

Feline Behaviour Mini Series

Session One: Feline Ethology and Behavioural Development

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Delegate notes for CPD solutions session 1: Feline Ethology and Behavioural Development

Reasons for Understanding Normal Cat Behaviour

There are several reasons for learning about normal behaviour and one of the most important is for understand their requirements in order to meet their welfare needs. Problem behaviours are a major cause of relinquishment of pets and also sadly euthanasia of otherwise healthy animals. In the case of cat behaviour problems these are very often a result of normal cat behaviour being expressed in a manner which is not compatible with their domestic situation. Understanding normal behaviour is therefore crucial for working out strategies to prevent behaviour problems developing in the first place and to alter problem behaviours if they do develop so that we can re-direct those motivations into more desirable activities or responses. Education also can be used to adjust owner expectations and help repair their damaged relationship with their cat so as to avoid going down the route of rehoming or euthanasia. Improvements that we keep them in, whether at home, at the veterinary surgery or in a cattery also requires a foundation in understanding the normal behavioural repertoire. Disease aspects such as the transmission of FeLV and FIV via fighting should also be considered because understanding of territorial disputes and why those might arise can help to prevent disease transmission.

The RCVS Declarations and Codes of Professional Conduct

Declaration by vets and nurses:

" I PROMISE AND SOLEMNLY DECLARE that I will pursue the work of my profession with integrity and accept my responsibilities to the public, my clients, the profession and the Royal College of Veterinary Surgeons, and that, ABOVE ALL, my constant endeavour will be to ensure the health and welfare of animals committed to my care."

1. Veterinary surgeons and animals

1.1 Veterinary surgeons must make animal health and **welfare their first consideration** when attending to animals.

1. Veterinary nurses and animals

1.1 Veterinary nurses must make animal health and **welfare their first consideration** when attending to animals.

It is important to highlight the welfare obligation that we have as professionals. General practice if often very busy with packed waiting rooms and long operating lists and, under the pressure to get work done, welfare can unfortunately be overseen.

During veterinary and nursing training the focus is primarily on the physical health of the patient and the emotional well-being may well be implied to be less important.

It is therefore important to remember when we are treating our patients, that we have made a promise to protect the welfare of our patients as a first priority. The emotional well-being of the animal should be always considered during physical examination, investigation processes and treatment as well as considering the welfare aspects of their lives outside of the veterinary surgery.

Animal Welfare Act 2006

9 Duty of person responsible for animal to ensure welfare A person commits an offence if he does not take such steps as are reasonable in all the circumstances to ensure that the needs of an animal for which he is responsible are met to the extent required by good practice. For the purposes of this Act, an animal's needs shall be taken to include its need for a suitable environment, its need for a suitable diet, its need for a suitable diet, its need to be able to exhibit normal behaviour patterns, any need it has to be housed with, or apart from, other animals, and its need to be protected from pain, suffering, injury and disease.

In addition to our professional obligations under the guidance of the Royal College we also have legal obligations under the Animal Welfare Act to ensure that the emotional well-being of our patients if protected and catered for.

Diagnosis of Underlying Motivations and Emotions

Behaviour is a response to an emotional state, previous learning or a physiological state. So in order to change that behaviour, the motivation for that behaviour must be identified. If the underlying motivation is addressed this should result in a change in the behaviour.

History of Domestication

This history of how cats came to live with us is an important aspect of understanding who they are today and why they behave as they do. There is good evidence that the ancestor of the domestic cat is the Arabian or North African Wildcat, *Felis silvestris lybica*. Various locations have been suggested as the starting point of the domestication process and as with many ancient historical investigations new evidence presents itself from time to time and alters the current understanding. At the current time the focus is on domestication initially occurring around the Mediterranean and Middle East, particularly Egypt. As hunter-gathers started to become settled around 10,000 years ago, and started to grow crops they needed to create storage areas for surplus food. This resulted in concentrated populations of rodents which apparently resulted in an associated feline population. The house mouse emerged at this same time which is perhaps no coincidence. However this does

not tell us about when cats were domesticated and being kept as pets, only that they were living around human settlements at this time.

