

Exploring the Behavior and Social Competence of Feline

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Abstract Cats are a popular pet, but research on their behavior and social skills is not yet very in-depth. This review introduces the behavioral habits of cats, including hunting behavior, sleep habits, cleanliness behavior, and estrus behavior; At the same time, the social abilities of cats were also explored, including their social interactions with humans and other cats. Through the research in this review, we found that cats exhibit strong individual differences in their behavioral habits and social abilities, with each cat having its own unique behavioral and social characteristics. The research results of this review provide better care and training recommendations for cat owners, as well as a foundation for us to better understand the behavior and social characteristics of cats.

Keywords Cat; Behavioral habits; Social skills

When exploring the behaviors and social abilities of cats, people are inevitably drawn to the dual nature of these mysterious creatures. On one hand, cats often exhibit a gentle and languid demeanor, lounging gracefully in some corner, or patrolling their territory with elegant strides. However, as cats are further understood, humans discover a brave and curious side to them as well. They enjoy exploring new environments, chasing fluttering feathers, and even interacting with other animals. This duality in their character turns the behavior of cats into a fascinating puzzle, awaiting to be unraveled step by step in this review.

The social abilities of cats are equally a captivating topic. Compared to dogs, cats seem to carry an air of mystery, often choosing to interact with humans on their terms and at their preferred times. Some cats are very affectionate, willingly lounging beside their owners to enjoy cozy moments, while others appear relatively independent, only showing affection when it suits them. Understanding the social cues, purring, and postures of cats will help humans better comprehend their emotions and needs, thus establishing a deeper bond in the human-cat relationship.

This review aims to delve deeply into the behaviors and social abilities of cats, uncovering the mysteries behind these fascinating creatures through observation and literature analysis. The review will explore various aspects of cat communication, play behaviors, territorial awareness, and attempt to answer why cats exhibit these unique behaviors and how they interact with humans and other animals. Additionally, this review will delve into the social status of cats within households and their relationships with other cats, providing insights into their social networks and group dynamics.

Through in-depth research into the behavior and social abilities of cats, humans can not only better meet their needs but also cultivate richer and closer relationships with these feline companions. Whether as pets or subjects of scientific inquiry, cats are deserving of increased attention and exploration from humans.

1 Cat Behavior Patterns

1.1 Hunting behavior

Cats are natural hunters with exceptional hunting abilities. Hunting behavior in cats is an innate instinct, driven not only by the need for food but also as an expression of their innate nature. This instinctual behavior can also be observed in domestic cats. Even as pets, their instincts can lead them to exhibit hunting behaviors similar to those

of their wild counterparts. In outdoor environments, cats typically hunt various small mammals such as mice, birds, and insects. Cats are known for their swiftness and agility during hunting. They can effortlessly climb trees and leap over obstacles in pursuit of their prey. After a successful hunt, cats often bring their catch home and may present it as a gift to their owners.

During hunting, cats choose concealed locations such as bushes, tall grass, or corners to wait for their prey. This is because cats are not fast runners and rely on hidden positions to ambush their prey. Throughout this process, cats remain highly alert, with their ears perked up, bodies tense, and ready to strike at a moment's notice (Figure 1). When prey appears, cats pounce swiftly. During this process, cats employ their exceptional aiming and reflexes, combining their striking ability and the sharpness of their claws to capture their prey rapidly. They typically use their teeth and claws for the capture. For small mammals, cats grasp the prey by the neck with their teeth and then secure the body with their claws, ultimately severing the prey's neck with their sharp teeth. In the case of insects, they use their claws to seize and bite.



Figure 1 Cats in hunting

The hunting behavior of cats is also crucial for their health and well-being. Hunting not only helps cats maintain physical fitness but also provides them with exercise and stress relief opportunities. In a household setting, owners can encourage this hunting instinct in their pet cats by providing small toys or food puzzles, allowing them to get sufficient exercise and mental stimulation. However, it's important to note that a cat's hunting behavior can have certain impacts on the surrounding environment and other animals. In indoor environments, owners should be mindful of potential damage to household items or harm to other pets. In outdoor settings, owners need to monitor their cat's behavior to prevent them from injuring other wildlife or disrupting the ecological balance of the surrounding environment.

