

# The Cat's Language – Communication

The cat's language signals may be the most important aspect of the cat's behaviour, which you must understand in order to develop a harmonious relationship with your cat. Cats expect that we understand the signals they send, and if we misinterpret them we may risk the cat becoming severely frustrated resulting in bites and scratches. Interpreting the cat's language is not as difficult as many think; it is just a matter of knowing what to look for. The signals are made up of many elements and each of them may represent a whole sentence in human language. Understanding your cat is easier if you have some general knowledge about how animals communicate.

## How Animals Communicate

Cats and other animals do not communicate in the way that humans do, in that they do not use words. Nevertheless, cats have many ways to communicate so that other cats can understand what they mean at that moment. They communicate the way they are feeling – their emotions and their intentions – what they want to do and what they want from other individuals. In this way, they can influence the behaviour of others in a preferable direction.

The *signal* is the basic unit of communication. A signal is a stimulus sent from one animal and perceived by another that can alter the behaviour of the recipient in a manner that benefits the signaller. It could be a particular vocalization, a tail movement or a urine mark. If the signal is not perceived by the other party, no communication has occurred. Therefore, during evolution, animal signals have evolved to become simple and distinct, so they stand out from ordinary behaviour.

Cat signals are used in communication between a queen and her kittens, regulation of social relationships, competition for resources and courtship. Signals are used when one cat is uncomfortable being close to another cat. We call such signals *agonistic* signals. They can either be part of *offensive aggression*, where the animal is threatening that 'If you do not leave, I shall attack you', or *defensive aggression*, where the animal is instead threatening that 'Although I don't want to fight, if you attack me, I can defend myself with teeth and claws' (see Fig. 4.1). Defensive signals imply that the animal is experiencing fear for its safety. As the subordinate cat displays its defence weapons, these are not signals of submission but of readiness to fight if provoked. If a subordinate cat finds a dominant cat too troublesome, it will run away or even emigrate to another area, as we shall see in Chapter 6. *Flight* is a component of agonistic behaviour, but it is usually not necessary to escape that far to get away from the threat.

Offensive signals are typically given by cats with high social status due to their strong competitive ability, while low-status individuals more often display defensive signals. Such signals minimize

serious fights. Giving defensive signals counteracts attacks by the opponent. There would be no point in attacking the subordinate individual, as such attacks would unnecessarily risk getting hurt. By using offensive signals, a high-status cat can also prevent an attack by a young upstart with little chance of winning a fight. Fights occur most frequently between individuals who have comparable competitive ability, where neither party manages to repel the other with threat signals.

The African wildcat, the ancestor of domestic cats, defends a territory against neighbouring wildcats using agonistic signals. The domestic cat has more flexible social behaviour, as described in Chapter 5, involving more varied use of communication signals. Domestic cats miaow more to other cats than the wildcats, and towards people after separation from their mother. They use signals in adulthood that wildcats only use as kittens towards their mother. The domestic kitten thus transfers its use of communication from the mother to people. Therefore, it is no surprise that cats miaow to communicate their needs. Continuing to perform juvenile behaviour in adulthood is a common phenomenon in domesticated animals called *neoteny*.

It is useful to be aware of what animals usually *do not* communicate. Animals are not likely to signal that they are sick or injured. In nature, this would reveal a vulnerability that could attract predators. Instead, they try to hide such disabilities. We must look for signs of illness or injury in another way. If the animal is unusually passive and there is a change in how much it eats or drinks (less or more) than before, this may indicate a disease. If the animal reacts with aggression or withdrawal when we touch a certain part of its body, this may indicate that the animal has an injury or disease that hurts at this spot. If you notice this more than once, you should take the cat to a vet.

Cats can use sounds, body postures, facial expressions, movements, scents, and touch to make themselves understood. They often use several types of communication signals simultaneously, making their intentions clearer. It is therefore important for the cat owner to listen carefully to the vocalizations and at the same time note the visual signals. We are not able to detect all the different scent signals used by cats, but the odour of urine marking by an intact male will be unmistakable. Some cats are more communicative than others. We must therefore get to know that individual to interpret its intention or emotion correctly. Some may be more vocal and miaow at all hours. For cats who are less vocal in general, even their weak signals may be informative.

## **Sound Signals - Acoustic Communication**

Cats use many types of sounds in their communication with others – purring, miaowing, yowling, growling and hissing. These sounds vary depending on the situation and the individual cat. Most sounds are made using the vocal cords. But cats do not shape the sound with the tongue tip like humans do. Instead, they produce different ‘vowel’ sounds by varying the muscle tension of their larynx, mouth, lips and face. They produce ‘consonants’ by closing or shaping the mouth in different ways that change the resonance. Muscle tensions and the shape of the mouth can be varied on a continuous scale. In this way, they can fine-tune a signal and how strongly it is

expressed, whereas people choose different words or stronger adjectives to adjust their meaning.

# Purring

## Soundtrack no. 1: purring

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For cat lovers, a cat's purring is usually a relaxing sound. You are happy when you relax on the sofa with a purring cat against your chest. But what is purring really, and why does the cat purr?

Purring is a deep sound produced by muscles of the larynx and diaphragm. The entire chest region of the cat vibrates at low frequency with fundamental frequencies of about 25 and 50 Hz but including vibrations up to 150 Hz. It is thought that a neural oscillator controls these muscle vibrations, allowing purring to continue during both inhalation and exhalation.

