

Chapter 3

THE HUMAN-CAT RELATIONSHIP

Penny L. Bernstein

Biological Sciences, Kent State University Stark Campus, Canton, OH 44720 USA

Abstract: With an estimated 76 million pet cats in the United States and 200 million worldwide, there is an increasing interest in, and need to understand more about, the human-cat relationship. This chapter presents the growing body of research that evaluates this relationship from a variety of perspectives. It considers the history and importance of animals as companions, worldwide trends in pet ownership, physiological and psychosocial health benefits of pet ownership, the role of pets in families and their special role in the lives of children, and the difficulties people have in dealing with the loss of their animal companions. Particular aspects of the human-cat relationship are also considered, ranging from cat socialization and the effects of paternity and breed on social behaviour, through to observational studies of human-cat interactions in the home, including cat vocalizations, petting, and social interactions, both between cats and between cats and humans. Responsibilities of pet ownership are examined, including providing veterinary health care for the animals, and minimizing zoonotic disease and other health risks to humans. Failures of the human-cat relationship can also occur, and a number of examples are considered: animal abuse and animal hoarding, feline behaviour problems, pet relinquishment and abandonment and the growing problem of free-roaming, stray and feral cats.

1. ANIMALS AS COMPANIONS

1.1 Introduction

Animals have been companions to humans since ancient times. Egyptians are often given credit for first domesticating African wild cats approximately 4,000 years ago; recent findings suggest cats may have been closely associated with humans as long as 9,500 years ago (Vigne *et al.* 2004). Ancient writings and historical records, as well as more recent studies, document the various ways in which animals and humans have related in a

positive way. Animals have served, for example, as protectors (dogs protecting against bears and wolves, and cats protecting crops by killing rodents); as food providers and hunting partners; and as an important “other” for humans to interact with and talk to, in both home and institutional settings (e.g. Beck & Katcher 1996; and see Hart 1990, 2000a for an overview of psychosocial benefits). Indeed, as Beck and Katcher (1996) note in their overview of human-animal interactions and animal companionship, the word “companionship” derives from the Latin for “together” and “bread”, and “eating together” is literally one of the many ways in which humans and companion animals interact, with humans giving carrots and sugar cubes to horses, choice table scraps to dogs and cats, fruit treats to parrots and so on.

1.2 Scale of Pet Ownership

At some point, animals went from being utilitarian companions to “pets”, although it is not clear what the crossover involves (see a series of discussions beginning with Eddy 2003a and followed by Copeland 2003; Eddy 2003b; Hart 2003; Lawrence 2003; Rollin & Rollin 2003; and Sanders 2003). That this “pet” companionship has been successful for both parties, however, is suggested by the dramatic increase in the population of companion animals. In 2002 in the United States it was estimated that there were between 55 and 61 million pet dogs and nearly 76 million pet cats (Euromonitor International 2003).

Such trends are carefully tracked worldwide by the pet food and pet care industries. A recent market study by Euromonitor International (2003) provides detailed information about pet ownership and notes key elements affecting pet numbers internationally. As might be expected, countries with larger populations tend to have more pets, demonstrated most obviously by China and the United States, ranked first and third in human population and second and first in pet ownership, respectively (Table 1). However, this relationship does not always hold: India is second in human population but a distant 29th in terms of pet ownership, while just four million Australian households collectively care for over 26 million pets. Demographic trends, such as increases in single households and urbanization, apparently favour ownership of smaller, easy-to-care-for animals such as cats, fish, birds, and even rabbits and ferrets, over larger, more care-intensive animals such as dogs.

The Euromonitor International report (2003) also suggests that population attitudes can affect ownership; there is little growth where dogs and cats are still regarded primarily as working animals and often rapid growth where they are seen more as companions. This supports findings

documented by Serpell (1985) in a review of the anthropological literature up to that time. This trend is most evident in Turkey, Brazil, China and Thailand, where increases in disposable income, coupled with an attitude shift and increasing urbanization, has resulted in dramatic increases in pet ownership. Turkey showed a 39% increase and Brazil a 28% increase in pet ownership from 1998 to 2002, and Thailand's pet population nearly doubled in this time period (reaching 14 million in 2002), resulting in that country becoming the fifth largest in pet ownership in the Asia-Pacific area. China showed the greatest numerical increase in its pet population over this period, expanding by nearly 40 million pets.

Table 1. Pet numbers for the top 15 pet-keeping countries (arranged in order by total number of pets). Data for 2002; numbers are in millions (Euromonitor International 2003).

Country	Number of pets	Cats	Dogs	Other
United States	366,370	76,430	61,080	228,860
China	271,774	53,100	22,908	195,766
Japan	75,372	7,300	9,650	58,422
Germany	72,600	7,000	Not in top 15	61,300
Brazil	67,005	12,466	30,051	24,488
Italy	63,100	9,400	7,600	46,100
France	56,000	9,600	8,150	38,250
Russia	50,790	12,700	9,600	28,490
United Kingdom	46,590	7,700	5,800	33,090
Australia	26,625	Not in top 15	Not in top 15	21,005
Canada	22,558	6,811	Not in top 15	11,416
Turkey	22,547	Not in top 15	Not in top 15	19,208
Poland	21,315	5,465	7,520	Not in top 15
Spain	20,519	3,191	Not in top 15	13,358
Ukraine	17,635	7,350	5,425	Not in top 15

Age has a major effect on ownership as well: eight of the ten countries with the greatest number of pets have the largest populations of persons over 65 years of age (Euromonitor International 2003). This finding is in line with results of various American studies that have demonstrated positive effects of pets on attitudes and health in the elderly (e.g. Baun & McCabe 2000; Enders-Slegers 2000; Friedmann 2000; Friedmann *et al.* 2000). Surprisingly, personal disposable income does not seem to have a strong effect on pet ownership, according to this report. While some economically-developed countries are among the top ten, countries such as Brazil and China where owners have considerably less disposable income, also rank in this group.

Cats continue to outrank dogs as pets in the United States and China (Table 1), as well as in several other countries with much smaller numbers of pet owners (Euromonitor International 2003). Reasons cited by the report for high numbers of cats as pets include increasing urbanization (e.g. parts of

Brazil), increases in the elderly population, restrictions on dog ownership (e.g. high license fees and other restrictions), and decreases in birth rates (e.g. all three factors cited for China). However, dogs continue to outrank cats in many countries, especially where population densities are low (e.g. parts of Brazil), where crime rates are high (e.g. South Africa), or where hunting is very popular (e.g. Italy). It should be noted, however, that “other” pets, including fish, birds, rabbits, other small mammals, and reptiles, greatly outnumber both dogs and cats in most of the key market countries. Turkey and Australia (which has seen a steep decline in cat populations since 1993, see Rochlitz 2000) are extreme examples of this pattern, with over 80% of their pet population numbers coming from the “other” category.

1.3 Benefits for Humans and Companion Animals

For a number of years, studies have suggested that human and animal companions benefit from one another. Human benefits range from physiological (blood pressure control, relaxation effects, decreased levels of chemicals associated with anxiety, improved survival and longevity after heart attacks; see Friedmann 2000 and Friedmann *et al.* 2000 for overviews) to psychological (decreased depression, elevated mood or decrease of poor mood; e.g. Zasloff & Kidd 1994a,b; Turner *et al.* 2003) to practical (serving as guides, “alerters” to unwanted psychological incidents for owners with mental conditions, or in other therapeutic roles in Animal-Assisted Therapy; e.g. Beck 2000; Fine 2000b). Not all studies show benefits to humans, however. This seems to depend in part on the age of participants and what health aspects are measured (e.g. Parslow & Jorm 2003).

Benefits for animals include reliable food supplies, veterinary care, protection from disease and predators, and good environmental conditions provided by humans, as well as decreased stress levels (Carlstead *et al.* 1993). Other ways in which animals and humans may gain health benefits from one another’s companionship are summarized in Fine (2000a) and Podberscek *et al.* (2000).

In addition to providing health benefits, companion animals can serve as focal points around which everyday interactions between humans can take place (e.g. Hunt & Hart 1992). They may also be an avenue for discussion of important issues such as animal consciousness and animal rights, as humans consider the problems surrounding abandoned and feral animals (e.g. Ash & Adams 2003), animal abuse (e.g. Arluke 1997; Ascione and Arkow 1999), animal hoarding (e.g. Patronek 1999; Arluke *et al.* 2002), relinquishment of animals to shelters and animal control facilities (e.g. Patronek *et al.* 1996; Salman *et al.* 1998; Scarlett *et al.* 2002) and success or failure of adoption of animals from shelters (e.g. Neidhart & Boyd 2002).

1.4 Companion Animals and the Family

Companion animals clearly play a role within the family. Triebenbacher (2000) provides a well-organized overview of the various roles, functions and contributions of pets and how those relationships and values change as families undergo life cycle changes (e.g. from having small children through children leaving the home and adults becoming elderly). She also examines problems and responsibilities associated with having companion animals, and the important effects of companion animal loss on the family. Cohen (2002) more directly examined what people mean when they say “My pet is a member of the family.” In her study, pets seemed to occupy an overlapping but different space from humans. People identified pets as family members by the way in which pets functioned within the household. In response to forced-choice questions, respondents often put pets ahead of humans when making decisions (for example, to save someone when a boat tips over or to provide needed medication). Humans even celebrate special occasions with their animal companions as if they were human family members, for example, having a bar-mitzvah ceremony for a beloved horse turning 13 years of age, or a bat-mitzvah for an adored pet female cat or a dog wedding between two cherished pets (Dresser 2000).

These studies suggest that separation from pets and concern for their well-being could be a major problem for owners when they are ill, hospitalized, or taking extended trips away from home. Allowing pets to travel with their owners or visit them in hospitals, or providing pets for residents in long-term care facilities, may have more profound and important effects than previously thought. Bernstein *et al.* (2000) noted that some residents in a long-term facility preferred animal visitations to non-animal activities such as Arts and Crafts because they had had pets before entering the facility and missed those interactions, or had had pets when they were young and visits from the animals reminded them of these happier times. A number of articles in Fine (2000a) provide guidelines for developing and running visitation or Animal-Assisted Therapy programs (AAT) in a variety of settings, as does the website (www.deltasociety.org) of the Delta Society, one of the major organizations in the United States devoted to providing information and guidelines about AAT and to organizing effective programs.

1.5 Companion Animals and Children

The relationship between children and animals has received special attention from a number of researchers. Classic works include those of Levinson (1969) and Myers (1999). More recently, Triebenbacher (2000) provided an overview of the changing relationships between children and

animals from early childhood through adolescence. She noted a number of skills and values children may gain from these interactions, including learning about mutual respect, kindness, humane treatment of others, giving and receiving love and affection, caretaking skills, responsibility, and pain of loss. Gail Melson has examined many of these issues in depth (e.g. Melson 2000, 2001). In her book *Why the Wild Things Are* (2001), she explains how a casual observation of a young boy, emotionally involved with his dog in a veterinarian's waiting room, had caused her to realize there was a critical lack of sociological research on child-animal interactions despite years of careful, thorough analyses of children's bonds with one another, with parents and other family members, and with humans outside of the family. Her long-term studies since then, of the relationship between children and animals, have led her to propose a view of development that recognizes the pervasiveness and importance of real and symbolic animals in children's lives. She outlines this "biocentric" approach in her book, mapping where our knowledge currently rests and where future research should be directed.

Several studies have focused on the use of animals in therapeutic programs for children. For example, Katcher and Wilkins (2000) examined therapies that employ caring for animals and nature study to help children with behaviour problems. Mallon *et al.* (2000) discuss how such programs can be developed and present the Green Chimneys model, based on that residential treatment center. The center specializes in the care of children with emotional and behavioural needs, and interaction with animals plays a significant role in therapy. Fine (2000b) discusses incorporating animals in psychotherapy programs, especially those for children.

Problems associated with children and abuse have also been studied. Ascione *et al.* (2000) examine the interrelationship between "animal maltreatment and interpersonal violence". Issues concerning animal abuse and its importance to children are examined in several ways: how children are affected by viewing animal abuse, connected or not with abuse of human family members, and stages children and adolescents go through that may or may not indicate abnormal behaviour with respect to animals and abuse.

1.6 Companion Animal Death

Owners also suffer upon the death of their pets. Books and articles point out important aspects of this part of pet ownership (e.g. Stewart 1999; Swabe 2000; Davis *et al.* 2003 for recent overviews). While natural death is clearly something owners must cope with, an additional issue is euthanasia. While technical considerations (when and how) are important, other areas that have received attention are the differing perspectives of the veterinarian, who deals with the issue frequently, versus the owner, who may have little

experience with this event and therefore less ability to take a “long view” (see Stewart 1999 and as summarized by Swabe 2000), and the problem of veterinarians having to deal with owners who request euthanasia for healthy pets.

