

Yawning in an old world monkey, *Macaca nigra* (primates: Cercopithecidae)

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Introduction

A gaping movement of the mouth, commonly called yawning, has been identified in all major classes of vertebrates, including fish (BAERENDS & BAERENDS, 1950; MORRIS, 1954), amphibians and reptiles (MCCUTCHEON, 1970), birds (MARLER, 1956; DFLIUS, 1967) and mammals (CARPENTER, 1940; BARBIZET, 1958; SCHALLER, 1972). Detailed studies of the ethology of this behavior pattern include those of SAUER & SAUER (1967) on the South African ostrich (*Struthio camelus australis*) and RASA (1971) on the jewel fish (*Microspathodon chrysurus*). In most animals yawning is interpreted primarily as a maintenance activity which correlates with drowsiness and fatigue (SAUER & SAUER, 1967). The yawn is often said to function directly as a means of increasing the supply of oxygen to the brain following periods of lowered activity or arousal (BARBIZET, 1958; ALTMANN, 1967). In the jewel fish, however, yawning correlates with increasing excitement and decreasing activity levels, and is evoked through either endogenous or exogenous stimulation (RASA, 1971).

Yawning in primates occurs under states of fatigue, drowsiness, boredom, stress, tension, and uneasiness (CARPENTER, 1940; HINDE & ROWELL, 1962; REDICAN, 1975). In some cercopithecines the exposure of the canine teeth during the yawn is said to function socially to produce a secondary intimidating effect on potential antagonists (DARWIN, 1872; HALL & DEVORE, 1965; ZUCKERMAN, 1932). In baboons and macaques some yawns are directly interpreted as low intensity threats (HALL & DEVORE, 1965; BERTRAND, 1969). The implication of social function has led ALTMANN (1967: 332) to recognize three "types" of yawns in nonhuman primates: "true" yawns, presumably stimulated by a lowered oxygen tension in the blood; yawns occurring in conflict or anxiety-producing situations; and yawns which are semantic messages - threats which involve a show of weapons. As the actual yawn does not vary from one type to another, the classification of yawns must be made on the basis of context.

In addition to differentiation by context, a social function to yawning in primates may also be indicated by differences in the frequency of pattern expression by certain individuals within a group. In particular it has been speculated that adult males, given their larger canine size (this usually being a sexually dimorphic character in nonhuman primates), would yawn more frequently than those without these "weapons". Although this has been suggested in a number of different species (BERTRAND, 1969; HALL & DEVORE, 1965; WOLFHEIM & ROWELL, 1972) no quantitative data have been available to indicate the degree of difference.

This report describes the use, distribution, and possible function of yawning in an Old World monkey, the "black ape" *Macaca nigra* (DESMAREST, 1822). These data are used to address three questions: (1) is the 'yawn' of the black ape structurally similar to the behavior pattern similarly labeled in other vertebrates?, (2) is there variability in the contexts within which yawns occur which might suggest that the pattern has social functions?, and (3) do yawns occur more frequently in some age/sex classes than in others?

MATERIALS AND METHODS

Subjects.

The subjects were members of a social group originally formed in September 1968 at the Yerkes Regional Primate Research Center's Field Facility in Lawrenceville, Georgia. The group was observed between January 1971 and July 1975, and for a brief period in March of 1977. The "black ape" is an Old World monkey, native to the island of Sulawesi (formerly Celebes). The taxonomic assignment of these animals to the genus *Macaca* follows Fooden (1969).

The Yerkes black ape group varied in size from seventeen to twenty-four individuals: there were two deaths and nine births during the main study period. There was no alteration of the group composition for experimental purposes during the study, although several individuals were temporarily removed for medical treatment. With one exception, no long-term changes in group social organization caused by permanent alteration of status relationships were produced. The exception occurred immediately prior to the testing period of 1977, when the removal of the alpha male resulted in his overthrow upon return to the group (BERNSTEIN, pers. comm.).

Housing, group maintenance.

Between September 1968 and December 1973 the group was housed in a 15 x 15 m outdoor compound, enclosed by a 1.8 m high chain link fence, topped by 3.0 m of sheet metal wall. A 5 x 3 m enclosed indoor shelter and sleeping area was attached to the compound. From December 1973 until August 1974 the group was housed in a 30 x 30 m compound area, with a 3 x 10 m shelter building attached. From August 1974 until the completion of the study in July 1975 the group was housed in a 38 x 38 m compound area (3 x 10 m indoor shelter). In January 1976 the group was returned to a compound similar to that in which they were originally housed. They were housed in this compound during the observations in 1977.