One thing that does seem certain is that cats domesticated themselves rather than it being an active human-driven process. Selective breeding of cats by humans is a much more recent occurrence.

Initially these cats would probably have shown an innate fear of humans and perhaps only been active when humans were asleep, but at some point in time some cats must have been better able to cope in close proximity to human activity. In addition to this humans must have shown tolerance to cats being around their food storage areas, realising the benefit as rodent controllers, much as farm cats continue to do to this day. With their ancestors being solitary territorial creatures, these early domesticated cats must also have learned to cope in closer proximity to other cats, with that eventually developing into them being able to form social relationships with other cats and with humans. It seems probable that the kittens who were born in proximity to humans underwent socialisation to humans and this encouraged them to become more tolerant and perhaps even friendly.

Pet Keeping

Many Egyptian artefacts depict cats and their relevance to Ancient Egyptian society is clear so cats were clearly being kept as pets at this time rather than simply living in close proximity to humans. Mummification of cats was common with cats and kittens being killed to be buried with a dead owner. Recent genetic analyses of material from mummified cats suggests that these are indeed domesticated cats rather than tamed wild cats. It is important to distinguish that because the Egyptians did keep various wild animals as pets which did not become domesticated species. A grave discovered in Cyprus found a cat buried with a human and this has been dated as older than the Egyptian findings by several thousand years but it is not clear from the archaeological evidence whether this was a pet cat or not. The domestic cat and its wild counterparts are so similar skeletally that differentiating them in archaeological sites can be difficult. There has also been some evidence from ancient China dated at over 5000 years ago but again this is only suggestive rather than conclusive evidence of pet keeping.

The domestication process has affected the behaviour of the domestic cat in some ways but not in others. The African Wildcat is a highly territorial, solitary creature. Mothers clearly spend time rearing kittens but once these kittens are of an age where they can be independent both males and females are chased out of the territory. This behaviour has been significantly altered during the domestication process, as it needed to be as such a solitary territorial creature would not make for a good pet! During domestication cats have developed the ability to form social relationships not only with other cats but also with other species and this has been key to their success in the domestic setting. There are other aspects of behaviour which remain similar to their wild counterparts, for example the tendency to be intolerant of unfamiliar cats, to show territorial behaviours and to be solitary hunters. Also of interest is that domestic cats can very easily revert back to being wild and self-sufficient which is not true of many other domestic species, including dogs.

If dogs become feral they still thrive best in environments where they are dependent on humans such as living in rubbish dumps or around village settlements. There are many domesticated farm animals who would certainly not survive in the wild, for example sheep who need shearing on an annual basis and some breeds of chicken who are too heavy to be able to fly high to roost safely at night.

Predators and Prey

Cats are both predators and prey and this plays a role in how they perceive and use their environment. Their preference is to be able to visualise their environment really well but not be seen by others and become vulnerable to attack. They also show a strong desire to avoid encounters with unfamiliar cats so keeping vigilant is important, either to chase them away out of their territory or to avoid conflict and potentially dangerous direct confrontation. Cats therefore make excellent use of their three dimensional space for both hiding and elevation for safety and using vantage points for observation. These behaviours are also key for their predation strategy as sit and wait hunters. They will often find a location where they expect prey to appear, for example a nest hole for small mammals, and sit quietly waiting for them to appear and ambush them. Clearly remaining well-hidden is essential for this strategy to be successful.

Time Budgets

Cats spend considerable time sleeping, as much as 15-20 hours out of 24. As hunters of small mammals they are naturally crepuscular, which means being most active at dawn and dusk, to fit in with the activity patterns of they prey. Research has shown that some cats are able to adapt this crepuscular tendency to fit in with their owner's activity patterns. As the effects of selective breeding take more effect over coming years perhaps this is an area which may continue to change as they become more adaptable to our domestic lifestyle. The pattern of activity of an individual cat can be influenced by various factors such as interactions with competitors, social behaviour and food availability.