Purring is a sound that kittens give when suckling their mother's milk. It signals the mother to keep calm and provide care, which includes giving milk, grooming, warmth and protection. Purring helps to maintain the bond with the mother and is usually associated with comfort and relaxed pleasure. Mother cats also purr when providing care to their kittens in the nest. When very young, the kittens feel the vibrations from the purring and stay close to her even though they don't hear them, as their ears are not yet open. The mother is signalling her desire to give them care.

When kittens and adult cats purr towards people, the meaning is usually the same. The cat expresses that it wishes to relax in close contact with us, whether in our lap or on the sofa next to us. 'Here I shall remain for some time, so keep calm and show me you care,' the cat says. While we don't produce milk, lick the cat or purr, we can provide a safe haven for resting, share our warmth, groom the cat and whisper sweet nothings. The cat has learned to accept our gentle strokes as the equivalent of being licked and our gentle words as the equivalent of purring. The relationship is mutually rewarding. It is not just about taking care from us but also giving care. The cat shows its care for us by purring, presenting its warm belly, and grooming us with its raspy tongue if allowed. The stronger the purring, the more intense is the cat's pleasure. You can notice this while you gently stroke a resting cat.

Although purring is usually associated with pleasurable situations, there is another form of purring that is louder and higher-pitched. Air is pressed through the vocal cords resulting in a higher sound frequency, creating strong sounds around 200–500 Hz. This more demanding purring is not relaxing to humans, but rather to the contrary – it sounds a bit annoying and cannot be ignored. It is a begging vocalization expressed when the cat is frustrated because it wants something it can't get by itself, or feels a more urgent need for care. Some cats direct these 'solicitation' purrs towards us when they have sniffed that there is inaccessible food nearby, or when we have slept in and they want us to wake up and feed them. They usually have the desired effect of cajoling us

into action.

Solicitation purrs can also occur when cats are frightened, ill or in pain. Occasionally, vets experience this. In such situations, purring is not an indication of well-being, but instead indicates that the cat seeks help. Cats that purr in a veterinary clinic are familiar with people and use the purring as needy kittens would when begging for care from their mother. So such purring means 'I need care'. If your cat has been ill and starts purring like this, don't be fooled into thinking that the cat has recovered.

Interestingly, regular purring corresponds to the vibration frequency of medical instruments used for healing injuries and promoting bone density. Since purring is also associated with the release of endorphins - the body's natural soothing, pain relieving hormones - it has been suggested that purring may aid cats in self-recovery from injuries. This may be a positive side-effect, though it is hardly the primary function of purring given that purring is a communication signal used in social contexts and cats rarely purr when alone. Gentle purring by the mother and littermates may contribute to kitten growth and bone density, though this has not been studied.

## Miaowing

The cat's miaow is another well-known vocalization of cats. It mainly occurs in kittenhood, in the communication between kittens and their mother. The miaow can be expressed in an incredible variety of ways. Research shows that people who are familiar with cats recognize the meaning of different miaows better than those lacking experience with cats. To understand miaows, we must listen carefully to how they are pronounced by each individual. Fortunately, there are some general rules that can guide us. The American behaviourist Mildred Moelk has contributed to this knowledge through her extensive study of cat vocalizations.

M-I-A-OW - the miaow consists of four syllables. To interpret the miaow, we must listen to which of the four syllables the cat emphasizes - which one is loudest or the most long-lasting - and note if any are missing. Some of these differences are shown in Fig. 4.2.

### **Mrrr, trill**

#### **Soundtrack no. 2: mrrr**

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The trill, or chirrup, is mainly an *m* sound, the first letter of the M-I-A-O, often without any of the following vocals. This may sound like *mrrr* or *mhrn* and may vary in duration from a short *mr* to a *mhrrrrrn*. It is given with closed mouth. If it starts abruptly, a phoneticist will write it like this: '*mhrn*'. This sound can be heard from a distance of about 12 metres and is much more powerful than regular purring. It is used by confident cats when initiating contact with a social partner. It simply means 'hello'. When the cat wakes up from its chair and approaches us, it can greet us with a *mhrn*

. When returning to her kittens, a cat mother uses this sound to announce her presence.

When the sound starts more abruptly and vigorously, '*mhrn*', it is a short-distance call sound. Then it is often repeated. Not only 'Hello, here I am' but 'Hello, I want contact with you'. The same applies if the *mhrn* sound goes up in pitch at the end. We can indicate this by writing the raised notes as superscripts: *mhr<sup>n</sup>n*. If a cat mother gives this

(m) - i - o - o

mhrn' -a-o-a (purr)

m-i - i - i - a - ou

(c) kHz

6

(d)

(e)

1 sec

4

2

0

m - i - i - o

m-i - a - a - ou

m - i - a - o - o - o - ou

kHz

6

4

2

0

(m) - i - o - o

mhrn' -a-o-a (purr)

m-i - i - i - a - ou

(c) kHz

6

(d)

(e)

1 sec

4

2

0

m - i - i - o

m-i - a - a - ou

m - i - a - o - o - o - ou

**Fig. 4.2.** Spectrographic images of different miaow types. (a) a mioo or meoo from a lonely, worried kitten, followed by the reassuring response of its mother, a mhrn'-aoa and purring. This is like the mother saying 'Hello, I'm back again; now we can have a nice time together'; (b) a miiiaou or meeeaaow from a cat experiencing an unpleasant or painful situation; (c) a miio or meeo from a lonely or otherwise distressed kitten; (d) a miaaou or meaaow from a demanding cat; and (e) a miaooou or meaoow from a frustrated cat. The horizontal axis denotes time (the length of *one* second is illustrated) while the vertical axis shows the pitch tone in kilohertz (kHz). Note that miaowing sounds occur in several harmonic series, one octave apart, and can reach a pitch of 50-60 kHz in the ultrasonic range beyond human hearing. sound to her kittens, she may be inviting them to suckle from her.