Feeding consisted of a daily regimen of commercially prepared monkey chow, available on an ad libitum basis. These provisions were supplemented five days a week by single daily feedings of fresh fruit and vegetables.

Data collection.

Data on yawns were collected between July 1972 and July 1975 for a total of 669.50 hours of observation. An additional 28.50 hours of observation were recorded in April 1977. Tests consisted of 1/2 or 1 hour observation periods during which all occurrences of yawning were recorded. The method of observation was behavior-dependent sampling (ALTMANN, 1974), recording all observations of pre-selected behaviors. First occurrences of yawns in infants were recorded in ad libitum records (ALTMANN, 1974) as were notes on the context of this behavior,

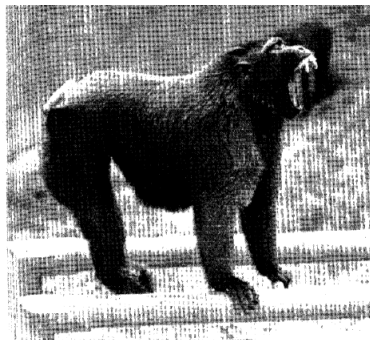
For the examination of age-specific changes in yawning, the individual group members were organized into eight chronological periods: two periods of 1-6 and 7-12 months for the first year of life, one year periods for the next five years, and a final period in which individuals older than 72 months of age were lumped. Finer breakdowns of this last period are not possible since many of the original colony members were acquired from animal dealers and came to the facility without certain birthdates.

The terms "subadult" and "adult" are based on operational distinctions. Females are

classed as adult at 48 months, and males at 72 months. In females the transition to adulthood is marked by puberty and the first obvious signs of sex skin swelling. This occurs at a median age of 48.5 months (47-50 months range) in *M. nigra* (HADMIAN & BFRNSTEIN, 1979). In males eruption of the permanent canine dentition is a convenient criterion for marking the transition to adult status, although an assessment of full adulthood must be based on behavioral, rather than physical, characteristics. Canine eruption in three of the subjects began in the fifth year of life. The lower canines erupted at an average age of 64 months. Canine growth was only about half completed in the oldest of these subjects at 76 months of age. In 1977 canine growth appeared to be complete in three of the four males who had been born into the group, while approximately half complete in the youngest, who was 76 months old at the time.

Observation and sampling biases.

Yawning was only one of a number of behavior patterns recorded during the testing periods. Some yawns were undoubtedly missed entirely, as the observer's attention was directed elsewhere. Yawning by some individuals (e.g. adult males) may have been more frequently scored than yawning in others because of the attention such individuals attract in the display of their canines. In an opposite sense, yawning by infants may be underestimated since infants are usually partly obscured front view by contact with their mothers. In all subjects, yawning was more likely to be noticed when occurring as part of an interaction than when delivered from rest.



RESULTS

Description of yawns.

The yawn of the black ape is a fluid gaping movement of the mouth that usually lasts between one and three seconds from start to completion. The yawn of the black ape has three stages that closely parallel the yawning stages described by BARBIZET (1958) for humans.

1. Preparation for the yawn is seen as the facial expression changes from a relaxed or tense closed mouth (cf. VAN HOOFF, 1967) to a partially open mouth in which the lips tighten as the cheeks begin to compress over the tooth rows. During the preparatory stage the normal panduriform appearance of the face is accentuated, with the cheeks 'hollowed' as the mouth opens to a small oval which shields both teeth and gums.

2. The acme of the yawn involves the rapid opening of the mouth to the fullest extent, with the canines and upper incisors fully exposed (Fig. 1).

3. Completion of the yawn carries the facial expression back to a relaxed or tense closed mouth face.

Yawns are given from any of a variety of postures, which include almost all variations of sitting, lying or standing positions. The head is usually held erect, and a slight bunching of the skin and hair on the neck and shoulders is often obvious. Yawns may occasionally be given during slow walks but are much more commonly given from stationary positions. Yawns are also observed during or immediately following general body stretching movements. The body is usually tensed during a yawn, and a characteristic quadrupedal stance adopted in which the arms and legs are spread and the hands and feet firmly planted (see Fig. 1). Yawns which occur during interactions are often preceded by a stylistic movement of the performer to a short distance away from the other interactant (a stepaway). Following this the rigid quadrupedal stance is adopted and the yawn delivered.

