

# Behavioral ecology of the common chimpanzee

[Environment](#), [Animals](#)



Behavioral ecology is essential for observing the evolution of primate behavior: it reinforces that each behavior is a flexible strategy towards maximizing their survival and reproduction in their environment. Studying these strategies gives us the privilege of understanding why non-human primates behave the way they do and under what circumstances. This essay will explore the geographic range, diet, habitat, group structure, physical characteristics, mating patterns and cultural traditions of a close relative, the common chimpanzee (*Pan troglodytes*).

Like all living things, the common chimpanzee is taxonomically classified as one of the four great apes, along with bonobos, gorillas and orangutans. Within the species *troglodytes*, there are four extant subspecies of common chimpanzees listed in Table 1, along with their taxonomic divisions. All of these subspecies are native to Africa and are found in Guinea, Ghana, Nigeria, Cameroon, Gabon, Congo Republic, Central African Republic, Zaire and Tanzania. Different subspecies have adapted to survive in different terrains, including dry woodland savannas, grasslands and tropical rainforests and at various altitudes. They prefer to reside in areas containing more vegetation, which explains why they are mostly found in primary forests: undisturbed forests containing mature trees bearing high quantities of fruit. They are also found in secondary forests, which have regenerated from natural and unnatural disturbances such as hurricanes and deforestation. *P. troglodytes* are diurnal (active during the day) and locomote terrestrially (on the ground) and arboreally (in the trees) quadrupedally on all four limbs by knuckle-walking, running and leaping; suspensory through limited brachiation (swinging between trees with their arms); and occasional

bipedalism by walking on their feet. Most often, knuckle-walking involves by distributed their body weight through their knuckles (Rowe 1996). Their wide range of locomotion allows them to feed from a variety of sources.

The diet of the common chimpanzee is seasonal and composed of over 250 food varieties including fruit (45-76%), leaves (12-45%), flowers (1-18%), seeds (1-11%), as well as galls and prey (0-5%). Their prey includes birds, mammals (bushbucks, bushpigs, duikers, rodents, hydraxes, primates), and insects (ants, termites, wasps, grubs). They are very frugivorous as they supplement most of their diet with easily digested high-quality fruit. During seasonal fruit shortages, they adapt by eating larger quantities of low-quality, harder-to-digest foods like leaves. In addition to food preference, they prefer different habitats based on the season and activity.

Common chimpanzees exhibit thermoregulatory behavior: for example, during the scorching dry season, they mostly forage near the ground where it's cooler and under the shade provided by the vegetation of the lush forest. If they come across cultivated fields containing high-quality crops, such as coffee plantations, they'll use this opportunity to engage in social activities that encourages cohesiveness amongst group members. They constantly challenge the benefits/consequences of inhabiting certain areas by considering risk avoidance (human presence) and food availability (number of food species). For example, although they tend to actively avoid human presence, they don't necessarily avoid foraging near roads due to their high amount of vegetation, despite the likelihood of human interaction. Their pattern of foraging is explained by the optimal foraging theory: they

minimize energy expenditure and maximize energy return by travelling the shortest distances while maximizing the rate at which they encounter food patches. However, they are willing to travel farther if higher-quality food is available. Having access to food is essential since it dictates group cohesiveness (how often they are together).

Common chimpanzees live in multi-male multi-female polygamies, where both sexes mate with multiple individuals of the opposite sex. These large groups contain up to 100 individuals with 7-25 adult females and 5-16 adult males. They incorporate a fission-fusion grouping pattern, meaning females forage alone or in small feeding parties of up to 4 individuals, but will reunite if larger fruit patches can accommodate more members. When this happens, they use long-distance vocalizations that are recognizable by members of their group or within-group members. When a fruit patch can't accommodate the entire feeding party, other members of the group aren't summoned to avoid intragroup competition or competition between members of the same group. The decision of females to forage alone versus in a small group is determined by food availability/distribution and rank: when fruit is less abundant, females forage alone to avoid intragroup competition. When fruit is more abundant, females forage in small groups because intragroup competition is low. Moreover, there is less food available to lower-ranking females because they tend to competitions for access to fruit patches. As a result, lower-ranking females tend to forage alone because the costs of intragroup competition outweigh the benefits of cooperating to compete against intergroup members. Competitions for fruit patches against intergroup members (individuals that aren't part of the group) are common,

thus foraging together also increases their intergroup competitiveness, or their ability to compete with intergroup members. However, males and females differ very extensively in their social behaviors with intragroup members.

Males are dominant and gregarious, spending only 14-29% of their time alone. Male-male grooming is frequently used to strengthen their bonds and encourage cooperation when defending resources within the community range. The community range encompasses the small home ranges of females (3900m in diameter), where females spend most of their time. This is an example of resource-defense polygyny: males defend access to the resources of multiple females and thereby indirectly control their reproductive success. Higher female reproductive success is associated with the producing more offspring. The exception to socialization patterns occurs during feeding and mating as males isolate themselves to reduce male-male intragroup competition. Males are philopatric by residing in their natal group and forming patrilineal groups of males related through paternal descent: this allows them to form linear dominance hierarchies that determine access to food and sexually receptive/estrus females. Since males spend much of their time together, they are constantly forming different alliances with the goal of raising their rank: they'll use intimidation tactics together against a higher-ranking male (branch dragging, loud vocalizations, chases) to overpower him and take the rank for themselves. Due to the high degree of relatedness among the intragroup males and the difficulty in tracking close relatives (due to the absence of matrilineal groups), the formation of alliances between male relatives aren't necessarily encouraged: studies show that the highest levels

of aggression can be seen between brothers. If an argument gets out of control, a third male may intervene and force them to groom each other to encourage reconciliation. Mending a collapsed friendship is important for the entire group: male cooperation is essential for defending the community range. However, the social patterns of males are very different from that of females.