Grief is another area that has been examined, including the difficulties many owners face of feeling “silly” for grieving for a “mere” pet. Davis *et al.* (2003) sought to examine what factors, including religion and approaches to euthanasia, might help people best cope with pet death. They found, as might be expected but is rarely quantified, that all but two of 68 people in their Australian sample group reported being “sad” at the death of their pet, and that over 40% described themselves as “devastated.” Religious beliefs did not seem to protect individuals from initially intense grief responses, but did seem to provide comfort over time, mostly due to beliefs in some sort of afterlife for their pet. Indeed, even participants who described themselves as atheists took comfort in this idea. Euthanasia decisions and experiences caused great conflict and distress, and having some sense of control seemed to be helpful. Veterinarians who provided clear information and clearly outlined options were identified as most helpful to clients; people also appreciated having a say in what happened to their pets.

But perhaps most important in this study was the finding that people wanted and needed to talk about their loss. The authors noted that for many owners, the pet they lost was in fact the very individual in whom they would most likely have confided about this difficult situation, and there might not be anyone else who could immediately fill that void. As has been noted in other studies, some participants were also reluctant to let others know how they were feeling “for fear of ridicule.” The authors also considered special situations, such as the unique difficulties faced by disabled persons at the loss of their therapy animals. These individuals often have particularly close bonds with their companion animals, as well as a special reliance on them. Based on their findings, the authors were able to provide veterinarians with a number of specific recommendations to help their clients cope with pet loss.

1.7 Ethical Treatment of Animals

A growing animal rights movement also reflects changes in the human-animal relationship. Since 1980, with the founding of People for the Ethical Treatment of Animals, PETA (www.peta.org), modern groups such as PSYETA, Psychologists for the Ethical Treatment of Animals (www.psyeta.org) and Ethologists for the Ethical Treatment of Animals /Citizens for Responsible Animal Behaviour Studies (EETA/CRABS, www.ethologicaethics.org) have joined older groups, such as the American Anti-Vivisection Society (founded in 1883, www.aavs.org), Humane Society

of America (HSUS, www.hsus.org), and the American Society for the Prevention of Cruelty to Animals (ASPCA, www.asPCA.org), to name a few, to increase public awareness, change opinions, and change practices related to a variety of issues concerning both wild and companion animals. The use of dogs, cats, and even rats, mice and primates in medical, veterinary, and commercial research or for training of students has been questioned, and in many cases greatly reduced as a result of these efforts.

The United States Department of Agriculture tracks the use of animals in research. Its latest report, citing data from 2002, indicates that cat research populations have decreased from a high in 1974 of 74,000 to a low of about 22,000 to 24,000, that has been relatively stable since 1998 (www.aphis.usda.gov/ac/publications/html). Alternatives to using animals in research and training continue to be actively pursued (e.g. Bekoff *et al.* 1992; Greenfield *et al.* 1995; Hart 1998). The University of California Center for Animal Alternatives has taken a leadership position in this area, providing publications, coursework, and a web-based tool (www.vetmed.ucdavis.edu/Animal_Alternatives/main.htm) designed to improve access to a wealth of information on alternatives, especially for use in education at all levels, e.g. for school children, college, and veterinary students (Hart *et al.* 2004; Hart & Wood 2004).

1.8 The Companion Animal Bond

It is clear that companion animals are important to humans. Serpell (2002) and others (Bahlig-Pieren & Turner 1999; Rajecki *et al.* 1999; Morris *et al.* 2000) have suggested that anthropomorphism itself, “attribution of human mental states (thoughts, feeling, motivations and beliefs) to nonhuman animals,” may have evolved to enable humans to recognize animals as “alternative sources of social support.” This human trait may have, in turn, acted as a selective pressure on the animals themselves, “favouring physical and behavioural traits that facilitate the attribution of human mental states to nonhumans” (Serpell 2002). Some of this may involve neotenization, the retention of juvenile characteristics into adulthood, such that adult animals continue to look and act young and “baby-like”. Several studies have made such claims for dogs (e.g. Coppinger & Schneider 1995; Goodwin *et al.* 1997; Coppinger & Coppinger 1998; McGreevy & Nicholas 1999). Cats may be similarly favoured because of their soft fur, small size, and the willingness of most of them to be held, petted and cuddled by humans (Figure 1). The personalities of pets and people may affect their relationship, as well (e.g. Podberscek & Gosling 2000), but understanding of this phenomenon has been hampered by

difficulties of definition, cross-species comparisons, and differences in methodology.



Figure 1. Cats may be favoured as companion animals because of their soft fur, relatively small size, and the willingness of most of them to be held, petted and cuddled by humans.

Archer (1997) explored these issues in some detail in his examination of the possible evolutionary aspects of pet-keeping. In essence, “pet ownership poses a problem, since attachment and devoting resources to another species are, in theory, fitness-reducing.” Like other forms of interspecific association, he argues, pet-keeping must be examined in terms of benefits and costs for the participating species. He suggests that pets evolved ways to elicit care-giving from their human partners, manipulating human responses that were originally selected to facilitate human-human interactions. The human partner in turn may be rewarded with a relationship that has fewer conditions and expectations placed upon it than those involving other humans.

Such evolutionary selection may have both positive and negative consequences. Serpell (2002) suggests, for example, that the loyalty and fidelity exhibited by many dog breeds may be a result of this process and is a positive outcome for both humans and dogs. Alger and Alger (1997) further suggest that humans and companion animals have formed shared rituals that

are co-understood and performed, allowing for routine interactions. On the negative side, Serpell (2002) and others (e.g. McGreevy & Nicholas 1999) note that the breeding of dogs for specific physical traits has resulted in numerous health problems, some lethal (for example, severe sleep apnoea in English Bulldogs). Serpell (2002) also suggests that selection may have resulted in animals that are themselves so dependent on their human attachments that various behaviour problems develop as a result (such as “separation anxiety”), often leading to relinquishment of the pet. Cats have not been subjected to as much selective breeding as dogs; however, increasing interest in “tailored” cats may have effects in the future. For example, the rise in interest in Pixie cats or Munchkins, who have exceptionally short legs, or Sphinxes, that lack normal fur, may lead to problems in cats similar to those found in dogs (see Chapter 10).

Evidence has mounted, then, that the companion animal bond “must be looked upon as a kind of relationship that supplements and augments human relationships – the bond distinctively different from human relationships” (Katcher 1981), and that there are both good and bad aspects to this relationship.

2. CATS AS COMPANION ANIMALS

2.1 Scale of Cat Ownership

In some countries, cats have surpassed dogs as the most numerous companion animal, with an estimated 76 million in American homes (Euromonitor International 2003). While the United States is the world leader in cat ownership, 12 of 15 countries considered key markets for cat food and cat care products have also shown increases in cat ownership from 1998 to 2002, ranging from a modest 1.4% (Ukraine) to as much as 28.4% (Brazil) (Euromonitor International 2003). Reasons cited for these increases include cats being easy to care for (they can use a litter box so don’t need to be taken outdoors), small enough to be kept easily in smaller living spaces such as apartments, and able to endure long separations without apparent problems. These traits make them ideal companions for present-day owners who work long hours, may postpone house buying until later in life, and move frequently, often to rented apartments rather than to owned houses.

2.2 Benefits of Cat Ownership

A number of factors that affect pet ownership were brought to the fore and considered in Podberscek *et al.*'s collection of papers (2000). However, cats do not play a big role in most of the studies presented. Indeed, cats form only a small part of many studies that examine favourable attributes or positive benefits of pet ownership, or are not included at all. If cats are included, they are generally ranked lower or less positively or with more mixed results than dogs. For example, Bonas *et al.* (2000, and see Serpell 2002 for overview) used a survey instrument (the Network of Relationships Inventory) to enable people to describe and evaluate the different kinds of social support they derive from both human and non-human animal relationships. Although humans scored highest overall in the aggregate, pet dogs scored higher than humans in some areas while cats ranked lower than dogs overall (although they did rank higher than other pets and scored almost as well as humans in some categories).

Enders-Slegers (2000) investigated the importance of companion animals to elderly cat and dog owners, most of whom lived alone. Her findings provided support for the idea that companion animals do play important social roles; however, only 14 of 60 participants owned cats, with an additional six owning both a cat and a dog. More than half of the participants owned only dogs.

Most physiological studies that show human health benefits focus on dogs, and when cats are included results are often mixed (see reviews by Friedmann 2000; Friedmann *et al.* 2000). For example, in a study of angina and other cardiovascular disease (Rajack 1997), results suggested that cat owners were more likely to be readmitted to hospital for further cardiac problems or angina than people who did not own pets. In addition, although people who adopted pets, either dogs or cats, from shelters experienced decreases in minor health problems one month after adopting, this effect lasted for the full 10 months of the study for dog owners but not for cat owners (Serpell 1991). Possible confounding factors in these physiological studies, however, include the fact that women were much more likely to be cat owners than men were, and were more likely to die from their heart conditions by the time they were hospitalized than were men; also physiological severity of illness was not always controlled for (Friedmann *et al.* 2000).

Studies of attachment and of the effects of cats on mood also provide mixed results. Zasloff and Kidd (1994b) examined 148 adult female students and found that having a pet could help decrease feelings of loneliness, particularly for women living alone, and compensate for the absence of human companionship. Cats and dogs seemed equally good at providing

companionship. However, women living with only a cat were less attached to the cat than women living with both a cat and other people. In contrast, single women with dogs were more attached to the dog than those in multi-person households. The authors suggested that being alone with a dog allowed for more walks, rides, playing of games, travel, and other activities together, during which the dog served as a meaningful companion. Being alone with a cat does not necessarily result in any more behavioural interaction or different kinds of interaction than being with a cat in a multi-person home.

Zasloff and Kidd (1994a) examined various aspects of attachment to cats in more detail and found a more positive result. They surveyed 100 adult cat owners who seemed to be strongly attached to cats. Participants owned 267 cats, and stated that they preferred cats because of the ease of care, the affection and companionship provided by them, and their personalities. They also liked the behaviour and appearance of cats, said they felt comforted by cats, or that they simply loved cats or had “always had cats”. One person said that “purring creatures who sit in your lap tend to reduce stress levels.” Respondents did not like some aspects of cat behaviour: annoying behaviour (which was not further defined), lack of social behaviour or affection, destructive or aggressive behaviour, shedding and hairballs, fights with other pets, or feeding problems. The authors then compared how people felt about their cats versus humans. For example, they compared rankings (1 = strongly disagree to 4 = strongly agree) on such statements as “My cat makes me feel safe” versus “My companion makes me feel safe”. They found that cats were ranked as being better than humans at making people feel needed, and providing companionship, something to care for, and something to watch. They were ranked as being worse than humans at making the participants feel safe or providing them with exercise.

Zasloff herself, however, cautions us about interpreting studies of attachment. She notes in a later study (1996) that the kind of survey questions used to assess attachment often include those specific to interactions with dogs, leading to higher attachment scores for dog owners than for owners of other pets. She developed a scale to assess this issue, based on postulates by Beck and Katcher, discussion with other researchers and other scales, primarily the Lexington Attachment to Pets Scale (Johnson *et al.* 1992). Using the Comfort from Companion Animals Scale (CCAS) which measures attachment in terms of comfort received from a pet, she documented that there were no differences in attachment scores between cat and dog owners on “11 items pertaining to the emotional nature of the relationship”; if two items pertaining specifically to dogs were included (relating to exercise and safety), dog owners showed a significantly higher degree of attachment.

Using an in-home interview approach, Miller and Lago (1990) sought to actually document differences in how dogs and cats interacted with owners. Again cats were underrepresented, with only 15 of 46 elderly women participants being cat owners. As might be expected, dogs inserted themselves much more into the interviews, interacting with owners and interviewers. They also were more likely to show coordinated movements with owners (e.g. owner got up, dog got up, owner sat back down, and so did the dog), make noises (such as whining, barking) and be given orders by the owner (e.g. "sit down"). Cats engaged in less social behaviour toward interviewers, and were more likely to be described by the interviewer as being calm, dignified, aloof or ignoring during the session. The main cat-related behaviours noted by interviewers were that cats let owners pick them up, the cats made friendly approaches to the interviewer (although fewer cats than dogs did this), and the owners told more stories about their cats than about their dogs. Clearly there are important differences in how cats and dogs serve as companions. While these differences may be familiar to owners, there is little scholarly research that examines these differences directly.

Albert and Anderson (1997) examined the contributions of dogs and cats to morale maintenance and positive social interaction within the family by surveying 85 families on 14 attitude items (such as "our pet helps family members cope with the normal stress of everyday life," or "our pet can sense when a family member is ill or upset."). Similar numbers of households had at least one dog or one cat. On the nine items that tested as significant, owners demonstrated that they perceived both cats and dogs as contributing to the morale of the family, that is, help "ameliorate daily stress, cope with life crises, and facilitate positive social interaction". However, dogs were perceived by owners to have a more profound impact on promoting morale and positive interaction, as demonstrated by the fact that pet type (dog) was the only variable found to have a significant effect on people's responses.

A ray of optimism about cats as companions comes from studies that focus directly on observations of the cat-human interaction, such as those by Turner and his colleagues. For example, in a number of studies this group examined how the presence of, and interactions with, a cat affected owners' moods (Rieger & Turner 1999; Turner & Rieger 2001; Turner *et al.* 2003). They found cats could decrease human negative moods, although the cat did not put an owner in a good mood, unlike studies of owners who were petting their dogs. Stambach and Turner (1999) found that cats may substitute for persons in the social network or provide an additional source of emotional support, especially for those who were strongly attached to their animals. Turner (2000a) also found that cats "appear to take on the role of a significant partner in relationships involving [older] people living alone." An

overview of human-cat attachment, factors that affect the relationship, and various mechanisms that seem to play a role in establishing and maintaining good relationships between cats and their owners are summarized in Turner (2000b).