Yawns are discrete rather than continuous signals (SCHLEIDT, 1973). Although they may occur in interaction sequences, yawns do not combine with other expressive patterns, as for example a stare might combine with an agonistic vocalization (e.g., barking), or show intensity gradients, as in grading from a closed to an open-mouth facial expression. Despite some variation in speed and 'force' of delivery, most yawning probably occurs at a 'typical intensity' (MORRIS, 1957). Even when given in direct proximity to another individual, yawning does not seem to evoke grossly overt responses. The exception to this is a possible facilitative or 'infectious' effect, in which individuals who have observed others yawning may themselves be prompted to yawn.

Despite the overall stereotypy of the yawn, some variants may be identified in either the degree to which all pattern stages are completed or in their ordering and recurrence. The single most common variant of yawning is probably the 'incomplete' yawn - the delivery of stage one movements aborts. This variant is frequently associated with the highly stylized body stance, 'hollowed' cheeks and visual orientation procedures (lateral scanning) of the completed pattern, suggesting that it is simply a yawn which is not carried to completion.

Some subtle variations may be observed in association with the yawn's second stage movements. Infants of less than six months of age rarely, if ever, show exposure of the tooth and gum rows at the yawn's acme. This could be a product of incomplete maturation of the facial musculature, although on a few occasions older subjects have been observed giving the same variant. Yawns may be rapidly repeated from second stage movements. Here the facial tension is only partly relaxed and closing movements of the mouth begin prior to a rapid delivery of the second yawn. This is distinguished from repetitive yawning, in which stage three movements are completed but a second yawn immediately follows. No more than two yawns have been observed in these repetition sequences. At other times yawns occur in 'bouts' in which they are repeated several times following short pauses. Yawning in 'bouts' is associated with high excitement and tension in the performers.

Age-sex class distribution.

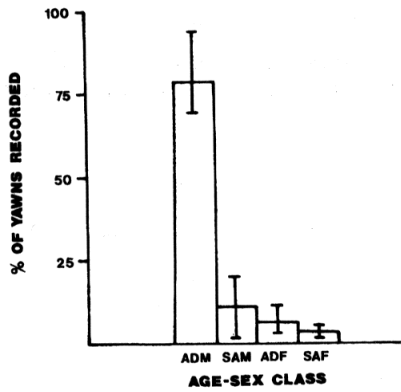


Fig. 2. Average percent and range (I) of all yawns observed as accounted for by the members of four age-sex classes. ADM = adult male. SAM = subadult male. ADF = adult female. SAF = subadult female.

Fig. 2 shows the distribution of all yawns recorded among four age-sex classes. Although representing only an average 25% of the population, the adult males performed between 68 and 92% of all yawns observed in the study years 1972-1975. As a group they average more than 1.50 yawns/hour for each individual, while the subadult males, expressing the next highest rate, average only about one yawn per individual in each three hours of observation. Females yawn much less frequently than do males, with the average adult female not yawning in more than one of every ten hours of observation and the average subadult female in not more than one of every twenty. Individual averages for the four fully adult males during the main study period are given in Table 1, together with an assignment for each within the group's dominance hierarchy. The highest ranking adult male, the group alpha, yawned more frequently than any other group member, and he did so consistently - his monthly averages were never exceeded, and only once tied, during the entire time he was alpha.

TABLE 1

Mean rate of yawning in four adult males for the major study period

Subject	Mean rate (yawns/hour)	Range	Rank (relative)	Rank (absolute)
Isaac	3.09	2.19-3.95	1	1
Dugan	1.72	1.49-2.17	2	2
Quirt	1.35	1.08-1.67	3	7
Erie	0.37	0.00-0.77	4	11

Both the relative rank of the males within the adult male peer group and their absolute rank in relation to all group members are given. Rank, or dominance status, is determined behaviorally: an individual who displaces or elicits submissive behavior from another is viewed as being "dominant" to that individual. Although complex, triangular, dominance relationships existed between some adult males and adult females, the dominance relationships of the adult males vis a vis one another were strictly linear.