Predation

Owner directed predatory behaviour can be extremely dangerous and result in serious injuries. It is therefore crucial to understand the development of predatory behaviour and how this can be guided appropriately. Predatory behaviour is influenced by weaning age and kittens who are weaned early are triggered to show both predatory and object play earlier than kittens who are weaned later. Conversely weaning late, at around 9 weeks of age, may have the potential for them to show less hunting behaviour as adults. However other experiments have found that the amount and type of play when they are kittens does not seem to affect or predatory behaviour later on.

The really important aspect as far as owner-directed predation goes is that kittens learn prey targets at a young age and are more likely to catch the prey that they were exposed to as kittens. Owners commonly teach kittens to chase fingers and toes which can be a very entertaining game when the kitten is small.

However this can lead to a very dangerous adult cat who shows serious predatory behaviour towards their owners or visitors to their home and should be strongly discouraged. This is an important piece of advice to give kitten owners when they attend the surgery for first vaccinations. The targets that their kitten practices on will be the preferred targets in adult hood so encouraging predatory play with fishing rod style toys and other acceptable targets should be encouraged.

Eating and Drinking Preferences

In addition to learning prey targets at a young age, kittens also learn taste preferences at this time. Feeding a wide variety of foods at weaning can be very beneficial to later food preferences so as to avoid a 'fussy' eater. Weanling kittens show a preference for foods that their mother prefers and this is due to influence via the placenta and lactation as well as a likely role by observational learning. Odour and temperature of the food are also important stimuli to trigger eating.

As hunters of small prey cats are predisposed to eat several frequent small meals in a day. As solitary survivors, they also have a high expectation of gaining access to resources immediately rather than queueing or waiting. If owners feed cats at set meals this can result in stress and also encourage over-eating. Generally cats are very good at self-regulating their food intake when fed ad libitum provided there is not an issue with competition over resources. Competition may arise in multi-cat households or if there are other cats in the neighbourhood and in these cases appropriate supply of resources is essential to maintain good self-regulation of appetite.

Cats hunt alone and are also therefore used to eating alone. Although they will come together to eat if necessary they are not social feeders. Grouping of feral cats is dependent on resource availability so if resources become depleted then groups will disperse. Therefore in multi-cat households resources must be plentiful to avoid competition, conflict and stress. Cats will come together to eat if they are forced to, for example if the food is highly palatable or if they are fed on a strict meal basis but cats would not usually choose to be in such close proximity to each other when eating. Predatory behaviour and appetite under separate central control so cat with strong hunting instinct will show predatory behaviour even if they are not hungry.

Cats are not tolerant of contamination of their food or water and have the potential to become very ill if they accidentally ingest toxins. They therefore avoid eating food or drinking water that is that might pose a risk to them. Food bowls and water containers should be placed in separate locations because cats may not drink water that has been potentially contaminated by food. Many cats show a preference for running water as this ensures it is fresh. They also show preferences for drinking vessels that do not affect their whiskers so using a wide brimmed vessel can be beneficial and filling this very full so they can drink from the surface of the water is preferred.

Behavioural Development



This diagram shows the developmental stages up to 12 weeks of age in more detail. This diagram should be referenced to credit the author and I will try to find the reference before the end of the course and supply this in the reference list.

During the neonatal phase, from birth up to 2 weeks of age, the kitten is primarily responsive to tactile, olfactory and thermal stimuli. Eye opening times are variable in kittens and depend on various factors such as the age of the mother, the light levels in the nesting area, paternal genetics and also the sex of the kittens. The visual system is not fully developed until kittens are several weeks old. Development of hearing is slightly quicker and this system is fully developed by 4 weeks. By two weeks they are able to orientate to sounds and their eyes have sufficient function that by this age kittens have sufficient sensory ability that the socialisation period has begun. At this time they are very receptive to learning about their environment, both social and non-social.

The age of sexual maturity is marked as 10 months on the above diagram but in reality this is very variable due to the seasonal nature of the feline reproductive cycle. Many cats seem to become pregnant before they are presented for neutering and therefore welfare charities are increasingly recommending the neutering of females at 4 months of age. Cats do not reach social maturity until 2-3 years of age and it is common that owners will notice changes in their cat's behaviour at this time. This is a common time that issues will arise in a multi-cat household where cats appeared to be living quite peacefully together and then apparently quite suddenly things are unsettled as a younger cat reaches social maturity.

