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## Social Behavior of Domestic Cats

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Domestic cats are often described as relatively asocial animals, and thus the concept of social behavior of domestic cats may appear to be oxymoronic. Domestic cats are, however, variable with respect to social behaviors; they have the capacity of living as stereotypic "solitary hunters" or of interacting within social units of other cats or humans. In this article, we briefly review animal social behavior in general, emphasizing the flexibility of social behavior as a function of ecologic variables. We then discuss the social systems of cats and present new data on cat-human interactions.

### Social Systems

A *social system*, or *society*, is generally defined as a cooperating or interacting group of individuals of the same species that live in close proximity to each other. An *aggregation* of animals, such as a swarm of insects attracted to a light or birds following a plow, is not considered a social group. Sociality requires that animals engage in reciprocal interactions and communications that are of a cooperative nature and that transcend sexual activity.<sup>1</sup>

There are many benefits to sociality. It facilitates encounters with members of the opposite sex and, therefore, sexual reproduction. Sociality also allows the potential for learning and exchange of information. In a group, animals can share in care of the young, protection from predators, food getting, and defense of resources against other animals. A group of animals may accomplish laborious tasks, such as modifying and/or monitoring the environment.<sup>2</sup> For instance, social insects, such as bees, maintain and repair the structure of the hive as well as regulate the humidity inside it. Prairie dogs and marmots have extensive tunneling systems that offer protection against inclement weather as well as escape routes from predators. These animals also spend a considerable amount of time keeping the brush low around their burrows, perhaps in order to better view the approach of predators.

A group of animals may also distribute tasks among specific members. Social insects, such as ants and termites, consist of separate castes composed of individuals specialized both morphologically and behaviorally for specific tasks, e.g., nest defense or foraging and care of the young. Different age groups and sexes of monkeys are likely to assume different roles in a troop. For example, in vervet monkeys, the adult males and juveniles engage in 99% of the territorial displays and chasing of intruders.<sup>3</sup> Dominant adult males in some primate groups suppress aggressive interactions within the group before the dispute becomes disruptive.<sup>4</sup> In primate troops, the adult males are often the individuals that engage in defense against predators. Female giraffes past calf-bearing age may tend nurseries of calves while the mothers browse away from their young.<sup>5</sup>

Group living also can result in social facilitation of many behaviors (e.g., eating and drinking) and synchronization of reproduction. Synchronized mating, parturition, and rearing can offer advantages in the successful rearing of offspring.

Being solitary has advantages as well. If food resources are scarce and occur in small concentrated units, it is advantageous to be alone rather than have to fight over or share a limited resource. In addition, a single animal may be able to avoid predators by hiding instead of belonging to a larger, more visible group.

Essentially, animals have evolved specific social organizations that maximize their ability to survive and propagate. Whether an animal is social or solitary is a reflection of a number of factors, such as availability of food and shelter, predator pressure, finding a mate, and requirements of rearing offspring. The social system of an animal is directly related to the environmental structure or setting in which it finds itself.

### *Describing Social Systems*

A description of social systems is complex, because such systems can be described in many ways and the descriptive categories overlap. Social systems can be described according to group size and composition, type of mating system, patterns of parental care, use of space and territory, and social hierarchies.

### *Group Size*

The simplest social system is the asocial individual or solitary animal. Except for periods of reproduction, the single individual is neutral toward, avoids, or even attacks conspecifics. Even though animals live apart, however, that does not mean they are not in communication with each other. Frequent communication may occur by means of auditory, visual, and/or olfactory signals. Feral or free-ranging domestic cats often live in a solitary state as adults but periodically vocalize and frequently deposit odors on conspicuous objects with secretions from sebaceous glands along the tail, forehead, lips, chin, and pedal areas<sup>6</sup> and by spraying urine. Scratching with claws is another means of leaving conspicuous marks on objects. Olfactory and visual marks allow reception of a signal long after the sender

has left the area. Thus, a solitary animal may not really be *asocial* but may actually engage in frequent communication with conspecifics, either over distances or over periods of time, by leaving odors or visual signals.

### *Group Composition*

Most species group into typical organizations that are popularly recognized and labeled,<sup>7</sup> for example, a pack of dogs, a herd of deer, a pride of lions, a pace of asses, or an exaltation of larks. Groups may consist of a mated pair, a mother and her offspring, all females, all males, or different ratios of males and females. The typical group composition may be organized year-round, seasonally, or temporarily.

Small, functioning groups may congregate into larger units. For example, bands of horses or groups of gazelles, which consist of one-male harems including several females, may group into larger herds. A herd of gazelles or zebras can number in the thousands. Albatross pair every year with the same individuals to raise young. Each pair has its own nest and territory within a temporary colony of hundreds or thousands of birds.

