

INTRODUCTION

Several studies have shown that rats emit ultrasonic vocalizations (USVs) in response to a sexual partner before and during copulation. Male and female rats produce more USVs in the presence of a sexually active partner than with a non-receptive female or castrated male, respectively. The vocalizations that are associated with the mating behavior are the so-called 50-kHz USVs. These 50-kHz USVs can be subdivided into flat and frequency modulated (FM) trill 50-kHz calls. Studies revealed that FM trill calls might have a reward value, while flat 50-kHz calls are not related to reward. Furthermore, playback of 50-kHz calls can induce approach behavior in male rats, which suggests that USVs have incentive properties. In this experiment, we investigated the role of different types of USVs in sexual incentive motivation in male rats.

QUESTIONS

- Do USVs of female rats have incentive value for male rats?
- Which type of USV is most attractive to male rats?

METHODS

First, we recorded 10 minutes of USVs produced by sexually experienced, hormone primed female rats. During the recording the females were placed in a compartment adjacent to a compartment with a male rat. From the recordings, we selected the different types of USV stimuli.

Sexual incentive motivation test:

Before both experiments, the male rats were habituated to the sexual incentive motivation box three times for 10 minutes (figure 1). During the tests, the male rats were exposed either to a sound stimulus (reproduced with the help of Metris Sonotrack-USV playback system®) or an olfactory stimulus for 10 minutes. The stimuli were offered in a Latin square design on 5 consecutive days. The time spent in the incentive zones, number of visits, distance moved and preference scores were calculated.

Sexual incentive stimuli:

- Background noise
- Smell of a receptive female
- 'Full song' (playback of the complete recorded 10 minutes)
- Flat 50-kHz USVs (repeated 30 times in 1 minute with one-minute breaks)
- FM trill 50-kHz USVs (repeated 30 times in 1 minute with one-minute breaks)