Socialisation

As the brain develops it becomes organised, with neuronal connections being moulded into their future networks. This process is affected by many different factors which can have long term consequences for the behavioural development of that individual. Example of factors that influence this process include nutrition or the mother, nutrition of the neonate, experience, genetics, attachment and social referencing. Critical and sensitive periods are times when changed in behavioural organisation are at their greatest and the time when external influences can have the greatest effect. The sensitive period for socialisation in cats is the optimum period for positive attachments to other cats, other species and environmental stimuli and the experiences they have during this time affect them long term.

There is some degree of variability but in general cats are most easily socialised to humans at 4-8 weeks old. Kittens learn more quickly if their mother is present and observational learning has a strong influence on them. Therefore if the queen shows nervous behaviour around people then her kittens are likely to learn this response and be nervous of people themselves. In this scenario kittens should be taken away from their mother for handling to ensure they build positive associations with people. In the case of a sociable and friendly queen it will benefit her kittens to observe her interactions with humans so it would be preferable to have her present during handling.

If kittens are not handled at this critical young age they will never be able to recover to become tame to humans. Therefore early handling of kittens is especially important for coping as pets in the future. Much research has been done into different aspects of handling that affect the socialisation of kittens.

- Amount of handling the more handling a kitten experiences during the socialisation period, the friendlier and approachable they are likely to be.
- Age of handling regularly handling kittens younger than 45 days resulted in kittens who were much more interested in approaching novel objects and people at 4-7 months of age.
- Style of handling different individuals may prefer different styles of handling but in general, handling them gently all over their bodies is beneficial. Getting them used to gentle restraint and being lifted off the ground are also useful.
- Number of handlers kittens who had been handled by five people coped better with meeting an unfamiliar person compared to those handled by 1 or 3 people.
- Presence of queen and/or litter mates see above regarding observational learning from the queen and bearing in mind whether she is nervous or friendly. The queen's presence can also be of benefit by providing familiarity in a novel situation. Kittens show greater confidence in the presence of their siblings.
- Socialisation with humans also seems to benefit the cat's ability to be socialised to other species such as dogs.

Of course it is not only exposure to people and handling by a variety of people that is important during these crucial early weeks. Exposure to species that the kitten is likely to encounter in the future, such as dogs, is important, as is exposure to a wide variety of other stimuli such as the sounds associated with living in a domestic environment. The more varied the experience that kittens have during these early developmental stages, the better equipped they will be to cope with domestic life in the future.

Genetic Factors

In the 1990s Sandra McCune and her colleagues did studies on socialisation and paternity. They look at interactions between early socialisation and the friendliness of their father and how this affected their later friendliness to people. Two groups of kittens aged 2-12 weeks were either handled or not handled. Within both of these groups were kittens whose father was identified as friendly or unfriendly. So there were essentially four groups of kittens: handled with friendly fathers, handled with unfriendly fathers, unhandled with friendly fathers and unhandled with unfriendly fathers. At 12 months of age they were tested to see how they responded to familiar people, strangers and novel objects. The cats who had been handled or had a friendly father were more confident and friendly. Offspring of friendly fathers were quicker to investigate the novel object than the cats from the unfriendly father. So this experiment found that cats who were handled regularly as kittens and those with friendly fathers were more sociable with strangers and better able to cope with being handled by them. This inherited factor from fathers has become known as the paternal 'boldness' gene and is very important to be aware of for those who are deliberately breeding cats as well as important for understanding the development of temperament in kittens with unknown fathers. There will also be inherited aspects of the temperament from the queen in addition to the observational learning effects already discussed.

Cats have only relatively recently been selectively bred by humans and this has primarily been for conformation, coat colour, coat type and so on rather than for behaviour or temperament. However when selectively bred for any particular chosen trait there are often consequences for inadvertent selection of other genes as well. In pedigree cats therefore, some breed differences in behaviour are observed. There will still be considerable individual variation within a breed.

