

# English Proficiency Exam

Universidade Federal de Alenas

Programa de Pós-graduação em Estatística Aplicada e Biometria

\* Indica uma pergunta obrigatória

## Instructions

Read the text carefully and answer the questions. Don't forget, you must answer only in Portuguese! Answers in English will not be considered.

1. Full name \*

---

2. E-mail \*

---

## **Family pigs' and dogs' reactions to human emotional vocalizations: a citizen science study**

Lehoczki, F.; Fraga,P.P.; Andics, A. Family pigs' and dogs' reactions to human emotional vocalizations: a citizen science study. *Animal Behaviour*, v.214, p.207-218, Aug. 2024.

Human distress vocalizations elicit an increase in dogs' stress responses. This modulation of behaviour to match one's emotional state to that of another individual is often described as emotional contagion. Whether this phenomenon is promoted by the dogs' selection for cooperation with humans or is rooted more generally in the universal vocal signals of emotion is unclear. To test this, we compared the reactions of companion dogs, *Canis familiaris*, and companion pigs, *Sus scrofa domesticus* (which are popular companion animals but whose domestication history lacks selection for cooperation), to human sound playbacks of crying, a high-arousal, negatively valenced sound, and humming, a low-arousal, less emotionally valenced sound, in a citizen science study. Dogs exhibited higher levels of behaviours associated with increased arousal and negative emotional states and vocalized more in response to crying compared to humming. In contrast, pigs showed more negative and high-arousal behaviours in response to humming than to crying. The fact that dogs seemed to have been affected by and reacted accordingly to the emotional content of human vocal sounds is in line with previous works and the emotional contagion account. In contrast, pigs' elevated stress to the low-arousal humming sound compared to the negative and high-arousal crying sound, cannot be fully explained by emotional contagion but rather by the novelty of the sound (neophobia). Selection for cooperation with humans may thus be key for promoting human sound-induced emotional contagion in domestic mammals.

© 2024 The Authors. Published by Elsevier Ltd on behalf of The Association for the Study of Animal Behaviour. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

3. 1. What this paper is about?

---

---

---

---

---

4. 2. Why the authors compared dogs and pigs?

---

5. 3. How did dogs respond to the stimuli?

---

---

---

---

---

6. 4. How did pigs respond to the stimuli?

---

---

---

---

---

7. 5. What did the authors conclude for domestic mammals? Can be the conclusion generalized for all the domestic mammals based on this study?

---

---

---

---

---

Our subjects were adult family dogs and family pigs from Hungary and other countries (Colombia, Israel, Mexico, Spain, Switzerland, U.S.A.) whose owners applied to participate in the study through an online form.

Thirty dogs were included in the analysis: 8 foreign and 22 Hungarian dogs, 16 males (4 intact, 12 neutered) and 14 females (2 intact, 12 spayed), 11 mixes and 19 purebreds (from 12 breeds). Age varied between 2 and 11 years (mean  $\pm$  SD = 5.75  $\pm$  2.54 years; Appendix, [Table A1](#)).

From the tested family pigs, 22 animals were included in the analysis: 8 foreign and 14 Hungarian pigs, 9 males (1 intact, 8 neutered) and 13 females (3 intact, 10 spayed), from three different mini pig breeds (Minnesota, Juliana, Vietnamese Pot-bellied) and their mixes. Age varied between 7 months and 11 years (mean  $\pm$  SD = 4.5  $\pm$  3.1 years; Appendix, [Table A1](#)).

Each animal was tested with two different stimuli on two different occasions (i.e. on one occasion, the subject was tested with a high-arousal, negatively valenced human sound and on the other occasion, with a low-arousal, less emotionally valenced human sound) with at least a 1 week break between the two tests. However, 11 dogs and 9 pigs had only one appropriate test video (see description of an appropriate test video below and the Appendix, [Table A1](#)). Single videos of these animals were also included in the analysis.

8. 6. Describe all the dogs' characteristics in this study.