Some species form *casual groups* or *subgroups*, which come together for specific reasons (e.g., feeding, roosting, grooming, or breeding) and then break up and reform, sometimes with different individuals. Leyhausen described an interesting phenomenon involving evening social gatherings of urban cats in Paris.<sup>8</sup> Male and female cats came to meeting areas near the peripheries of their territories and stayed together for varying periods of time, generally dispersing by midnight. These cats sat near, looked at, and sometimes groomed each other. The tomcats sometimes "paraded" before the group. There was little hostility other than an occasional growl. Whether or not these cats were related or raised together is unknown. The function of these gatherings can only be surmised.

### *Mating and Parental Systems*

In monogamous systems, one male and a single female may remain together for a single breeding season or for life. *Polygamy* refers to any form of multiple mating. *Polygyny* involves a single male mating with multiple females; *polyandry* involves a single female mating with multiple males. Animals may group temporarily for mating purposes only or for extended periods, sometimes as long as the life spans of the individuals. Some species form groups that live together until the offspring can survive on their own, and then the group disperses. In other species, adults may remain together after the young leave. Some groups form extended families in which the offspring stay for several generations.

Harems are composed of a single breeding male and several females, who may or may not be accompanied by offspring from the previous year. Harems can be seasonal (as in camels) or permanent (as in vicuñas). Other groups of animals, such as baboons, may include several adult males and females and their offspring.

Matriarchal families occur in many species. These soci-

eties are composed of a female and her offspring of the last one or two reproductive seasons and often several generations of her female offspring and their offspring. One or more males may temporarily join the system and then leave.

An atypical mating system involves leks, which are communal display and breeding areas used exclusively for reproduction.<sup>1</sup> The males vie for optimal territories in the leks in which they display to the females and which they vigorously defend from other males. The females are attracted to the displays or the area itself. The majority of matings takes place in a small percentage of the territories within a lek, and competition among the males for these optimal areas is intense. The females leave the area shortly after being bred.

Most wild felids, as well as the feral domestic cat, live solitary adult lives. The female raises her young without help from the male. Kittens stay with their mother until six months to one year of age, at which time the group disperses.<sup>9</sup> The kittens may stay together for several more months before establishing independent home ranges. If food and shelter resources are plentiful, the female offspring may stay with the mother indefinitely, establishing a stable matriarchal group. Estrous cycles of the adults tend to be synchronized, and the mothers often nurse each other's kittens or pool the kittens in a communal nest.<sup>10</sup> The mothers also assist each other in repelling from the area strange tomcats that may engage in infanticide. Owners of household cats with kittens have observed not only nursing queens care for each other's kittens but also report observations that other cats in the household, including spayed females, castrated males, and even the sire of a litter, curl up with the kittens in the nest area.

Lions form a very different social system from that of other felids.<sup>11</sup> Prides often consist of two adult males of breeding age, usually siblings, and several females and offspring. Lions engage in cooperative hunting strategies and bring down large game. Even if the male lions do not engage in most of the hunting, they provide an important function in the pride by protecting the young from nomadic male lions, which may try to establish themselves in a pride and kill the cubs. After death of the cubs and subsequent cessation of nursing, the females go into estrus. The new males can then sire their own offspring and invest their guarding energies in protecting their own cubs.

In some species, members of the society other than the parents help care for the young. These helpers are commonly referred to as "aunts" or "uncles" and are usually related to the young, although a genetic relationship is not a prerequisite for this type of behavior. Such alloparenting behavior occurs in the higher social insects, birds, and mammals and is especially common among primates. Some of the functions of alloparenting can include allowing young animals to gain experience with parental care before they reproduce as well as to establish social alliances with other animals. Obviously, with alloparenting, a mother and/or offspring may benefit from increased protection from predators, increased time for foraging, added food

resources, and perhaps protection from the environment.

### *Use of Space or Territory*

Societies can vary with respect to use of space. Many animals have a *home range*, that is, an area over which they routinely travel and patrol during hunting and exploration. Home ranges can overlap. Among male domestic cats, home ranges overlap each other as well as encompass the territories of several females. A *territory* is generally a smaller area, which is defended against encroachment from conspecifics. The territories of female cats usually do not overlap, although they may be shared (usually by female siblings, littermates, or mothers and offspring) on a temporal basis. The cats may use the areas consecutively, either several hours or a day apart, and thus rarely meet. It is possible that the regular schedules followed by the cats are monitored by the cats assessing each other's urine marks.<sup>9</sup> Large groups of migrating animals usually do not defend a territory, although they may repel conspecifics that approach too closely to their family or social units.