There is at least circumstantial evidence to indicate that yawning increases with a rise in status and decreases when status is lost. Fig. 3 shows the yawning rates for the two adult males, Dugan and Isaac, between July 1972 and July 1975. Prior to October 1972 Dugan was the group alpha. In October 1972 he was supplanted by Isaac who clearly dominated him by all behavioral measures (pers. obs.). Following this status transition, Isaac's yawning rate shows a strong increase

while Dugan's decreases. In February 1977 Isaac was removed from the group for medical treatment and held out for a total of three days. Following his return he was attacked and defeated by other resident males (BFRNSTEIN, pers. comm.). In April 1977 Isaac ranked seventh among the eight adult males in the group, while Dugan had clearly regained alpha status. Table 2 gives the rate at which the eight adult males in the group were observed yawning in April 1977. During this period Dugan yawned at a higher rate than had ever been recorded for him in forty-four months of observation, while Isaac's rate had shown a stunning and precipitous drop to a rate far below any previously observed for him.

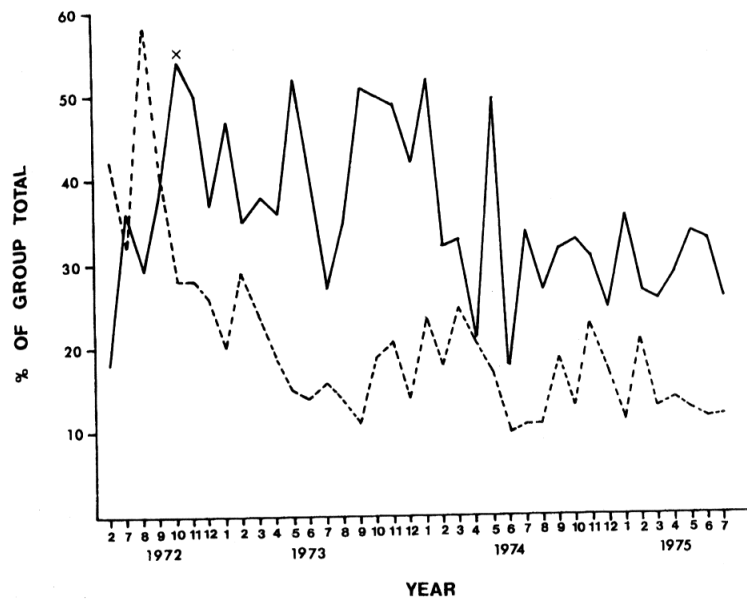


Fig. 3. Monthly yawning rates for the adult males, Isaac and Dugan, calculated as their contributions to all yawns observed among group members. X = month of dominance transition.
 Isaac- Dugan -----

Ontogeny.

It may be that the gaping expression which is seen at the moment of birth as the first drawing of breath is a yawn. Whether or not this is the case, neonates begin to yawn during the first few days of life. By the fourth week from birth yawns are used in specific contexts, as the pattern initially becomes integrated within complex motor and behavior pattern sequences. One infant female (35 days) performed a complete objectshaking demonstration (see the following section), ending with a yawn.

TABLE 2

Mean rate of yawning in eight adult males during April 1977

Subject	Mean rate (yawns/hour)	Rank (relative)	Rank (absolute)
Dugan	3.26	1	1
Tahn	1.54	2	2
Yoga	1.22	3	3
Quirt	1.54	5	
Rooter	1.40	5	
Pepper	1.75	5	
Isaac	0.35	7	
Erie	1.43	8	

Due to the extreme instability in the group's dominance hierarchy at this time only the first three ranks could be rated in absolute terms. Three males were tied in rank below the third ranking male, and the former alpha, Isaac, was ranked seventh, still being clearly dominant to the lowest ranking male in the group, Erie.

Another 35-day old female performed a similar, though incomplete, sequence of this type associated with yawning during interruptions of these movements. A third infant female at 28-days of age yawned following an exchange of non-agonistic signals (lipsmacks and brow retractions) with an adult female.

With maturation, infants begin to use yawns in an increasing variety of contexts, and this is developmentally paralleled by changes in the appearance of the pattern itself. During the first few months the infant's yawn often appears slow and forced, only gradually acquiring the speed and crisp stereotypic movements typical of older subjects. This increasing stereotypy is paralleled by the broadening of contexts in which yawns are used.

