

INDICATORS OF EMOTIONAL AROUSAL IN THE STRUCTURE OF DEFENSE CALLS OF GREAT GERBILS (*RHOMBOMYS OPIMUS* LIGHT)



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INTRODUCTION

The increase of emotional arousal leads to changes in the structure of calls of different species of mammals and people. However there is very few information about what parameters respond for the expression of the emotional arousal in the calls. In present study we designed aggressive male-male conflicts in Great Gerbils on neutral arena. Soon one of the males became a winner and after that the winner pursued the loser. The loser demonstrated the behavior of submission and cried.

The aim of our study was to assess how the structural parameters change with increasing of emotional arousal.

METHODS

Idea of experiments

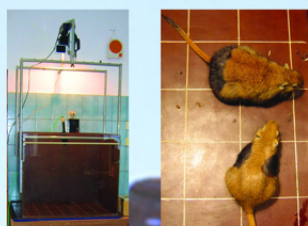


V. M. Smirin

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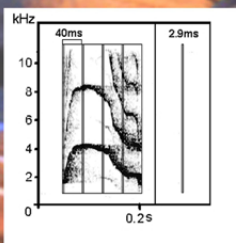
Idea of experiments
When the distance is decreasing the emotional arousal of loser

Experimental procedure



- 24 experiments lasted in average one hour
- 23 males of Great Gerbils
- Olympic system: the loser doesn't take part in following experiments

Audio analysis



- 1016 calls of 12 losers analyzed using Avisoft Saslab Pro software
- 9 temporal, frequency and power parameters measured in total sounds and within each 40-ms segment of the sounds (corresponding to one frame of video)

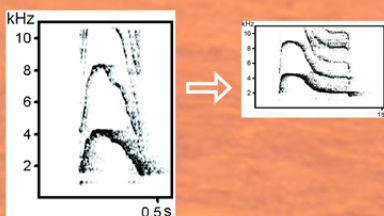
Video analysis



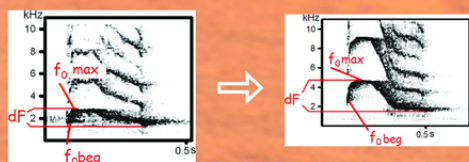
- 47 fragments of 12 experiments of total duration 45.5 min
- frame-by-frame analysis (40 ms segments)
- measurements of male-male distance in each frame during the loser's calls

RESULTS

1. Decrease of duration



2. Increase of f0 beg, f0 max and frequency modulation



3. Increase of f peak



COMPARISON OF CHANGES IN THE STRUCTURE OF CALLS IN GREAT GERBILS AND OTHER SPECIES OF MAMMALS WITH INCREASING OF EMOTIONAL AROUSAL

	Duration of sounds	f0*	Energy of sounds**
Great Gerbil (<i>Rhombomys opimus</i>)	↓	↑	↑
Pallid gerbil (<i>Gerbillus perpallidus</i>)	↑	↑	↑
Other species of different orders of mammals (primates, carnivore, rodent, hoofed mammals) and humans	↑	↑	↑



CONCLUSION

A shift of energy to higher frequencies with increased emotional arousal is the indicator of emotional arousal in Great Gerbils. Our results agree with results of other studies for different species of mammals and people. Thus, a shift of energy to higher frequencies may be the most universal indicator of increasing emotional arousal for mammals.