---

---

---

---

---

9. 7. What does SD stand for?

---

---

---

---

---

10. 8. Describe all the pigs' characteristics in this study.

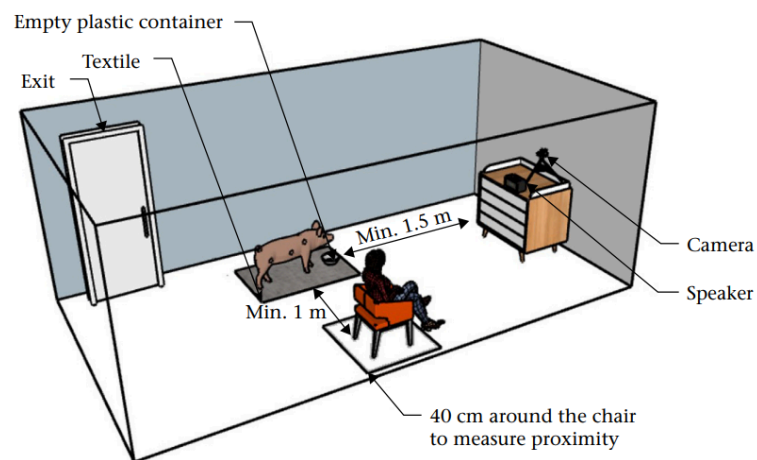
---

---

---

---

---



**Figure 2.** Illustration of the ideal room set-up for the playback test, with the camera positioned in the same place as the speaker. The owner had to sit at least 1.5 m away from the speaker. A plastic container, used as an attractor for the subjects, was placed next to the chair at a minimum distance of 1 m distance. The subject moved freely in the room while the camera recorded its reactions to the sounds.

11. 9. Explain the experiment setup.

---

---

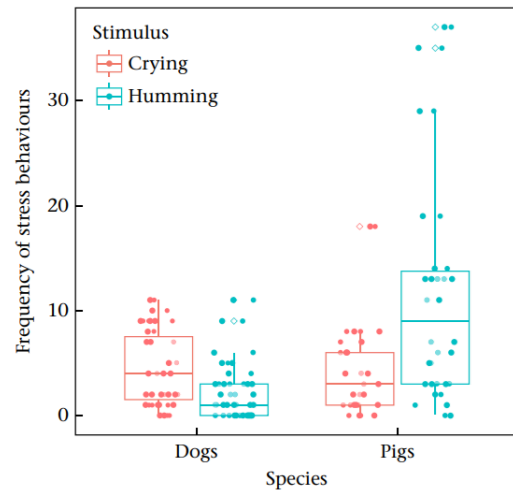
---

---

---

### Statistical Analysis

Data analysis was conducted in R statistical environment (RStudio 2022.07.0 in R version 4.1.3). We included the data from pigs and dogs in the statistical models so we could assess the effect of the species along with test order, stimulus, their paired interactions (included as factors) and identity (ID) as a random factor. We used generalized linear mixed model with Poisson distribution and log link ('lme4' package) for the analysis of the frequency of stress-related behaviours, the frequency of owner and speaker orientation, the frequency of vocalizations and the frequency of immobility. Percentage data of the other coded behaviour variables (orientation to the owner, orientation to the speaker, proximity to the owner, immobility) were analysed individually by nonparametric beta regression ('glmmTMB' package) as the distribution of the behaviour variables was far from normal and the transformations failed to reach the normality. We analysed subjects' latency to orient to the owner and to the speaker and their proximity to the owner with Cox regression ('coxme' package). In the case of dogs, we also ran extra analyses on subjects' latency to touch



**Figure 3.** Effect of the interaction of species and stimulus type on the frequency of stress behaviours. Each dot represents the data of an individual subject. Box plots show the medians (horizontal lines), upper and lower quartiles (boxes) and lowest and highest values within 1.5 times the interquartile range (whiskers).

12. 10. What statistical software was used and what does Figure 3 is supposed to say?

---

---

---

---

---