There were ten females and five males born into the group who were observed during various developmental periods. Fig. 4 shows the hourly rate of yawning in both males and females as a function of age. The profiles for the members of the two sex classes are quite similar until around the 48th month from birth at which time the males begin to show an increase that first slowly and later rapidly accelerates to totally differentiate their yawning rate from that of the females. This increase carries these subjects from an average rate of a little more than 0.10 yawns/hour to about 0.80 yawns/hour between the 48th and 72nd months from birth. The females do not show a comparable change in any chronological period, although their averages do show a slight increase from roughly 0.05 yawns/hour to 0.10 yawns/hour following the 36th month from birth.

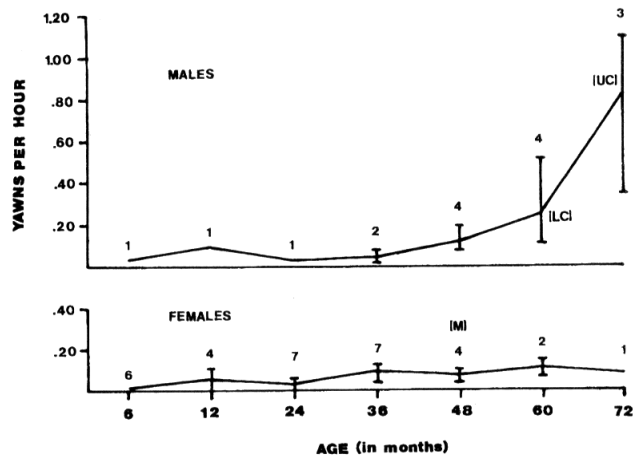


Fig. 4. The average rate (mean and range) for yawning in males and females as a function of age. m = average age at puberty, Ic = average age for the eruption of lower canines in males. uc = average age for the eruption of upper canines in males. The number of subjects observed is given for each age period.

The trends observed in these subadults are consistent with the later expression of the pattern in adults. Female yawning increases only slightly, if at all, after infancy, while male yawning increases through adolescence and jumps dramatically as males enter early adulthood. By 1977 the four males studied as subadults between 1972 and 1975 had all become fully adult. Their yawning rates in 1977 reflected and in effect confirmed that adult males yawn more frequently than other age-sex classes, and that there is a level which, in this group at least, could be called average or typical for the expression of yawns in adult males (see Table 2).

Context and behavioral associates.

Yawning occurs within a wide variety of contexts and in association with a broad range of social and environmental conditions. At times yawns are clearly associated with states of “drowsiness” or “fatigue”, as they are performed at rest prior to sleep or immediately following rousing from sleep. At other times, however, yawns are delivered by completely alert and responsive performers, often following or during interruptions in fast paced interactions or locomotor activities. Table 3 roughly correlates some of the more common contexts in which yawning is observed with variations in the activity levels of the performers. This is a general schematization and does not account for many of the more subtle cues which undoubtedly play a role in eliciting the pattern.

Yawning often appears to be triggered by environmental stimuli which startle, disturb, alert or appear to threaten the performer. Loud and sudden noises, such as thunder, almost always evoke yawns in adult male black apes. Yawns are common responses to the approach of strange humans towards the compound area or the movement of vehicular traffic on nearby service roads. Agonistic behavior within the group may have a disturbing effect on individuals who are not direct participants and elicit yawning. Yawning also occurs in low key interactions where changes in proximity between individuals appear to lead to increasing tension. For example, a low ranking adult male might appear “uneasy” and yawn repeatedly after a dominant has approached and sat nearby. Likewise, a high ranking male in consort with an estrous female might yawn.

At times yawns are observed as discrete elements of complex interaction sequences. The majority of these contexts are typified by some level of tension, belligerence, or hostility between

interactants. Certainly one of the more common contexts of yawning during agonistic interactions comes during “challenges”. By definition these are interactions in which there is a mutual or reciprocal exchange of threats or aggressive contact. The most common of these is probably the mutual face-off in which there is an exchange of a series of reciprocated lunges, slaps and threats, during which one, but rarely (if ever) both, interactant yawns while directly facing the other. Yawns are also observed following nonhostile interactions in which some degree of tension develops. For example, yawns often follow rough and tumble play, where the boundary between play and aggression seems easily crossed.