Marchei and colleagues (2009) found differences in rates of behavioural development when they compared Norwegian Forest Cats with Orientals, Siamese and Abyssinians. In further studies (2011) they identified slower development of the limbic system in Norwegian Forest cats, who were slower to habituate to the threatening stimulus and also showed poorer memory retention. There is still a wealth of research to be done in this field and the future is likely to find more differences between pedigree breeds.

Stelow and colleagues (2015) studied coat colour and the relationship to aggression. This questionnaire based study found some suggestion that certain coat colours may be slightly more aggressive.

There were actually very low levels of aggression in all the cats and so realistically they did not find evidence of an association between aggression and coat colour. These findings indicate that further research is needed and new results from another group of researchers were published earlier this year.

Wilhelmy and colleagues (2016) also used a questionnaire to look at colours and coat types relating to behaviour. This study identified various associations between breed and behaviour and also between coat colour and behaviour. Abyssinians were found to have higher scores for sociability towards humans but also higher scores for aggression towards other cats. Maine Coons showed a lower prevalence of some behaviour problems, including attention seeking and separation behaviours but a higher prevalence of owner directed aggression. When most of the coat colour findings were looked at in relation to the breeds exhibiting the behaviours, it was found that the behaviours were attributed to breed rather than coat colour. However there were some instances where appearance was associated with behaviour such as red Maine Coons showing higher prey interest. As with all retrospective questionnaire based studies there are limitations into the conclusions that can be drawn from this work but it is a really interesting start and hopefully over coming years this research will yield further results.

Feline Social Structure

During the domestication process cats have developed the ability to form social relationships not only with other cats but also with other species, such as humans and dogs. Sociability of individual cats will be variable depending on genetic and experiential factors, particularly during the crucial early socialisation period. It is important to remember that cats do not actually depend on social relationships for survival but have more learned to create social relationships as a by-product of the context in which they find themselves living. Communication strategies in cats reflect their evolutionary history as solitary creatures and this lack of a need to maintain social relationships for survival. They do not have the complex appeasement gestures that are seen in socially dependent creatures. Likewise they are not predisposed to make social relationships with unfamiliar cats and their communication strategies reflect this.

Social structure in free living groups of cats is based on related females. Groups are formed if there is sufficient resource availability. If sufficient resources exist then female kittens will stay with their mothers into adulthood and groups of related females may cooperate to rear their kittens. Male kittens would usually disperse from the group at around 4 months of age when they are sufficiently independent and males then tend to be solitary apart from during the breeding season when they will seek out receptive females. Groups of cats defend their territory and the resources contained within it. In many social groupings one can identify communication signals that are aimed at creating a stable hierarchy between members of the group.

These would involve signals that suggest a higher position in the hierarchy and those which reflect submission and acceptance of the higher ranking animal. However such signalling has not been identified in cats and it is thought that their social systems are primarily based on the use of affiliative and cooperative behaviours.

The primary aim of these affiliative behaviours is to maintain a group scent profile. So between cats that are in the same social group we see allorubbing, i.e. rubbing against each other and this may be the heads or the bodies, allogrooming where the cats groom each other and also sleeping in contact with each other. These behaviours are also used towards other species that the cat has made social relationships with, such as when they rub their heads or their flanks on their owners or on dogs.

Identifying Social Groups

Cats would not usually share resources with those that are not within their social group. When working with multi-cat households the social structure within the home must be determined. This is done by observing affiliative and agonistic behaviours that occur between individuals and can be represented using a diagram with arrows. Agonistic behaviours are likely to be seen between members of different social groups but these can sometimes be quite subtle and owners may need help in identifying them. So affiliative behaviours that we might observe are the tail up greeting, allorubbing and allogrooming, sleeping in contact and the use of a vocal sound called the chirrup or trill which often accompanies the tail up greeting. Agonistic behaviours might include staring, blocking access, hissing, spitting and chasing. Owners are asked to observe their cats carefully, perhaps over a period of a week, and provide me with the information needed for create a diagram like this one below.