Female chimpanzees are submissive and solitary, spending 65% of their time alone with their offspring. Predictably, social activities that strengthen relationships (grooming) rarely occur between females. The exception to their solitary lifestyle occurs when females are forced out of solitary at large feeding sites and during mating. When a female reaches sexual maturity, group dispersal is female-biased: the males collectively force her to leave her natal group and reside elsewhere in an attempt to reduce inbreeding. Females do not necessarily disperse: high predation risk and food abundance within her natal group would discourage her emigration. On average, a female that remains in her natal group conceives two years sooner than one that doesn't: she already has access to resources in her natal group. When trying to immigrate to a new group, the female residents may viciously attack her as she represents another competitor for resources. Since females disperse at a young age and regularly avoid each other, their dominance hierarchies aren't easy to distinguish. Females are divided into three ranks based on agonistic/aggressive behavior (signifying dominance) and pant-hooting (a vocalization signifying submission): high, intermediate and low. These dominance hierarchies are important for females as the higher rank means greater access to high-quality food, translating to higher reproductive

success, offspring survivorship, and longer lifespan. Aside from social organization, common chimpanzees have a unique set of physical traits.

Male and female common chimpanzees share many physical similarities: they are covered in dense black hair and pink/brown faces that darkens during adulthood. By adulthood, they have a moderate degree of sexual dimorphic characteristics that distinguish both sexes apart excluding sex organs. The common chimpanzee also has a wide variety of life history traits or developmental stages that are reached from infancy to adulthood. Males and females also differ in their mating strategies.

Estrus females involuntarily display noticeable sexual swelling or engorgement of their perineum that signals sexual receptivity to males. They secretly and promiscuously mate with multiple males year-round to lower male-male intragroup competition and confuse paternity, making it difficult to predict who was responsible for whose pregnancy. Not surprisingly, male parental investment (such as watching offspring while females forage) is low. High-ranking males may use certain vocalizations to solicit sex (lip-smacking), but lower-ranking males refrain to avoid aggression from the dominant male. To increase his chances of reproducing, a lower-ranking male can take a female on safaris, which involves leaving the group's community range for days to reproduce with an estrus female. If the female refuses, the male may retaliate with aggression or infanticide (murdering her infant). Safaris are risky for both parties: travelling outside of the community range makes them vulnerable to attacks from the patrolling males of neighboring groups.

*P. troglodytes* exhibit a wide variety of communication modes: visual, tactile, olfactory, gustatory and vocal communication. Visual communication is accomplished through facial expressions of the eyes, eyebrows, mouth and even female sex swellings to signal sexual receptivity. Tactile communication is widely used between males through grooming to express affiliation. Olfactory communication can be accomplished by smelling female anogenital regions for pheromones, which suggests mating receptivity. Chimpanzees also taste the urine of intragroup members, however its function in gustatory communication remains unknown. Over 34 types of vocalizations have been observed in *P. troglodytes*, such as grunting, whimpering, barking, screaming and pant-hooting, which translates to social excitement upon the discovery of high-quality food or submissiveness when reinforcing hierarchies. Similar to communication behaviors, proto-cultures are essential for common chimpanzees to thrive as a community.

The common chimpanzee incorporates a variety of cultural traditions known as proto-cultures, which are behaviors that have been passed down for generations. Different subspecies that reside in different areas use different traditions that allow them to adapt to their environment, such that no single group uses the same tradition. An interesting example is the consumption of the anti-tumour *Antiaris toxicaria* plant by Ugandan chimpanzees, despite it having barely any nutritional value. Since parasites are commonplace, they have also developed traditions to reduce the likelihood of parasitic infections: leaf-swallowing—which involves folding and swallowing a whole leaf, such that it remains undigested in the feces - is commonly performed before the first meal. The leaves have abrasive surfaces that irritate the



lining of the gastrointestinal system, encouraging their bodies to quickly empty the contents of their stomach that may or may not contain tapeworms . Proto-cultures highlight one of many flexible strategies chimpanzees have incorporated to thrive in their environments.

In conclusion, these behavioral strategies of diet, foraging patterns, mating patterns, social patterns, physical characteristics and cultural traditions serve as the basis for explaining why common chimpanzees behave the way they do. Each strategy was reflected through its ability to maximize an individual's chances for survival and reproduction: from foraging in the shade to regulate body temperatures, to copulating with multiple individuals to reduce competition. Studying primate behavior is endless: depending on the species and environment, each primate will incorporate their own unique strategy to maximize their chances of survival.