Behaviour guide to African carnivores

Module # 4 - Component # 8

Cheetah

Traits

The felid version of a greyhound, the most specialised cat.

Height and weight: 78 cm (70-90), and 50 kg (35-65), **males more robust** and c. 10 kg heavier than females. **Lightly built with long, comparatively thin legs** and small feet with blunt (except dewclaw), **unsheathed claws**, swayback, short neck, small, rounded head with foreshortened face, broad but low ears, teeth relatively small, especially canines.

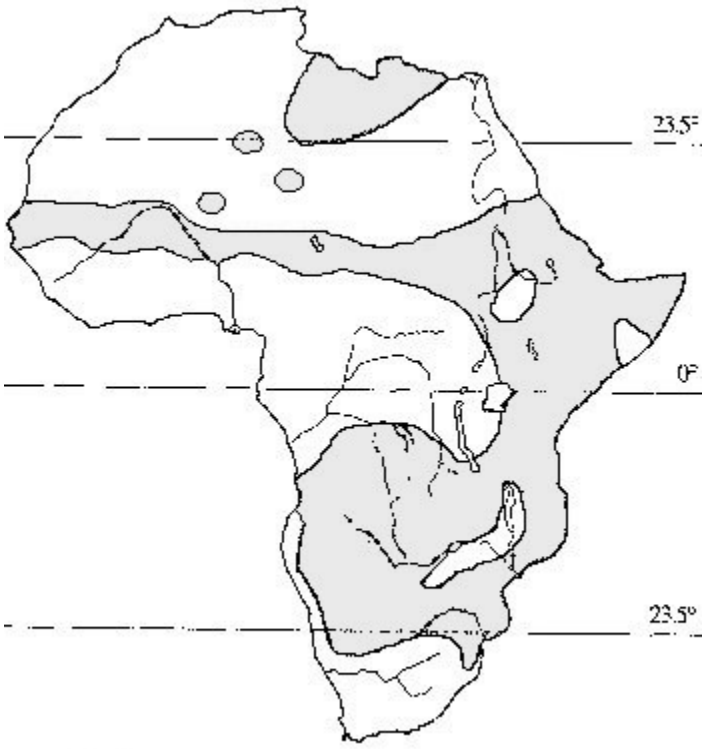
Colouration: tawny, with white underparts, a short ruff, **more developed in males**, and fluffy hair on belly and chest; spots small and solid, outer tail ringed black and white, tip usually white; black ear backs, lips, nose, and "tear stains" from eyes to mouth; juvenile coat black with faint spots and a cape of long, blue-grey hair.

Scent glands: presumably anal glands.

Mammae: 12.

Distribution

Similar to lions: the cheetah formerly ranged through the Near East to South India and throughout Africa **except in equatorial forests and true desert**. The cheetah became extinct in India in the early 1950s and is now **extremely rare elsewhere in Asia and North Africa.** It is still widely but sparsely distributed south of the Sahara in the savannas and arid zones but greatly reduced in range and numbers. This species is **far less adaptable to man than the leopard**, but Namibia has benefited from the removal of lions and hyenas and the reintroduction of antelopes on ranches. However, an **extraordinary degree of genetic uniformity in this species raises the possibility that disease could devastate wild populations**.



Ecology

T**he cheetah is specialised to prey on the fleetest antelopes**, especially the gazelles and their close relations, the blackbuck and springbok, which dominate(d) the arid wastelands of Asia and Africa. That the cheetah is built for speed (fig. 21.24) is demonstrated by the fact that the **fastest dogs-greyhound, whippet, Afghan hound-produced after centuries of selective breeding have a similar conformation**. No other mammal is as fast as a cheetah, which has a top speed of 90-112 kph (60-70 mph), but dogs have something the cheetah lacks: stamina (**more under predatory behaviour**). **To capture its prey, the cheetah has to overtake it within 300 m**. It has a hard time getting within sprinting range on plains with no cover; optimum cheetah habitat, therefore, includes cover in the form of bushes, medium-length (not tall) grass, trees, broken ground, and such. In the bush and savanna woodlands, the impala takes the place of gazelles as the cheetah's mainstay, accounting for 68% of 1092 cheetah kills in Kruger N.P., for instance.