The cat can also give a stronger 'Hello!!!' by adding vowels to the *mrr* sound. Then it sounds like *mhrraow*. In Fig. 4.2a we can see an example of such use at the beginning of the mother's response; a *mhrrn-ao* where the mother responds to reassure a lonely, worried kitten. Exactly what the cat aims to express in addition to 'Hello!' depends on whether the cat uses a long *a* or *ow* sound (see *miaaao*, *miaoow* and call sounds below).

## **Miiao**

### **Soundtrack no. 3: miiao**

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### **Soundtrack no. 3: miiao**

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A long *e* syllable in the *miaow*, *miiao* or *meeeeo*, gives a whining sound. It can indicate that the cat is experiencing discomfort or pain, meaning 'Ouch! Help me!'. If we accidentally step on the cat's tail, or the cat gets stuck, we may hear this sound. The longer or stronger the sound, the stronger is the discomfort. See an example in Fig. 4.2b.

Young kittens, only a few weeks of age, do not manage to *miaow* with a diphthong, the *ow* part of the sound. Instead, they say *miiy*, *miio* or *meeeeo*. This is not necessarily a pain signal. The small kit-ten can also give a marked *e* sound in situations when a juvenile or adult cat would use a marked *a* sound (see below). You can see an example of this in Fig. 4.2c, where a kitten has been briefly separated from its mother and seeks contact with her.

## **Miaaao**

### **Soundtrack no. 4: miaaao**

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### **Soundtrack no. 4: miaaao**

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A long *a* sound in the *miaow* is probably the most typical *miaow* sound, *miaaao*. See an example in

Fig. 4.2d. A long-lasting *miaow* with a marked *a* sound indicates that the cat desires something. It is saying, 'I want something now!'. The *miaow* does not tell us what the cat wants. We must infer this from the context in which the sound is given. If a cat is sitting by the food bowl expressing a *miaaao*, we can understand that it is begging for food – even if there is food in the bowl, it may want something better. Perhaps the canned food is starting to spoil. Cats will naturally avoid food that does not smell fresh. This is a mechanism that prevents them from ingesting harmful bacteria.

In other cases, the cat may *miaaaao* at the front door indicating that it wants to be let out, or in front of us when we sit on the sofa, asking to sit on our lap. It may *miaaaao* while standing by the litterbox, indicating that it wants it cleaned. The longer the *a* syllable in the miaow, the stronger the request. The cat typically starts with a short *miaow*, then *miaaow* and eventually *miaaaow* if the desired goal is not yet reached. If your cat is miaowing with a long *a* sound quite often, and you are sure that it has everything it really needs, this could be because your cat has learned that this is an effective way of getting you to respond to its slightest whims. For example, if you find yourself frequently giving treats or opening the door several times in short succession, you may be pandering to your cat's demands too much, an issue to which we shall return in Chapter 11.

## **Miaooww**

### **Soundtrack no. 5: miaooww**

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### **Soundtrack no. 5: miaooww**

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If your cat begins to lose faith that its wishes will be fulfilled, it will start getting frustrated. The cat signals this by dragging out the closing end of the miaow and we can hear a *miaooww*, as shown in

Fig. 4.2e. This usually drops in pitch – *miaooww*. The longer the *ow*-sound, the stronger the frustration. The cat may have begged for food with a *miaaaao*

without success and now becomes more and more frustrated, and we can hear that the miaow transforms from *miaao* to *miaaaaao*, *miaooww*, and finally a long *miaoouuu* – ‘I was expecting food, but it seems that I won't get any this time’. Kittens extend their isolation cries when worried that their mother has not returned, as seen in Fig. 4.2a.

## **Mngaow**

Occasionally, we can hear that the cat puts a *ng* element into the miaow, which then sounds like *mngaow*. This signals a protest over a result the cat is not satisfied with. For example, perhaps the cat has been begging for food and we put down a bowl of freshly boiled fish. We quickly remember that the cat cannot eat scorching hot food and remove the bowl to allow the food to cool down. The cat does not understand this and expresses its *mngaow*. ‘Hello, put the food down again immediately. It's mine!’

## **Calling miaows**

Calling vocalizations typically increase in pitch at the end in an invigorating, expectant way. Such calling miaows can have both short and long *a* sounds, depending on the strength of the cat's motivation to attract another. Male cats use such miaows when they call females in heat, sounding more like a *mowl*. If they have difficulty finding females, they may add a *mrr* sound and make the *a* sound long and deep, yet with an increase in pitch at the end like the typimuch that causes more

complaints about cats than the yowling of tomcats during the mating season (Fig. 4.3). If accidentally coming too close to another male opponent, a tomcat may make a short howl starting with a loud *a* sound followed by a brief closed-mouth murmur. If finding himself facing another intact male of similar size – and visual threat signals do not have the desired effect – a yowling competition will start. It's all about who can make the longest, most powerful yowl. Since the yowl is energy-intensive, it displays the strength and vigour of each cat. The yowl is a type of miaow, where the *an* and *ouw* syllables are drawn out to the extreme and can last for many seconds. The yowl sounds like *miaaaaaaaaaaoooooooooooouw*. The extended *a* sounds in the yowl mark a strong desire for something, namely that the opposing party will go away. The *ouw* sound in the yowl shows frustration when the other does not comply.