### *Social Hierarchy Systems*

Some form of social hierarchy usually develops in all social systems. Social hierarchies range in complexity from despotisms, in which one animal is dominant over all others, to linear hierarchies or pecking orders to complex social networks influenced by kinship and social alliances. Some societies are organized into absolute dominance hierarchies in which the social hierarchy is the same regardless of where the group goes or what the circumstances. Other societies are organized into a relative dominance hierarchy in which the social rank depends on particular locations or circumstances. For example, in feral domestic cats, a high-ranking individual defers to a subordinate when near the subordinate's sleeping places. Circumstances, such as time of day, may determine social status, in that a cat may enjoy high rank at one time of day in a particular location but defer to another cat in that location at a different time of day.<sup>8</sup> Liberg observed that rural tomcats with overlapping home ranges would routinely defer to each other in specific areas.<sup>12</sup> A particular cat obviously had the right of way or was dominant in one location, while the reverse applied in another location. In laboratory colonies where cats are kept in higher concentrations than occur in household or feral environments, a despotic system may develop involving both despots and social pariahs who are the recipients of most of the aggressive displays.<sup>8</sup>

Usually, dominance/subordinance is indicated by specific signals or postures. For instance, a dominant wolf or dog may engage in direct stares and "stand-over" postures with tail and ears erect. In contrast, the subordinate averts its gaze, rolls over on its side or back into a submissive posture, and displays facial postures of submission (such as horizontal retraction of the lips and flattening of the ears). Cats, on the other hand, do not have specific dominance or subordinance displays. Relative social status is indicated by combinations of offensive and defensive aggressive behaviors, avoidance, immobility, and deference.<sup>8</sup>

### Flexibility of Social Systems

It was a common assumption that the social system of a species was a fixed product of evolution and natural selection and, thus, inevitable and unmodifiable. Recent evidence, however, particularly from socioecologic studies, indicates that such assumptions are untenable.<sup>13</sup> Depending on the environment, usually in terms of food distribution and presence of predators, animals of a given species may actually alter the social system in which they operate.

There is evidence that all of the basic features of social systems (e.g., composition, defense of territory, establishment of dominance hierarchy, and types of mating and parenting systems) are flexible, at least to some degree, and that some species are more flexible socially than others.<sup>13</sup> For instance, a specific species of fish may be solitary, live in loose groups, or live in more tightly condensed groups depending on the likelihood of predator pressure. Guppies of a particular species in Trinidad do not group together if they live above waterfalls, which act as natural barriers to certain predators; however, in other areas of the same stream, the guppies group together as a means of predator defense.<sup>14</sup> A species of surgeonfish that used to feed alone now forms foraging groups because of increased pressure from predators.<sup>15</sup> Sociality as a response to predator pressure also occurs in white-tailed deer. They tend to be solitary in wooded areas but form groups when living in open habitats.<sup>16</sup>

Coyotes provide an interesting example of how sociality depends on availability of food resources.<sup>17,18</sup> Social organization of coyotes is influenced by the size of available prey, the spatial distribution of the prey, and its seasonal or temporal distribution. During the winter, coyotes that live in areas where numerous large dead prey (hunter-killed elk) are available tend to live in groups and to have larger group sizes than coyotes living in areas of less food availability (e.g., occasional dead deer). The social structure of a single population may change seasonally. During the summer, when coyotes sustain themselves mostly by catching rodents, group size is significantly smaller and many animals become solitary.

Coyotes living in packs, which form when there are numerous large dead prey available, are more likely to defend a specific territory. Territoriality, thus, is related to the presence of a large clump of defendable food resources.

A dramatic example of variation within a social system involves golden-winged sunbirds,<sup>19</sup> a nectarivorous species that winters in East Africa. These birds feed on flowers that vary in nectar production throughout the day. When the nectar production is high, individual sunbirds guard specific areas and remain solitary. When the flowers produce less nectar, the birds stop defending specific areas and begin interacting with each other in a different, organized way involving a dominance hierarchy system. The type of social system displayed is a direct function of the amount of food available; the birds can shift from one social system to another in a matter of minutes, depending on the balance of energy benefits accrued by one system over another.

**TABLE I**  
Household Cat Interactions with Each Other

Frequency of Interactions <sup>a</sup>	Play (n=554 <sup>b</sup> )	Sleep (n=547 <sup>b</sup> )	Groom (n=543 <sup>b</sup> )	Eating (n=548 <sup>b</sup> )
Frequently	70.8%	65.6%	57.8%	80.8%
Sometimes	9.7%	9.3%	11.8%	4.4%
Infrequently	4.0%	4.2%	4.4%	3.3%
Rarely	4.7%	4.8%	3.5%	2.2%
Never	10.8%	16.1%	22.5%	9.3%

<sup>a</sup>Frequently = once a week or more; sometimes = once a month or more; infrequently = less than once a month; rarely = once a year or more.

<sup>b</sup>Number of responses to this question.