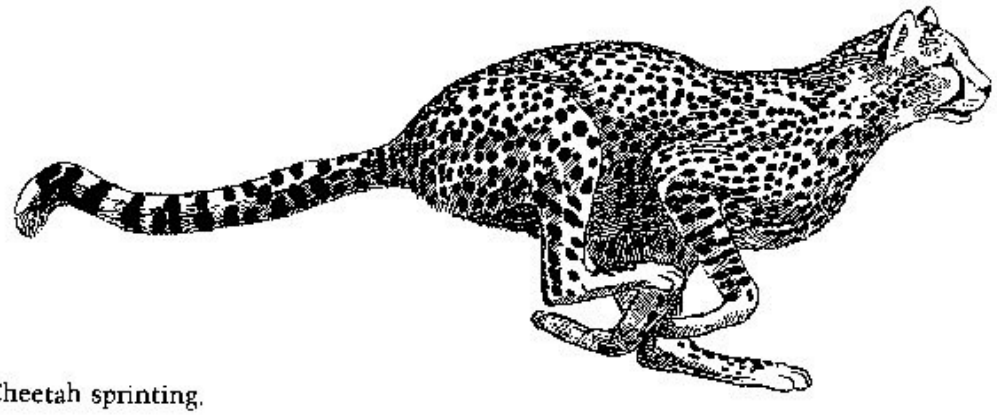


Fig. 21.24. Cheetah sprinting.

This cat also occurs in the *Miombo* Woodland Zone, where its **main prey is probably the bush duiker, reedbuck, lechwe, oribi, juvenile sable and roan, and warthog**. Single cheetahs seldom kill antelopes heavier than themselves and often take smaller game; in Serengeti N.P. hares are second (12%) in importance to Thomson's gazelles (62%), especially during times when gazelles are scarce. **Serengeti cheetahs regularly go 4 days between drinks**, after which they will travel 5-10 km to water if necessary. In the Kalahari, where they eat melons, cheetahs easily go 10 days without drinking.

Social organisation

Diurnal, territorial, female's solitary, **males in coalitions or alone.**

Being an inhabitant of open country, diurnal, and often seen in groups, the cheetah **could well be supposed to be a social carnivore**. However, these groups almost always turn out to be **mothers with subadult cubs, young adult siblings** recently separated from their mother or coalitions of males. Adult females are as solitary and shy as other cats. In acquiring the speed to catch the fleetest antelopes, **the cheetah sacrificed the strength and weapons needed to defend its kills and offspring against competitors**. Perhaps its delicate build is enough to explain the timidity that characterises this cat, it is afraid of lions, surrenders its kills to hyenas, and can even be intimidated by vultures-probably because it realises that vultures attract other predators. **To avoid being victimised, it makes itself as inconspicuous as possible, aided by its cryptic colouration.**

Home range and territory

Where their main prey is migratory, cheetahs cover a wide area: the **annual range of Serengeti females that subsist largely on Thomson's gazelles is c. 1000 km^2.**

But several females whose histories were recorded for up to 11 years had narrow ranges 50-65 km long, which included habitat utilised by gazelles both during wet and dry seasons (Frame and Frame 1981). **The cheetahs were able to move with the gazelles in a regular cycle that took them from end to end of their home ranges**. When offspring reached 17-23 months and separated from their mother, daughters remained within the maternal home range, but each stayed alone. Once a mother and daughter were seen only 20 m apart but parted without coming any closer. However, despite minor adjustments of range during the ensuing years, a **broad overlap between the ranges of the mother and 2 daughters persisted**. The daughters' ranges overlapped much less.

Male offspring emigrate and typically wander huge distances while maturing and seeking to establish territories. Nine males marked in Namibia were retrapped at distances of over 200 km from the marking site (McVittie 1979). Among other dangers, transient males run the risk of injury, even death, if caught trespassing on the territories of established males (example under Agonistic Behaviour); **consequently, females may be twice as numerous as males** in the adult population. Males compete for the best hunting grounds and defend areas much smaller than the females' ranges-the reverse of the arrangement seen in most carnivores. However, **males may range outside their territories.** The areas defended by Serengeti males were found to be 39-78 km^2; they had no overlap and sharp boundaries. Territorial males did not trespass, whereas females passed through several territories during the circuit of their ranges.