Territory

Understanding territory layout plays a crucial role in resolving many behaviour problems, particularly house soiling. This diagram below shows a very basic explanation of how feline territory is laid out. The core area is shared by members of the same social group. Within this area they would not expect to encounter unfamiliar cats and would usually show agonistic behaviour towards them in order to remove them. New kitten members are usually easily accepted but it is not usual to accept new adults. In reality the core area is unlikely to be just one area, but will be several patches which are linked by home range areas. In the areas that are shared by unfamiliar cats time sharing is used so as to avoid close proximity.

In the hunting range there is a high chance of encountering other cats and this is where the most frequent territorial marking behaviour is seen.



The Importance of Core Territory

This is key for owners to enable them to understand how they may need to distribute resources if they have more than one social group living in their home or if there are external threats from neighbouring cats. It is also vital in housesoiling cases in terms of altering the cat's perception of areas it is using for inappropriate marking or toileting.

Due to their evolutionary history as solitary animals cats like to be in control of their resources and have an expectation of immediate access to them. The important resources which cats would generally expect to be immediately available include food, resting places, latrines, water and core territory entry and exit points.

Predictability and control are important for any animal for keeping stress levels low. Cats can control both hygiene and security of their core area. They will generally toilet away from their feeding and resting areas. Security within the core territory involves not being able to see unfamiliar cats and they use marking behaviours in order to maintain this security and keep other cats at a distance. As cats are relatively lacking in face-to-face communication signals their preference is to avoid conflict with unfamiliar cats by trying to avoid close contact with them in the first place. Marking signals serve to keep cats at a distance and are therefore crucial for the success of this system. They will use claw marks at the edge of the core territory, urine sprays in the shared areas and use facial and flank marking within the core area. Scent marks are topped up daily.

Houseplans

In addition to studying the relationships between cats, owners are also asked to make houseplans before I visit them. These are especially important for multi-cat households and for any housesoiling cases. Owners are asked to mark the general layout of furniture, doorways, windows and so on. They then need to mark the resources that are available including resting places, food, water, litter trays and access to outdoors. I also ask them to identify the main areas where each cat spends time as this can be very helpful for understanding the cat's perspective of its territory layout. Below is an example of the downstairs layout supplied by one of my clients with a cat who was housesoiling indoors. The use of houseplans will be discussed further in the next session.



Communication Strategies

The primary aim of feline communication is to maintain distance from other felines that are not within the social group. Cats need to maintain their territory and protect the resources within it so they would usually attempt to remove any intruding cats. As we discussed earlier on, cats are solitary survivors, they are not dependent on others for survival and so they must avoid injury at all costs. As cats have only relatively recently adapted to social living they are lacking in appeasement signals which means that there is a high risk of injury if they do get into physical conflict. Cats also use communication in ways discussed above, to create a familiar, secure core territory area and also to create and maintain social bonds within the social group.

Appeasement Signals

Animals that are dependent on social living for survival have highly developed signalling which is aimed at avoiding actual physical conflict. Cats have not developed such skills because they are essentially solitary survivors that have learned to adapt to social living rather than depend on it. So cats do have some limited signalling but as discussed above their primary strategy is to avoid encountering other cats in the first place. Once they actually do end up in visual contact with an unfamiliar cat they have very limited signalling to diffuse that situation and physical fights and injury are therefore quite likely if they do end up in close proximity.

Appeasement signals are not only used to diffuse conflict but also to repair a damaged relationship following conflict. Cats do not have any survival need to repair a damaged relationship and so have not developed the communication strategies to enable them to do this.

Olfactory Communication

Scent is of prime importance for cats and is used for recognition of their environment, familiar individuals, reproductive behaviours and territorial marking. Pheromones are chemicals that are secreted by the animal that has an effect on the behaviour of that individual or on others of the same species. Olfactory communication is an excellent strategy to use for maintaining distance from other cats because they provide a way of sending messages to other cats without having physical interactions with them risking injury. The scent glands on the chin and around the periorbital area as well as the flanks are used in recognition of core territory and recognition of the social group.