If the yowling becomes very strong, the competition may escalate into a fight resulting in scratches or damage to the ears and paws, so this is clearly a type of offensive aggression. Fighting is always a last resort, but this can happen if neither visual signals nor yowling identify a winner. During yowling, the cats can approach and keep their heads just a few centimetres apart. Great courage is needed to tolerate such close-up yowling, but the males are competing for access to females in heat. Mating is a cat male mating call. We can write this as *mhrr ou aaa* priority for a fertile tomcat, so he will not give up others, such as calling males when they are in heat. All cats can use a calling miaow when calling social partners, whether cats or humans. In both wild and domestic cats, cat mothers use a calling miaow when attracting kittens who have got lost. At short distances, a *mhrrn* (greeting) that goes up at the end, *mhrrn*, can also indicate a desire for contact – 'I would love to see you, but where are you?'.

## Yowling

### Soundtrack no. 6: yowling

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Whilst both male and female cats yowl as part of their communication with an opponent, there is not until his health and safety are seriously threatened.

## Growling

A cat can growl almost like a dog, with a deep murmur with almost closed mouth. Growling

**Fig. 4.3.** A tomcat expresses his offensive attitude by vigorous yowling while holding his ears slightly backwards. (Photo: Audun Braastad, 2019) implies a warning, and can be directed to cats, other animal species and people. It happens when a cat has a resource to defend, such as its food, or wants to be left in peace for other reasons. It is therefore a type of defensive aggression. The cat says 'Stay away, this is mine' or 'Stay away, I feel uncomfortable when you are so close'. If the cat needs to make this point even stronger, the growling can grow into a powerful miaow: *grrrrraao*. If

the recipient does not respect this growl, the cat may attack as a defensive response. People can only blame themselves if they get bitten when not respecting the cat's desire to be left in peace.

## Hissing and spitting

Hissing consists of air pressed out of an open mouth without use of the vocal cords. It is typical of snakes and cats. Hissing is used as a defensive signal, especially among cats that are cornered and cannot escape. Never touch a cat that is howling, growling or hissing. If you do, you can experience powerful bites and scratches as the cat tries to defend itself. The cat has warned you and you are responsible if you do not heed the warning. Slight hissing can already be seen in newborn kittens when picked up by people. They open their mouth abruptly and repeatedly, as is the case in hissing by adult cats, but are unable to blow out any air.

Spitting occurs when a cat suddenly opens its mouth and blows a loud noise, again without using the vocal cords. It may sound like an abrupt *the*. It is a quick defensive warning that the cat gives if startled by the sudden appearance of an unexpected opponent. The intruder may also be startled by this abrupt sound.

## Chatters and chirps

The chatter is a staccato, rattling sound, like a rapidly repeated *ke-ke-ke*. Cats make this sound by clacking their teeth, but chatters can be accompanied by voiced elements as well, such as chirps. Cats occasionally chatter and chirp when they see prey at a rather short distance. The most typical situation is a cat who sees a bird sitting on the other side of the window. It appears that these sounds may lure prey by mimicking their sounds, or that of insects the birds eat. Perhaps the cat thinks if the bird came even closer, it would be able to catch it. Outdoors, these sounds may be given as a 'Come hither!' when a potential prey is just out of reach. If the sound attracts a bird to hop a little closer or, at least, relax its vigilance and wander closer, the waiting cat could launch a successful attack. A cat does not vocalize to other cats when hunting. Hearing those types of sounds would alert prey to the danger. Chattering may also indicate the cat is feeling a degree of frustration (see Chapter 8).

# Body Language – Visual Communication

The body language, or visual communication, of cats was thoroughly explored by the German ethologist Paul Leyhausen. His classic book about wild and domestic cat behaviour has been translated into English and is well worth reading for those interested in detailed descriptions and explanations of cat body language. Leyhausen found that cats can simultaneously show signs of two opposing behavioural tendencies by displaying both defensive and offensive signals at the same time. These signals involve body postures (including the tail), which provide general information about the cat's mood and behavioural tendencies, and facial expressions (including the ears), which provide finely tuned, rapid information about moment-to-moment changes in motivation. Therefore, to correctly interpret your cat's intentions, you must note the body posture and tail movements while directing your main attention to the head and eyes, and especially the ears.

# Facial expressions

The famous Austrian ethologist Konrad Lorenz once wrote that 'few animals show their moods by means of facial expressions as markedly as cats do'. In Fig. 4.4, you can see what different facial expressions mean. The most non-aggressive cat face is shown in the top left. The diagram has two axes – a horizontal, offensive, axis and a vertical, defensive, axis. If we go to the right of the chart, we see faces showing a gradually increasing *offensive tendency*, that is increasing motivation to attack if necessary to repel an opponent. What do we see then? The ears are swivelled around until they point backwards. Displaying the backs of the ears is a strong offensive signal that shows that the cat is ready to attack. In lynx and tigers, the back of each ear has a bright white spot surrounded by a dark border, making it easy for an opponent to notice that the ears are back even at night.