TABLE 3
Contextual and behavioral associates of yawning
Activity level

Relaxed	Alert	Tensed
Prior to or following periods of rest, inactivity or sleep	Following changes in proximity in potential interactants	
During casual social interactions (e.g. allogrooming)	Performer is non-interacting but alert, attentive to surroundings	Following rough and tumble play, or nonreciprocated play solicitation
		Following copulation
		Following nonspecific approaches and affiliative signaling
		Following environmental disturbances
		During high intensity agonistic interactions

Of all behavioral contexts yawns are associated most strongly with the variety of behavior patterns categorized as demonstrations. A "demonstration" is a general series of body movements during which an environmental object is shaken or manipulated to produce an audible noise and disturbance which draws attention to the performer. Such patterns have been described in several macaque species (CARPENTER & NISHIMURA, 1968; KAUFMANN & ROSENBLUM, 1966; BERNSTEIN, 1970; BERTRAND, 1969) and may be part of a complex of related behaviors found in many Old World monkeys. In the black ape demonstrations are usually highly patterned sequences of events. A typical sequence consists of the following elements:

- (1) an approach to an environmental object, (e.g. the chain link fence), either by running or walking,
- (2) a brief visual scan of the object,
- (3) a leap to the surface in which it is grasped with both hands and feet,
- (4) a vigorous and rhythmic pumping and pushing alteration sequence which shakes the object,
- (5) a rebound from the surface by leaping to the ground or rapidly climbing down from an elevated surface,
- (6) the adoption of a rigid quadrupedal stance, which may be followed by
- (7) a yawn, after which the yawner often visually scans the surrounding area in a deliberate manner.

Demonstrations are commonly evoked by the same stimuli as yawns and can be broadly interpreted as serving to draw attention to the performer, probably conveying specific information about the performer's motivational and emotional status. Yawning seems to accent many demonstrations. It is probably of some significance that when the yawn occurs in association with the demonstration it always occurs following the demonstration.

DISCUSSION

The widespread distribution of yawning among most, if not all, major vertebrate groups suggests that the pattern has had a long phylogenetic history (SAUER & SAUER, 1967). Yawning may have originated as a maintenance behavior which met directly some physiological requirement of the organism (SAUER & SAUER, 1967; REDICAN, 1975). In some animals, particularly among the primates, the yawn has apparently acquired a secondary communicative value in which it plays an as yet incompletely known role in the transmission of information from one animal to another (DARWIN, 1872; CARPENTER, 1940; HALL & DEVORE, 1965).

As a maintenance behavior yawning has traditionally been linked directly to respiratory processes in birds and mammals (BARBIZET, 1958; PEIPER, 1963; REDICAN, 1975), but not in fish, where a reduction of water flow over the gills (and hence a decrease in oxygen intake) occurs during the yawn (RASA, 1971). Although suggested as a means of reestablishing equilibrium in the level of carbon dioxide and oxygen in the bloodstream (DUMPART, cited in PEIPER, 1963; ALTMANN, 1967; REDICAN, 1975), yawning is not elicited in humans as a response to voluntary apnoea (BARBIZET, 1958), and its exact functioning in terms of respiratory involvement remains to be clarified. In another sense the maintenance properties of the yawn can be viewed in terms of the pattern's comprising a "comfort movement" (BAERENDS & BAERENDS, 1950), one which perhaps "keens" an individual for further action (RASA, 1971). From this a general interpretation might be to view yawns as "facial stretches", directly comparable to body stretching

patterns (TELEKI, pers. comm.). Yawning may in fact be the only common manner by which the complex musculature of the face and neck can be effectively stretched.

In some animals yawning may be used to communicate information about the motivation of the performer. The exact nature of the message content of yawns is not known. Enough is known, however, to point to functional variability in the organization of the pattern, leading to the distinction of 'types' of yawning, such as the generally recognized 'fatigue' and 'stress' yawns in contrast to 'threat' and 'canine display' yawns.