Hart (2000b) also provides a positive overview of the value of cats as companions in her chapter on the selection of animals for Animal-Assisted Therapy. She stresses the flexible nature of cats, including their ability to be socially self-sufficient, to be left alone for longer periods than dogs, and to be more likely to accept care from strangers (such as neighbours or friends) if owners become ill or hospitalized. Cats also require less effort and are less demanding than dogs and require less vigorous interaction, a positive aspect for owners who are older, disabled, or fatigued from caring for others who are ill. In the same volume, Granger and Kogan (2000) outline how cats can best be used for therapy. For example, they are especially useful for those individuals who are afraid of or allergic to dogs (though cat allergies are more common), and the best cats are those who are very friendly and seek and respond well to petting and being held on a person's lap. Bernstein *et al.* (2000) showed that cats and dogs brought to clients in long-term care facilities as part of a therapy regimen enabled clients to participate in more frequent and longer lasting conversations with both humans and the animals, increase their initiation of social behaviours (both conversations and petting the animals), and dramatically increase the amount of touch in which they were involved, due primarily to petting the animals. Being able to initiate interactions and touch something outside of themselves are both important ways these patients can maintain contact with their external surroundings.

2.3 Dislike and Fear of Cats

Not all humans like cats, and some fear them. Serpell (2000) notes that throughout medieval Europe cats were seen as “malevolent demons, agents of the Devil” and associated with witchcraft; traditional Japanese folklore also depicted cats as demons. Citing Ritvo (1985), Serpell notes that even in the professional zoological literature of the 19th century, cats were the most “frequently and energetically vilified of all domestic animals.” Even in the twentieth century, owners in many countries continued to voice concerns that cats would sleep on children's faces, smothering them, or “steal their breath”, or cause asthma (Serpell 2000). While cats are popular pets today, they continue to also be targets of dislike.

Fear of cats may actually result in phobia, “persistent and irrational fears of a specific object, activity, or situation that is excessive and unreasonable, given the reality of the threat” (American Psychological Association, glossary at www.psychologymatters.org). Felinophobia, or ailurophobia, is

one of several anxiety-related disorders now defined as “specific phobias”, and is similar to agoraphobia (fear of crowds), acrophobia (fear of heights), and arachnophobia (fear of spiders). Cat phobia does not seem to be linked to a dislike of cats; people are simply irrationally afraid of them. The fear may be the result of a bad interaction with an animal in early childhood but more often the origin of a specific phobia is unknown (McNally & Steketee 1985). Although many children may fear animals at some point early in their lives, most apparently lose that fear as they grow older; adults with specific animal phobias are thought to be those whose childhood fear has failed to dissipate (McNally & Steketee 1985). Like most phobias, this fear may cause simple symptoms such as dizziness, sweating or breathlessness, or more complex and frightening reactions including heart palpitations, fear of dying, fear of becoming mad or losing control, or a full-blown panic attack. Treatments range from traditional psychotherapies to various behaviour therapies to hypnosis.

3. THE HUMAN-CAT RELATIONSHIP

3.1 Socialization and Paternity

Kittens spend much of their first few weeks with their mother, experiencing a warm, encircling “hollow”, with their bodies in contact with warm surfaces (mother and litter mates). This may influence what “spots” cats prefer as adults (warm encircling areas such as pillows, laps, chair corners) and their social skills, which they are gaining at the same time. The latter develop as the kittens learn to adjust their suckling behaviour with respect to changes in the behaviour of littermates and their mother (Rosenblatt *et al.* 1961).

The important socialization period of cats to people seems to occur between 2 and 8 weeks (e.g. Karsh & Turner 1988) and socialization to people seems to be less effective if delayed until after 7 weeks. Several studies have addressed natural temperaments, that is behaviour expressed as kittens before extensive exposure to outside influences, while others have examined individuality, socialization to other cats, and possible ways to encourage socialization to humans, usually through increased human handling of kittens at an early age (Moelk 1944; Meier 1961; Collard 1967; Moelk 1979; Adamec *et al.* 1983; Meier & Turner 1985; Feaver *et al.* 1986; Mertens & Turner 1988; as reviewed in Mendl & Harcourt 1988 and updated in Mendl & Harcourt 2000).

Feaver *et al.* (1986) identified a number of cat personality types from observed behaviors, condensing them into active/aggressive, timid/nervous, and confident/easy-going. Other studies have used similar terms (e.g. Moelk 1979; Karsh & Turner 1988). Lowe and Bradshaw (2001) looked for stable personality traits by studying the post-meal behaviour of kittens and described several sets of traits that seemed to remain more or less stable for the duration of the study (4 to 24 months). The most stable behaviours were those that started as kitten investigatory behaviours (such as “inspecting the experimenter”) and kitten approach behaviours to the observer (described as “boldness”). Staying indoors after eating and various rubbing-associated behaviours (such as rubbing objects or the observer, and flicking the tail) were somewhat less stable or seemed related to specific environmental or developmental conditions (such as a cat needing to urinate outside soon after eating). Several studies have demonstrated that handling by humans during early development can help kittens be less fearful and friendlier toward people, especially when contact includes talking (summarized in Karsh 1984). However, they also reveal that some kittens seem resistant to change in their original types; in other words, some friendly kittens remain friendly whether handled or not, and some fearful kittens remain so despite handling.

Some studies have suggested that the genes of the father, genetic and behavioural influences of the mother, the presence or absence of the mother during early encounters with humans, aspects of kitten curiosity and fear, and human stroking and feeding may all be factors that affect kitten responses to humans (e.g. Collard 1967; Turner *et al.* 1986; Reisner *et al.* 1994; McCune 1995; and summary in Turner 2000b). For example, Reisner *et al.* (1994), sought to determine if handling at early ages or other factors, such as paternity (Turner *et al.* 1986), would help kittens in a research colony better respond to necessary laboratory or veterinary procedures (vaccinations, etc). They found that a limited period of handling (15 minutes, three times per week for three weeks, which they felt would be a realistic protocol for assistants to follow if instituted as policy) had no clear effect on later behaviour (up to 20 weeks). Rather, paternity and litter of birth had the greatest influence on whether or not kittens were calm during procedures.

McCune (1995) sought to extend Turner’s work (Turner *et al.* 1986), simultaneously investigating the influences of early kitten socialization to humans and friendliness of the kitten’s father on subsequent interactions of kittens with humans. Each of these aspects was found to influence the behaviour of cats at one year of age. Kittens were handled or not from 2 to 12 weeks and then tested at one year of age. Testing involved three different situations per cat: a familiar person entering the test enclosure, sitting for ten minutes, and then approaching the cat; an unfamiliar person doing the same sequence; or the placing of a novel wooden box in the center of the

enclosure. There was a significant effect for some behaviours, such as latency to approach within 50 cm of the test person, touch, and rub the person, and short latency correlated with the friendly father and socialized condition. Socialized one year olds from a friendly father were more likely to show relaxed behaviour and less likely to show defensive behaviour to a stranger (such as hissing, body flattening, or hiding). Socialization did not seem to play a role in responses to the novel test box; the box initially distressed all the cats. However, friendly-father cats were quicker to approach, touch, enter the box, and stay near it than were cats with unfriendly fathers. This response, based more on father characteristics than early handling, suggested that the cats had inherited or developed a “boldness” to approaching people or objects, rather than simply an increased “friendliness” toward people. Although only two fathers were involved, the results suggest that father personality plays a role in the development of kitten personality.

Mertens and Turner (1988) confirmed that individual personality types in adult cats influenced their behaviour when interacting with strange people in an unfamiliar setting (an observation room), a nice demonstration of differing “styles” of cat-human interaction. Lowe and Bradshaw (2002) extended these findings by examining how pet cats reacted to being held and petted for one minute by an unfamiliar person, at ages ranging from weaning to three years old. They found stable individual differences in attempts made to escape and others signs of distress (growls, tenseness, protruding claws) from 4 months on. Early handling did not seem to be a major factor after 4 months, suggesting that the way a cat reacts to being handled by an unfamiliar person is largely determined by then. The most escape attempts and distress occurred at 12 months, a time when social and hormonal changes might also be occurring (e.g. Bernstein & Strack 1996).

Mendl and Harcourt (2000) revisited the issue of individuality and socialization, and suggested an overall schema summarizing the factors that appear to affect the expression of “friendliness to humans”. These include early social experience with mother and siblings, paternity, breed, coat colour, maternal care, duration and quality of interaction with humans (and probably timing and context as well), and environmental complexity, affecting an individual cat’s boldness in novel situations and specific responses to humans. All of these factors together interact with features of a specific current situation to predict the level of “friendliness” that will result. Evidence they present suggests that some behaviours will be stable within an individual over time and some may change.

Siegford *et al.* (2003) have attempted to use the understanding gained from these and other studies (e.g. Lee *et al.* 1983) to develop a relatively quick, simple, and reliable cat temperament test that would help shelter staff,

veterinarians, and others to better assess “cat sociability, aggressiveness, and adaptability”(see section 5.3 for more detail).

3.2 Breed Differences

There are currently 37 pedigree and four “miscellaneous” breeds recognized by the Cat Fanciers’ Association, Inc. in the United States, described as the world’s largest registry of pedigreed cats (see website www.cfainc.org); there are similar numbers listed by the Governing Council of the Cat Fancy in the United Kingdom (see website ourworld.compuserve.com/homepages/GCCF_CATS). Although both groups and many popular cat books describe physical and behavioural characteristics of different breeds, for example the “intelligence, inquisitive personality, and loving nature” of the Siamese or the “playful but not demanding and tremendously responsive nature” of Persians, few studies exist that directly examine behaviour differences among breeds.

In one such study, Turner (2000a) sought to examine breed differences in human-cat interactions by looking specifically at pedigree Siamese and Persian versus non-pedigree cats. The common belief among most cat owners is that these two breeds, among the oldest purebred lines, behave differently from the “common” domestic short hair and are among the most extreme of cat breeds in behaviour and character. Owners of Siamese, Persian, and non-pedigree cats were asked to assess their cats’ behaviour traits using a series of rating scales (for example, for playfulness and affection toward owner). They were asked to rate their actual cat versus their “ideal” cat, that is, how their current cat actually behaves versus what behaviour they would most like to see in a cat. They were also directly observed interacting with their cats at home (both techniques were used in part to control for differences in owner perceptions and behaviour). A total of 21 Siamese, 35 Persian, and 61 non-pedigree cat households was observed.

This study confirmed that selective breeding seems to have resulted in Siamese and Persians being more predictable and socially interactive than non-pedigree cats. Siamese initiated more interactions and vocalized more in doing so (confirming what cat most owners believe about this “talkative” breed). Their owners rated them as more playful, curious, friendly to strangers, more often near the owner, more likely to vocalize, higher on affection to the owner, and significantly less “lazy” than did owners of non-pedigree cats. Persian cats were ranked higher on affection to the owner, staying closer to them, vocalizing more, more predictable, clean, fussy about eating, and more friendly toward strangers. Overall, the purebreds were fussier eaters but were ranked as being better behaved and more interested in

their owners than non-pedigree cats. Direct observations in the home showed that people tended to interact much longer with the purebreds than with the non-pedigree cats, and spent more time near them. Results also showed that owners tended to interact more often and for longer periods and spoke more frequently with cats who were confined indoors, usually the purebreds, than with cats who went outdoors. Further, older adult humans (greater than 65 years) seemed to accept the independence of their cats better than did younger adults, and seemed more tolerant of them.

Studies such as these provide prospective owners with research-based information about breed behaviour and the effects of genes and early handling on subsequent behaviour. Such information may ultimately guide people in choosing their pet cat more wisely in the future or in dealing with cat behaviour problems.

3.3 Interactions between Cats and Humans

Traditionally, the study of interspecific interactions by animal behaviour researchers has focused on examples such as oxpeckers and oxen, flowers and their pollinators, ants and acacia trees. And yet some of the most obvious interspecific interactions, those between pet owners and their pets, have been largely ignored. Cat-human interactions are no exception; few studies have actually examined how cats interact with one another and with humans in the home. Cat interaction studies by Bernstein and Strack (1996) and by Barry and Crowell-Davis (1999) are two pioneering studies in this area. Both demonstrate the complexity, subtlety, and adaptability of cats that are placed together by humans in groupings and in environments usually not of their own choosing. The role of individual cat personalities and changing circumstances in ensuing behaviour is clear in both studies.