## Increasing offensive tendency

**Fig. 4.4.** Facial expressions, showing different combinations of increasingly offensive signals (towards the right column) and defensive signals (towards the bottom row). See the text for further explanation. (After Paul Leyhausen, *Verhaltensstudien an Katzen*, Verlag Paul Parey, Berlin, 1956)

Domestic cats almost always have single-coloured ears, but the 'ears back' signal nevertheless means the same: 'There is a great chance that I will attack you if you do not go away right now'.

If we go *down* the chart, we see faces with a gradually increasing *defensive tendency*. Now we can see that the ears are more and more flattened towards the skull. The more the ears are folded down, the stronger is the motivation to defend the body from attack. The cat at the bottom left has flattened its ears so much that they are almost invisible. When cats flatten their ears, their defensive signals cannot be interpreted mistakenly as offensive. This reduces the risk of provoking a dominant cat to attack them unnecessarily. A highly defensive cat will also open its mouth, signalling its readiness to bite if attacked.

Also note the size of the pupils. The most defensive face, shown in the bottom left, has the widest pupils. This is a sign that the sympathetic nervous system has been activated, with excretion of adrenaline from the adrenal glands. This stress response means that the cat is alert, scared and mobilizing energy to defend itself if this becomes necessary. At the same time, we usually see that the hair rises on the back of the neck, called *piloerection*. In a shorthaired cat, this makes the cat look bigger, which may help to deter an attack. In contrast, the purely offensive cat at the top right is confident and does not need adrenaline to claim its interests. Be aware, however, that the pupils of all cats will open more widely at night, as this allows them to see better in the dark – this is a reflex unrelated to adrenaline release. The pupils may also widen in other situations, such as when a cat is playing or hunting a bird. The four drawings in the lower right part of Fig. 4.4 show intermediates between offensive and defensive signals. These cats are partly offensive and

Increasing defensive tendency partly defensive, and are in doubt, or conflict, about whether to attack or defend themselves. By looking at how turned backwards the ears are, and how flattened down they are, we can see the relative balance between offensive and defensive tendencies. The cat at the bottom right is the most conflicted. In this state, it might do something unpredictable, or

perhaps attempt to calm itself by doing something irrelevant to the situation – a displacement activity (see Chapter 8).

## Lip licking

A clear indication that a cat is worried or anxious can be seen when it quickly licks its lips two or three times, while closely watching another animal, person or object of concern. This suggests that the cat's mouth has become dry out of fear, as happens also to people when stressed. Normal licking of the mouth, as seen after the cat has eaten, is much calmer and more carefully directed.

## Body postures

Increasing defensive tendency body postures using a diagram with an offensive axis and a defensive axis. The drawings in Fig. 4.5 show cats exhibiting offensive and defensive tendencies to varying degrees. We see a non-aggressive, relatively relaxed body posture at the top left, with increasingly offensive tendencies towards the right column and increasingly defensive tendencies towards the bottom row.

When assessing the cat's intentions, pay attention to the distance between the body and the ground. The more offensive a cat is, the more upright the cat will be. On the other hand, the more defensive the cat, the lower it will crouch. The head, particularly, will be held low. On the bottom left, we see a purely defensive cat. It is close to the ground, with its tail tightly tucked between its legs and flattened ears. The confident cat at the top right shows pure offensive signals, with raised body, straight legs, the tail down and the ears back. Such a cat will display the side of its body to the opponent rather than just the front. This lateral display shows off its big body: 'Look at me! I'm huge and strong. You should go away for your own safety.' Note how this visual communication signal to another cat differs from the body posture of an alert cat engaged in a non-social type of offense, the hunt (Fig. 4.6).

## Increasing offensive tendency

**Fig. 4.5.** Body positions, showing different combinations of offensive signals (to the right) and defensive signals (downwards). (After Paul Leyhausen, *Verhaltensstudien an Katzen*, Verlag Paul Parey, Berlin, 1956)

In a social contest, a somewhat arched back and partially raised tail indicates mild conflict between approach and withdrawal. The conflicted cat on the bottom right of Fig. 4.5 has the most arched back, showing that the tendencies to attack and defend are both strong. Leyhausen describes what is happening as a conflict between the front half and the back half of the cat. The cat has a fighting spirit, but the front end of the body closest to the opponent is retracted for safety. The centre of gravity moves backwards, making it easier to escape from the opponent if suddenly needed, bending the spine into an arch (Fig. 4.7). Suppose a mother cat with kittens nearby is facing a scary dog. She would love to chase away the dog but does not dare. Escape is out of the question, as she does not want to desert her offspring, so she stays and makes the best of it. She may also raise her tail, showing that she doesn't want to fight. Below, we explain other social contexts

involving a raised tail.

Great boldness is required to launch an attack because it is easy to get wounded in the heat of battle. When two similarly matched cats are in a dispute, each cat carefully evaluates the resolve of the other, watching for tell-tale visual signals from the face, ears, eyes, tail and overall body posture. They are also evaluating the sound signals, especially the yowl, as described earlier. In this battle of nerves, the balance of power is on a knife-edge and a moment's loss of concentration, or an impulsive signal, can cause the other to attack. All movements are very slow to avoid provoking an unnecessary attack. From time to time, the hindquarters of one or both cats may slowly sink down (see Fig. 4.8). This seems to act as a signal of ceasefire, giving the cats a much-needed thinking break. If one cat exposes its teeth, it becomes clear that it is more defensive than the other. Usually, defensive signals are respected, and the more confident cat will not attack. This cat's dominance has been recognized and it can proceed to other important tasks.