**TABLE II**  
Household Cat Interactions with Owners

Frequency of Interactions	Sleep With <sup>a</sup> (n=875 <sup>c</sup> )	Table Tidbits <sup>b</sup> (n=875 <sup>c</sup> )	Share Snacks <sup>b</sup> (n=877 <sup>c</sup> )	Greet Owners <sup>b</sup> (n=870 <sup>c</sup> )
Always	38.5%	8.5%	6.5%	52.1%
Usually	20.3%	7.9%	5.2%	28.6%
Frequently	14.4%	13.0%	13.2%	9.1%
Sometimes	15.4%	37.8%	43.0%	7.1%
Never	11.3%	32.8%	32.0%	3.1%

<sup>a</sup>Usually = 5 to 6 nights/week; frequently = 2 to 5 nights/week; sometimes = less than 2 nights/week.

<sup>b</sup>Usually = 80% to 90% of the time; frequently = 30% to 70% of the time; sometimes = less than 30% of the time.

<sup>c</sup>Number of responses to this question.

**TABLE III**  
Time Owners Spend Daily Interacting with Their Cats by Talking to, Playing with, Exercising, Training and/or Care Giving<sup>a</sup>

Time (hr)	Percent of Respondents
Less than 1/2	19.3
1/2-1	34.6
1-2	23.2
2-3	14.2
4 or more	8.8

<sup>a</sup>n = 862.

Brown hyenas switch their rearing strategies depending on environmental conditions. In low-quality territories they care only for their own young, occasionally rear their young communally in higher-developed territories, and always rear young communally in the central Kalahari (Africa).<sup>20,21</sup> It is not clear, however, whether these alternate rearing strategies are a result of fluctuations in resources or of increases in pressure from predators.

### The Social Systems of Cats

Most field studies of feral domestic cats have indicated that cats are solitary hunters of small prey. As adults, their friendly social behavior is generally restricted to the interactions of courtship and mating. Domestic kittens may stay with the mother until they are 6 to 12 months of age before dispersing and establishing their own areas of living. Free-ranging domestic cats that are provided with food and/or shelter may congregate in groups, usually consisting of large numbers of females as well as their female offspring.<sup>8-10,12,22,23</sup> It is interesting to note, however, that even when there are abundant resources, adult intact males do not live together.

Kittens between 8 and 16 weeks of age may accompany their mother on excursions in her home range.<sup>9</sup> During these expeditions she may lead the kittens in scavenging or may bring them prey, although she apparently does not let them hunt with her. The trips appear to be to familiarize the kittens with the area. Kittens then begin hunting alone but continue to rest together and groom each other throughout their first year of life. Thereafter, they establish their own foraging ranges. If resources are plentiful, the female kittens may remain in their maternal group until they die. Even in a well-provisioned area, some females emigrate. When they do so, they establish a residence in a location free of other cats and may start a new female group.<sup>12</sup> Unfamiliar intact female cats will not join an established fe-

male group. Between 10 and 14 months of age, the male kittens begin staying away from the core area for progressively longer periods of time and eventually disperse.<sup>12</sup> It is thought that permanent dispersal is related to harassment by the adult breeding tomcat that patrols the female's core area. If the young male is protected by periodically being allowed in a house, the age at which he leaves the area is delayed.<sup>12</sup>

When the young males emigrate they settle in areas away from the focal areas of social activities. As they mature, however, they begin to visit the female units. Between two and four years of age, they gradually begin challenging the adult tomcats that patrol the female group. If the central breeding male does not tend the estrous female constantly, a peripheral male may breed her.

Between 3 and 5 years of age and after reaching a critical weight, a challenger may establish a home range that encompasses one or more female groups where he is the central breeding male. Home ranges of breeding males often overlap. An individual male may be the central breeding male in some of the female groups and a peripheral male in others. The tenure of a central breeding male is rather short—a few years at most. In his study area, Liberg was not aware of any breeding males over 6 years of age.<sup>12</sup> He did observe that breeding males shifted their home ranges over the years. This trait would decrease incest, because after a year in the same home range a breeding

TABLE IV  
Percentage of Cats That Owners Considered As Knowing Tricks<sup>a</sup>

	Fetch	Interesting Behavior	Learned Trick	Meow on Command	Play Games	Understand Everything	Come When Called
Percent of Responses	15.8	12.3	7.9	6.0	4.2	1.7	4.0

<sup>a</sup>n = 887.