1.2 Sleep habits

Cats are highly unique animals, and their sleep habits also possess several distinct characteristics. Cats tend to sleep for extended periods, often exceeding 16 hours (Figure 2). This behavior is linked to their natural instincts in the wild. Wild members of the feline family need to spend a considerable amount of time hunting, protecting territory, and reproducing, necessitating ample sleep to maintain their physical fitness and health. Sleep plays a vital role in a cat's overall health. It helps cats sustain the normal functioning of their immune and nervous systems. Additionally, sleep assists cats in recuperating from fatigue, keeping them energized for their daily activities. Furthermore, during sleep, cats produce a hormone called "melatonin," which helps them establish healthy sleep patterns and contributes to their overall well-being and happiness.

Cats' sleep patterns typically consist of two types: light sleep and deep sleep. During light sleep, a cat's body relaxes, but its ears and eyes often remain alert, enabling it to wake quickly in response to any movement or noise. In deep sleep, the cat's body becomes even more relaxed, with its ears and eyes closed, while its breathing and heartbeat continue at a relatively stable rate.



Figure 2 Sleeping cat

A cat's sleep duration typically varies with age. Kittens usually require more sleep to promote their physical growth and development. Adult cats generally sleep less but still need sufficient rest to maintain their health. Senior cats, on the other hand, tend to increase their sleep time. This is because as cats age, their bodily functions start to decline, necessitating more rest and sleep to preserve their vitality and well-being.

To ensure that a cat gets sufficient sleep, the owner should provide a comfortable, quiet, warm, and safe sleeping environment while maintaining cleanliness and regularly changing bedding. Cats usually prefer to sleep on soft cushions, blankets, or pillows, and they also appreciate having some private space, such as a room or a corner to themselves. The cat's sleep environment should be quiet, avoiding excessive noise like loud TV or disturbances. Additionally, owners need to provide an adequate supply of food and water to ensure the cat receives proper nutrition and hydration during sleep. It's important to note that a cat's sleep habits can be influenced by various factors such as illness, environmental changes, stress, and anxiety. Owners should also pay attention to the cat's sleep patterns, and observe the cat's sleep duration and sleeping posture. If there is a significant decrease in sleep duration or unusual sleeping postures, it may indicate a health issue. In such cases, owners should take them to the veterinarian to ensure their well-being.

1.3 Grooming behavior

Cats are incredibly clean animals and spend a significant amount of time maintaining their personal hygiene. Cat grooming behaviors include licking their fur, grooming their coat, and cleaning their environment. These behaviors help them stay healthy and content.

Cats engage in frequent grooming by licking various parts of their bodies, including their head, face, body, legs, and tail. Their tongues are equipped with small barbs that help them remove dirt and impurities from their fur. This grooming behavior also aids in the secretion of oils, maintaining the shine and health of their coats. Grooming by licking is also a way for cats to establish an intimate bond with their owners, as they express their affection by licking the human skin (Overall et al., 2005).

In addition to licking, cats also groom their fur with their own paws. They typically use their front paws to groom the fur on their head and face, and their hind paws to groom the fur on their body and tail. This grooming behavior not only helps cats remove impurities from their fur but also stimulates blood circulation in the skin, promoting overall health. Cat fur needs regular grooming, especially for long-haired breeds, to prevent issues like matting and tangling.

In a cat's grooming behavior, there is another crucial aspect-oral hygiene. Oral hygiene is essential for cats because the condition of their mouth directly affects their overall health. Cat's oral hygiene includes behaviors like licking their lips, nose, and teeth. Owners can provide dental care products for cats, such as toothbrushes and cat toothpaste, to help them with regular oral cleaning.