In the Serengeti study, 41% of the adult males were solitary, 40% lived in pairs, and 19% lived in trios (Caro and Collins 1987a). **The benefits to male cheetahs of forming coalitions are far less obvious than in the case of lions**. Female cheetahs are solitary, and as single males apparently meet as many as do males in coalitions, singletons would not have to share or compete for copulations with companions. **However, there is evidence that single males have a harder time acquiring and keeping a territory**. Only 4% of the observed single males ever held a territory, whereas all the single males that joined coalitions acquired territories. Furthermore, estimated territorial tenure increased with coalition size: the median tenure for singletons was 4 months (3½-9), it was 7½ months (2 ¾-16) for pairs, and 22 months (18 ½-24 ½) for trios. One trio held territory for 6 years.

How coalitions are formed

Littermates often stay together for several months after separating from their mother. One by one, the females drop out before they reach 2 years of age, presumably at the onset of oestrus. Some males also separate, whereas others stay together as permanent companions (fig. 21.25). Of 6 Serengeti litters containing more than 1 male, brothers of 4 litters went their separate ways. **A single male joined a pair of brothers after separation while they were still living in their mothers' adjacent ranges**. Then they moved 20 km and established a 36 km^2 territory on the Serengeti Plain. Fourteen months later, they extended their range by 22 km^2 during a time when gazelles were scarce, but within a month were back in their usual area.

Fig. 21.25. A male coalition of 3 cheetahs, drinking.

Social relations between cheetah males are more restrained and less affectionate than relations within lion coalitions. Cheetahs seldom lie in contact, and their greeting ceremony proceeds no further than cheek-rubbing. During 38 hours of observation over five days, males of the above trio exchanged cheek rubs only five times. **The unrelated male, which proved to be dominant**, administered 4 of the 5 cheek rubs, two to each brother, and he issued 5 of 9 play invitations, all declined (the 2 brothers played once for a minute). No cheek rubs were initiated by the lowest-ranking member of the trio. In addition to the cooperative defence of their territory, **the males jointly marked their property**. They sniffed existing marks 55 times and urine-marked 59 times in 34 hours. Number 3 male marked most (27 times), and number 2 marked least (13 times), although he sniffed as often as the alpha male (20 times) (Frame and Frame 1981).

The largest number of cheetahs seen in the Serengeti totalled 9 and consisted of 2 females with their offspring. Associations between adult females were seen about once in every 500 cheetah sightings and lasted only a few hours. Of 1260 cheetah sightings, 35% were lone adults, 40% were females with offspring, 7% were littermates on their own, 7% were male coalitions, and 3% were female-male consorts. In Namibia, however, **groups numbering from 10 to 14 are not uncommon**; 16% of 102 adult females were observed in groups of 2 or more, and 28% of all litters were accompanied by more than 1 adult (McVittie 1979). This population also kills bigger game than usual, including adult kudus and wildebeests. These differences may be explained by the fact that **the cheetah has become the dominant predator on fenced range**, where other large carnivores have been exterminated. The implication is that the cheetah's social organisation and predatory role are shaped elsewhere by the presence of hyenas and lions.

Activity

The most diurnal cat, cheetahs, do almost all of their hunting by daylight but usually rest during the hottest hours. Rarely cheetahs will engage in brief chases by moonlight or even on dark nights. In Nairobi, N.P., females and cubs moved about 3.7 km per day, compared to 7 km for males.

Postures and locomotion

See predatory behaviour and family introduction.

Predatory behaviour

Of **493 observed hunts by Serengeti cheetahs, 203 were successful** (41%). Only 40% of the stalks of Thomson's gazelles, which made up nearly 60% of the kills, ended in chases (fig. 21.24), but **half of those chased were caught** (Frame and Frame 1981). **Male coalitions and females with subadult young use their combined might to pull down game the size of yearling and 2-year-old wildebeests**. Four males in Nairobi Park even killed a zebra and a waterbuck.
An actively hunting cheetah walks along alertly, utilising termite mounds and trees with low branches as vantage points from which to spot potential prey. To get within sprinting range (50 m or less), a cheetah uses several different techniques, depending on the terrain and the type, dispersion pattern, and behaviour of the prey. It may simply wait at a vantage point if it sees that a group of gazelles is moving in its direction. **Or it may approach slowly and openly an alert herd** on the open plain, whose members stand and watch or even trot closer for a better look. If it can get within 60-70 meters before the animals take flight, the cheetah may gallop at them but will accelerate to full speed only after selecting a particular quarry.