TABLE V  
Percentage of Cats Indicated by Breed as Engaging in Categories of Behaviors That Owners Considered Tricks<sup>a,b</sup>

Breed	n	Percent							
		Fetch	Meow on Command	Play Games	Show Interesting Behavior	Learned Trick	Come on Call	Understand Everything	Other Tricks
DSH/DLH <sup>c</sup>	485	15.3	7.0	4.3	11.1	9.3	4.9	1.4	3.5
Mixed Breed <sup>d</sup>	114	11.4	3.5	5.3	15.8	9.6	3.5	0.9	2.6
Siamese	113	29.2	8.0	4.4	14.2	4.4	3.5	3.5	3.5
Persian	33	9.1	0.0	9.1	15.2	9.1	3.0	3.0	3.0
Abyssinian	11	45.5	18.2	0.0	9.1	27.3	18.2	0.0	9.1
Himalayan	11	27.3	18.2	0.0	27.3	0.0	0.0	0.0	0.0
8 other purebreds	52	9.6	1.9	3.8	15.4	1.9	3.8	0.0	7.7

<sup>a</sup>n = 819.

<sup>b</sup>Tricks are not mutually exclusive.

<sup>c</sup>DSH = Domestic Shorthair; DLH = Domestic Longhair.

<sup>d</sup>Half purebred or a cross of two purebreds.

**TABLE VI**  
**Percentage of Cats Taken with Owners**  
**on Overnight Trips or on Errands**

<i>Frequency of Cat Accompanying Owner<sup>a</sup></i>	<i>Overnight (n=866)</i>	<i>Errands (n=873)</i>
Always	4.6%	0.1%
Usually	5.0%	0.1%
Frequently	3.8%	0.9%
Sometimes	16.1%	6.5%
Never	70.6%	92.3%

<sup>a</sup>Frequently = once a week or more; sometimes = once a month or more; infrequently = less than once a month; rarely = once a year.

male's daughters would be of reproductive age. Wolski noticed that in free-ranging situations females often did not bear their first litter until 18 to 24 months of age.<sup>9</sup> Tomcats may experience higher mortality than females in that their extensive home ranges take them across more roads and they engage in fights with other males. Ethologists often mention that tomcat fights are rarely serious, but a more accurate description would be that immediate mortality is rare. Certainly few cats seriously mutilate or kill each other during a fight, but a single bite can develop into an abscess and accompanying septicemia over the course of several days.

When sufficient food and shelter are available, domestic cats display friendly social behaviors to each other on a more extended basis. Leyhausen described the friendly approach behavior displayed by cats toward other cats, based on observations of both free-living groups and laboratory colonies. The social behaviors observed included (1) sleeping together, (2) grooming each other, (3) rubbing against each other, (4) friendly greeting after a prolonged absence,

(5) running beside each other and purring and rubbing against each other with tail raised, and (6) playing together. Owners have always insisted that cats engage in amicable social behaviors with one another. A recent survey we conducted among owners of household cats indicated that the majority of cats frequently play, sleep, groom, and eat with other cats (Table I).

Moelk<sup>24</sup> described many years of observations on the development of vocal and friendly approach behaviors in house cats. The author of the paper described four patterns of friendly approach behavior:

1. *Murmuring*—sounds like an extended single-stroke purr; usually uttered in one to four distinctive rolls and represented as “mhrn,” “mhrnhrn,” or “mhrnhrn mhrnhrn”
2. *Purring*—a continuous vibration of both the inhaled and exhaled breath, represented as “hrn-rhn-hrn-rhn”
3. *Rubbing*—rubbing head, shoulder, and body against a vertical object, such as a doorpost, piece of furniture, or human leg
4. *Rolling*—cat lying on the side and rolling the body from side to side with or without clutching or batting movements of the paws.

These four types of friendly behavior develop in the kitten by the age of five weeks. Each behavior can be used as a response to the touch, the voice, or the sight of the mother cat or a human.

Purring, rubbing, and rolling do not vary much other than in length of time and intensity; whereas “mhrn” murmurs exhibit wide variation and are sensitive to the response of a social partner (cat or human). Murmuring can provide the cat a broad range of vocal expression.<sup>25</sup> “Mhrn” vocalizations appear with high frequency between mother and young. They serve as a greeting when the

**TABLE VII**  
**Percent of Cats That Alert Owners to Visitors<sup>a</sup>**

	<i>Frequency of Alerting Behavior</i>				
	<i>Always</i>	<i>Usually<sup>b</sup></i>	<i>Frequently<sup>b</sup></i>	<i>Sometimes<sup>b</sup></i>	<i>Never</i>
Percent of Responses	26.3	14.3	8.4	17.3	33.8

<sup>a</sup>n = 868.

<sup>b</sup>Usually = 80% to 90% of the time; frequently = 30% to 70% of the time; sometimes = less than 30% of the time.

**TABLE VIII**  
**Types of Feline Behaviors That Owners Considered Protective<sup>a</sup>**

	<i>Type of Protective Behavior</i>					
	<i>Alert to Noises</i>	<i>Threaten People</i>	<i>Threaten Animals</i>	<i>Follow Owners</i>	<i>Sleep with Owner</i>	<i>Other</i>
Percent of Responses	65.2	12.2	9.4	2.6	2.2	13.8

<sup>a</sup>n = 283.

