Among the few features left to distinguish humans from all other nonhuman animals is our reflexive mind, that is, that humans of all cultures are not happy with merely living a good life here and now, but are always keen to explain their roots and their future. Second, only humans live with companion animals not entirely based on instincts, as, for example, in the case of slave-keeping ants, and not as a decadent habit developed during the industrial age, but dating far back to human prehistory (Serpell, 1986). So, is it true that humans are “biophilic” (Wilson, 1984) and, if so, what would that mean and why are such relationships between species possible at all? Why are humans able to engage in close and individually varied relationships with companion animals and why are they capable of developing feelings of safety and calmness in the presence of animals in general and in the presence of their companion animal in particular? (It should be noted, however, this is not a fixed rule: Humans may also be stressed by the presence of animals, may develop anger or fear of animals, and may choose to avoid them.) Thus, far more than inanimate objects, animals have meaning for people. Unavoidably, attitudes and beliefs are projected on animals. Quite obviously, the presence of animals affects human moods, and even a transfer of moods from animals to humans, and vice versa, seems possible. This may lead to mutually affecting each other’s behavior and to some degree of synchronization. Behavioral biologists used to call this mechanism “social facilitation,” and it seems that this affective communication is not unilateral between animals and people.

Generally, well-socialized companion animals are neither unavoidably “anthropomorphized” nor abused by being targeted with human affection. It seems as if a well-educated human companionship would by and large also satisfy the companion animals’ social needs. And often it looks as if humans and animals would engage in “real” social relationships. This seems somewhat strange, because humans not only look different to their companion dogs, cats, horses, or birds, but also there are distinct differences between species in how they express their emotions. Still, there may be a deep, non-verbal, affective understanding, which is not only *felt* by the (human) proponents, but its behavioral and physiological equivalents can also be measured in an objective way. Hence, it is the main goal of this chapter to reflect on the structures and mechanisms that are shared between humans and their companion animals and that allow them to engage in mutual social relationships.

Because these social structures and mechanisms are shared between species, this must be due to either the Darwinian continuum, that is, represent “homology,” or to “analogy.” Homologous traits would be spread over certain parts of the vertebrate pedigree by common ancestry. By contrast, features that evolved in parallel in a convergent way in the different species due to parallel selection pressures are generally referred to as “analogies.” In the brain, such analogous structures are often built from the same basic ingredients, such as the social control brain, where homologous neuronal elements constitute the prefrontal cortex in mammals and the nidopallium caudolaterale in birds (O. Güntürkün, personal communication, Bochum, Germany, April 2007). It seems as if most of the features relevant to the ability to socialize between species are homologous, that is, due to common descent and that the “basic social vertebrate model” is much

more similar in many of its components than the divergent hulls of the organisms might suggest.

A Four-Level Approach to Why Humans and Animals Relate to Each Other

In order to explain phenomena and traits from an evolutionary perspective, organismic biologists usually employ the comparative approach. This approach shares with evolutionary psychology the concept that any attempt to explain phenomena in humans demands that they be put into perspective with their more closely or distantly related animal relatives to discuss why they are there and what they are doing. In such a comparative framework, “why” questions need to be tackled at four different levels (Tinbergen, 1963), because only such a four-level approach can provide a full explanation of “natural” features, that is, those generated by evolution of virtually everything from body size to personality traits.

Hence, to explain why humans are able and willing to relate to other animals and why this is often mutual, biologists would turn to these four levels. They would investigate

1. the potential “adaptive value” in this relationship,
2. the physiological, neurological, and psychological mechanisms behind it,
3. the ontogenetic development of the relationship, particularly during early life histories, and
4. how this may have developed over evolutionary history.

The Adaptive Value of Human–Animal Relationships

To be of “adaptive value,” relating to animals should have not only a survival value for the human individuals engaging in it, but also the potential to increase the evolutionary fitness of these individuals, that is, enable them to leave more reproductively active offspring over their lifetimes than individuals who do not relate to animals. Dogs as helpers may have such an effect, at least at the group level, by assisting in hunting or warning against foe. But at the same time this has to be counterbalanced with the potential costs of living in close association with animals, such as the very real risk of tapeworm infections and other zoonoses from dogs (Zimen, 1988). In the case of modern animal companionship, when people live socially close to their dogs and cats, one could still argue that the social support provided by their animals and the health-promoting effects of living with them (see chapter 3 for details) could ultimately benefit their reproductive potential.

