Acoustic Variations of Aggressive Vocal Activities of *Semnopithecus entellus* in Chitrakoot

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Abstract-. Acoustic signals are very essential for communication in Non-human primates. Nineteen types of different Vocalization of *Semnopithecus entellus* had been reported in the past. Present research work is focussed on acoustic variations of *Semnopithecus entellus* to distinguish the aggressive behaviour, acoustic signals and different type of aggressive vocalization. The research work was carried out from July to December, 2023 in Chitrakoot. PRAAT was used for sound analysis of collected vocalization. The present investigation reveal the pitch variation in different aggressive vocal behavior grunt, long grunt, and harsh bark of *Semnopithecus entellus*.

Key words- Acoustic signals, vocalization, acoustic ecology, bioacoustics.

Introduction

Vocalizations are an important mode of communication for most primates, as in general they are well suited to both their social and physical environments. Many primate species live in arboreal, low-visibility environments and individuals from the same group are often separated as they travel and forage over large distances. (Fedurek and Slocombe, 2011). Due to change in land pattern (forested areas to deforested or semi forested or semi residendial areas), non human primates are forced to live in or near residendial areas(Gill, 2017). Human and *Semnopithecus entellus* interact with each other in many places. In many places both humans and Hanuman langurs are familiar and in some places they are familiar with each other and don't decode their communication signals and vocalization. (Mishra and *et al.*, 2014). The investigation on acoustics of *Semnopithecus entellus* is very crucial. Hanuman Langurs adopt various types of communication (tactile, acoustics, chemical, gesture and visual etc.,). Here the present investigation is focused on aggressive vocal behavior of *Semnopithecus entellus.*

Materials & methods-

Research Site-

Ground work on behavioural acoustics of call variation of *Semnopithecus entellus* (Hanuman Langurs) in Chitrakoot were carried from July to December, 2023 in district Chitrakoot. The field work for voice sample conducted in the habitat of *Semnopithecus entellus.* 4 places of Chitrakoot were selected 1. Devangana Ghati 2. Police line Khoh 3. Hanuman dhara and 4.Devangana Ghati. Sites were selected on the basis of natural habitat of *Semnopithecus entellus.* The sampled vocalization recordings were analyzed in PRAAT computer application platform. Vocalizations were categorized on the basis on their behavior and categorization of vocalization in *Semnopithecus entellus.*

Equipment -1. Sound recorder of Sony ICD-UX560F

2. Mic

3. Speaker

4. Sound level meter

5. Acoustic software platform

Result-

Bhaker *et al.*, **(2003)** reported and categorized vocal patterns, concerning the degree and dimension of structural acoustic variation of 19 types of vocalization in *Semnopithecus entellus*. They produce various sounds like grunting, panting, honking, hiccups, rumbling, coughing etc to communicate and alarm other members (Mishra and *et al.*, 2014,*)*.

In hanuman langurs, aggressive behaviour included contact aggression and non- contact aggression. Contact aggression includes actual physical contact between two individual of same species or different species. Contact aggressive behaviour include biting, chasing , pinned on the ground, roughly pulling. Pushing and slapping. Non contact aggression involve agnostic interaction at a distance and do not incude any physical contact (Lal and Lal, 2010).

Here, 5 type of vocalization are described with its acoustical features (call duration and frequency range) with their age sex categorization.

1- Grunt bark by adult male

2. Long grunt by adult male

3. Grunt by adult female

4. Long grunt by adult female

5. Harsh bark by adult male

1- **Grunt bark by adult male** -

Grunt produced by adult male were given for social grooming and physical contact to adult female or sub adult female.

Duration-424 milisecond **Mean power (intensity) in air**: 53.24 dB

Minimum pitch: 90.067 Hz **Maximum pitch**: 149.700 Hz

2. **Long Grunt by adult male-**

This call was produced as a acoustic response of sudden human presence. The individual showed aggressive gestures to human with bark.

Duration: 967ms **Mean power (intensity) in air**- 75.6 dB

Minimum pitch: 261.741 Hz **Maximum pitch:** 431.391 Hz

3. Grunt by adult female-

This call was produced in response to sudden physical contact of other juveniles.

Duration: 389ms **Mean power (intensity) in air**: 58.97 dB

Minimum pitch: 139.758 Hz **Maximum pitch:** 169.064 Hz

4. **Long grunt by adult female**

Long grunt was produced by adult females as response of sudden physical contact of male.