Bernstein and Strack (1996) focused, in over 300 hours of observation, on the spacing patterns, use of favoured spots, dominance and other relationships, and communication behaviours, such as tail signalling, of 14 cats in one home. Individual personalities, age and gender played major roles in the cats' behaviours. For example, the death of the oldest male, the only cat in the group to demonstrate classic dominance behaviours of fighting, chasing others, and supplanting, led to a number of unexpected changes in the spacing patterns and behaviours of other cats, including those with whom this male had not obviously interacted (they had rarely if ever been the targets of his dominance behaviours). Favoured spots throughout the house, where certain cats were likely to be found at certain times of day, were time-shared by specific groups of individuals rather than being used randomly. These groups seemed to be based on gender and individual identity, as well as on past history (as when an older female continued to share a spot with an

adult male who she had “adopted” as a kitten). An increasing understanding of such normal behaviours among cats in the home would improve our ability to tell owners what to expect from their cats, how to deal with problems and the role owners play in cat-cat as well as cat-human interactions.

Barry and Crowell-Davis (1999) examined the behaviour of two-cat dyads in 60 homes. Twenty dyads of each gender combination (male-male, male-female, female-female) were observed for 10 hours for each pair, a total of 600 hours. All the cats were neutered and indoor-only. They found less aggression and more affiliative behaviours and time spent in proximity than they had expected. Only 68 instances of aggression were noted, and these seemed to depend more on relationships between specific individuals than on gender, age, size of home or other factors. Length of time in the relationship correlated with decreased levels of aggression. Cats spent an average of 40% of their time within 3 meters of each other, despite their homes having more than enough space to allow them to stay further apart, and male-male pairs spent more time in close proximity, 0 to 1 meter, than did other pairs. A wide variety of affiliative behaviours were seen, including allorubbing, allogrooming, and sniffing. Despite the limited spatial range available and the forced proximity of these cats to each other, they displayed behaviours more typical of a social than of an asocial species. Cat social behaviour is discussed in greater detail in Chapter 1.

Few studies have directly examined interactions between cats and humans in the home. In one such pioneering study, Mertens (1991) showed the complexity of the human-cat relationship as it occurs naturally in the house. She observed 72 cats interacting with 162 people over a 12-month period, in sessions lasting 210 minutes each. She attempted to reduce observer effect by trying to make the owners and cats feel as if she were a normal visitor. She talked to and ate with owners if invited, and stood or sat in rooms as a visitor might; however, she never interacted with or responded to the cats. She identified and examined a list of “social events” engaged in by people and their cats, and the durations of each. The list included a range of typical situations, such as approaching within one meter or withdrawing that far by a cat or human, passing by within sufficient proximity for an interaction, a person picking up or putting down a cat or a cat jumping up on a person’s lap or leaving it, petting of a cat by a human and rubbing of a human by a cat, a human speaking to the cat, and so forth. She examined the results by person, by cat, and by the cat-human dyad.

Generally, there was a low level of interaction and most interactions were of fairly short duration (one minute or less). Humans tended to approach within 1 meter of the cat more often than the reverse, but when the cat did the approaching, the human and cat stayed within 1 meter of each other for a

longer time. The gender and ages of the people in the experimental situation affected cat interactions: women, men, boys, and girls interacted differently with cats (for example, adults vocalized toward the cat earlier in an interaction and for longer than did children). Women spent more time at home and therefore had more interaction with cats than did men; juvenile humans (11 to 15 years of age) were least likely to be within 1 meter of the cat and had the least amount of interaction, although it was not clear why. Single cats stayed closer to owners for longer and had more social play and more interactions in general with owners than did multiple cats. Interaction, proximity, and rubbing by the cat were moderately more frequent in smaller than in larger families. In view of the increasing popularity of cats as companion animals in many countries, follow-up studies are needed in this area.

Turner also investigated how humans interact with their pets, focusing more on emotional aspects. In his study of purebred versus non-pedigree cats (2000a, see section 3.2), he found that humans tended to have certain expectations of their cats, and that purebreds seemed to meet them more predictably than did non-pedigree cats. Turner's group also demonstrated that the human-cat relationship is indeed a "two-way partnership, with both parties adjusting their behaviour to that of their partners" (Turner & Stambach-Geering 1990; Turner 2000b).

Heidenberger's survey of 550 German cat owners (1997) also provided insight into how cats and humans interact and utilize the space and resources inside houses (e.g. how much space cats utilize, who sleeps with whom, availability to cats of food and litter boxes). Some information about what owners perceived as problems (behaviour the owner dislikes and wants to change) was also examined and attempts made to find correlations. For example, neutered females (who represented the largest group of cats in the study) were perceived most often as exhibiting problem behaviour, and people who said they interacted with their pets for several hours over the course of each day mentioned fewer problems. However, the author points out that problem behaviour was owner-defined (for example, one owner's problem, such as the cat scratching on furniture, might be seen by another owner simply as typical cat behaviour and not reported), and owners who mentioned fewer problems might have different perceptions of what constitutes acceptable behaviour in cats.

Studies by Alger and Alger (1999, 2003) of cats in shelters echo findings in the home, with both cats and people (mainly the shelter volunteers) making choices about who they will interact with, where, how and when. These authors talk about the "negotiated order" that emerged in the culture of one shelter they studied closely, an order based on both cat and human

needs and behaviours. They stressed that the cats were partners in the interactions with each other and with humans, rather than targets.

One of the most obvious and familiar human-cat interactions is that which occurs when humans pet or stroke cats (Figure 2). Surprisingly, little formal study has focused on this interaction. Turner and his colleagues (1999; Turner & Rieger 2001; Turner *et al.* 2003) have been interested in the importance of petting in providing emotional support for humans, that is whether petting cats can elevate the mood of humans. Results indicate that petting of cats seems to have little effect on mood overall and does not seem to predictably put owners into good moods as petting of dogs seems to, but does seem to help decrease negative mood (see section 2.2).



Figure 2. Surprisingly, little formal study has focused on the interaction which occurs when humans pet or stroke cats.

In a preliminary study based on responses of cat owners to questions about petting, Bernstein (2000) has found patterns of interaction that suggest shared ritual, that is, agreed-upon rules for social interaction and shared routines (see Alger & Alger 1997). Owners identified body areas where their cats seemed to prefer to be petted; cats indicated these areas by engaging in behaviours such as staying still, or closing their eyes, or moving their head

or body in such a way as to encourage rubbing of specific sites (for example, along the cheeks, between ears and eyes, top of head, stomach). Owners described sequences of petting that the cat seemed to indicate were desired (e.g. head to back to tail to stomach), and behaviour patterns of the cat that were interpreted as seeking initiation of petting (for example, leap on lap, rub on person's leg, flop down in front of person and look up). Some cats had specific "petting arenas" in the house, often leading owners to a particular spot before standing still or flopping down for petting, or only allowing petting in certain sites, such as the bathroom.

In a different approach, Soennichsen and Chamove (2002) tested nine cats for body-area petting preferences using a prescribed protocol. Family members were instructed to pet their cats for five minutes at one of four body sites, three involving gland areas (temporal gland between the eye and ear, perioral gland on chin and lips, and caudal gland) and one non-gland site. The temporal area had the greatest number of positive responses from the cats (although it is not clear what that response was) and the caudal the least. These results are similar to those in Bernstein's survey, where 48% of 90 cats preferred petting in the head area: 27% of those on the cheeks, nose and eye area or under the chin, and 21% on the ears, in front of the ears (temporal area) or behind the ears; only about 8% of the cats were described as preferring to be petted on the stomach or tail (either at the base of the tail or on the tail itself).

Cat vocalizations toward humans are another obvious area for study. Attempts have been made to parse the vocalizations by context (Moelk 1944, 1979; Brown *et al.* 1978; Bradshaw & Cameron-Beaumont 2000; Nicastro & Owren 2003), and to even assess human perceptions of the calls. For example, Nicastro and Owren (2003) asked human subjects to classify cat vocalizations into specific contexts; accuracy was just above chance, and better for those who had lived with, interacted with, and had a general affinity for cats. This suggests that cat meows are relatively nonspecific and their meanings must be learned by human owners and accompanied by other contextual information to be meaningful. Recently, Nicastro (2004) asked human subjects to rate vocalizations from specific contexts as pleasant or not; long, low-frequency calls were perceived as less pleasant than shorter, higher-frequency calls, indicating an ability of humans to gain important emotional information from the calls, perhaps helping to prompt specific and useful responses. The latter is an attempt, in part, to assess whether domestic cat vocalizations have been adaptively selected to elicit positive responses from humans.

An overview of cat to cat communication by Bradshaw and Cameron-Beaumont (2000) examines a variety of other signals, including olfactory, visual, auditory and tactile displays, as well as vocalizations. These authors

also examine the evolutionary relationships among the Felidae and seek patterns in the evolution of various communication signals. They suggest that some signals, such as vocal meows and purrs, visual tail-up signals (previously examined by Kiley-Worthington 1976 and Bernstein & Strack 1996), rolling and certain rubbing displays, have been modified for interspecific communication with humans, including neotenization of some of the signals; these possibilities have only begun to be evaluated.

There is a large veterinary literature on food products for pet cats. Research is ongoing to explore what foods best help cats develop good health, maintain it, and avoid potentially fatal problems (e.g. National Research Council 2003, see Chapter 9). However, little study has been done of the actual feeding interaction itself (initiation, coordination, ending), even though this is one of the most common, frequent and important interspecific interactions in which humans and cats engage and where communication and manipulation by one or both parties may play important roles. Bradshaw and Cook (1996) did examine the behaviour of 36 cats during feeding for a general overview of cat behaviour in this situation. They observed each cat during a pre-eating period as each owner opened a can of food provided by the observer (to begin an observation period), as the cat ate the food, and during the first 5 minutes post-eating. Each cat was observed 8 times, for a total of 288 behaviour sequences. Overall, cats spent much of the time during the pre-meal period interacting with the owner, using communicative patterns such as meowing, tail-up and rubbing, and spent much of the post-meal time grooming, with much less interaction with the owner. There were elements of individual "style" within these sequences, but no major differences among cats. While these behaviour patterns are quite well known to cat owners, this is one of the few studies to seriously research this situation and to document the behaviour quantitatively.

Other common human-cat interactions that have not yet been well studied include those involving litter boxes, such as placement, litter type, number of boxes per social group (there is some evidence that cats try to solicit changing of soiled litter, S. Crowell-Davis, personal communication); contact-seeking behaviour, with either party initiating this (e.g. petting, cats sleeping on laps or on beds with owners); and conversation. While study of the latter has begun for dogs (e.g. Mitchell & Edmonson 1999, Mitchell 2001), there are few data for cats. In a preliminary study, Sims and Chin (2002) observed undergraduate students as they used a toy to engage a cat that was unfamiliar to them. Almost all the students spoke to the cat, and the language used was similar to child-directed language in a number of ways, for example involving short utterances, very short words, a large amount of repetition, and many imperatives. The authors concluded that this interspecific conversation follows a human model whereby the human

perceives a social interaction and thus uses speech, modifying that speech based on the perceived comprehension of the listener. It is not clear, however, if or how the cat modifies its own “conversational” style. Further experimental studies, as well as studies of naturally-occurring conversations between cats and humans in the home setting, are needed.

Cats may suffer when their human companions leave them alone in the house. There is some evidence that they develop clinical signs of separation anxiety, a phenomenon more typically associated with dogs, including inappropriate urination and defaecation, excessive vocalization, destructiveness, and other problem behaviours (Schwartz 2002).

Another area that has not been well studied involves interactions that occur between cats and other animals, where the animals interact as if they were companions, for example cats and dogs in the same household that regularly play and sleep together, or cats that regularly stay and interact with horses: are these cases of pets keeping their own pets, of companions having their own companions? While there is much anecdotal information about this phenomenon, research has not directly addressed this aspect of cat relationships.

4. RESPONSIBILITIES OF PET OWNERSHIP

4.1 Veterinary Health Care

There are obvious responsibilities of pet ownership: providing adequate and appropriate nutrition, means of identification to avoid loss, vaccinations, and other preventative health care. Cat owners, however, traditionally have been less likely than dog owners to take their pets to veterinarians. The latest survey conducted by the American Veterinary Medical Association in the United States (AVMA 2002), based on information from 54,000 households in 2001, found that even though cat owners made an astounding 70 million visits to veterinarians, dog owners made over 117 million visits, despite more cats being kept as pets. Nevertheless, according to surveys conducted by the American Pet Products Manufacturers Association (APPMMA 2004), cat owners increased the number of visits to the vet from 1.6 in 2000 to 2.3 visits in 2002, making them more comparable to dog owners (who averaged 2.6 visits in 2000 and 2.7 in 2002). In the American Veterinary Medical Association Survey (2002), both dogs and cats were most frequently brought in for physical exams (69% and 67% of visits, respectively). Dog visits were more likely to involve drugs and medications (31% of visits versus 18% for cats), while cat visits involved vaccinations slightly more frequently (71%

for cats versus 64% for dogs). Cat visits were much more likely to involve spaying or neutering (14% versus 6%). Few dogs (0.6%) and cats (0.3%) were provided with computer microchips or tattoos for identification. In the United States in 2001, cat owners spent over 6.6 billion dollars and dog owners over 11.6 billion dollars on veterinary visits. It is interesting to note that in 2002 in the United States only about 1% of cat owners and 2% of dog owners, or 3% in total, had health insurance for their pets compared with 15% in England and 57% in Sweden (APPMA 2004).