TABLE IX

Percentage of Owners That Believed They Are Aware of Their Cat's Moods and Percentage of Owners That Believed the Cats Were Aware of the Owner's Moods

Frequency <sup>a</sup>	Owner Aware of Cat's Moods <sup>b</sup>	Cat Aware of Owner's Moods <sup>c</sup>
Always	29.7%	21.4%
Usually	44.7%	33.7%
Frequently	13.2%	16.1%
Sometimes	10.9%	19.5%
Never	1.4%	9.3%

<sup>a</sup>Usually = 80% to 90% of the time; frequently = 30% to 70% of the time; sometimes = less than 30% of the time.

<sup>b</sup>n = 868.

<sup>c</sup>n = 851.

mother returns to the nest and attract the kittens to her. "Mhrn" vocalizations greatly increase in frequency during courtship and mating. The "mrhn" is not simply a mating call but also appears to function as a friendly approach communication that may coordinate and synchronize courtship and mating behaviors.

"Mhrn" greetings between kittens decrease around the time of weaning and when the mother starts bringing prey back to the nest. Small prey items, such as mice, can only be possessed by one kitten; hence, they elicit extreme competition. The kitten that manages to seize the prey item runs off with it and will growl, hiss, and swat at other kittens who approach. Kittens raised in a household where food is plentiful usually do not display such possessiveness and intense aggression toward each other.

Occasionally, however, regardless of food supply, a very palatable morsel, such as a piece of chicken, may cause a normally docile kitten to hiss and spit as it defends its find. This aggression may be directed toward another cat or to a person who tries to take away the food. At this time, kittens also become increasingly interested in small moving objects and object play. Solitary play and intense aggression over scarce, palatable prey probably begins to prepare the kitten for its life as a solitary hunter. In situations where food and shelter are abundant, intense competition does not arise among the kittens over these resources and friendly behaviors continue to develop.

## New Data on Cat-Owner Interactions

Owners have always insisted that cats engage in amicable social behaviors with one another and with people. Evidence supporting the social behavior of household cats was obtained from a survey of cat owners who filled out a questionnaire while they were waiting for medical or surgical attention for their pet at four veterinary hospitals on the East Coast.<sup>3</sup> A total of 887 questionnaires was either completely or partially filled out; 41% of the questionnaires referred to cats brought to the clinic and 59% to cats at home. Thirteen percent of the respondents filled out two questionnaires concerning their cats, 3% filled out three questionnaires, and 1% filled out more than three questionnaires.

According to the survey, the majority of cats frequently engage in social behavior with other cats in the household (Table I) as well as with the owners. The majority of owners indicated that their cats slept with a person in the family, shared food with people, and greeted the owner on return to the home (Table II). Several respondents wrote in comments indicating that their cat also greets friends, rubs against their legs, or plops itself down on the rug in the middle of the activity area when visitors are present.

According to this questionnaire, 46% of cats and owners spend more than one hour daily interacting with each other (Table III). Although talking to, playing with and exercising, training, and/or caring for the cat each day may be primarily owner initiated, the cat has to be cooperative and interact reciprocally with the owner for the behaviors to occur. Forty percent of the cats were reported as knowing tricks. Types of behaviors that the owners listed as tricks were fetching, retrieving, meowing on command, playing games (such as chasing strings or batting pencils), coming when called, learned actions (such as sit or roll over on command or jump over a fly swatter) as well as any interesting behavior that the cat did, such as wake the owner, watch birds, or roll over to be petted. Some owners simply answered the question with the statement that the cat understands or obeys everything (Table IV). The responses to the survey confirmed the belief that Siamese cats retrieve or fetch more than most other breeds. Abyssinians and Himalayans also appear to be good retrievers (Table V).

Most owners interacted with their cats in ways that per-

<sup>3</sup>The Veterinary Hospital of the University of Pennsylvania (VHUP), The Animal Medical Center in New York City, a feline specialty practice, and a suburban small animal general practice.

TABLE X

Frequency of Owners Talking to Cats About Matters Important to the Owners<sup>a</sup>

Percent of Responses	Frequency of Confiding				
	Very Often <sup>b</sup>	Frequently <sup>c</sup>	Sometimes <sup>d</sup>	Occasionally <sup>e</sup>	Never
	11.6	13.1	3.2	19.2	43.0

<sup>a</sup>n = 865.

<sup>b</sup>Once a day or more.

<sup>c</sup>Once a week or more.

<sup>d</sup>Once a month or more.

<sup>e</sup>Less than once a month.