In addition to cleaning themselves, cats also clean their surroundings. They typically use their front paws to dig through litter, dust, and other debris, and then use their hind paws to bury these materials. This behavior helps cats maintain the cleanliness and tidiness of their living environment. However, for domestic cats, owners need to provide clean litter boxes and cat beds, regularly clean the litter box, wash cat beds and toys, etc., to ensure a clean and hygienic living environment for the cat (Heath, 2019).

In the cat's grooming behavior, there are also issues that owners need to pay special attention to. Cat's fur may develop odors and stains due to food residue, dander, bacteria, etc. In such cases, owners should promptly clean and groom their fur, trim their claws, etc., to maintain their cleanliness and health. Additionally, a cat's claws also need regular trimming to prevent them from scratching themselves and furniture. Furthermore, owners should provide a clean living environment for their cats, including regularly cleaning the litter box, washing cat beds and toys, and so on.

1.4 Behavior during estrus

A cat's estrus cycle typically lasts for 7 to 10 days, with most of that time spent in the estrus state. The onset of estrus varies depending on factors such as the cat's breed, age, and the season. During estrus, a cat's hormone levels rise, leading them to exhibit more active, affectionate, and sexually receptive behaviors (Finestone, 1957). They may also display increased playfulness, such as chasing their tail, rolling around, and leaping. These behaviors are a result of the elevated hormone levels in cats, which fill them with energy and excitement.

1.4.1 Female cat's mating behavior

Female cats typically reach sexual maturity between 5 to 10 months of age, and estrus cycles usually last for 7 to 10 days. During estrus, female cats become more affectionate and eager, frequently rubbing their heads and bodies. They may even rub against their owners using their heads, throats, and bodies to express their affection and desire. They may also produce various vocalizations, such as hissing, softly whimpering, and purring, to attract their owner's attention. Additionally, during estrus, female cats experience an increase in hormone levels, which significantly raises their ovulation rate, making them more likely to become pregnant. During this time, female cats may crouch on the ground, frequently lick their genital area, and curl their tails to the side while emitting low growling sounds to attract the attention of male cats. If a female cat does not successfully mate, she may continue to yowl and seek out male cats, which can last for several weeks.

During estrus, unsterilized female cats may exhibit undesirable behaviors like urine marking, aggression, and provocation. To prevent these behaviors from occurring, owners may consider having their female cats spayed through a surgical procedure. Spaying can help control these behaviors and also has the added benefit of preventing unwanted pregnancies and certain health issues in female cats.

1.4.2 Male cat's mating behavior

During the mating season, male cats typically reach sexual maturity between 6 months to 1 year of age. During this period, male cats exhibit more active and playful behavior, frequently pacing, jumping, and running around. Additionally, they spray urine to mark their territory, and may engage in scratching and biting furniture. They also experience heightened sexual impulses, actively seeking out female cats for mating. The mating season for male cats usually lasts for 7-10 days, but it can be longer in the spring and fall seasons.

During this period, male cats may exhibit aggressive behavior as they compete with other males to pursue female cats. Therefore, owners need to pay closer attention to the emotions and behaviors of male cats, avoiding unnecessary conflicts and injuries.

In conclusion, the mating behaviors of male and female cats differ, but both can exhibit some undesirable behaviors during their mating periods. These behaviors are a result of the hormonal influence on cats during their mating cycles, leading to suppressed and anxious emotional reactions. Therefore, during these periods, owners need to pay closer attention to the emotions and behaviors of their cats, providing them with care and assistance to prevent undesirable behavior. Additionally, intact cats may frequently leave home in search of mating partners. To

avoid accidents related to mating behaviors and reduce health risks, owners may consider spaying or neutering their cats.

2 The Social Skills of Cats

2.1 Socializing with humans

Cats, as intimate companions in human lives, have sparked endless curiosity and exploration in their interactions with humans. From affectionate embraces to mysterious moments of solitude, cats communicate with humans in their unique ways. This subtle interaction not only fosters deep emotional connections between humans and animals but also brings joy and companionship to the daily lives of their owners. In this short passage, this review will delve into the social bond between cats and humans, unveiling the emotional ties and behavioral mysteries that lie within.