4.2 Human Health Concerns

The general public, and physicians, veterinarians and healthcare associates considering Animal-Assisted Therapy for their patients, have an interest in and a need to examine potential health risks from companion animals, including cats. Risks include zoonoses, that is diseases naturally transmitted between animals and humans, as well as allergies, asthma, bite injuries and infections, flea and parasite transmission, and other hazards. These risks have been examined from a variety of viewpoints (e.g. Warner 1984; Hoff *et al.* 1999; Morrison 2001; Brodie *et al.* 2002; Linneberg *et al.* 2003; see Chapter 6). Most references emphasize the low risk of disease associated with cat ownership.

Even those humans with compromised or depressed immune systems, including the sick and very young, may benefit from and be able to continue pet ownership with precautions (e.g. Spencer 1992; Angulo *et al.* 1994; Lappin 2000). The introduction of long-lasting rabies vaccines, the finding that toxoplasmosis can be introduced from a variety of sources, not just from cats, and other factors (such as owners keeping cats indoors so they are less likely to be exposed to parasites or to transmissible diseases) seem to have decreased human concerns about cat zoonoses. Some recent studies have even reported surprising results, such as finding that being exposed at home to pet cats and dogs early in life may have a protective effect against allergy (e.g. Ownby *et al.* 2002) or even asthma (Perzanowski *et al.* 2002), rather than exacerbating these conditions, although one study found pet ownership had little effect on asthma either way (Ownby *et al.* 2002).

Pets have also become one of many foci in the “war on terrorism”. There is concern that bioterrorism might include the use of pets and other animals as transmitters of disease. More positively, pets might also serve as a “first alert” repository of diseases, indicating that bioterrorism is being attempted.

5. FAILURES OF THE HUMAN-CAT RELATIONSHIP

5.1 Animal Abusers and Hoarders

Sometimes the human-animal bond goes wrong in serious ways. Animals are often subjected to physical and emotional abuse and cruelty, and they may also become targets of hoarding behaviour, in which individuals live with dozens to hundreds of living and dead animals. Such individuals often show signs of pathological self-neglect and a variety of psychological conditions, including obsessive-compulsive disorder (Arluke *et al.* 2002). They may surround themselves with other objects as well as animals, such as newspapers, dirty plates and utensils, or accumulated food, and declare that they love their pets while seriously neglecting them.

Research presented in Arluke and Luke (1997), Lockwood and Ascione (1998), Ascione and Arkow (1999), Donley *et al.* (1999), and a classic paper by DeViney *et al.* (1983), most vividly examine the connection between animal abuse and violence among humans. Summaries of case reports of abuse, chilling first-person accounts, reviews of laws and the handling of cases by authorities provide important overviews of these phenomena and set an agenda for future work. Although one of the major points of these studies is that there is a connection between abuse of animals and abuse of people, one of the more disconcerting findings is that many instances of animal abuse are not done by individuals who go on to hurt humans. Rather, abusive acts can be performed by "apparently normal" individuals who do not see anything wrong with harming dogs and cats, and who do not see them as deserving of care or respect.

Serpell (1999) examines this phenomenon from a historical perspective. He notes that hunter-gatherers exerted little control over their wild prey, rarely meeting them or directly interacting with them until the moment of death, seeing them as independent beings with independent minds; the need to meet them on their own terms in order to gain food led to a respect for animals. Farmers and herdsman, on the other hand, have a great deal of control over their domestic animals from the start, a situation which fosters domination as a principle force rather than equality. This human-centered worldview has been reinforced by philosophers since Aristotle, including Aquinas and Descartes. Serpell argues, then, that humaneness, kind or respectful treatment of animals, is an ancient human phenomenon rather than a recent one, and that this natural tendency was suppressed by the rise of domestication and other concurrent cultural changes. Rather than a tendency to abuse animals being part of our "animalistic" nature, this approach

suggests the reverse, that we are much more likely naturally to respect animals and therefore can change cultural historical habits that emphasize domination and control.

Several researchers have examined the problems animal abuse pose for veterinarians and suggested strategies and policies for dealing with them (e.g. Ascione & Arkow 1999; Donley *et al.* 1999). Sharpe and Wittum (1999) provide a brief overview of the difficulties veterinarians face in dealing with these issues in small animal practice, issues similar to those faced by medical practitioners confronted with child abuse but without the supporting legal network. Munroe and Thrusfield (2001) presented some quantitative information by surveying 1000 small animal practitioners in the United Kingdom: of 404 responses, 48% had suspected or seen cases of non-accidental injury, with 448 documented cases (243 dogs and 182 cats). The Royal College of Veterinary Surgeons in the United Kingdom has issued guidelines to its practitioners, and the American Veterinary Medical Association issues periodic news reports and educational notes on these issues and includes sessions on this topic at its annual conferences (see website at www.avma.org/onlnews).

Animal collecting or “hoarding” has also been receiving more attention as a major source of animal abuse and an indicator of human mental illness (e.g. Lockwood 1994; Patronek 1999). Hoarders accumulate large numbers of animals, which overwhelm the ability of the person to care for them. The persons involved often fail to acknowledge the deteriorating condition of the animals and the household environment, and fail to see the negative effects on their own health or on that of their family or other housemates. Serpell (2002) notes that the same anthropomorphism that may enable people to see companion animals in ways that facilitate the normal relationship may also play a role in animal abuse and hoarding. When the human-like expectations are not met or when people over-empathize with the animals, abuse and hoarding may result.

According to information provided by the American Veterinary Medical Association, (see website, based on information from Patronek 1999 and Arluke *et al.* 2002), 76% of hoarders are female, nearly half are 60 years of age or older, and most are unmarried and live alone. Animal urine and faeces as well as dead and sick animals are commonly found throughout the house. Although hoarders often accumulate multiple species, cats are involved in 65% of cases. In 1997, an interdisciplinary group including researchers, veterinarians, social workers, and humane society leaders formed the Hoarding of Animals Research Consortium, to develop more effective interventions through research, veterinary support and public education tasks (see website at www.tufts.edu/vet/cfa/hoarding/index.html).

Animal law is a rapidly developing field with a burgeoning number of courses, books, and conferences on the topic. For example, animal rights legislation and law enforcement considerations are included in Ascione and Arkow (1999), with specific recommendations for improvement at all levels of the legal system. Other examples include Francione (1995, 2000); Center for Animals and Public Policy at Tufts University School of Veterinary Medicine, (www.tufts.edu/vet/cfa/legislat.html); the Animal Rights Law Project, Rutgers University, the first law school in the United States to include animal rights in the curriculum ten years ago (www.animal-law.org), the National Center for Animal Law, Lewis and Clark Law School, Portland, Oregon (www.lclark.edu/org/ncal), and its Animal Law Review, the first law review dedicated to this topic; the Animal Law Center, Boulder, Colorado, a nonprofit organization dedicated to ensuring legal rights of animals; and numerous other groups and organizations such as the Animal Legal Defense Fund (www.aldf.org). In 2004 an International Animal Law Conference was held at the California Western School of Law, San Diego, California, United States, featuring scholars and legal authorities from a wide range of fields and a number of countries.

Fortunately, there are increasing numbers of books, research articles, and educational literature and programs designed to examine and change attitudes and increase the humane treatment of animals (e.g. see summaries of programs in Ascione & Arkow 1999 and Fine 2000a; books such as those by Beck & Katcher 1996; Serpell 1996; Dolins 1999; articles such as Ascione & Source 1997; online information such as that of the Scottish Society for the Prevention of Cruelty to Animals at www.scottishspca.org/campaign/firststrike.html and online brochures such as that of the National Society for the Prevention of Cruelty to Children in the United Kingdom, working with 13 affiliated organizations).

5.2 Behaviour Problems

The last decade has seen explosive growth in interest and research in pet behaviour problems (see Chapter 4). Veterinary clinicians, researchers in ethology and psychology, and a variety of other individuals with animal experience (e.g. trainers, breeders) have developed private practices dedicated to helping people deal with pet problems. Specializations in behaviour are now recognized in veterinary medicine, and boards of certification have been formed to certify practitioners from various fields of study (for example, see the American Veterinary Society of Animal Behavior website at www.avma.org/avsab, the Animal Behavior Society website at www.animalbehavior.org, and the website of the Association of Pet Dog Trainers at www.apdt.com).

5.3 Shelter Issues

Interest in pet behaviour has been generated in part by the increasing number of pets, numbering in the millions, that are surrendered to shelters for euthanasia each year because of behaviour problems. Inappropriate elimination (toileting) leads the list of such problems for cats, followed by aggression and destructiveness (e.g. furniture scratching). These problems are themselves often the result of pets being in stressful social situations in homes, the result of crowding, incompatibility among individuals, or lack of owner attention or knowledge (Patronek *et al.* 1996; Scarlett *et al.* 2002).

A study by Patronek *et al.* (1996) helped demonstrate that risk factors for relinquishment are often ones that can be modified with proper intervention and education. Surveys of 218 owners who had relinquished cats to a shelter, versus 459 who had not, revealed several factors that increased the risk of relinquishment. These included the cat remaining sexually intact (possibly from the resultant spraying, yowling, and fighting with other cats, although this was not stated), cats being allowed outdoors, cats being mixed breed rather than purebred, the owner being uneducated about cats (those that read a book or other educational material about cats were less likely to relinquish their cat), and the owner having specific expectations about the cat's role in the household (such as being a close companion). Miller *et al.* (1996) obtained similar results in a smaller study, including the finding that young cats were more likely to be relinquished (for scratching furniture or "aggressive" play), and that an owner's lack of understanding or knowledge of normal feline behaviour often led to unrealistic expectations. The Miller study also noted that when owners had to move unexpectedly to a new location there were often problems, such as housing rental policies that excluded pets, and that these unpredictable aspects also played important roles in relinquishment.

A comprehensive study by Neidhart and Boyd (2002) examined several important adoption issues. They found that retention of adopted animals is similar whether pets were acquired directly from the shelter or at alternative sites, such as large chain pet stores, which is reassuring for shelters attempting to increase adoption rates. But these researchers, like others before them (e.g. Patronek *et al.* 1996), had problems obtaining information on adoption outcomes, despite using a professional marketing firm to make contacts. Only approximately 20% of adopters could be located and were willing to participate in the one-year study. These individuals, however, provided important information about the successes and failures of adoptions. How the pet related to the family, based primarily on pet characteristics and personality, as well as presence and age of children in the home, seemed to best predict retention. Factors for relinquishment,

disappointment with or loss of the animal during the year differed for dogs and cats. Behaviour problems were more likely to be cited for dogs than for cats. Overall, more adopters were satisfied with their new cat than dog adopters were with their dogs, although satisfaction was high for both groups (94% for cats, 86% for dogs). Unfortunately, cats died during the first year of adoption at twice the rate of dogs, presumably from collisions with cars (although only a small number of animals, eight dogs and 15 cats, actually perished). Findings from these and other studies provide the impetus for veterinarians and others to provide guidance, support and education to owners in an effort to modify owner perceptions and behaviour.

Since the 1980s, there has been a movement towards no-kill shelters, perhaps best illustrated by the pioneering work of the San Francisco Society for the Prevention of Cruelty to Animals (San Francisco SPCA, website at www.sfspca.org). Once accepted into the shelter, animals are not euthanized unless they are incurably sick, disabled or display extreme behaviour that makes them unsuitable for adoption. However, due to limited space, these facilities are often quite selective in which animals they take. Animal sanctuaries specialize in offering lifetime care and are also selective. Most shelters take in as many animals as possible as a community service, and must then choose which to keep and which must be euthanized. The Humane Society of the United States and the American Society for the Prevention of Cruelty to Animals play increasingly important roles as educators about animal care and animal welfare issues and as sponsors of studies of behaviour, in an attempt to decrease the numbers of animals entering shelters and increase the number of animals adopted from them. A growing movement seeks to couple no-kill policies with attempts to better observe, evaluate and modify the behaviour of shelter animals so they will be more adoptable and less likely to be returned.

In an effort to help shelters, veterinarians, and others who need to assess cat temperament, Siegford *et al.* (2003) developed and validated a strategy for testing cats. Working with 10-month old kittens housed in an animal facility, the researchers tested behaviour over the next 8 months, both before adoption and for 3 and 6 months after adoption. Individuals were evaluated in three ways before adoption, using an easily-scored Feline Temperament Profile (FTP) developed by Lee *et al.* (1983), video tapes of cat interactions with their caretakers at the animal facility, and reactions of cats to an unfamiliar man and woman in open field tests in an unfamiliar room. The FTP was then administered again post-adoption. The researchers found that cat scores on the FTP were fairly consistent over time and circumstance and correlated positively with responses to caretakers and unfamiliar humans. Cats could be ranked generally by their FTP scores as being more or less sociable toward people. This provided insight into what kinds of reactions

shelter workers, veterinarians, and new owners might expect from individual cats, and what steps they might take to avoid problems or incompatibilities. For example, cats that ranked as less sociable on all tests might best be placed by a shelter with an experienced cat owner or someone who did not expect or desire a social, attention-seeking companion; a veterinarian might handle such a cat differently when it came in for a check-up.