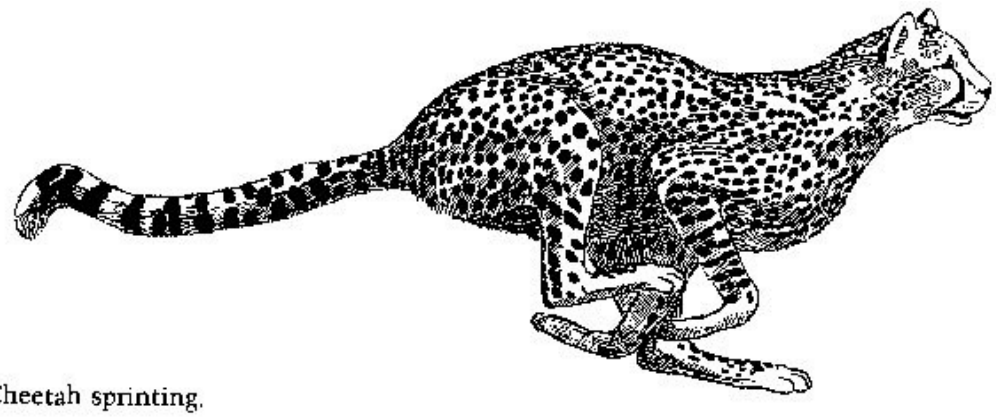


Fig. 21.24. Cheetah sprinting.

Alternatively, if all the animals are grazing unsuspectingly, **the cheetah may rush at them from over 100 m** (rushing) and try to get close enough to select a quarry before being detected. But whenever cover is available, cheetahs stalk as close as possible, walking semi-crouched with head lowered to shoulder level, trotting, freezing in mid-stride when the game looks up, dropping to the ground, lying crouched, and sitting. In a sample of 129 complete hunts, stalking was employed 85 times, taking anywhere from a few minutes to more than an hour. In ⅓ of the hunts, the cheetah first walked closer and then began stalking or tried rushing. Forty-six of the hunts failed, **either because the prey spotted the hunter before it could get within range (28 times), the quarry wandered away during the stalk (5 times), or the cover ran out before the cheetah could get near enough**. Five times cubs alerted the quarry. Lone animals at a little distance from a group and individuals near cover are **most likely to be singled out**, but the cheetah does not look for individuals in poor condition and takes no account of wind direction. However, it will single out and pursue small fawns that leave their hiding places, coming on the run from as far away as 500-600 m. **Hunting success with fawns is 100%-a small but sure meal** (Schaller 1972b).

Once a cheetah gets within range, **often flight seems to trigger pursuit**. An antelope or warthog that stands its ground may well not be chased. Although a cheetah can accelerate to about 112 kph (70 mph), **the average speed during a chase is less than 64 kph (40 mph)**. If it fails to overtake its quarry within 300 m, the cheetah's breathing rate goes up to 150 a minute, its temperature soars, and it has to cool down for half an hour before trying again (Taylor and Rowntree 1973). Having overtaken its quarry, the cheetah may yet fail to catch it, for Thompson's gazelle, in particular, **reacts by turning sharply, and the cheetah is hard to put to follow closely**, the more so, the greater the difference in speed. A Tommy seldom makes more than 3-4 such turns, but by then, the cheetah is often winded.

The harder its quarry is running, the easier it is for a cheetah to unbalance it by the striking rump, thigh, or hindleg with a sideward or downward stroke of a forepaw, or simply by tripping it. The victim crashes on its side or even flips end over end, sometimes breaking a leg. If the prey is going slower or standing, the cheetah rears, hooks into the flank or back with a dewclaw, and yanks backwards, causing it to fall on its side. Using one or both legs and its chest to hold the struggling animal down, the **cheetah lunges for the throat and secures a grip on the windpipe**, usually from behind, out of the reach of flailing hooves.

The canines are so small that they only penetrate a short distance, but **the skull is designed to give the cheetah a vice-like grip** (Kingdon 1977).