In *M. nigra* yawning is observed most often in adult males, paralleling trends reported for a variety of other nonhuman primates (BIERTRAND ' 1969; HALL & DEVORE, 1965; WOLFHFIM & ROWELL, 1972; REDICAN, 1975). This finding has been linked to male aggressiveness by interpreting their yawns as "threats" (e.g. BERTRAND, 1969) or "canine displays" (e.g. HALL & DEVORE, 1965) aimed at intimidating potential opponents. The interpretation of the yawn as either a "threat" or "canine display" still remains open. The failure of yawns to elicit direct responses argues against use as a direct threat comparable to the variety of behaviors like staring or barking which function directly as warnings in these animals. The increase in the rate of yawning in late adolescent and early adult male black apes prior to the full emergence of the adult canine dentition argues against the exclusive use of the pattern as a canine display, as does the use of yawns by females in contexts identical to those observed in males (albeit at a much lower frequency). HALL & De VORE (1965) interpreted the display of the canines in male as producing a "secondary intimidating effect" on potential antagonists. Notwithstanding the impressiveness of this kind of display in male monkeys, yawning in all age-sex classes does serve to display the teeth, and these can all be considered "weapons" in animals where the most serious fighting involves biting. Perhaps the communicative value of yawning may be most parsimoniously interpreted as a pattern which serves as an "expressive movement symbolizing the animal's motivational state" (CARPENTER, 1940: 168). From this CARPENTER suggested that the yawn could be interpreted as exercising a "kind of immediate social control" (1940: 168) in some situations.

Clearly further and more finely detailed analyses of the structure and relationship of yawning to other behavior patterns are warranted before any general attempts are made to define its role in species behavior. The widespread distribution of the pattern in many vertebrates, its suggested ancient phylogenetic history, and the apparent functional variability associated with it make the yawning pattern an interesting behavior worthy of further comparative analysis.

SUMMARY

The yawn of the black ape appears to be structurally homologous to the behavior pattern widely described for other vertebrates, even in its finer details.

The pattern is highly stereotypic, showing only minor structural variants and not exhibiting any tendency to grade continuously into other expressive or communicative behavior patterns.

The yawn occurs in many different contexts, in association with a variety of social and nonsocial situations. Yawns tend to occur in contexts which elicit some level of stress in the performer.

Yawns commonly follow "demonstrations" in which a performer vigorously manipulates an environmental object, with the result of producing a loud noise which draws the attention of others.

Adult males yawn significantly more frequently than any other age-sex class. The highest ranking or alpha male tends to yawn at a higher rate than other group members, and in at least one case this was found to be true even following a dominance reversal involving alphas.

An ontogenetic trend appears in males: yawning rates increase with age. The most dramatic change occurs during adolescence preceding the eruption of permanent canine dentition. Typical adult male rates are probably reached prior to the completed eruption of the canine teeth.

Résumé

Le bâillement du singe noir semble être comparable du point de vue de déroulement au modèle de comportement largement décrit pour d'autres vertébrés, même au point de correspondre dans les détails plus subtils à ceux décrits pour d'autres espèces. Le modèle est très stéréotypé, ne montrant que des variations évolutives mineures et ne manifestant aucune tendance à se confondre ou à s'allier à d'autres types de comportement expressifs ou communicatifs pour cette espèce.

Il n'existe pas de réponses précises qui puissent être prédites, associées à l'incidence des bâillements, bien qu'un effet qui facilite ou provoque un acte réponse chez l'individu en présence du bâilleur puisse se produire. A certains moments, le bâillement se produit au cours des interactions sociales et à d'autres moments au cours d'une série d'activités non-sociales. Les bâillements tendent à s'associer contextuellement à un certain niveau de tension du bâilleur. Le comportement qui s'associe le plus souvent au bâillement est la "démonstration", pendant laquelle l'exécutant manipule vigoureusement un objet à fin de produire un bruit audible et un dérangement qui attirent l'attention des autres.

Le mâle adulte surpasse de loin les autres membres du groupe du point de vue de fréquence de bâillements. Celui qui possède un statut de dominant, c'est-à-dire le mâle alpha, a tendance à bâiller à une fréquence beaucoup plus élevée que les autres membres du groupe, et il se peut que cette tendance soit "role specific". Une tendance ontogénétique apparaît chez les mâles, c'est à dire que la fréquence des bâillements augmente avec l'âge du bâilleur. Le changement le plus net se produit pendant l'adolescence, précédant l'éruption des canines permanentes (néanmoins, le statut de mâle adulte est probablement atteint avant la fin de l'éruption des canines). Dans une certaine mesure le profil de l'incidence du bâillement de n'importe quel individu (mais surtout des mâles adultes) varie avec le temps, sans doute répondant directement aux situations qui sont à l'origine de la tension.

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