Sexual incentive motivation test

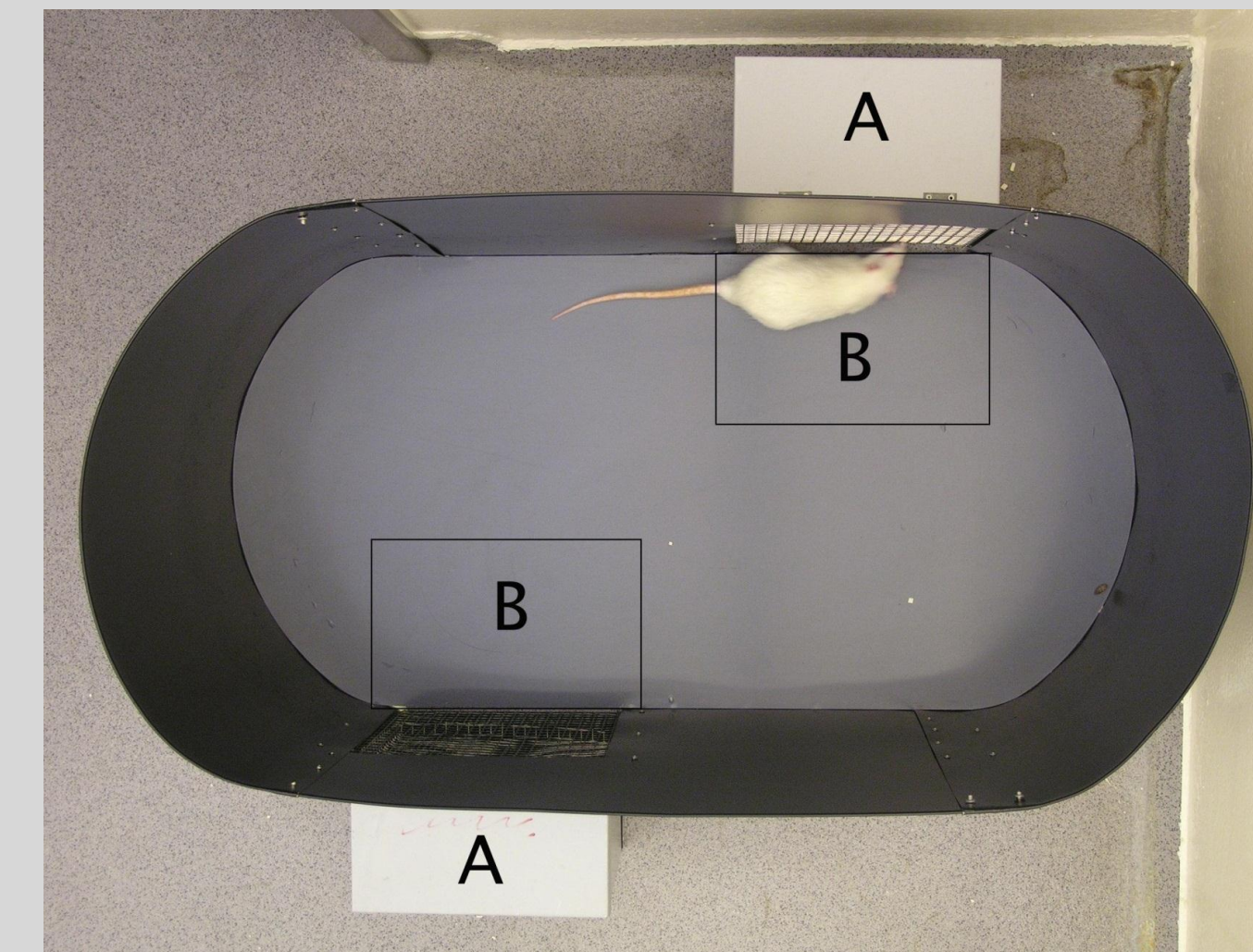


Figure 1: Sexual incentive motivation test box

Sound stimuli

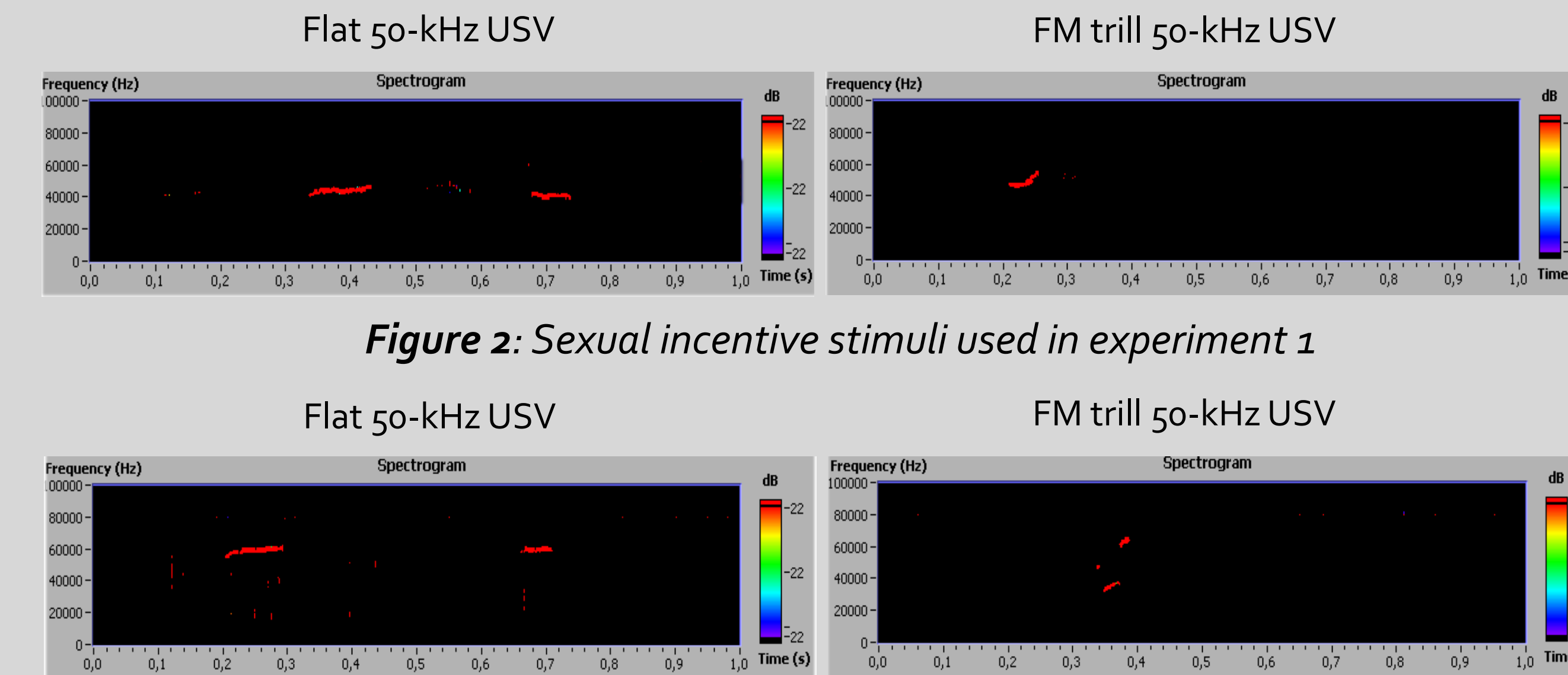


Figure 2: Sexual incentive stimuli used in experiment 1

Figure 3: Sexual incentive stimuli used in experiment 2

RESULTS EXPERIMENT 1

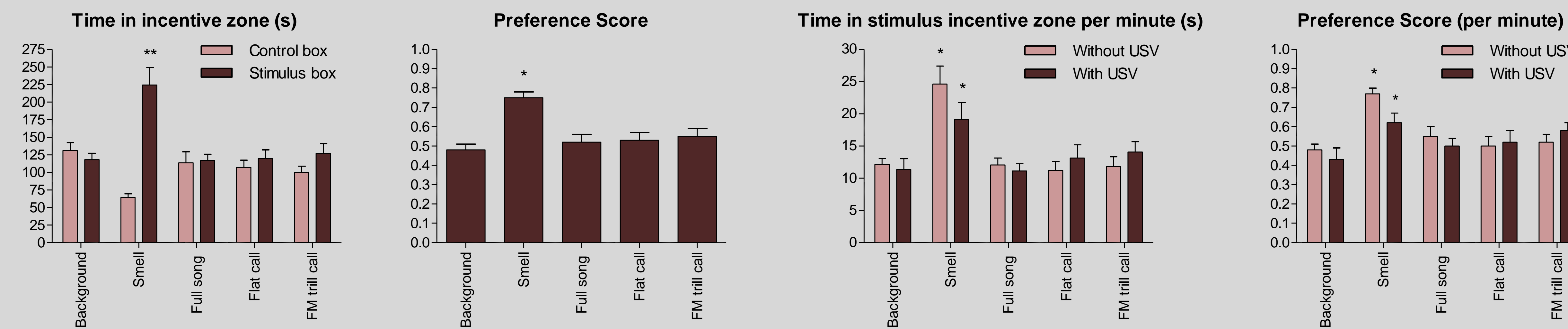


Figure 4: results of the sexual incentive motivation test of experiment 1