After the victim's struggles have ceased (typically within 4½ minutes), **the cheetah proceeds to drag it into nearby cover** (fig. 21.26), if any and there settles down to eat while **keeping a wary eye out for other predators** and scavengers. It opens the carcass by shearing the belly skin with its cheek teeth, then eats the muscles of the limbs, back, and neck first. It **may eat up to 14 kg at a sitting**, then not kill again for 2-5 days. A female with cubs is kept much busier. One with youngsters 3-4 months old that was followed for 35 days captured 31 gazelles and a hare during that time (Schaller 1972b). An estimated 4 kg of meat per day is available in a cheetah's kills. Most bones, the skin, and the digestive tract are left uneaten. Unlike other big cats, **cheetahs do not hold their meat between their paws** but gnaw or tear off large chunks. They do not return to their kills and only occasionally rake dirt over a carcass before leaving it.

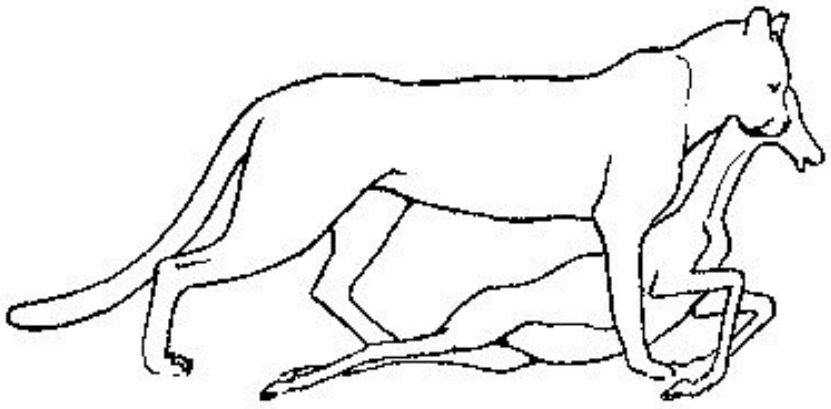


Fig. 21.26. Cheetah dragging prey to cover.

Relations with other predators

Serengeti cheetahs lose about 10% of their kills to other predators, mainly spotted hyenas and lions, half the time before they have begun feeding. Sometimes a cheetah, especially a mother with cubs, will resist giving up a kill to a hyena or African wild dogs, growling, moaning, spitting, and even making mock charges, but **will not hold its ground if a larger carnivore continues to advance**. Lions catch and kill cheetahs whenever possible; cheetahs will often flee even from a lion's voice. **Leopards and African wild dogs have also been known to kill cheetahs**. Man is another one of the predators which have long exploited the cheetah's hunting skill: a silver vase from the Caucasus dated to 2300 B.C. depicts a cheetah wearing a collar.

Social behaviour communication

Vocal communication

Chirping or yelping, churring, growling, snarling, moaning, bleating, purring. Maternal and juvenile: whirring, nyam nyam, ihn ihn (mother calling cubs), prr (maternal "follow me" call).

Many of the cheetah's calls are **unlike the sounds of other cats**, particularly the 2 discrete contact cries, *chirping* and *churring*, which are often given alternately and repeatedly, at varying intensity. The birdlike chirp, which sounds like a yelp or a dog's yip at high intensity and **maybe audible for 2 km**, is the usual call given by females to summon hidden or lost cubs, by greeting or courting adults, and by cubs around a kill, the **intensity reflecting the degree of excitement**.

Churring is a **staccato, high-pitched growling sound** that is less far-carrying. These 2 calls have been compared to the lion's loud and soft roars. Cheetahs also growl, snarl, hiss, and cough in anger or fright, but less frequently than other big cats.

When forced to surrender its prey to another predator, a cheetah may hiss and sometimes moan loudly. *Bleating*, equivalent to meowing, is **a sound of distress**, as in the lion; for example, a female circling a lion that had stolen her kill uttered a growling bleat. **Cubs squabbling at a kill** made a whirring sound possibly equivalent to growling in other cats, which rose to a ferocious squeal at peak intensity and subsided to a rasp. A sound like *nyam, nyam, nyam* is also associated with eating, and captives anticipating food sometimes **utter a curious humming**. Contented and friendly cheetahs purr like huge housecats, especially while greeting or licking each other. Other calls heard between mothers and young include *ihn, ihn, ihn*, which, like chirping, is used to summon young; a sharp *prr, prr* which elicits close-following when the mother is moving; and a **short, low-pitched sound that makes the young stay still**. Small cubs disturbed in hiding sometimes make sounds like breaking sticks.