**Fig. 4.7.** This cat arches its back, displaying conflict between offensive and defence motivations. The ears are erect, showing that the cat is not very frightened at the moment. (Photo: Maria Myrland, 2019)

**Fig. 4.8.** Two equally matched cats in a ceasefire. Both have their ears turned somewhat backwards and lowered hindquarters. (Photo: Bjarne O. Braastad, 2011)

## Rearing

Fortunately, the cat uses its body language not only in conflict situations but also when approaching a friend. It may then lift both front paws up off the ground for a couple of seconds, assuming a more vertical posture, and then put them back down again. If greeting a person, the cat may also rest the front paws briefly against the person's legs while rearing.

## Lifted paw

You sometimes see that a cat suddenly stops and lifts a forepaw, the paw hanging in a relaxed way. The cat looks like it is concentrating, perhaps attending to a sound or odour that has caught its interest. A dog will do the same. This is referred to as an *intention movement*. The animal shows its intention to move on but pauses to evaluate if this is wise. It is saying 'Hey, what was that?'. It indicates mild conflict over what to do next.

## Exposing the belly

If you stroke an unfamiliar cat on its belly, you can quickly get a scratch. The cat aggressively defends its belly using its claws if it does not feel completely safe with those nearby. This is an important survival response that protects the body's most vulnerable region. The abdomen is not covered by bones and an injury here could fatally expose vital organs. The chest has some protection from the ribs, and the head is well protected by the skull, so cats more easily accept strokes there.

However, when a cat has full trust in you, it may roll over on its back and present its belly, like a mother cat presenting her udder for suckling by her kittens. This is an invitation to gently caress the belly. If the cat is unknown to you, be careful not to reach for the belly if it rolls on its back as it is probably doing so just to scratch its back.

## Tail signals

### Tail up

A 'tail up' signal involves a stiff upward motion that lifts the tail quickly until it is more or less straight up. This is a greeting signal that can be addressed to both cats and people. It is usually accompanied by a slightly curved back and a greeting sound *mrrrt* or *mhrrrn*, that rises in pitch at the end. The cat can use this as a short greeting even if it is just passing by. Then we see the tail go up and down again after a couple of seconds, without any sounds. This is a 'Hi' in passing. The cat has seen us but is not seeking to make close contact at the moment.

The 'tail up' is a signal used by kittens when greeting their mother, and adult cats use the same towards people and other friends. It can be the start of a more elaborate greeting in which the nose is rubbed against the cheek or body of the one being greeted. Kittens do this to their mother when they are hungry. Adult cats direct this greeting to cats of higher social status, signalling their friendly intentions.

### Tail over the head

Sometimes you can see a male cat walking with lifted tail, but with the tip of the tail tilting forward towards the head. This is a sign of high self-confidence. It may be a signal to females that it is high-ranking, and a signal to less confident males that they should stay away. At a lower degree of self-confidence, a cat can hold the tail partially lifted. In juveniles, when the tail is tilted forward, it shows that they feel safe in their surroundings and may be playful.

### Lashing tail

This is a common tail signal and means something completely different from the dog's tail wagging. It consists of rapid jerks of the tail from side to side and shows that the cat is annoyed. The stronger the lashes, the stronger the irritation. Often, this signal is accompanied by other body signals that indicate irritation, or growling. The cat wants to be at peace and if we do not respect this, the cat may suddenly bite.

### Slight tail movements

When resting, if something disturbs a cat, or if it does not feel completely safe, we may see small twitches of the tip of the tail. This is a warning that, while the cat looks relaxed, it is alert and ready to react if necessary. If the cat becomes drowsy or falls asleep, these tail movements will stop. But if the cat is in our lap wanting to sleep and we keep touching it in ways that keep it awake, the tail

movements can become stronger, and may even develop into tail lashes. In the end, the cat may suddenly bite our hand, not hard, but as a warning. The cat has had enough and is telling us, 'Stop! Don't you understand that I want to sleep?'. This can be startling if we thought the cat was resting contentedly. From the cat's perspective, the cat asked us to stop when it was twitching its tail and we ignored the signal, so it gave a stronger signal.

## Tail rub

Sometimes you can feel that the cat swings its tail against you, perhaps twisting it partly around your leg or cheek. The cat uses its tail to caress you. Occasionally, this friendly signal will be followed by rubbing its cheek against you. In addition to the visual signal, this behaviour can involve scent and touch signalling (see below). The cat usually gives such signals only to close social partners, so we must regard this behaviour as a statement of great trust and desire to maintain a close relationship with us.

# Odour Language – Olfactory Communication

Like many mammals, cats use their sharp sense of smell to receive important messages. The odour language, or olfactory communication, involves production of specialized chemical signals, called *pheromones*, which are perceived by other cats and influence their behaviour. Whereas hormones convey chemical messages within the body, pheromones take chemical messages out into the environment where they can be detected by other cats. They can be delivered via urine, faeces, footprints, udder or by rubbing their head and body against objects. When odour molecules are sniffed by other cats, they attach to cells in the nose. From there, the signal is passed along nerves to the olfactory bulbs of the brain for processing. However, unlike us, cats also have a whole other system for processing pheromones, which we describe in the next section.