The cat overpopulation problem, relinquishment of cats to shelters and factors affecting the adoption of cats from shelters are discussed in greater detail in Chapter 5.

5.4 Allowing Cats Outdoors

Traditionally in the United States cats have been allowed to roam free at their will (Figure 3). In the last decade or so, this practice has changed in response to a number of pressures. Research suggesting that cats are incredibly successful predators with the ability to reduce wild bird populations considerably, at least on islands (e.g. see Fitzgerald 1988, but see tempered overview of cat predation, Fitzgerald & Turner 2000) has resulted in the call by many humane organizations, wildlife conservation groups, and ornithological associations to ban cats from the outdoors. Increasing risks to cats from their own predators, such as raptors and coyotes, and the growing volume of vehicular traffic have also affected owner willingness to allow cats to roam. An increase in infectious and often lethal diseases, such as feline immune deficiency syndrome, feline leukaemia, and infectious peritonitis, has resulted in people wanting to protect their cats from infected strays. Owner fears that they themselves might be susceptible to cat diseases also plays a role in keeping cats indoors, although there is little evidence for significant zoonotic transmission (see section 4.2 and Chapter 8).

In one moderately sized American city, Akron, Ohio, a series of letters to the editor in response to the question “should cats be required to be licensed and leashed” were intensely anti-cat and in favour of restricting their freedom. Most letter writers complained about cat faeces in their gardens, cats digging in flower beds, or simply that cats were wandering around and were considered scary, annoying or possible carriers of disease (Akron Beacon Journal 2001).

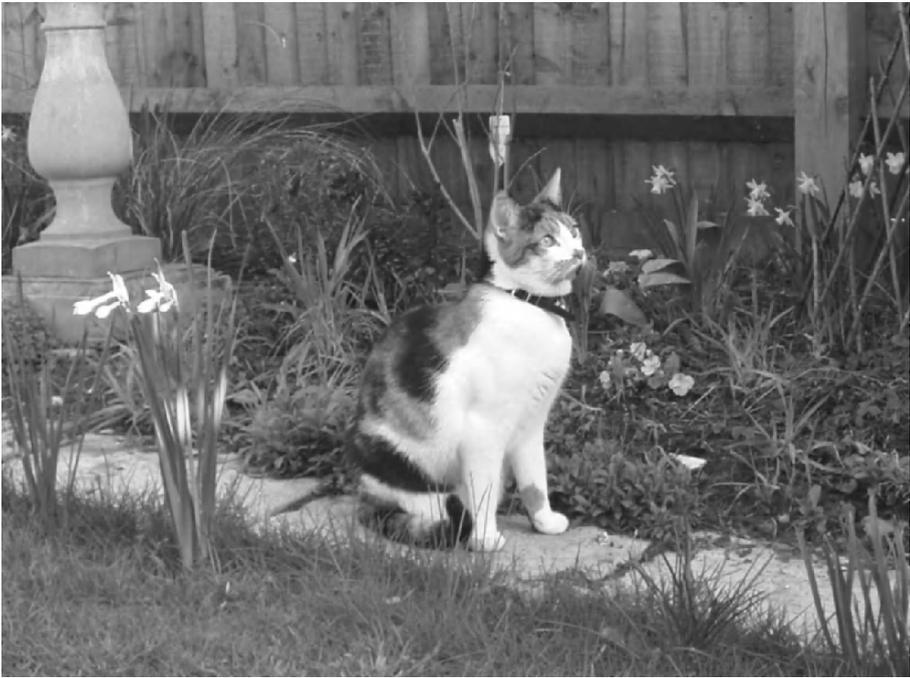


Figure 3. In the United States, cats have traditionally been allowed to roam free at their will, but in the last decade this practice has changed; more and more cats are being confined indoors. (Courtesy of Cerian Webb).

This combination of issues and concerns seems to be having an impact on owners, at least in the United States. In a preliminary study of 256 households surveyed from 1993 to 2003, Bernstein (2001, 2003) found that 50% of 503 cats were being kept indoors at all times. Of those allowed outdoors, only 33% were unrestricted (about 17% of all cats); an additional 15% (7% of all cats) had restricted outdoor access, such as sitting with their owners on a house deck, being walked on leashes, being restricted to a lead in the yard, or only allowed into small fenced-in areas in the yard. Interestingly, at least some cats restricted themselves, either showing no interest in going out when offered, or acting fearful and running away when the possibility was presented. Owners of declawed cats were equally likely to let their cats out as keep them in. These findings are in sharp contrast to the figures recently released by the Feline Advisory Bureau (2004, and at www.fabcats.org) from a survey of 1853 British cat owners: in this group, 75% of cats were allowed out at will during daylight hours.

A survey by Clancy *et al.* (2003) of cat owners was conducted in 2001 during routine veterinary visits at the small animal hospital of the Tufts University School of Veterinary Medicine. Based on 184 cats, researchers

found that cats acquired recently were less likely to be allowed outdoors than those acquired during previous years. Access to the outdoors, when allowed, was likely to be limited to daytime hours; declawing, age, and health status played no significant role in the decision, and cats acquired as strays were more likely to be allowed outdoors than those acquired at shelters. The latter may be due in part to a growing number of shelters and rescue groups requiring adopters to pledge to keep cats indoors. Perception of cat experience might also play a role, as strays may be perceived as already having demonstrated knowledge of the outdoors and the skills necessary to survive, and therefore be let out more. Both Clancy *et al.* (2003) and Rochlitz (2003) have illustrated the perils that can befall cats, particularly young males, that go outdoors, including cat bites, disease, predation by hawks and coyotes, and injuries and death from dogs and automobiles. What remains to be tested is whether cats that are kept primarily indoors or are indoor-only are more prone to develop behavioural and other problems. Some evidence suggests this may be the case: in a survey of German cat owners, Heidenberger (1997) found that owners who let their cats out only rarely or irregularly (e.g. only in good weather) were more likely to say their cats had behaviour problems than owners whose cats were allowed out regularly (e.g. whenever they wanted or at least two to three times per week or every weekend; see Chapter 4 on behaviour problems and Chapter 7 on the housing of cats).

5.5 Feral and Stray Cats

Another increasing problem is that of roaming, abandoned, stray, and feral cats (see Chapter 6). In response to growing populations of stray or feral cats, many towns now have their own corps of dedicated “cat caretakers”, local people who not only feed the cats and generally attempt to care for them, but also try to catch them and have as many as possible neutered and spayed, often paying veterinary expenses out of pocket.

Major animal welfare groups such as the Humane Society of the United States, the American Society for the Prevention of Cruelty to Animals, and Alley Cat Allies also provide information, education, and guidelines about this growing problem. In 1996 the American Veterinary Medical Association, after holding its Animal Welfare Forum, various hearings, and study of reports from various groups, adopted its first position statement on abandoned and feral cats (AVMA 1996). Although the main goal of the policy is to eliminate the problem, it provides guidelines for management of feral colonies and stresses the need for communities to establish cooperative resource networks (teams of care givers, veterinarians, public health

officials, control officers, and others) to work together to achieve the goal of decreasing colony numbers.

6. CONCLUSIONS

Companion animals are important to humans in many ways, bringing a range of health benefits and playing an important role in their lives, particularly within families and with children. While a large array of studies has provided us with insights into the human-animal relationship, fewer of them have focused on cats as opposed to dogs. Nevertheless, while differing from dogs in what they bring to the relationship, cats are clearly very effective companion animals to humans, as evidenced by the increasing numbers of pet cats in many parts of the world. Recent studies have shed light on some of the ways humans and cats interact, and the factors that influence these interactions.

The growing numbers of cats in shelters, and increasing populations of stray and feral cats, are evidence of failures of the human-cat relationship, as is the serious problem of animal abuse and hoarding. These important issues demand that we learn more about our cat companions, so that we can better educate and support the humans who attempt to live with them.

7. REFERENCES

- Adamec, R.E., Stark-Adamec, C. and Livingston, K.E. (1983) The expression of an early developmentally emergent defensive bias in the adult domestic cat (*Felis catus*) in non-predatory situations. *Applied Animal Ethology* **10**, 89-108.
- Akron Beacon Journal (2001) Should cats be licensed, collared and otherwise restricted? Wednesday Forum, June 13.
- Albert, A. and Anderson, M. (1997) Dogs, cats, and morale maintenance: some preliminary data. *Anthrozoös* **X**, 121-124.
- Alger, J.M. and Alger, S.F. (1997) Beyond Mead: symbolic interaction between humans and felines. *Society & Animals* **5**, 65-81.
- Alger, J.M. and Alger, S.F. (1999) Cat culture, human culture: an ethnographic study of a cat shelter. *Society & Animals* **7**, 199-219.
- Alger, J.M. and Alger, S.F. (2003) *Cat Culture: The Social World of a Cat Shelter*. Temple University Press, Philadelphia, USA.
- American Pet Products Manufacturers Association (2004) *National Pet Owners Survey*. Greenwich, CT, USA, xxiv.
- American Veterinary Medical Association (1996) AVMA adopts position on abandoned and feral cats: AVMA position statement on abandoned and feral cats. *J. American Veterinary Medical Association*, **209**, 1042-1043.
- American Veterinary Medical Association (2002) *U.S. Pet Ownership & Demographics Sourcebook*. Membership and Field Services, Schaumburg, IL, USA.

- Angulo, F.J., Glaser, C.A., Juranek, D.D., Lappin, M.R., and Regnery, R.L. (1994) Caring for pets of immunocompromised persons. *J. American Veterinary Medical Association* **205**, 1711-1718.
- Archer, J. (1997) Why do people love their pets? *Ethology and Sociobiology* **18**, 237-259.
- Arluke, A. (1997) Links between animal and human abuse. *Abstracts of the International Society for Anthrozoology*, 6th Annual Conference, Boston, MA, USA..
- Arluke, A. and Luke, C. (1997) Physical cruelty toward animals in Massachusetts, 1975-1996. *Society & Animals* **5**, 195-204.
- Arluke, A., Frost, R., Luke, C., Messner, E., Nathanson, J., Patronek, G.J., Papazian, M. and Steketee, G. (2002). Health implications of animal hoarding. *Health & Social Work* **27**, 125-136.
- Ascione, F. R. and Arkow, P. (1999) *Child Abuse, Domestic Violence, and Animal Abuse*. Purdue University Press, West Lafayette, Indiana.
- Ascione, F. R., Kaufmann, M.E. and Brooks, S.M (2000). Animal abuse and developmental psychopathology: recent research, programmatic, and therapeutic issues and challenges for the future. In Fine, A. (ed.). *Handbook On Animal-Assisted Therapy: Theoretical Foundations and Guidelines for Practice*, Academic Press, San Diego, USA, pp. 325-354.
- Ascione, F.R. and Source, R (1997). Humane education research: evaluating efforts to encourage children's kindness and caring toward animals. *Genetic, Social & General Psychology Monographs* **123**, 59-78.
- Ash, S.J. and Adams, C.E. (2003) Public preferences for free-ranging domestic cat (*Felis catus*) management options. *Wildlife Society Bulletin* **31**, 334-339.
- Bahlig-Pieren, Z. and Turner, D.C. (1999) Anthropomorphic interpretations and ethological descriptions of dog and cat behaviour by lay people. *Anthrozoös* **12**, 205-210.
- Barry, K. and Crowell-Davis, S. (1999) Gender differences in the social behaviour of the neutered indoor-only domestic cat. *Applied Animal Behaviour Science* **64**, 193-211.
- Baun, M. M. and McCabe, B.W. (2000). The role animals play in enhancing quality of life for the elderly. In Fine, A. (ed.), *Handbook On Animal-Assisted Therapy: Theoretical Foundations and Guidelines for Practice*, Academic Press, San Diego, USA, pp. 237-251.
- Beck, A. (2000). The use of animals to benefit humans: Animal-assisted therapy. In Fine, A. (ed.), *Handbook On Animal-Assisted Therapy: Theoretical Foundations and Guidelines for Practice*, Academic Press, San Diego, USA, pp. 21-40.
- Beck, A. and Katcher, A. (1996) *Between pets and people: the importance of animal companionship*. Revised 1st edn. Purdue University Press, West Lafayette, USA.
- Bekoff, M., Gruen, L., Townsend, S.E. and Rollin, B.E. (1992) Animals in science: some areas revisited. *Animal Behaviour* **44**, 473-484.
- Bernstein, P.L. (2000) People petting cats: a complex interaction. *Abstracts of the Animal Behaviour Society*, Annual Conference, Atlanta, GA, USA, 9.
- Bernstein, P. L. (2001) Cat owners favor keeping cats indoors. *Abstracts of the International Society for Anthrozoology*, 10th Annual Conference, Davis, CA, USA, 10.
- Bernstein, P. L. (2003) Cats, houses, and people. *Abstracts of the International Society for Anthrozoology*, 12th Annual Conference, Canton, OH USA, 14.
- Bernstein, P.L., Friedmann, E. and Malaspina, A. (2000) Animal-assisted therapy enhances resident social interaction and initiation in long-term care facilities. *Anthrozoös* **13**, 213-224.
- Bernstein, P.L. and Strack, M. (1996) A game of cat and house: spatial patterns and behaviour of 14 domestic cats (*Felis catus*) in the home. *Anthrozoös* **IX**, 25-39.
- Bonas, S., McNicholas, J. and Collis, G.M. (2000) Pets in the network of family relationships: an empirical study. In Podbersceck, A.L., Paul, E.S. and Serpell, J.A. (eds.), *Companion*