Olfactory communication

Scent-marking by *urine-spraying*, *scuffing* (± urination), defecating on landmarks, clawing (rare).

Scent is apparently the main communication channel among cheetahs. They spend much time searching for, smelling, and depositing their own scent on previously marked places. **Elevations and other landmarks used as observation points are preferred marking places**, thus serving as regular stations where virtually every cheetah receives and leaves olfactory information. So-called "play trees" on Namibian ranches attract all passing cheetahs; ranchers (and researchers) take advantage of this habit to trap them (Marker 2000).

When a cheetah comes to a marking place, it crouches on its forelegs and sniffs long and carefully. In a group, the posture stimulates other cheetahs to approach and do likewise. A male then **sprays urine on the spot** and (unlike lions) often sniffs his own mark before continuing on his way, which may zigzag between established scent posts. **Females also urine-mark**, with increasing frequency as they come into oestrus, but less actively than males; in Botswana, ranchers have trapped up to 40 cheetahs in a decade-all males-at traditional marking trees situated at junctions between several territories. **Both the urine and faeces of oestrous females also attract males from far and wide**. It is not known whether faeces have any territorial significance, but both sexes often defecate on the mounds, boulders, and trees they use as observation and scent posts.

Tactile communication

The cheetah *greeting ceremony* features much **mutual sniffing** (oral and anogenital), **face-licking, and cheek-rubbing, but no body-leaning or side-rubbing**.

Visual communication

The "tear stains" and black lips edged with white fur **direct attention to the face** and clearly signal changes of expression at close range. A cheetah sitting and *looking away* (mildly intimidated) keeps its lips pursed so that the **mouth line is concealed**, whereas the lips and tear stripes merge in an emphatic geometric figure in cheetahs with confident and aggressive expressions (fig. 21.27).

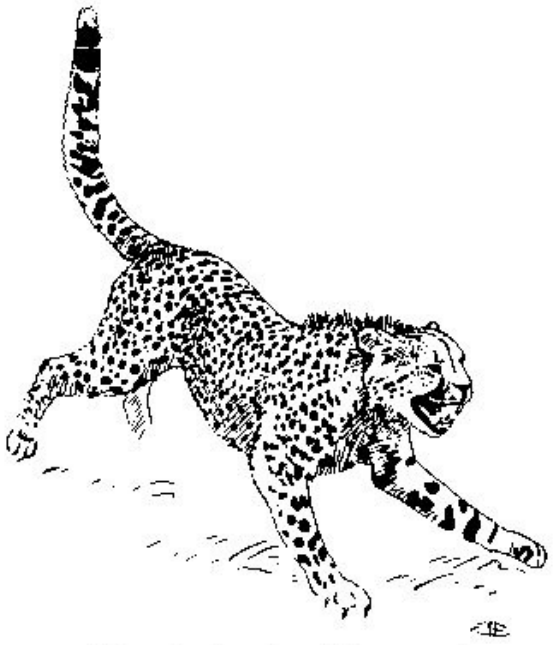


Fig. 21.27. Cheetah charging (offensive threat). (From a photo in Eaton 1971.)

But otherwise, the **cheetah's colouration and markings are cryptic** except at close range. The continuation of spots onto the face makes the head as hard to see as the body from a distance. The black earmarks only show up well from behind or when a cheetah has its head lowered in threat. However, the tail with its black and white rings is conspicuous, **functioning perhaps mainly as a follow-me signal for the young**.

Agonistic behaviour

Dominance/threat displays

Stiff-legged approach with head below shoulder level, often in lateral presentation, charging (fig. 21.27), and aggressive facial expression (see fig. 21.3).