2.1.1 Expressing emotions

Cats are highly social animals, and they communicate and interact with humans through body language and sounds (Bradshaw et al., 2012). This communication ability allows them to establish strong bonds with humans, demonstrating deep affection and trust towards their owners. Cats often express their emotions towards their owners through intimate physical contact, licking their owner's face and head, rubbing against them, and making purring sounds (Xiao, 2006, *Pet World: Cat Lovers*, (5): 40-41). Recent research suggests that cats use eye contact, body postures, and vocalizations to establish even closer communication and emotional resonance with humans.

Cats convey their inner emotions through eye contact. For instance, direct eye contact usually shows curiosity and friendliness, while squinting or closing their eyes indicates relaxation and contentment. Additionally, body posture is another tool they use to express emotions. For example, tail wagging, ears upright, body shortened, and wide-open eyes imply excitement and curiosity, while raised back fur, flattened ears, wide-eyed expression signal anger (Figure 3). Ears pointing backward indicate unease or fear, while forward-facing ears suggest curiosity and friendliness. When cats are displeased, they may scratch, flick their ears, glare, or even pout and swish their tails. Furthermore, they use vocalizations to convey emotions (Kong et al., 2019). Low, purring sounds and throaty murmurs often indicate contentment and pleasure, while cheerful meows and calls communicate happiness. Sharp cries and hissing suggest fear or anger (Tian, 2001, *Henan Forestry*, (1): 51). Some cats may howl, retch, or yowl to express pain and discomfort.

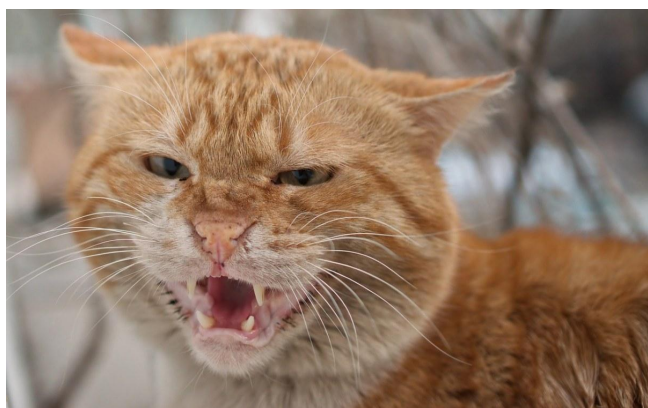


Figure 3 Angry cat

These means of communication not only showcase the rich emotional world of cats but also foster a deeper emotional connection between humans and cats. By understanding these unique ways cats communicate, this review can better address their needs and nurture a more harmonious human-cat relationship.

2.1.2 Playful and mischievous

When cats interact with humans, they may sometimes exhibit mischievous behaviors to attract their owner's attention, such as scratching, rolling around, biting, or damaging objects.

Cats are fond of scratching because it's an innate instinct and a way to exercise their claws. If they lack appropriate scratching posts, they may scratch furniture, carpets, or even their owner's arms. Rolling around is one of the ways cats exercise their bodies and seek stimulation. Some cats perform this behavior in front of their owners to get attention. Occasional biting may occur when they feel uncomfortable or angry. For example, if the owner ignores the cat's needs or touches areas they don't like, they may use biting to express their displeasure. Sometimes, cats may also bite during play to initiate interaction. Destructive behaviors like knocking over plants or chewing on cords can be a result of boredom. In such cases, owners should provide a variety of toys and activities to offer cats more options.

At the same time, owners need to be mindful of protecting themselves and their furniture. Cats' occasional mischievous behavior can sometimes result in harm to themselves or their owners. Ensure the safety of windows and door gaps to prevent escape attempts. Create a secure outdoor environment for cats where they can explore the outdoors under controlled conditions (Figure 4).

