

# DEFENCE CALLS REFLECT LEVELS OF DISCOMFORT IN THE PALLID GERBIL (*Gerbillus perpallidus*)



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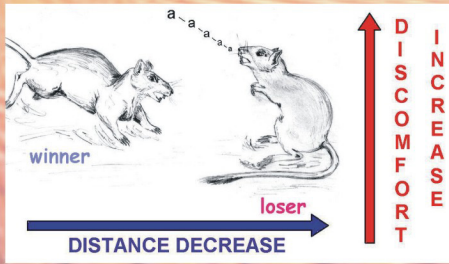
## INTRODUCTION

In mammals, calls change their structure with increase of discomfort. Maybe, trends of changes in structure are shared by species, because one can hear and recognize discomfort state in a caller of any species, from mouse till human. But what parameters reflect discomfort in calls and how we can estimate their trends?

In our object animal, Pallid gerbil, male-male conflicts on neutral arena result in a quick win of one of opponents. After that, the silent winner chases the calling loser. Changing winner-loser distance was taken as a measure of discomfort level for the loser (caller). Distance decrease reflected increase of discomfort and distance increase – decrease of discomfort.

**PURPOSE** Here we study changes of call characteristics in relation with discomfort level (measured through distance between opponents in male-male conflicts) in loser Pallid gerbils.

## IDEA OF EXPERIMENTS



Decrease of winner-loser distance results in increase of loser's discomfort

## EXPERIMENTAL PROCEDURE



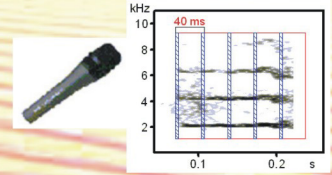
- 21 adult male Pallid gerbils
- Neutral arena
- 31 male-male conflicts
- Olympic system: losers are out from future games

## VIDEO ANALYSIS



- 19 fragments of total duration 512 s
- Frame-by-frame analysis (40 ms segments) with Edge Detect software, specially created for this study
- Auto measurements of male-male distance in each frame

## AUDIO ANALYSIS

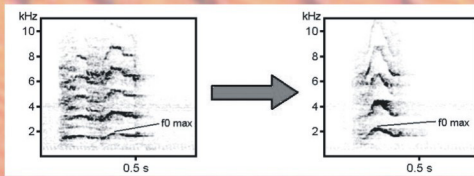


- 652 calls analysed using Avisoft Saslab Pro software
- 7 temporal and power parameters measured within each 40-ms segment (corresponding to one frame of video)

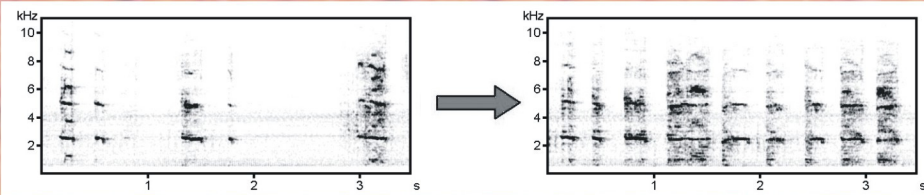
## RESULTS



### 1. INCREASE OF f0 max

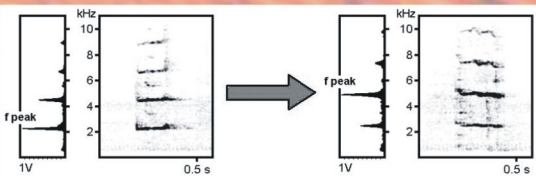


### 2. INCREASE OF CALLING RATE

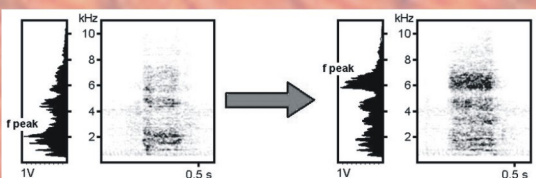


### 3. INCREASE OF f peak

#### A) Tonal calls



#### B) Noisy calls



Similar data suggesting a shift of energy to higher frequencies with increased discomfort were reported from Barbary macaques (*Macaca sylvanus*), piglets (*Sus scrofa*), squirrel monkeys (*Saimiri sciureus*) and humans.

May be, this rule is universal for mammals?