- Animals and Us: Exploring the Relationships Between People & Pets*, Cambridge University Press, Cambridge, pp. 209-236.
- Bradshaw, J.W.S. and Cameron-Beaumont, C. (2000) The signaling repertoire of the domestic cat and its undomesticated relatives. In Turner, D.C. and Bateson, P. (eds.), *The Domestic Cat: the biology of its behaviour*, 2nd edn., Cambridge University Press, Cambridge, pp. 68-93.
- Bradshaw, J.W.S. and Cook, S.E. (1996) Patterns of pet cat behaviour at feeding occasions. *Applied Animal Behaviour Science* **47**, 61-74.
- Brodie, S.J., Billy, F.C. and Shewring, M. (2002) An exploration of the potential risks associated with using pet therapy in healthcare settings. *J. Clinical Nursing* **11**, 444-457.
- Brown, K.A., Buchwald, J.S., Johnson, J.R., and Mikolich, D.J. (1978) Vocalization in the cat and kitten. *Developmental Psychobiology* **11**, 559-570.
- Carlstead, K., Brown, J.L. and Strawn, W. (1993) Behavioural and physiological correlates of stress in laboratory cats. *Applied Animal Behaviour Science* **38**, 143-158.
- Clancy, E.A., Moore, A.S. and Bertone, E.R. (2003) Evaluation of cat and owner characteristics and their relationships to outdoor access of owned cats. *J. American Veterinary Medical Association* **222**, 1541-1545.
- Cohen, S. P. (2002) Can pets function as family members? *Western J. Nursing Research* **24**, 621-638.
- Collard, R. R. (1967) Fear of strangers and play behaviour in kittens with varied social experience. *Child Development* **38**, 877-891.
- Copeland, M.W. (2003) The defining difference: response to "What is a pet?" *Anthrozoös* **16**, 111-113.
- Coppinger, R. and Coppinger, L. (1998) Differences in the behaviour of dog breeds. In Grandin, T. (ed.) *Genetics and the Behaviour of Domestic Animals*, Academic Press, San Diego, USA, pp. 167-202.
- Coppinger, R. and Schneider, R. (1995) The evolution of working dog behaviour. In Serpell, J. (ed.) *The Domestic Dog: Its Evolution, Behaviour and Interactions with People*, Cambridge University Press, Cambridge, UK, pp. 21-47.
- Davis, H., Irwin, P., Richardson, M., and O'Brien-Malone, A. (2003) When a pet dies: religious issues, euthanasia and strategies for coping with bereavement. *Anthrozoös* **16**, 57-74.
- DeViney, E., Dickert, J. and Lockwood, R. (1983) The care of pets within child abusing families. *International J. for the Study of Animal Problems* **4**, 321-329.
- Dolins, F.L. (ed.) (1999) *Attitudes to Animals: Views in Animal Welfare*. Cambridge University Press, Cambridge.
- Donley, L. Patronek, G.J. and Luke, C. (1999) Animal abuse in Massachusetts: a summary of case reports at the MSPCA and attitudes of Massachusetts veterinarians. *J. Applied Animal Welfare Science* **2**, 59-74.
- Dresser, N. (2000) The horse bar mitzvah: a celebratory exploration of the human-animal bond. In Podberscek, A.L., Paul, E.S. and Serpell, J.A. (eds.), *Companion Animals and Us: Exploring the Relationships Between People & Pets*, Cambridge University Press, Cambridge, pp. 90-107.
- Eddy, T.J. (2003a) What is a pet? *Anthrozoös* **16**, 98-105.
- Eddy, T.J. (2003b) The challenge: reflections on responses to "What is a pet?". *Anthrozoös* **16**, 127-134.
- Enders-Slegers, M-J. (2000) The meaning of companion animals: qualitative analysis of the life histories of elderly cat and dog owners. In Podberscek, A.L., Paul, E.S. and Serpell, J.A. (eds.), *Companion Animals and Us: Exploring the Relationships Between People & Pets*, Cambridge University Press, Cambridge, pp. 237-256.

- Euromonitor International (2003). *The Global Market for Pet Food and Pet Care Products*. London, UK
- Feaver, J., Mendl, M. and Bateson, P. (1986) A method for rating the individual distinctiveness of domestic cats. *Animal Behaviour* **34**, 1016-1025.
- Feline Advisory Bureau (2004) *Up Close and Purrsonal, Report of the Cat Personality Survey*. FAB Publications, Tisbury, Wiltshire, UK.
- Fine, A.H. (2000a). *Handbook On Animal-Assisted Therapy: Theoretical Foundations and Guidelines for Practice*. Academic Press, San Diego, USA.
- Fine, A.H. (2000b). Animals and therapists: incorporating animals in outpatient psychotherapy. In Fine, A. (ed.), *Handbook On Animal-Assisted Therapy: Theoretical Foundations and Guidelines for Practice*, Academic Press, San Diego, USA, pp. 179-211.
- Fitzgerald, B.M. (1988) Diet of domestic cats and their impact on prey populations. In Turner, D.C. and Bateson, P. (eds.). *The Domestic Cat: the biology of its behaviour*, 1st edn., Cambridge University Press, Cambridge, pp. 123-147.
- Fitzgerald, B.M. and Turner, D.C. (2000) Hunting behaviour of domestic cats and their impact on prey populations. In Turner, D.C. and Bateson, P. (eds.). *The Domestic Cat: the biology of its behaviour*, 2nd edn., Cambridge University Press, Cambridge, pp. 152-175.
- Francione, G.L. (1995) *Animals, Property and the Law*. Temple University Press, Philadelphia.
- Francione, G. L. (2000) *Introduction to Animal Rights: Your Child or the Dog?* Temple University Press, Philadelphia.
- Friedmann, E. (2000) The animal-human bond: health and wellness. In Fine, A. (ed.), *Handbook On Animal-Assisted Therapy: Theoretical Foundations and Guidelines for Practice*, Academic Press, San Diego, USA, pp. 41-58.
- Friedmann, E., Thomas, S.A. and Eddy, T.J. (2000) Companion animals and human health: physical and cardiovascular influences. In Podberscek, A.L., Paul, E.S. and Serpell, J.A. (eds.), *Companion Animals and Us: Exploring the Relationships Between People & Pets*, Cambridge University Press, Cambridge, pp. 125-142
- Goodwin, D., Bradshaw, J.W.S., and Wickens, S.M. (1997) Paedomorphosis affects agonistic visual signals of domestic dogs. *Animal Behaviour* **53**, 297-304.
- Granger, B.P. and Kogan, L. (2000). Animal-assisted therapy in specialized settings. In Fine, A. (ed.), *Handbook On Animal-Assisted Therapy: Theoretical Foundations and Guidelines for Practice*, Academic Press, San Diego, USA, pp. 213-236.
- Greenfield, C.L., Johnson, A.L., Schaeffer, D.J., and Hungerford, L.L. (1995) Comparison of surgical skills of veterinary students trained using models or live animals. *J. American Veterinary Medical Association* **206**, 1840-1845.
- Hart, L.A. (1990) Pets, veterinarians and clients: communicating the benefits. In *Pets, benefits and practice*, Waltham Symposium 20, BVA Publications, London, pp. 36-43.
- Hart, L.A. (1998) *Responsible Conduct with Animals in Research*. Oxford University Press, Oxford.
- Hart, L.A. (2000a) Psychosocial benefits of animal companionship. In Fine, A. (ed.), *Handbook On Animal-Assisted Therapy: Theoretical Foundations and Guidelines for Practice*, Academic Press, San Diego, USA, pp. 59-78.
- Hart, L.A. (2000b) Methods, standards, guidelines and considerations in selecting animals for animal-assisted therapy. Part A: Understanding animal behaviour, species, and temperament as applied to interactions with specific populations. In Fine, A. (ed.), *Handbook On Animal-Assisted Therapy: Theoretical Foundations and Guidelines for Practice*, Academic Press, San Diego, USA, pp. 81-97.
- Hart, L.A. (2003) Pets along a continuum: response to "What is a pet?". *Anthrozoös* **16**, 118-122.

- Hart, L.A. , Wood, M.W., Massey, A. and Smith, M. (2004) Uses of animals and alternatives in pre-college education in the United States: need for leadership on educational resources and guidelines. *Proceedings of Fourth World Congress, Transforming middle and high school education with animal alternatives, Alternatives to Laboratory Animals* **32** Supplement 1, 485-489.
- Hart, L.A. and Wood, M.W. (2004) Uses of animals and alternatives in college and veterinary education at the University of California, Davis: institutional commitment for mainstreaming alternatives. *Proceedings of Fourth World Congress, Transforming middle and high school education with animal alternatives, Alternatives to Laboratory Animals* **32** Supplement 1, 617-620.
- Heidenberger, E. (1997) Housing conditions and behavioural problems of indoor cats as assessed by their owners. *Applied Animal Behaviour Science* **52**, 345-364.
- Hoff, G.L., Brawley, J. and Johnson, K. (1999) Companion animal issues and the physician. *Southern Medical J.* **92**, 651-660.
- Hunt, S.J. and Hart, L.A. (1992) Role of small animals in social interactions between strangers. *The J. Social Psychology* **132**, 245-256.
- Johnson, T.P. Garrity, T.F. and Stallones, L. (1992) Psychometric evaluation of the Lexington attachment to pets scale (LAPS). *Anthrozoös* **5**, 160-175.
- Karsh, E.B. (1984) The effects of early and late handling on the attachment of cats to people. In Anderson, R.K., Hart, B.L. and Hart, L.A. (eds.) *The Pet Connection, Conference Proceedings*. Globe Press, St. Paul.
- Karsh, E.B. and Turner, D.C. (1988). The human-cat relationship. In Turner, D.C. and Bateson, P. (eds.). *The Domestic Cat: the biology of its behaviour*, 1st edn., Cambridge University Press, Cambridge, pp. 159-177.
- Katcher, A.H. (1981) Interactions between people and their pets: form and function. In Fogle, B. (ed.), *Interrelationships Between People and Pets*. Charles C. Thomas, Springfield, USA, pp. 41-67.
- Katcher, A.H. and Wilkins, G.G. (2000). The centaur's lessons: therapeutic education through care of animals and nature study. In Fine, A. (ed.), *Handbook On Animal-Assisted Therapy: Theoretical Foundations and Guidelines for Practice*, Academic Press, San Diego, USA, pp. 153-177.
- Kiley-Worthington, M. (1976) The tail movements of ungulates, canids, and felids with particular reference to their causation and function as displays. *Behaviour* **56**, 69-115.
- Lappin, M.R. (2001) Cat ownership by immunosuppressed people. In August, J.R. (ed.), *Consultations in Feline Internal Medicine* 4th edn., W.B. Saunders Company, Philadelphia, USA, pp. 18-27.
- Lawrence, E.A. (2003) Some observations on "What is a pet?". *Anthrozoös* **16**, 123-126.
- Lee, R.L., Zeglen, M.E., Ryan, T., and Hines, L.M. (1983) Guidelines: animals in nursing homes. *California Veterinarian* **3**: 22a-26a.
- Levinson, B. (1969) *Pet-oriented Child Psychotherapy*. Charles C. Thomas, Springfield, IL, USA.
- Linneberg, A., Nielsen, N.J., Madsen, F., Frolund, L., Dirksen, A., and Jorgensen, T. (2003) Pets in the home and the development of pet allergy in adulthood. The Copenhagen Allergy Study. *Allergy* **58**, 21-27.
- Lockwood, R. (1994) The psychology of animal collectors. *American Animal Hospital Association Trends Magazine* **9**, 18-21.
- Lockwood, R. and Ascione, F.R. eds. (1998) *Cruelty to Animals and Interpersonal Violence. Readings in Research and Application*. Purdue University Press, West Lafayette.
- Lowe, S.E. and Bradshaw, J.W.S. (2001) Ontogeny of individuality in the domestic cat in the home environment. *Animal Behaviour* **61**, 231-237.