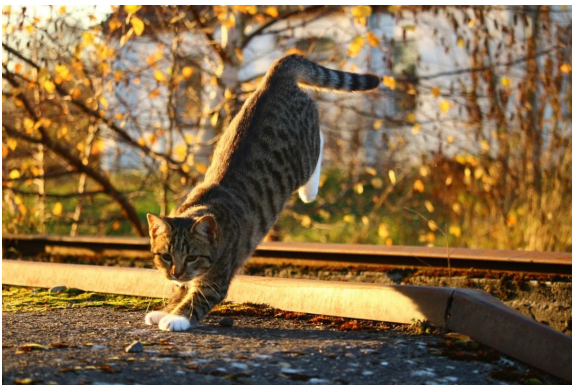


Figure 4 Cat going out to explore

It's essential to carefully observe a cat's behavior and take measures to prevent it from causing harm to the owner or itself. Providing appropriate scratching posts, securing doors and windows, and preventing access to hazardous items are all helpful measures. Additionally, offering cats enriching activities and toys (Delgado and Hecht, 2019) to satisfy their energy expenditure and stimulation-seeking needs is beneficial. By understanding a cat's behavior, establishing more meaningful interactions, owners can better enjoy the wonderful moments they share with their feline companions.

2.1.3 Independent personality

When cats socialize with humans, they typically exhibit an independent personality, such as enjoying solitude, not liking to be hugged, and being self-reliant.

Cats often tend to stay alone in corners or hidden places. This may stem from their preference for solitude or to avoid interaction with other animals or humans. Even though cats enjoy being with their owners, they still value having independent space and time. Some cats even like to hide in places that are hard to find, like in cabinets or under beds, where they feel safe and comfortable. Unlike dogs, cats typically don't enjoy being tightly hugged or excessive closeness. If owners forcibly hug them, it might make the cat feel uncomfortable or attempt to escape. This doesn't mean that cats don't like the company of their owners; it's just that they don't enjoy feeling restrained.

Some cats may curl up next to their owners and fall asleep. During this time, it's fine to gently stroke their head or back, but avoid excessive cuddling. Some cats enjoy lying beside or on their owners' laps. Owners can prepare a comfortable resting area for them, such as a cushion or pet bed.

Cats typically possess independent traits. They enjoy exploring, discovering new things, and are willing to solve problems on their own. For example, some cats may use their paws to push open door handles or lift food covers to access what they need. If the owner attempts to intervene or help, it may lead to the cat's dissatisfaction or refusal.

When interacting with cats, owners should respect their individual personalities and habits, avoiding forcing interference or restricting their behavior. Additionally, providing a safe and comfortable environment where cats can freely express their emotions and needs is essential. In such an environment, cats will be more relaxed and content, leading to a better relationship with their owners.

2.2 Socializing with other cats

2.2.1 Social structure

The social structure of cats with other cats is a complex process that involves many different factors, such as territory and resources, social hierarchy, aggression, and more.

The social structure among cats is typically related to territory and resource allocation. When cats are in the wild, most of them are solitary animals. Each cat establishes its own territory and maintains its territorial boundaries. This territory can be a large expanse or just a small corner, as long as it fulfills their needs. When the territories of two cats overlap, they usually issue warnings, and if the intruder doesn't heed the warnings, they may resort to aggressive behavior. Unlike human interactions, the social distance between cats is usually greater. They often don't engage in physical contact or hugging but instead communicate through eye contact and vocalizations. When the distance between two cats becomes too close, they may feel uneasy or threatened and will attempt to maintain a certain distance.

Some cats enjoy forming social groups with other cats, where they share territory and resources and help each other. This behavior may be because they enjoy socializing or feel safer and more comfortable in a group. Some cats prefer living together and form a social group. Such social groups are typically composed of several cats who share the same territory and resources. Their social relationships within the group can be quite complex, often involving a social hierarchy where higher-ranking cats get access to better resources and treatment. In these groups, cats assist each other, hunt together, and protect their territory as a team. Social hierarchies in such groups are typically expressed through body language and vocalizations.