**TABLE XI**  
**Number and Percentage of Cats Addressed with Pet Talk, as a Child, as an Adult, or Other<sup>a</sup>**

Type of Talk	Number	Percent
Child only	320	36.8
Adult only	178	20.5
Pet only	113	13.0
Other (one answer)	22	2.5
Pet talk and child	52	6.0
Pet talk and adult	28	3.2
Pet talk and other	6	0.7
Child and adult	70	8.1
Child and other	8	0.9
Adult and other	6	0.7
Pet, child, and adult	54	6.2
Pet, child, adult, and other	12	1.4

<sup>a</sup>n = 869.

**TABLE XII**  
**Type of Family Member That the Cat was Considered<sup>a</sup>**

Type of Member	Number	Percent
Animal member only	376	49.6
Child only	224	29.6
Other single answer <sup>b</sup>	53	7.0
Animal and other answer(s)	83	10.9
Child and other answer(s)	90	11.9
Animal and child only	56	7.4

<sup>a</sup>n = 758.

<sup>b</sup>Brother/sister or other.

<sup>c</sup>Child, parent, brother/sister, and/or other.

<sup>d</sup>Animal, parent, brother/sister, and/or other.

mitted or encouraged the cats to remain close to them throughout the day. Not only did owners allow the cats to sleep on the bed, feed them tidbits and snacks (Table II), and spend time playing with and caring for them (Table III); but also 95% of the cats were allowed on furniture, and some accompanied the owners on errands or on overnight trips (Table VI). Most cats (96%) were talked to at least once a day, and less than 1% were talked to less than once a week. No respondents answered that they never talked to their cats.

Many owners celebrated their cat's birthdays, although only 23% knew their cat's exact birth date. Twenty-five percent of the cats were assigned a birthday if the exact date was unknown. People usually celebrated the cat's birthday by giving the cat a present or a special treat (70%), and a few did so with parties (6%).

### Owners' Perceptions of Their Cat's Behavior

Thirty-three percent of the cats were considered to be protective of the owners or a good "watchcat" for the

home. About 26% of the cats were described as always alerting their owners (Table VII). A total of 283 people responded to the question "what does your cat do that makes you consider the cat protective?" The majority considered cats that were alerting the owner to noises as having protective value. Some felt that their cat's aggressive behavior to people or other animals was motivated by protection. A few people believed that following and sleeping with the owner was protective, and a few considered killing bugs or mice protective behaviors (Table VIII).

Most owners believed that they and their cats were able to communicate to each other their respective moods. For instance, more than 70% of the owners believed that they were usually or always aware of their cat's moods, and more than 50% of the owners believed that the cats were aware of their owner's moods (Table IX).

The majority of the people surveyed answered affirmatively to the question "do you confide in your cat (talk to him/her about problems and events important to you)?" (Table X). When asked how they talked to their cat, the majority indicated they conversed as if the cat were a person, usually a child, rather than a pet (Table XI). Some cats, however, were addressed in more than one manner, usually both as a pet and as a child.

A total of 99% of the cats in the survey was considered members of the family. Although most cats were talked to as people, the majority were thought of as animal members of the family (Table XII). In response to the question "what kind of family member do you consider him? (check all that apply)," about 50% of the cats were considered strictly animal members and 11% as human members as well as animal members. About 30% of the cats were considered as children.

Our survey suggests that most owners of household cats do not consider their pet unfriendly and aloof. In fact, cats may be interacted with and perceived as social companions in much the same way dogs are, at least by a population of owners that seek sophisticated veterinary care. A number of surveys indicate increasing cat ownership in the United States.<sup>26</sup> Veterinarians should be aware that most pet cats interact with each other and with their owners in a far more social manner than has been generally appreciated.

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## UPDATE

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Within the past few years, four valuable texts on cat behavior have been published.<sup>1-4</sup> Turner and Bateson's book<sup>1</sup> is the most basic and research oriented of the recent volumes. It has excellent reviews of several subject areas by the major researchers currently studying cat behavior, many of whose previous works were cited in the original Voith and Borchelt article.<sup>5</sup> Articles include updates by Leyhausen on cat social life in general, Kerby and MacDonald and Liberg and Sandell on social organization in feral outdoor populations, and Natoli and De Vito on feral cat mating systems; an article on domestication of the cat by Serpell; and an overview of the human-cat relationship by Karsh and Turner to name a few.

John Bradshaw's *The Behaviour of the Domestic Cat*<sup>2</sup> is a slim volume summarizing current research in several major areas, including history and domestication of the cat, behavioral development, sensory capabilities, feeding and hunting behavior, social behavior, cat-human interaction, cat personality "types," and cat welfare. In the final chapter, Peter Neville, a London-based behavior consultant,

discusses diagnosis and treatment of behavior problems.