In a reproductive context, social attention and caregiving are generally oriented toward a partner and children. If a companion animal satisfies these social needs, one might even speculate that in modern society, this may distract individuals from investing in deep interpersonal relationships and in raising children. In a way, animal companionship might therefore even be maladaptive and the urge to live with, and care for, animals might even represent a kind of “exploitation” of the human social dispositions by the animals (Serpell, 1986). Therefore, it is not clear whether animal companionship may indeed have consequences for biological fitness in modern societies and it is certainly

hard to produce testable hypotheses about this. The evolutionary consequences for the animals are generally easier to judge. Although many companion animals are neutered or spayed and thus reproductively dysfunctional, humans in their vector function have allowed cats and dogs to join the club of the evolutionarily most successful species. Dogs, for example, have spread over virtually all continents, where they live in huge numbers, whereas their wild ancestor, the wolf, has been pushed back to fractions of its former geographical range.

The Physiological, Neurological, and Psychological Mechanisms Behind Human–Animal Relationships

To answer the “why?” question on the mechanistic level may be much easier and more direct than answering the question about the evolutionary adaptedness of living with companion animals (see previous subsection). Comparative morphology, physiology, neurology, and behavioral biology indicate a wealth of common ground between humans and nonhuman animals to engage in interspecific social relationships. If this were not the case, the use of animal models in medical and pharmacological research would be useless. Much of the following chapter and, in fact, much of this book is devoted to this mechanistic, proximate level.

The Ontogenetic Development of Human–Animal Relationships

It is obvious that not every adult human relates to animals the same way. Also, dog fans are not necessarily fond of cats (although many are) and vice versa. By contrast, virtually all children are extremely interested in all living creatures (DeLoache, Pickard, & LoBue, 2011; Wedl & Kotrschal, 2009). This interest clearly diversifies and individualizes over ontogeny. Viewed “from the other side,” not even individuals from domesticated species make good pets and animal companions without proper early socialization. How trustful and socially competent individuals relate to others later in life, and whether and to what degree they can benefit from emotional social support by others, is mainly a consequence of early social interactions with their main caregivers, in both humans and in nonhuman animals. Again, this is the basic theme of this book.

The Development of Human–Animal Relationships Over Evolutionary History

Finally, it is reasonable to assume that human biophilia, as all other human traits, has developed during our long evolutionary period as hunter–gatherers. However, since the evolutionary history of human–animal relations may at best be remodeled in evolutionary scenarios, but nevertheless hardly testable in a scientific way (Popper, 2002), these early relationships will forever be open to educated guessing. Most likely, living with tame wildlife was a by-product of hunting and of early spiritual beliefs. Erikson,(2000), for example, discussed why in many hunter–gatherer societies, the offspring of animals killed are raised as pets. This may not only have provided these people with the same pleasant feelings we enjoy nowadays when we raise a puppy, but may have also been done to reconcile the spirit of the killed mother (see below).

Later in this chapter, we return to the four Tinbergian levels whenever appropriate. In general, the topics of this chapter mainly deal with levels 2 (mechanisms) and 3 (ontogeny). But first, the subsection immediately following deals with level one: The question of why humans have developed a keen interest in animals and nature at all.

Human Biophilia and Interest in Animals

Throughout the longest period of their evolutionary history, humans lived as highly adaptable hunter–gatherers in fission–fusion groups (i.e., parties of different individual composition splitting from the group and rejoining after foraging, patrolling the territorial border, etc.) in close contact with nature and animals. In principle, our closest relatives, the chimpanzees, still engage in basically a similar lifestyle. Still, although chimpanzees develop a range of different cultures with respect to their foraging techniques (Wrangham, McGrew, de Waal, & Heltne, 1994), they are considerably less ecologically flexible than early humans. Humans, probably starting far back in their prehistory, are generally and profoundly biophilic (Kellert & Wilson, 1993; Wilson, 1984), meaning that not only are they interested in all kinds of natural phenomena in their surroundings, but also that they probably employed their social behavioral systems early on to relate particularly to the offspring of the animals they hunted and to tame wildlife (Serpell, 2000). A broad interest in nature was certainly adaptive for early humans, not primarily for spiritual reasons, but to acquire individually learned and socially transmitted knowledge about nature. This served niche expansion and the colonization of new habitats and also served individual safety in dealing with a potentially dangerous environment. Ultimately, biophilia may be seen as a “syndrome” of cognitive and emotional traits that seems to be uniquely human and as the main factor explaining why humans were able to invade more environments than any other species on earth – to make a living from rainforests to deserts and from the equator deep into the Arctic.