A cat colony refers to a group of cats that are either a family or a community of cats living in the same area. They typically reside in the same region, establish their territories, and often help each other, sometimes sharing resources and even hunting together. This behavior may be due to shared genetics and culture among them or because they feel safer and more comfortable within the colony. Cat colonies are usually comprised of cats with a common genetic lineage, sharing common genes and culture among them.

Some cats have hostile relationships with each other, leading to mutual attacks or competition for territory and resources. This behavior can occur when their territories overlap or due to competition between them. If cats have not established social relationships with each other, they may engage in mutual aggression and even fights (Figure 5). This behavior often arises from competition between them as they seek to protect their territory and resources.

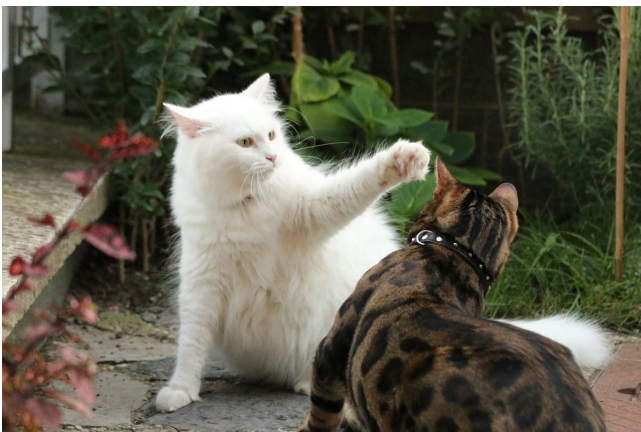


Figure 5 Fighting cat

The social structures among cats with other cats are diverse, including solitary living, forming social groups, and cat communities (Barry and Crowell-Davis, 1999). Each cat has its own social habits and behaviors, and owners should respect their cats' social behaviors and habits, providing a safe and comfortable environment.

2.2.2 Cat's language communication

Cats are highly social animals with a diverse range of communication methods, including vocalizations, scent, and physical contact. Through these various means of communication, cats engage in a subtle yet profound interaction in their own world.

Vocalization is one of the primary ways cats communicate. They use various vocalizations, such as purring, meowing, and sharp cries, to express different emotions and needs. Purring often signifies contentment and relaxation, while sharp cries may indicate fear or anger. Meowing, on the other hand, is their primary means of communication with humans. They may use meowing to interact with human when seeking attention, food, or when exploring new areas.

Olfaction also plays a crucial role in communication among cats. They possess a highly developed sense of smell, allowing them to gather information about another cat's emotional state, gender, health, and more through scent. Cats often use their cheeks and heads to rub against objects, which is one of their ways to mark territory and transmit information during social interactions.

Physical contact plays a significant role in communication among cats. They express friendliness and closeness through gentle rubbing, arching their backs, and nuzzling, which are common behaviors in cat social interactions. Additionally, cats convey their emotions and states through postures, such as raising their backs or stretching their bodies. For instance, an arched back may signal vigilance or anger, while a stretched-out body indicates that they feel comfortable and relaxed.

In conclusion, cats have created a intricate and fascinating communication network through their diverse means of interaction. Through sounds, olfaction, and physical contact, they can convey emotions, needs, and information among themselves, forming a unique and profound social system. This allows human to better understand and establish deep emotional connections with these lovely companions.

3 The Influence of Coat Color and Personality on Social Behavior

There is a certain relationship between a cat's coat color and its personality when it comes to social behavior. Some research suggests that a cat's coat color may be determined by certain genes, and these genes might also influence their personality and behavior.