* $p < 0.05$ compared to others

** $p < 0.05$ compared to others and to the control box

Sound stimuli did not induce approach behavior

RESULTS EXPERIMENT 2

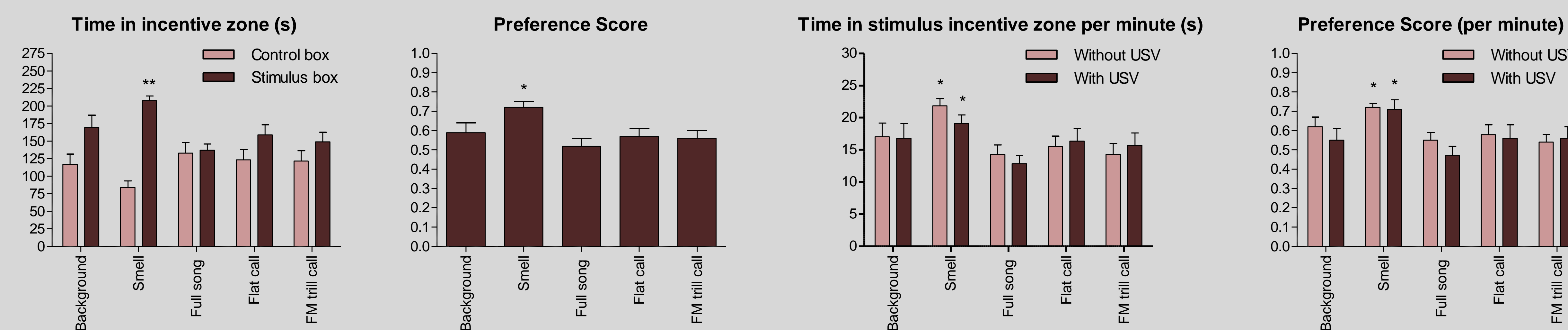


Figure 5: results of the sexual incentive motivation test of experiment 2

* $p < 0.05$ compared to others

** $p < 0.05$ compared to others and to the control box

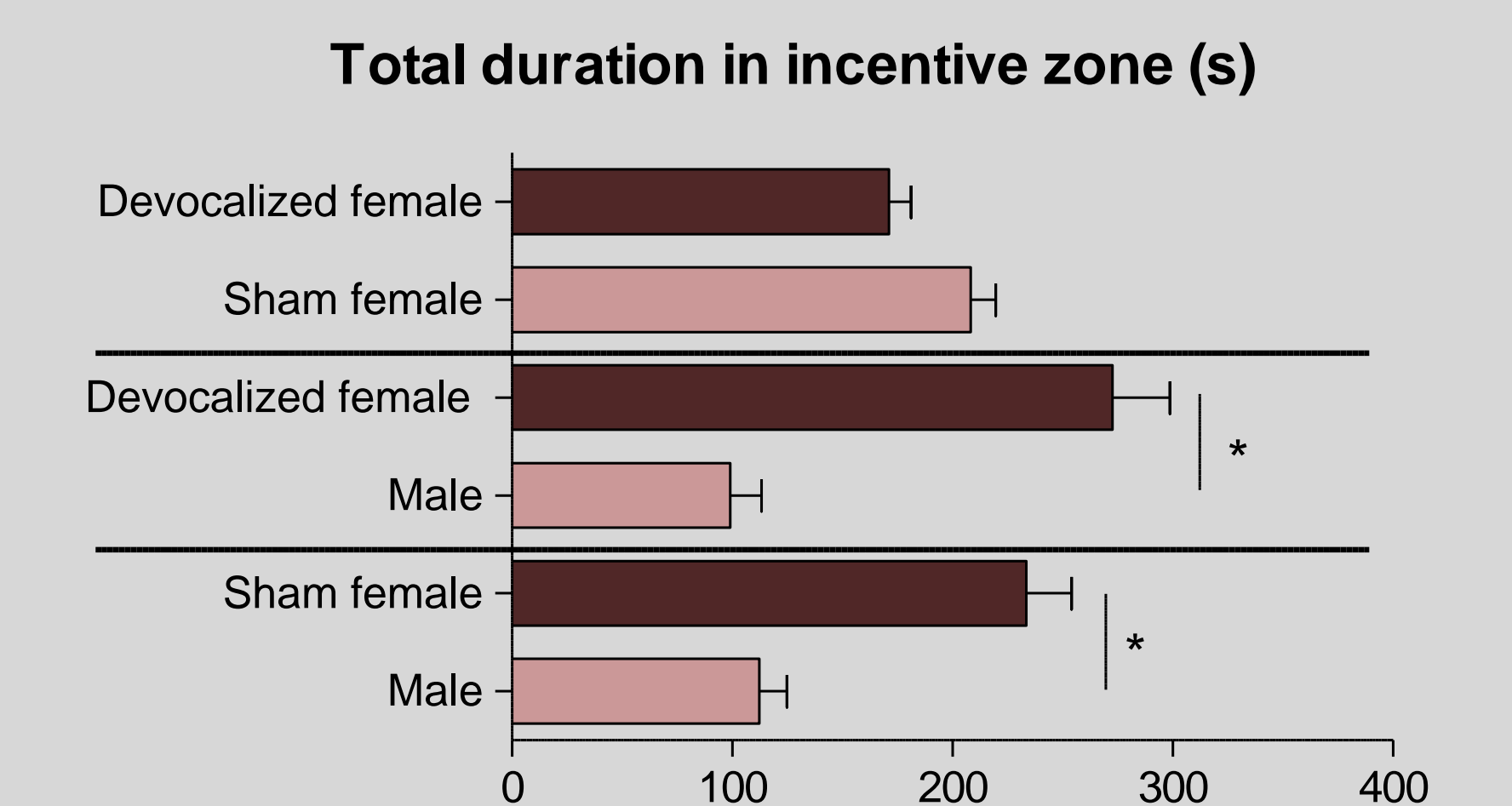
Same results as in experiment 1