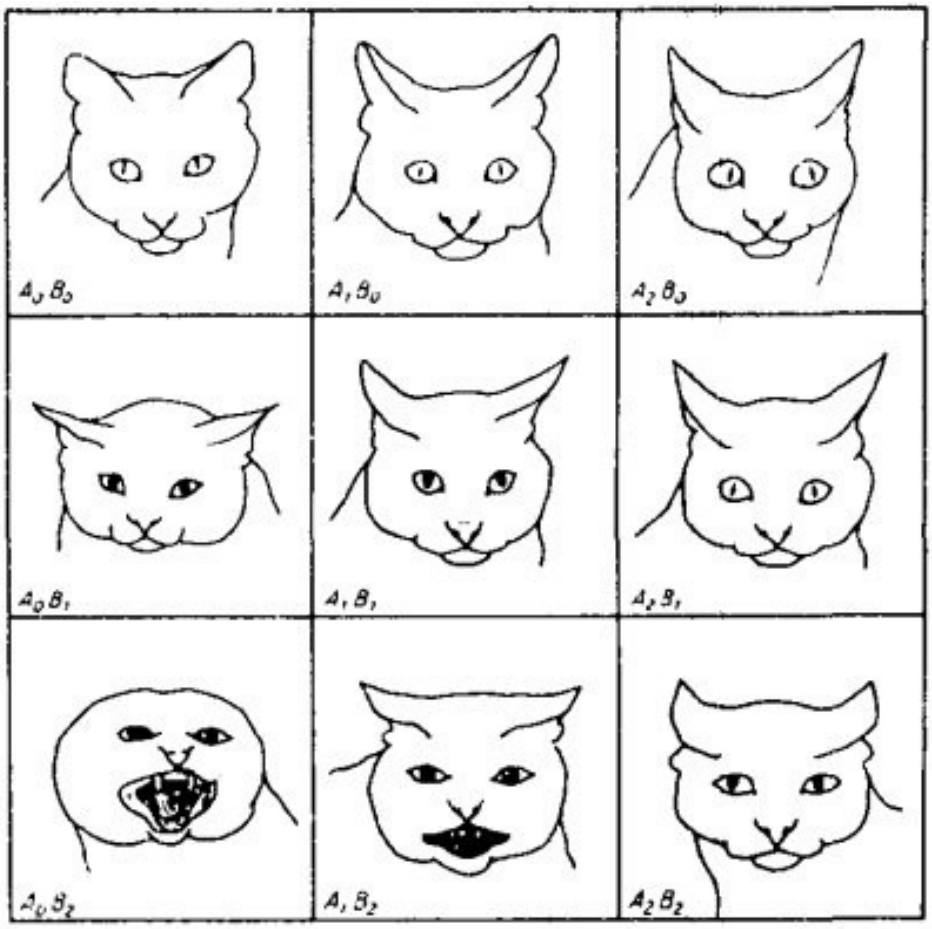


Fig. 21.3. Offensive and defensive facial expressions: same arrangement as in fig. 21.2, but to a less extreme degree. Here A_0B_0 denotes a relaxed expression, A_2B_0 an offensive mood unaffected by fear, A_0B_2 a purely defensive threat, and A_2B_2 equally strong offensive and defensive moods. (From Leyhausen 1979.)

Defensive/submissive displays

Looking away, lying on side, rolling on back, crouching with wide-mouthed snarl, lunge or mock charge, slapping and snapping.

In defensive threat, a cheetah crouches low, snarling with mouth wide open and ears flattened, eyes glaring upward. **At the highest intensity, the animal makes sudden lunges and thumps the ground sharply with downward strokes of its forepaws**, meanwhile moaning and hissing but rarely growling. **Two cheetahs performed this display convincingly enough to discourage 8 hyenas from moving in on their kill**.

Fighting

Rare as long as unassociated cheetahs avoid meeting, **fights are most likely to occur when males collect around an oestrus female** or catch other males on their territory.

Fatal fights are occasionally reported, including one gruesome case in which the coalition of 3 Serengeti males mentioned earlier repeatedly attacked and finally killed 1 member of another trio of known males who intruded on their territory. The territorial trio chased the intruders, overtook and proceeded to attack one viciously while the others withdrew to a distance of several hundred meters and merely looked on. **All 3 resident males participated, tearing out fur and biting the intruder hundreds of times, but the unrelated, alpha male was the most persistent and vicious.** However, the number 2 male administered the coup de grace by securing a throat grip and strangling the intruder like a gazelle. **Strangely enough, the victim made almost no effort to defend himself but just lay there and took it.**

Reproduction

Minimum age at first conception 21-22 months; the interval between birth and next conception 18 months; perennial breeding with possible mating peaks after short and/or long rains; gestation 90-95 days; average litter 3-4 (1-8).

Sexual behaviour

Courtship may be extended or brief, stormy or calm, depending on the female's receptiveness and individual temperament and the number of competing males.