For example, black cats are often considered mysterious and independent, and they may prefer a solitary life rather than being with other cats. This could be because the black color genes are associated with certain behavioral traits, such as a tendency to protect their territory and resources, making them more inclined to live alone. In contrast, white cats are generally seen as friendly and gentle, and they may be more willing to socialize with other cats and form social groups. This could be because the white color genes are associated with different behavioral traits, such as a willingness to share territory and resources and an easier ability to establish social relationships with other cats. Gray cats are often thought of as intelligent and agile, and they may prefer challenges and exploring their territory. This could be because the gray color genes are linked to certain behavioral traits, such as curiosity, bravery, and a greater willingness to explore new territories, making them more inclined to seek challenges. However, these personality traits are just general trends and do not mean that all cats of these colors will have the same personality traits.

In addition to coat color, a cat's personality can also influence their social behavior. Some cats have naturally more active and playful personalities, enjoying interaction and exploration with other cats. These cats may be more willing to establish social relationships with other cats and adapt easily to new environments. On the other hand, some cats are more introverted and independent, preferring a solitary life rather than interacting with other cats. When introducing a new cat, it's important to understand their individual personality and behavior habits. If the

new cat has an active and playful personality, it might be more inclined to play and socialize with other cats. However, if it is a more introverted and independent cat, it might need more time to adapt to the new environment and other cats.

The relationship between a cat's coat color and personality is a complex topic. Coat color and personality can influence their social behavior and interactions with other cats. Both coat color and personality are determined by genes, and their relationship may also be influenced by other factors. However, each cat has its own unique personality and behavior, so owners should guide their social behavior accordingly based on each cat's individual characteristics.

4 Conclusion

Cats are a common pet species, and compared to dogs, their behavior and social abilities are relatively more independent and mysterious. This is one of the reasons why many cat lovers choose to have cats as pets. However, understanding the behavior patterns and social abilities of cats is still very important, as only by correctly understanding and addressing their issues can we provide them with a better living environment and care.

Behavioral habits in cats refer to a series of behaviors they exhibit in their daily lives. Cats are natural hunters with an innate hunting instinct, and they will chase and capture small animals such as mice and birds. This hunting behavior is a natural instinct for cats and is highly beneficial for their physical and mental health. In addition, the sleeping habits of cats are also worth noting. Cats typically sleep during the day and are more active at night. Cats spend most of their time sleeping. Furthermore, a cat's grooming behavior is an important habit in their lives. Cats like to clean themselves by licking their bodies with their tongues to maintain their hygiene. Finally, behavior during the mating season is also one of the behavioral traits of cats. During this time, cats exhibit more activity and mating behaviors.

A cat's social ability refers to the behaviors and abilities that cats exhibit when interacting with humans and other cats. In their interactions with humans, cats typically express their emotions such as affection, dislike, or discomfort. Additionally, cats engage in playful and mischievous behaviors, which are often their way of expressing love and dependence on their owners. Furthermore, a cat's independent nature is also a part of its social ability. Cats generally do not rely on humans as much as dogs do; they tend to lead more independent lives in their own world.

In their interactions with other cats, cats typically have their own social structures, including territory and social relationships. There is also a relationship between a cat's coat color and its personality, with different coat colors often associated with distinct personality traits. Moreover, a cat's communication through language is also a part of their social ability. Cats use vocalizations and body language to convey their intentions and emotions. Additionally, a cat's territory and territorial marking are also expressions of their social ability, as cats use their scent to mark their territory.

Of course, cats may also exhibit certain behavioral and social issues, such as scratching, destructive behavior, biting, excessive meowing, and more. These problems often have various causes, including social issues, health problems, environmental factors, and more. In daily life, it's important for owners to pay attention to their cat's behavior and actions, and to promptly identify and address any issues that may arise. Owners can help cats develop good behavioral habits and improve their quality of life and happiness by employing the correct methods for resolving these issues.

Authors' contributions

CMY was responsible for reviewing and organizing relevant literature and materials, as well as writing the first draft of this review; LCC participates in literature collection, analysis, and guides paper writing and revision. The two authors read and agreed to the final text.

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