CONCLUSIONS

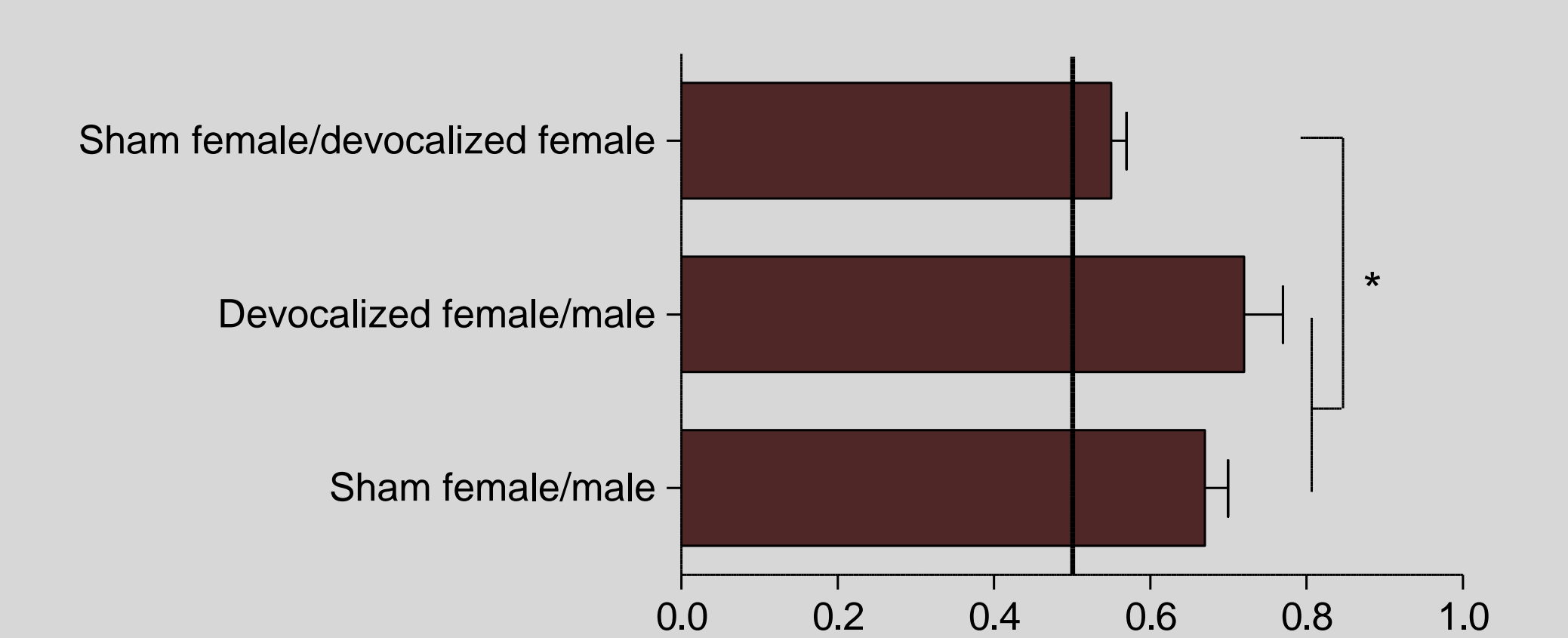
- Playback of the full song, flat calls and FM trill calls did not induce approach behavior in male rats.
- Smell of a receptive female did induce approach behavior in males.
- The same results were found in 2 separate, but similar experiments. Different USV stimuli were used to optimize the potential attractiveness of the auditory stimuli.
- Using this procedure, USVs seem to have no incentive value in sexual motivation of male rats.
- Smell, on the other hand, is important in the sexual motivation of males.

EXTRA PRELIMINARY DATA

In this experiment we used hormone primed devocalized and sham female rats as incentive stimuli for the males. The devocalization was done by bilateral sectioning of the inferior laryngeal nerve.



Preference Score



Same preference for devocalized and sham female