- Lowe, S.E. and Bradshaw, J.W.S. (2002) Responses of pet cats to being held by an unfamiliar person, from weaning to three years of age. *Anthrozoös* **15**, 69-79.
- Mallon, G.P., Ross, S.B. Jr. and Ross, L. (2000). Designing and implementing animal-assisted therapy programs in health and mental health organizations. In Fine, A. (ed.), *Handbook On Animal-Assisted Therapy: Theoretical Foundations and Guidelines for Practice*, Academic Press, San Diego, USA, pp. 115-127.
- McCune, S. (1995) The impact of paternity and early socialization on the development of cats' behaviour to people and novel objects. *Applied Animal Behaviour Science* **45**, 109-124.
- McGreevy, P.D. and Nicholas, F.W. (1999) Some practical solutions to welfare problems in dog breeding. *Animal Welfare* **8**, 329-341.
- McNally, R.J. and Steketee, G.S. (1985) The etiology and maintenance of severe animal phobias. *Behaviour Research and Therapy* **23**, 431-435.
- Meier, G.W. (1961) Infantile handling and development in Siamese kittens. *J. Comparative Physiology and Psychology* **54**, 284-286.
- Meier, M. and Turner, D.C. (1985) Reactions of home cats during encounters with a strange person: evidence for two personality types. *J. Delta Society (later Anthrozoös)* **2**, 45-53.
- Melson, G.F. (2000). Companion animals and the development of children: implications of the biophilia hypothesis. In Fine, A. (ed.), *Handbook On Animal-Assisted Therapy: Theoretical Foundations and Guidelines for Practice*, Academic Press, San Diego, USA, pp. 375-383.
- Melson, G.F. (2001). *Why the Wild Things Are: Animals In the Lives of Children*. Harvard University Press, Cambridge, USA.
- Mendl, M. and Harcourt, R. (1988) Individuality in the domestic cat. In Turner, D.C. and Bateson, P. (eds.). *The Domestic Cat: the biology of its behaviour*, 1st edn., Cambridge University Press, Cambridge, pp. 159-177.
- Mendl, M. and Harcourt, R. (2000) Individuality in the domestic cat: origins, development and stability. In Turner, D.C. and Bateson, P. (eds.). *The Domestic Cat: the biology of its behaviour*, 2nd edn., Cambridge University Press, Cambridge, pp. 47-64.
- Mertens, C. (1991) Human-cat interactions in the home setting. *Anthrozoös* **4**, 214-231.
- Mertens, C. and Turner, D.C. (1988) Experimental analysis of human-cat interactions during first encounters. *Anthrozoös* **2**, 83-97.
- Miller, D.D., Staats, S.R., Partlo, C., and Rada, K. (1996) Factors associated with the decision to surrender a pet to an animal shelter. *J. American Veterinary Medical Association* **209**, 738-742.
- Miller, M. and Lago, D. (1990) Observed pet-owner in-home interactions: species differences and association with the pet relationship scale. *Anthrozoös* **4**, 49-54.
- Mitchell, R.W. (2001) Americans' talk to dogs: similarities and differences with talk to infants. *Research on Language and Social Interaction* **34**, 183-210.
- Mitchell, R.W. and Edmonson, E. (1999) Functions of repetitive talk to dogs during play: control, conversation, or planning? *Society & Animals* **7**, 55-81.
- Moelk, M. (1944). Vocalizing in the house-cat: A phonetic and functional study. *American J. Psychology* **57**, 184-204.
- Moelk, M. (1979) The development of friendly approach behaviour in the cat: A study of kitten-mother relations and the cognitive development of the kitten from birth to eight weeks. In Rosenblatt, J.S., Hinde, R.A., Beer, C. & Busnel, M. (eds.) *Advances in the Study of Behaviour*, vol. 10, Academic Press, New York, USA, pp. 163-224.
- Morris, P., Fidler, M. and Costall, A. (2000) Beyond anecdotes: an empirical study of "anthropomorphism". *Society & Animals* **8**, 151-166.
- Morrison, G. (2001) Zoonotic infections from pets. *Postgraduate Medicine* **110**, 24-35.

- Munroe, H.M.C. and Thrusfield, M.V. (2001) 'Battered pets': features that raise suspicion of non-accidental injury. *J. Small Animal Practice* **42**, 218-226.
- Myers, G. (1999) *Children and Animals: Social Development and Our Connection to Other Species*. Westview Press, Boulder, CO, USA.
- National Research Council, Subcommittee on dog and cat nutrition (2003) *Nutrient requirements of dogs and cats*. The National Academies Press, Washington, D.C.
- Neidhart, L. and Boyd, R. (2002) Companion animal adoption study. *J. Applied Animal Welfare Science* **5**, 175-192.
- Nicastro, N. (2004) Adaptive implications of species-level differences in meow vocalizations. *J. Comparative Psychology* **118**, 287-296.
- Nicastro, N. and Owren, M.J. (2003) Classification of domestic cat (*Felis catus*) vocalizations by naïve and experienced human listeners. *J. Comparative Psychology* **117**, 44-52.
- Owby, D.R., Johnson, C.C. and Peterson, E.L. (2002) Exposure to dogs and cats in the first year of life and risk of allergic sensitization at 6-7 years of age. *J. American Medical Association* **288**, 963-972.
- Parslow, R.A. and Jorm, A.F. (2003) The impact of pet ownership on health and health service use: results from a community sample of Australians aged 40-44 years. *Anthrozoös* **16**, 43-56.
- Patronek G. (1999) Hoarding of animals: an underrecognized public health problem in a difficult-to-study population. *Public Health Reports* **114**, 81-87.
- Patronek G.J., Glickman, L.T., Beck, A.M., McCabe, G.P. and Ecker, C. (1996) Risk factors for relinquishment of cats to an animal shelter. *J. American Veterinary Medical Association* **209**, 582-588.
- Perzanowski, M.S., Ronmark, E., Platts-Mills, T.A.E. and Lundback, B. (2002) Effect of cat and dog ownership on sensitization and development of asthma among preteenage children. *American J. Respiratory and Critical Care Medicine* **166**, 696-702.
- Podberscek, A.L. and Gosling, S.D. (2000) Personality research on pets and their owners: conceptual issues and review. In Podberscek, A.L., Paul, E.S. and Serpell, J.A. (eds.), *Companion Animals and Us: Exploring the Relationships Between People & Pets*, Cambridge University Press, Cambridge, pp. 143-167.
- Podberscek, A.L., Paul, E.S. and Serpell, J.A. (2000) *Companion Animals and Us: Exploring the Relationships Between People & Pets*, Cambridge University Press, Cambridge.
- Rajack, L.S. (1997) Pets and human health: the influence of pets on cardiovascular and other aspects of owners' health. Ph.D. thesis, University of Cambridge, UK.
- Rajecki, D.W., Rasmussen, J.L., Sanders, C.R., Modlin, S.J. and Holder, A.M. (1999) Good dog: aspects of humans' causal attributions for a companion animal's social behaviour. *Society & Animals* **7**, 17-35.
- Reisner, I.R., Houpt, K.A., Erb, H.N., and Quimby, F.W. (1994) Friendliness to humans and defensive aggression in cats: the influence of handling and paternity. *Physiology & Behaviour* **55**, 1119-1124.
- Rieger, G. and Turner, D.C. (1999) How depressive moods affect the behaviour of singly living persons toward their cats. *Anthrozoös* **12**, 224-233.
- Ritvo, H. (1985) Animal pleasures: popular zoology in eighteenth and nineteenth century England. *Harvard Library Bulletin* **33**, 239-279.
- Rochlitz, I. (2000) Feline welfare issues. In Turner, D.C. and Bateson, P. (eds.). *The Domestic Cat: the biology of its behaviour*, 2nd edn., Cambridge University Press, Cambridge, pp. 208-226.
- Rochlitz, I. (2003) Study of factors that may predispose domestic cats to road traffic accidents: Part 1. *Veterinary Record* **153**, 549-553.
- Rollin, B.E. and Rollin, L. (2003) Response to "What is a pet?". *Anthrozoös* **16**, 106-110.

- Rosenblatt, J.S., Turkewitz, G. and Schneirla, T.C. (1961) Early socialization in the domestic cat as based on feeding and other relationships between female and young. In Foss, B.M. (ed.) *Determinants of Infant Behaviour*, Methuen, London, U.K., pp 51-74.
- Salman, M.D., New, J.G., Scarlett, J.M. (1998) Human and animal factors related to the relinquishment of dogs and cats in 12 selected animal shelters in the United States. *J. Applied Animal Welfare Science* **2**, 207-226.
- Sanders, C.R. (2003) Whose pet? Comment on Timothy Eddy, "What is a pet?". *Anthrozoös* **16**, 114-117.
- Schwartz, S. (2002) Separation anxiety syndrome in cats: 136 cases (1991-2000). *J. American Veterinary Medical Association* **220**, 1028-1033.
- Scarlett, J., Salman, M.D., New, J. G., and Kass, P. (2002) The role of veterinary practitioners in reducing dog and cat relinquishments and euthanasias. *J. American Veterinary Medical Association* **220**, 306-311.
- Serpell, J. (1985) Best friend or worst enemy: cross-cultural variation in attitudes to the domestic dog. *The Human-Pet Relationship: Proceedings of the International Symposium*, Vienna: Austrian Academy of Sciences/IEMT.
- Serpell, J. (1991) Beneficial effects of pet ownership on some aspects of human health and behaviour. *J. Royal Society of Medicine* **84**, 717-720.
- Serpell, J. (1996) *In the Company of Animals*, 2nd ed., Cambridge University Press, Cambridge.
- Serpell, J. (1999) Working out the beast. An alternative history of western humaneness. In Ascione, F.R. and Arkow, P. (eds.). *Child Abuse, Domestic Violence, and Animal Abuse*, Purdue University Press, West Lafayette, Indiana, pp. 38-49.
- Serpell, J.A. (2000) Domestication and history of the cat. In Turner, D.C. and Bateson, P. (eds.). *The Domestic Cat: the biology of its behaviour*, 2nd edn., Cambridge University Press, Cambridge, pp. 180-192.
- Serpell, J.A. (2002) Anthropomorphism and anthropomorphic selection – beyond the “cute response”. *Society & Animals* **10**, 437-454.
- Sharpe, M.S. and Wittum, T.E. (1999) Veterinarian involvement in the prevention and intervention of human violence and animal abuse: a survey of small animal practitioners. *Anthrozoös* **12**, 97-104.
- Siegford, J.M., Walshaw, S.O., Brunner, P., and Zanella, A.J. (2003) Validation of a temperament test for domestic cats. *Anthrozoös* **16**, 332-351.
- Sims, V.K. and Chin, M.G. (2002) Responsiveness and perceived intelligence as predictors of speech addressed to cats. *Anthrozoös* **15**, 166-177.
- Soennichsen, S. and Chamove, A.S. (2002) Responses of cats to petting by humans. *Anthrozoös* **15**, 258-265.
- Spencer, L. (1992) Pet prove therapeutic for people with AIDS. *J. American Veterinary Medical Association* **201**, 1665-1668.
- Stammach, K.B. and Turner, D.C. (1999) Understanding the human-cat relationship: human social support or attachment. *Anthrozoös* **12**, 162-168.
- Stewart, M.F. (1999) *Companion Animal Death: A Practical and Comprehensive Guide for Veterinary Practice*, Butterworth Heinemann, Oxford, UK.
- Swabe, J. (2000) Veterinary dilemmas: ambiguity and ambivalence in human-animal interaction. In Podberscek, A.L., Paul, E.S. and Serpell, J.A. (eds.), *Companion Animals and Us: Exploring the Relationships Between People & Pets*, Cambridge University Press, Cambridge, pp. 292-312.
- Triebenbacher, S.L. (2000). The companion animal within the family system: the manner in which animals enhance life within the home. In Fine, A. (ed.), *Handbook On Animal-*

- Assisted Therapy: Theoretical Foundations and Guidelines for Practice*, Academic Press, San Diego, USA, pp. 357-374.
- Turner, D.C. (2000a) Human-cat interactions: relationships with, and breed differences between, non-pedigree, Persian and Siamese cats. In Podberscek, A.L., Paul, E.S. and Serpell, J.A. (eds.), *Companion Animals and Us: Exploring the Relationships Between People & Pets*, Cambridge University Press, Cambridge, pp. 257-271.
- Turner, D.C. (2000b) The human-cat relationship. In Turner, D.C. and Bateson, P. (eds.). *The Domestic Cat: the biology of its behaviour*, 2nd edn., Cambridge University Press, Cambridge, pp. 194-206.
- Turner, D.C. and Rieger, G. (2001) Singly living people and their cats: a study of human mood and subsequent behaviour. *Anthrozoös* **14**, 38-46.
- Turner, D.C., Rieger, G. and Gyax, L. (2003) Spouses and cats and their effects on human mood. *Anthrozoös* **16**, 213-228.
- Turner, D.C., Feaver, J., Mendl, M. and Bateson, P. (1986) Variations in domestic cat behaviour towards humans: a paternal effect. *Animal Behaviour* **34**, 1890-1892.
- Turner, D.C. and Stambach-Geering, K. (1990) Owner assessment and the ethology of human-cat relationships. In *Pets, benefits and practice*, Waltham Symposium 20, BVA Publications, London, pp. 25-30.
- Vigne, J-D., Guilaine, J., Debue, K., Haye, L. and Gerard, P. (2004) Early taming of the cat in Cyprus. *Science* **304**, 259.
- Warner, R.D. (1984), Occurrence and impact of zoonoses in pet dogs and cats at US air force bases. *American J. Public Health* **74**, 1239-1242.
- Zasloff, R.L. (1996) Measuring attachment to companion animals: a dog is not a cat is not a bird. *Applied Animal Behaviour Science* **47**, 43-48.
- Zasloff, R.L. and Kidd, A.H. (1994a) Attachment to feline companions. *Psychological Reports* **74**, 747-752.
- Zasloff, R.L. and Kidd, A.H. (1994b) Loneliness and pet ownership among single women. *Psychological Reports* **75**, 747-752.