## Urine marking

A cat can urinate in two ways: using the regular squatting posture or standing upright with elevated tail to send small squirts of urine straight backwards. The first method is for eliminating waste products from the body, and cats usually cover this urine. It is the second method that is mainly used for olfactory communication. It is termed *urine marking*, or *spraying*, and we notice it only too well when an intact tomcat has been urine marking. The strong odour comes from glands located by the urinary opening. The secretions from these glands are released into the urine stream during urine marking and in intact males, they have a particularly pungent odour. Urine marks are usually directed towards prominent vertical objects such as trees and walls, making it more likely that other cats will find them. While they can smell them from a distance through their nose, close-up investigation allows cats to use another odour-processing system to learn more about the cats who produced them.

One can see that after carefully sniffing another cat's urine mark, a cat will partially open its mouth, raise its head and lift its upper lip. This is called a *flehmen response*. The movement of lifting the lip causes two tiny ducts to open in the roof of the mouth, allowing the odour cocktail to enter a specialized organ called the *vomerinasal organ*. During flehmen, the cat may also flick its tongue to direct the odour into this organ. The vomeronasal organ contains nerve cells that transmit signals to the accessory olfactory bulbs of the brain. This part of the brain works like a chemical laboratory to process pheromones. Horses and cows have the same mechanism. However, while we may screw up our nose when we smell something unpleasant or breathe in deeply a pleasant smell, we do not have a functional vomeronasal organ.

Both males and females can urine mark and show flehmen, though these behaviours are more commonly seen in males. Tomcats often urine mark when they are courting a female cat in heat. Their urine has a high content of the amino acid felinin, a substance that smells strongly and is believed to signal the male's skill in finding high-quality food. Therefore, the urine marking behaviour is probably sending a message about how successful he is – the tomcat's way to boast to the females and convince them to mate with him. Males also show flehmen when sniffing the urine of females, which contains pheromones telling males when they are in heat. It is *not* common for males to urine mark or perform flehmen as part of a face-to-face confrontation with another male.

Faeces can also be used as a scent mark. Then cats deposit faeces in open places where the odour signal can spread well. When cats want to conceal their presence, they carefully cover both urine and faeces with soil or litter. If none is available, they may scrape the floor for an extended period in an unsuccessful attempt to bury the excreta.

In many animal species, individuals use olfactory communication to mark the boundaries of their territories, but in cats, urine marking acts more like a business card. Cats do not treat scent marks as territorial boundaries. By sniffing the mark and performing flehmen, the cat can identify *who* was there and how long ago the mark was deposited. The scent contains distinctive characteristics of the individual cat. While cats may still be able to detect a scent mark seven days later or even more, Jaap de Boer in Amsterdam showed that fresh urine marks deposited within the last four hours receive the most sniffing and flehmen responses. Because different substances in urine break down at different rates, the chemical composition of a mark changes over time, providing information about how long ago it was deposited.

Pheromones play an important role in the social system of cats. As soon as a cat goes outdoors, it will sniff around to check if other cats have been there. Then it will probably know both who and when, so the cat becomes updated about the cat traffic in its neighbourhood. In Chapter 5, on social behaviour, we shall see how cats use such knowledge in regulating their movements. Some insecure cats may even use urine marking in an attempt to attract an owner who has been away for a longer time than usual, though this is futile as well as being unwelcomed by people.

## Scents from skin glands

Cats have many other ways to send olfactory signals besides urine marking. When they scratch on a post, they are depositing pheromones from glands between their toes, called interdigital glands (Fig. 4.9). Rubbing against objects such as poles, trees, chair legs or trousers results in transfer of

pheromones from glands in the corner of their mouth, cheeks, mid-forehead and the root of the tail. Sweat glands around the teats of nursing mothers produce a pheromone that appears to have a calming effect on kittens. Synthetic versions of some cat pheromones can be used to calm down cats, which could be helpful when addressing problems with tension and conflict between cats in the household. (Read more about how to solve behaviour problems in Chapter 11.)

The composition of odours produced by the body is influenced by genetics and by diet. Therefore, closely-related cats and cats eating the same type of food have similarities in odours that cause them to seem somewhat familiar to each other even if they have never met before. They may be quicker to accept such cats as friends than other strangers that smell more different. In addition, cats learn to recognize the odours of the other members of their group and distinguish them from strangers. They pay particular attention to the scent marks of unfamiliar cats, especially intact males, presumably attempting to learn as much as possible about them before encountering them face-to-face. When two cats first meet and eventually dare to approach each other, they want to sniff each other, first at the mouth, then the cheek, body and back. Sniffing the hindquarters is often not allowed, as it feels unsafe to have a stranger behind them. The smell of close group members often seems comforting to cats. This may explain why they love lying on clothes that belong to their owner, especially when the owner is out.

There is still much we don't yet know about cats' scent language. As we do not distinguish the differences between their scents in the sophisticated way that they can, it is not easy to investigate this topic. We do not know if the different glands around the head give the same signal, or if rubbing the cheek sends a different signal to rubbing other parts of the body. Cats often deposit scents from several glands in succession, such as when rubbing with their mouth, cheeks, head and tail, and some suggest that they just use the most accessible part of the body for scent marks from skin glands. This would imply that the information is more-or-less the same: 'This is how I smell'. However, the cheek glands alone may include several components, each with a slightly different meaning.