The book is an easy read and an articulate overview of the behavioral biology of domestic cats and is based on published studies rather than anecdotes. The last chapter is based primarily on his personal philosophy and experiences from his own caseload and gives fewer references to or discussions of other published articles.

Overall, this volume provides a quick way to review the classic literature, catch up on recent developments, and gain a better understanding of the domestic cat—where it comes from, how it acts, and why. There is also an excellent bibliography.

Beaver's book<sup>3</sup> has a more veterinary slant. She uses some of the same information sources as Bradshaw, so there are some areas of overlap; but she provides a more extensive bibliography of cat behavior topics, many of which are related to veterinary medicine and are not covered in the other volumes.

The O'Farrell, Neville, and Ross text<sup>4</sup> is primarily devoted to the diagnosis and treatment of feline behavior problems. It also includes chapters on factors that influence a cat's behavior and may underlie problem development, such as owner attitudes, early development, senses, instinct, cognition, anxiety, and stress. The final chapter is devoted to helping owners prevent problems by providing practical information, based on O'Farrell and Neville's experience and the few recent studies, about such topics as how to choose a breed of cat for a pet, whether to allow cats outdoors, socializing cats to one another, acclimating cats and babies to one another, and helping cats cope with a move.

## IN-HOME STUDIES

Although an estimated 60 million cats in the United States currently reside as pets in people's homes, little research has focused on how cats actually live and interact in this setting. At the University of Georgia,<sup>6</sup> a study of the congeniality of pairs of household cats by gender is discovering, for example, that male dyads engage in many amicable behaviors. A colleague and I recently reported a study<sup>7,8</sup> of seven castrated male and seven spayed female housecats living in a one-story ranch house; this study showed several new or revealing aspects of how cats actually live within a home.

We found, for example, that cats indoors formed individually distinct but overlapping home ranges (areas of habitual use), with adult males having slightly larger ranges than adult females. Although these findings resembled those for adult feral cats outdoors<sup>9</sup>; they also suggested that sex, age, individual personalities, and relationships played a role in how cats formed and maintained their home ranges with respect to one another.

We could also identify particular spots within home ranges where individuals were likely to be found at particular times, using the areas repeatedly for sleeping, resting, and grooming. Such "favored spots" are familiar to all cat owners but are rarely discussed in the literature. Individuals in our population were either the only cat to use a spot or they shared the spots with others. In this population, cats

shared the spots by using them in temporal sequence, each cat using the same spot at different times. This "time-sharing" aspect of housecat behavior has not, to our knowledge, been formally studied previously. Because we could identify groups, usually two to three individuals, who predictably used the same spot at different times, our findings suggested that individuals "knew" with which other cats they shared a spot. Gender played a role in these groupings, with most spots being shared either by all-female or all-male groups.

There is little agreement in the literature about the concept of dominance in domestic cats. Some studies find obvious evidence for dominant individuals and even hierarchies, at least in outdoor populations or in laboratory settings.<sup>10-13</sup> Others find mixed evidence or no evidence at all to support this concept of dominance within the species.<sup>4,2,3,5</sup> I am not aware of any published formal studies that focus on dominance among cats in the home.

Despite the presence of 14 cats in the small home (124 m<sup>2</sup>) in our study, overt aggression was rare; it was therefore difficult to identify individuals as dominant. One or two cats indicated a dominance, at least in some situations, by controlling resources or supplanting other individuals—two commonly cited general indicators of dominance in animals.<sup>14,15</sup> One individual seemed subordinate to all others, withdrawing from the resource at the approach of any other cat. The death of a dominant individual, however, led to changes in the behavior of the other cats. These changes, coupled with the lack of overt aggression, suggested that individual relationships, situation, temperament, and even breed played important roles in shaping dominance-subordination interactions in this population and that subtle cues, rather than overt aggression, may have governed these relationships.

Our preliminary findings<sup>7,8</sup> also indicated that tail signals in this population may have helped "tag" individuals at a distance as more or less likely to interact and in what ways (e.g., aggressive or not), such that recipients might have tailored their responses in ways that reduce aggressive encounters. My colleagues and I have shown or speculated that tail signals play such a role in other social groups.<sup>16-18</sup>

Density calculations for the population in our study indicated that they lived at densities some 50 times greater than those found in most studies of feral cats outdoors,<sup>9</sup> yet they formed a stable grouping with little overt aggression. Although the possible interactions between density and social organization have been addressed for populations of feral cats outdoors<sup>9,19</sup> and explored informally for various animals indoors (including nondomestic felids in zoo or circus settings),<sup>20-23</sup> we have not found any studies of housecats that investigated the effects that living at differ-

ent densities might have on social interaction. As part of a follow-up project, I am currently pursuing such a study as part of a follow-up project. In this study, cat owners are being surveyed to investigate the general applicability of our findings to other in-home populations of various compositions and densities.

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