The biophilia syndrome may have also provided an important feedback in the evolution of the human brain and may have catalyzed its ability to process language, myths, and symbols (Shipman, 2010). Moreover, biophilia is most likely one of the dominating factors for the evolution of the human psyche (Freud, 1975; Jung, 1995; Wilson, 1984), simply because living in close contact with nature necessitated cooperative social systems, which, in turn, shaped the human brain (Byrne & Whiten, 1988). Brain and mind, like other bodily structures and functions, were (and are) under permanent selection and, hence, are shaped to optimize fitness. Alongside the ecological advantages, living with animals and nature for so long in human prehistory was also promoted by culture, notably by beliefs in the animated nature of animals, plants, and even stones. In this context, the human mind has evolved to make simple and adaptive decisions in a complex world.

Spiritual Beginnings

Universally, hunter–gatherers did not and do not consider animals as inferior to humans, but as sentient beings of their own kind, able to feel and think; often, animals are considered to be close relatives or even spiritual mediators. Within this framework, killing of animals creates guilt and therefore necessitates appropriate rituals for reconciliation with their spirits (Eriksson, 2000). Failure to do so would result in malaise. This utilitarian metaphysics of animism and shamanism, which developed in the context of relating to and explaining nature, may be considered as the root of the typically human

inclination toward religion (Broom, 2003). However, as a historic scenario, this cannot be formally tested. Nevertheless, the fact that humans seem to be inherently biophilic (Wilson, 1984) lends credibility to such a scenario for the evolution of human nature and the human mind. This is supported by the fact that virtually all young children have a particularly profound, nearly “instinctive” interest in animals (De Loache et al., 2011; Serpell, 2000; Wedl & Kotrschal, 2009). Still, not all humans are equally eager to socialize with animals, because over ontogeny and in a gender-specific way, individual interests in social contexts, including human–animal relations (Paul, 2000a, 2000b), and individual orientations necessarily diversify.

Pet keeping was common in hunter–gatherer societies and still is in those remaining, probably also as part of the appeasement of and reconciliation with the spirits of the prey killed (Erikson, 2000). In fact, socializing with animals is a fundamental component of biophilia (Serpell, 1986; Wilson, 1984). Hence, pet keeping is not just a relatively recent decadent bourgeois habit as some still seem to regard it. Communist societies in particular discouraged or banned pet keeping, for example, until recently dogs were banned in Chinese cities (Zheng, 2007). Today, however, nature and animals are increasingly being reconsidered as an essential part of the human environment (see the IAHAIO Tokyo Declaration 2007 at www.iahaio.org), and having children grow up without regular contact with nature and animals amounts to deprivation.

Sociobiological Context

Use of the building blocks of sociality, which are shared between humans and their companion animals and which are discussed below, may be facilitated by the general functional/evolutionary background for social systems, namely, the tactics and strategies of the two sexes to optimize reproductive success in a given physical/ecological/social environment (Trivers, 1985). The psychological dispositions of humans developed in this sociobiological context and, therefore, are evidently compatible with social dispositions in other animals, not only because of phylogenetic continuity (i.e., homologous characters), but also because of parallel selection pressures (i.e., producing convergence in social decision-making rules).

Finally, one of the psychological dispositions shared between higher social vertebrates is to distinguish between “us” and “them,” that is, to be able to associate discriminately with individuals of a certain kind, often matching one’s own phenotype, and to include/exclude individuals in one’s own bonding system or group (Eibl-Eibesfeldt, 2004). The extent to which a partnership is inclusive or exclusive with respect to others will depend on the functions, the intrinsic stability, and the needs of the dyadic partners, as well as on external challenge and, probably, partner characteristics such as personality, attitudes, sex, and age (e.g., Larson & Holman, 1994). The more operational a partnership (e.g., a dog as a partner for various activities), the more open the individuals may generally be for the inclusion of outsiders. In fact, working dogs have been selected to accept changing human masters. Hunting dogs, assistance dogs for the disabled, or sled dogs may indeed be trained by a different person than their final partner, or the same dog might be put to work for several human partners (Coppinger & Schneider,