Cats will use scent marking around the periphery of their territory as a signal to other cats. Urine spraying is used and faeces is left out in the open as both a visual and a scent mark. This is called middening. Glands in the interdigital area leave scent marks in addition to the physical marks left by scratching. These marks are used by cats to time share the shared areas of the territory. They use the level of degradation of the marks to work out whether another cat has recently marked, in which case it might still be close by, marked a while ago and therefore is unlikely to still be in the vicinity or whether the mark is so degraded that it will soon need a top-up and the marker may return any minute.

Vocal Signalling

This is the least understood of cat communication signals and is complicated by individual cats adapting signals depending on learning, particularly in relation to vocal communication with humans. Vocal signals seem to be primarily associated with greeting and social contact in cats but is also used in confrontation. At least 16 different vocal signals have been identified but these are still being studied to find out what they mean.

There are three recognised groups of sound.

- Those produced with an open mouth that is gradually closing aim to incite interaction, for example the miaow and mating calls.
- Sounds produced with the mouth closed such as the purr and the chirrup.
- Loud sounds with the mouth fixed open tend to be used in defence and aggression for example the hiss, spit, growl, snarl and shriek.

Tactile Communication

This is very important in cats primarily for maintaining social relationships in the form of the allorubbing and allogrooming discussed above. They will rub heads and bodies and also intertwine their tails. Physical contact seems to be particularly important for litter mates who live together into adulthood. It can also be an important way in which cats interact with their owners.

Visual Communication

The use of body language and facial expressions to recognise underlying emotional states and motivations can be very useful because cats use very clear unambiguous signals to avoid conflict. They want to be sure that an unfamiliar cat understands what they are trying to convey. Their body posture gives distant information and the more detailed facial signals are used when cats are in closer proximity. The position and shape of the facial features is very important with the ears, eyes, whiskers and mouth all conveying information. Tail position and movement are also useful indicators of emotional state and arousal level.

Body Posture



Image source: Manual of Clinical Behaviour Medicine 2013, Karen Overall.

The cat labelled A0B0 in the top left corner depicts a relaxed posture. Moving along the top row, the cat is becoming increasingly confident and showing offensive aggression. This cat is aiming to cause the other cat (or person) to increase their distance. The offensive aggressive cat A3B0 has his body weight leaning slightly forwards, his hind legs straight and ready to move forwards, his head is lowered and neck are forwards. Moving down the left hand side from the relaxed cat we see a cat who is increasingly fearful and trying to avoid interaction. If the threat were not to move away the cat's body language may progress along the bottom row to cat A3B3 who is shows overt defensive aggression. So the difference between offensive aggression and defensive aggression is primarily the confidence felt by the cat in whether he believes that his strategy will work to remove the threat.

Facial Signals



Image source: Manual of Clinical Behaviour Medicine 2013, Karen Overall.

When reading information from the face, note all the features as ears, eyes, mouth, nostrils and whiskers all play a role. The position of the head relative to the neck is also important because a very fearful cat will pull the head in tight against the neck. As with the body posture diagrams, the cat on the top left is relaxed, moving to the right the cat progresses to offensive aggression and moving down the left hand side the cat progresses to defensive aggression.

Ear Position

- Erect ears an alert cat who is focusing on a particular stimulus
- Ears in relaxed position calm cat, not focussed on anything in particular
- Ear rotation

- Inner pinna is facing sideways offensive aggression
- Inner pinna facing down defensive aggression
- Ears held back and flat down onto the head extreme fear.

Other Facial Features

- Pupil dilation as cats become increasingly fearful and defensive the pupils become more dilate and rounder in shape.
- Flaring of the nostrils with increased arousal.
- Increasing tension in the muscles around the mouth as arousal increases.
- Whiskers become more prominent as the facial muscle tension increases.

Tail Signals

In general if the tail is held out away from the body and behind the cat this is a good sign and suggestive of a relaxed, confident, alert and friendly cat. During friendly greeting the tail is held erect and slightly curled. In contrast during offensive behaviour the tail is held down or perpendicular to the ground. Most people would recognise the erect and bristled tail which indicates a high arousal state, which can be seen in both offensive and defensive aggression. In this case the rest of the body language must be taken into account in order to predict how the cat is likely to respond (defensive or offensive).