**Fig. 4.9.** When a cat scratches with its claws, it deposits pheromones from glands between the toes. (Photo: Nina Svendsrud, 2019)

## Touch Language – Tactile Communication

When a cat rubs itself against another cat or person, touch language is involved. This is called *tactile communication* by ethologists. Among cats, rubbing is probably a means of ingratiating themselves with other cats. Kittens rub more against adult cats than *vice versa*, and female cats rub more against male cats than *vice versa*. They are saying: 'Be nice! I want to be with you'. When a cat rubs against us and we respond by gently stroking it, we are accepting the invitation. Through this tactile contact, both parties are depositing scent on each other. The mixture of individual scents shared between group members creates a familiar group scent that cats perceive as showing that they belong together.

Another important form of touch comes through *social licking*. In contrast to rubbing, it is usually a more dominant cat that directs licking towards a more subordinate one. Licking signals care. When

the mother cat returns from a hunting trip, she informs her kittens of her presence. If the kittens are younger than five days and the ear canals are not yet open, she cannot give them *mhrn* or miaow sounds even if the kittens give distress calls, *miiiy*, because they are cold or hungry. The queen licks the kittens before lying down to nurse them. They associate this licking with milk and comfort as the queen also grooms them while nursing, and they quickly settle down to suckle. Similarly, if a cat hesitates to accept the food we offer, it is more likely to start eating if we gently stroke it. We can avoid interrupting the feeding session by only continuing the stroking for a short while as it eats, before slowly withdrawing our hand. In this way, we use the touch language of cats to achieve our goal.

## Communicating with Cats

In the sections above, we have pointed out several cases where we can use our knowledge of cat signals to communicate with cats in their own language. We must consider the message we want to give and ask ourselves how the cat would convey the same message. We can call our cat with a *mhrn* or miaow, increasing the pitch at the end. We can 'smile' with half-closed eyes and accept its presence with gentle stroking. Of course, we cannot have detailed conversations with cats using human words. Nevertheless, cats can learn to understand specific words, such as their name. They can learn how we want them to respond when we give a specific signal as long as we train them appropriately, as we explain in Chapters 10 and 11.

When we encounter an unfamiliar cat with whom we wish to make contact, we should not just go straight up to it and touch it. Many cats will perceive this as a threatening situation and run away. You must first *greet* the cat and announce that you have no aggressive intentions. Sit down to get closer to the cat's height, slowly extend a paw (hand) towards the cat and let the cat sniff it while you talk with a welcoming sound that goes up in pitch at the end. If the cat shows defensive signals, be particularly patient. Let the cat approach you when it feels safe enough to do so. Then you can stroke it gently on the cheek (Fig. 4.11), on the head and eventually on the flank, but avoid its back and hindquarters until it knows you better.

When looking at a cat's eyes, it is not only the size of the pupils that can provide useful information;

**Fig. 4.11.** Then you can gently stroke the cat on its cheek. This baby has already understood this. (Photo: Agnethe-Irén Sandem, 2019)

**Fig. 4.12.** When a cat approaches you with half-closed eyes, you can rest assured that it has good intentions. (Photo: Audun Braastad, 2019) the position of the eyelids is also important. If a cat stares at you with wide-open eyes, its head slightly lowered and back slightly arched, it is sending you a threat signal. This means 'Do not try something stupid or you'll be in trouble'. Halfclosed eyes, on the other hand, send a friendly signal showing that the cat accepts your close presence (Fig. 4.12). Therefore, when you meet an unfamiliar cat, it is important not to stare. First, look slowly away from the cat before turning your gaze back towards its face. While doing this, close your eyes halfway before making eye contact. When you are looking at each other, blink your eyes repeatedly but slowly; keep your eyes shut for a second each time and only half open your eyes

between every blink, sometimes moving your gaze away to the side. If the cat responds with the same eye signal, it has calmed down and accepted your presence. Now you can go one step further and offer your hand for sniffing.

The *blink signal* can be used when talking to your own cat as well. It will help strengthen the bond between you. You can use this signal, blinking markedly a few times, if your cat becomes anxious for some reason, for example due to sudden loud sounds or lightning. It will serve as a calming signal and show the cat that you do not detect any danger. This can work well with other animal species, too, such as dogs and cattle.

Bjarne has observed that both his previous cat and the present one seem to react instinctively to a smooth whistle tone of around 440 Hz (an A note in music). As he calmly gives a long whistle at this pitch, the cat stands up and approaches him as if in a trance. It seems to be a calling signal. Perhaps the kitten's *miao* to attract its mother is most effective if it has a fundamental tone around A, possibly with higher octaves. You can try this on your cat. You may need to vary the tone somewhat, as the optimal pitch may vary between cats.

If we provide signals that our cat does not understand, we have not communicated with the cat.

All too often, animal owners scold their cat or provide other signals that are not recognized by the cat. The result is a confused or insecure cat. To signal to a cat that a particular behaviour is unacceptable, we must use the principles of proximity in time and space during training. Our reaction must come immediately after the cat's unacceptable behaviour, and the cat must still be in the same place. The cat can then make the connection between its behaviour and our reaction. If the cat has defecated on the carpet in the living room and you come home an hour later and scold the cat as it approaches you to greet you, you will be punishing the cat's approach and not its actions an hour previously. Your cat may interpret your behaviour as social rejection. Is it strange that the cat then gets confused? However, it is better not to punish your cat as this is not a very effective training method and places your social relationship at risk. You will learn more about this in Chapter 10.

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