

Behaviour

Defence calls reflect levels of discomfort in the pallid gerbil (*Gerbillus perpallidus*)

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Recent experimental evidence indicates the existence of common mammalian principles in coding discomfort features in calls and in their action to recipients. Here we test the hypothesis of OWREN and RENDALL (1997) that special call structures (high-intensive, plosive sounds), can modify the behaviour of a recipient by acting directly on its nervous system.

We designed 31 male-male conflicts between 21 pallid gerbils in a neutral arena. The loser in each trial displayed escape or defensive behaviour and produced calls. In contrast, winners never called. Losers were not used repeatedly, no animal was wounded during conflicts and all animals bred after these tests. Video and audio recordings of all tests were digitised. Distances between animals were analysed using EdgeDetect software created for this research. A total of 652 calls were analysed using Avisoft Saslab Pro software. Each call was dissected into 40 ms-segments (corresponding to one frame of video); for each segment we measured 7 temporal and power parameters.

We assumed that a shortening of the distance between combatants reflected an increase of discomfort for the loser (caller), whereas an increased distance reflected decreased discomfort. We found that a decrease in distance between combatants resulted in an increased calling rate and translocation of sound energy to a higher spectral area. For tonal calls there was also an increase of fundamental frequency and an enhancement of call noisiness. For all call types, independent of their structures, the increased peak frequency was the most reliable vocal indicator of discomfort in the pallid gerbil. 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. Probably, this rule is universal for mammals.

Also we demonstrated that emission of defensive calls significantly decreased the probability of a shortening of the distance between combatants. Thus, defensive calls of pallid gerbils modified the behaviour of the attacking animal, throwing it away and reducing the social pressure due to increase of a distance between combatants. These data support the hypothesis of OWREN and RENDALL (1997) about direct influence of calls on recipient's behaviour.

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OWREN MJ, RENDALL D (1997): An affect-conditioning model of nonhuman primate vocal signals. In: Perspectives in Ethology (eds): OWINGS DH, BEECHER MD, THOMPSON NS, New York, Plenum Press 12, 299-346.