Duration: 745ms **Mean power (intensity) in air**: 49.47 dB

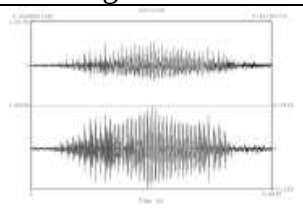
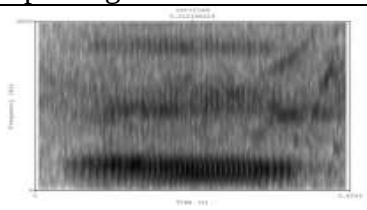
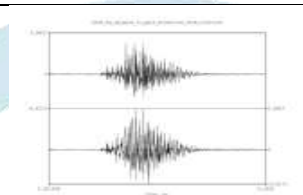
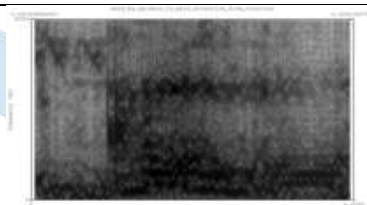
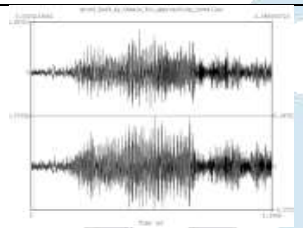
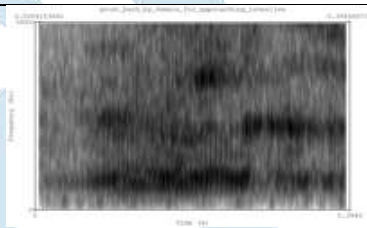
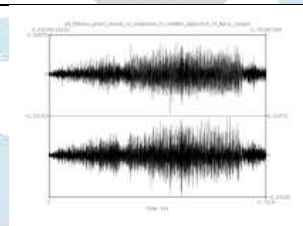
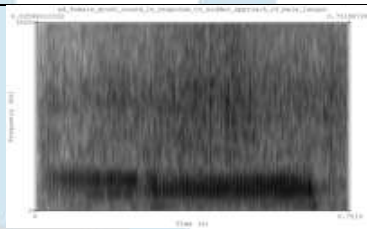
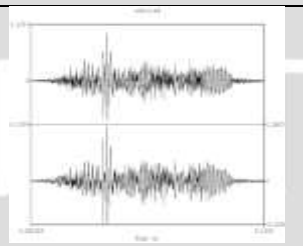
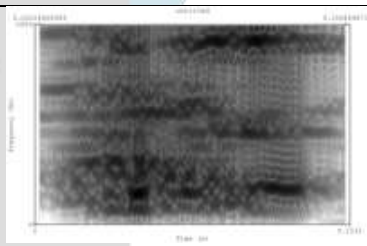
Minimum pitch: 112.713 Hz **Maximum pitch**: 129.086 Hz

5. **Harsh bark by adult male**

The harsh bark was recorded as result physical contact conflict of adult male langur with another adult male langur.

Duration: 148ms **Mean power (intensity) in air**: 70.11dB

Minimum pitch: 383.110 Hz **Maximum pitch**: 457.105 Hz

	Call type	Oscillogram	Spectrogram
1.	Grunt by AM		
2.	Bark by AM		
3.	Grunt by AF		
4.	Long grunt by AF		
5.	Harsh bark by AM		

Discussion-

In Semnopithecus entellus, 19 vocal patterns were characterized by Bhaker and *et al.*, with concerning the degree and dimension of structural variation. The most common vocalizations were loud calls (whoops), harsh barks, cough barks, grunt barks, pant barks, grunts, honks, rumble, rumble scream, hiccup and alarm calls. Here in the presented study loud calls are characterized with variation along sexes (male/ female). Grunt by AM (424ms) had longer call duration than AF (389ms). Sometimes AF produce long grunt (call duration of 745 ms). Two other loud calls, produced by AM of *Semnopithecus entellus* (Bark and Harsh bark). The loud calls were produced during intra or inter specific contact or non contact conflict. Loud calls of primates were very distinct that could provide information of the caller (Erb and *et al.*, 2013). *Sometimes, Semnopithecus entellus* use vocalization in playing behavior to show fake aggression. (Špinka et al., 2016).

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