A lone female that revealed she was **nearing oestrus by stopping to sniff virtually every tree, bush, and grass clump** she came to, and urine-marked at the high rate of once every 10 minutes, was observed for 8 days (G. W. and L. H. Frame 1980). **Early on the sixth day, a male came across her tracks and broke into a fast walk, alternately *yelping* and *staccato-purring***. When the female heard him, she immediately turned and trotted toward him, then lay down as soon as she saw him. The male mated her practically without preliminary while maintaining a hold on her nape. Afterwards, the female rolled, groomed her face and legs, and studiously ignored the male. **He growled and hissed whenever she moved**, then followed and sniffed the grass where she had lain. After resting the whole day, the pair mated again at dusk and stayed together until the next afternoon. The female then stole away while the male was sleeping.

In another, more typically feline courtship sequence, the female alternately tempted and resisted her suitor. Both uttered *churring* and *chirping calls*.

Parent/offspring behaviour

Since **females withdraw into cover to give birth and carefully hide their cubs,** cheetahs less than a month old are rarely seen. A litter of 3 cubs born in captivity emerged at 20-25-minute intervals; the female broke the foetal membrane of each in turn with her teeth. Blind newborn cubs weighing 150-300 g can **crawl, turn their heads, give soft *churring* calls, and spit explosively**. Four wild-born cubs only 3 days old were found in a patch of high grass when the mother was seen transporting them (by the back, once by a foreleg). After depositing them in a thicket, she returned twice to the former site as if to make sure none had been overlooked. A mother with 10-day cubs **moved them at least every other day**. Another female kept her cubs within a 1 km^2 area and hunted a 10 km^2 area for the first month.

The zoo-born cubs' eyes opened at 10 days; they could walk on day 16 and got their first teeth at 20 days. A litter of wild cubs was first led to a kill at c. 5½ weeks and **thereafter followed wherever the mother led**, except when she chased prey. However, they often **ignored her stalking movements and sometimes spoiled hunts** by playing or trotting ahead of her. She countered this by sitting and patiently waiting until they came back. After 3 months, when the cubs were probably already weaned, they stayed behind, following slowly or waiting for the kill.

They **formed a close-knit family with remarkably little friction**, even when feeding together on small prey. After eating, the mother would lick their faces clean to the accompaniment of purring.

Cheetah cubs begin practising catching and killing for themselves well before they become independent. The mother brings back gazelle fawns and the like and lets the cubs try catching them before they are ½ years old. Between 9 and 12 months, cubs may hunt and capture hares and fawns for themselves while the mother remains on the sidelines, but **they are rarely able to make the kill**. Even at 15 months, 3 cheetahs took turns swatting and bowling over a gazelle fawn they flushed 10 different times; finally, the mother rushed in and bit it in the neck.

Play

Joy Adamson described the **spirited, incredibly athletic games played by young cheetahs** in great detail: mainly stalking, pouncing, chasing, boxing, wrestling, and tug-of-war (Adamson 1969, 1972). Playing animals run with tails raised in typical cat fashion; they also climb trees and play king-of-the-mound. **The commonest form of play, beginning at about 3 months, is chasing and swatting at one another's hindquarters, the typical way of bringing down prey.**

Antipredator behaviour

See Relations with Other Predators. **Probably less than half of Serengeti cheetahs survive the first 3 months.** They are fair game for a whole range of predators down to the size of the larger eagles. Whether the resemblance of the juvenile coat to a ratel's colour pattern has any deterrent effect on predators (eagles, for instance?), a recurrent suggestion, remains to be tested. Mothers may courageously defend their offspring. **One with 3 one-third grown cubs went out of her way to charge and tree a leopard, normally a dominant competitor which could kill a cheetah** (author's observation).

Sources

Adamson 1969, Adamson 1972, Caro 1994, Caro and Collins 1987b, Eaton 1970, Eaton 1970a, Eaton 1978, Foster and Kearney 1967, Frame 1980, Frame, G. W., and L. H. Frame 1976, Frame, G. W., and L. H. Frame 1977, Frame, G. W., and L. H. Frame 1980, Kingdon 1977, Laurenson 1994, Marker 2000, McLaughlin 1970, McVittie 1979, Myers 1975, O'Brien et al. 1985, Pienaar 1969b, Schaller 1972b, Spinelli and Spinelli 1968, Taylor and Rowntree 1973.