Recognising Emotional States

Relaxation

- If resting and relaxed they don't look like they are about to get up and run away!
 - A relaxed cat may fold their feet under like a croissant or they may hold their feet sideways.
 - They might also roll over onto their side or back.
 - The eyes may be half closed.
 - They may be purring slowly and rhythmically.
 - The ears would tend to be upright but in a more relaxed posture than those of a cat who is focusing on something but they may be rotating in response to auditory stimuli.
- A relaxed active cat will be showing a normal behavioural repertoire
 - Eating, drinking, playing and resting.
 - Some marking behaviour in relevant contexts and locations but excessive marking is likely to indicate stress.
 - Engaging with the environment.

Fear and Anxiety

- Hiding is a very important strategy for coping with stress.
- Elevation is commonly used with cats make excellent use of their three dimensional environment.

- Hypervigilance suggests anxiety where the cat is keeping an eye out for potential threats.
- Retreating from a threat
 - Running as fast as they can to get away OR
 - A common response, particularly in relation to confrontation with other cats, is to move very slowly, perhaps to avoid inciting a chase response
- Attempts to make the threatening stimulus move away through the use of defensive aggression.
- Freezing
- Normal behavioural repertoire becomes inhibited, for example they may show less exploratory behaviour, a reduced appetite, less play behaviour and so on.

Recognising Conflict

Aggressive behaviours are not necessarily overt and many owners will miss subtle signs. Staring is a very threatening behaviour in cats and they also use their physical presence to block access, such as sitting in a doorway or by the cat flap. There are of course the more overt signs of aggression such as chasing, hissing, growling and spitting which can result in a physical fight with biting.

Play Behaviour

There are two main types of play that we see in cats and those are object directed play and social play. As discussed in the behavioural development section, social play begins at 3-4 weeks of age. This helps kittens to develop social relationships with their litter mates as well as aiding motor development. By 7-8 weeks of age kittens are much more coordinated and play is more skilful. By 12 weeks of age the motor patterns of play more associated with predatory behaviour and social fighting. The postures that are most successful at inducing play in a litter mate include pouncing, rolling with the belly up and standing up vertically. Play style changes over time and social play starts to decline at around 12-14 weeks of age with the style of play altering from social play into object based play. Once they reach this age social play is increasingly likely to end in a genuine fight. Kittens who lack the opportunity to play may be asocial or socially dysfunctional to other cats.

Play in Adult Cats

This is a grey area! These are some criteria that Kaufer has identified for play in her book about dog play.

- Play needs an atmosphere of familiarity and emotional security in a safe environment Play is a luxury afforded to those who are well fed, have had enough sleep, do not feel under threat and so on.
- Play has no other aim but itself so for example although one might see sequences of the predatory sequence during play, there is not actually any real prey but the play partner is simply pretending to be prey.

- Play is voluntary and self-rewarding. This I think is the most important criteria that we need to consider in cats Kaufer states that play partners participate of their own free will. A one-sided game is therefore only play for one of the participants and I feel this is what we primarily see in adult cats. One cat is playing and the other is a victim.
- Play is not the same as reality. In dogs and other animals one sees various aspects of normal behavioural repertoires intermingled in a random way during play and there is a lack of serious intent. Again this does not ring true with adult cat play where it often escalates into genuine confrontational staring and may escalate into a real fight.

Role reversal, self-handicapping and play signals are also significant features of play that are seen in other species. I have not seen these features when watching adult cats 'playing'. The play signals that we see in kittens that elicit play in litter mates, such as the standing up on the hind legs, do not seem to feature significantly in play between adults cats although batting with a paw does seem to and perhaps rolling onto the back. Play signals are an essential aspect of communicating intention to the play partner and if these signals are not present, or insufficiently present, then the behaviour may be interpreted as real rather than play.

All the references for the three sessions will be supplied at the end of the course.