

Measuring emotions in dogs using infrared thermal imaging

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INTRODUCTION

Understanding and assessing animal emotions via non-invasive methods has become a key point for improving animal welfare. Previous studies have shown how emotional contexts affect the emotional status and the physiological response in dogs. The aim of this study was to investigate the influence of an emotional context in the eye temperature of dogs, measured via a non-invasive method, the infrared thermal imaging (IRT), in a separation-reunion experiment. Additionally, validation tests for testing the IRT equipment were conducted.

METHODS

61 adult pet dogs were tested in a separation-reunion experiment with their owner. The test experiment consisted of three phases of 5 minutes each:

1. **BASELINE** (the owner is in the room with the dog)
2. **SEPARATION** (the dog remain alone in the room)
3. **REUNION** (the owner re-enters in the room)

The control experiment consisted of 15 minutes in which the dog and the owner are together in the room. Descriptive physiological analysis were also conducted in 11 individuals. IRT analysis were conducted via FLIR ResearchIR Max 4 software. Five additional validation experiments were conducted for testing the equipment.

INDIVIDUAL PHYSIOLOGICAL DESCRIPTIVE CHART

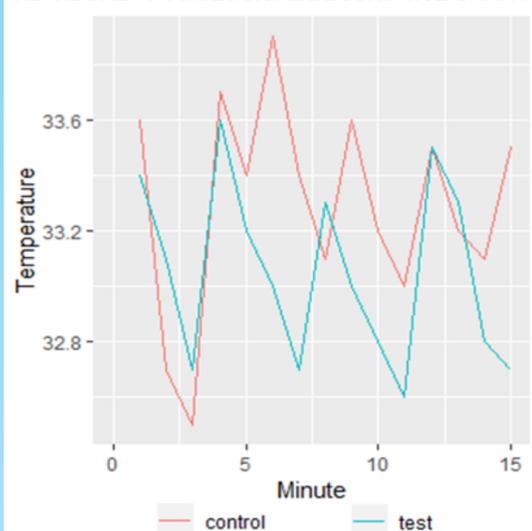


Fig 1. Individual physiological descriptive charts of a dog. Temperature as a function of time. The blue line represents the temperature of the dog during the test experiment. The red line represents the temperature of the dog during the control experiment.

Validation test - Person IRT video



Fig 2. Temperature as a function of time in the validation test with the person as the experiment subject. Data of the IRT video of the eye region are displayed. The red line represents the maximum temperature recorded, while the blue line represents the average temperature.

DIFFERENCE IN TEMPERATURE ACROSS PHASES AND CONDITION

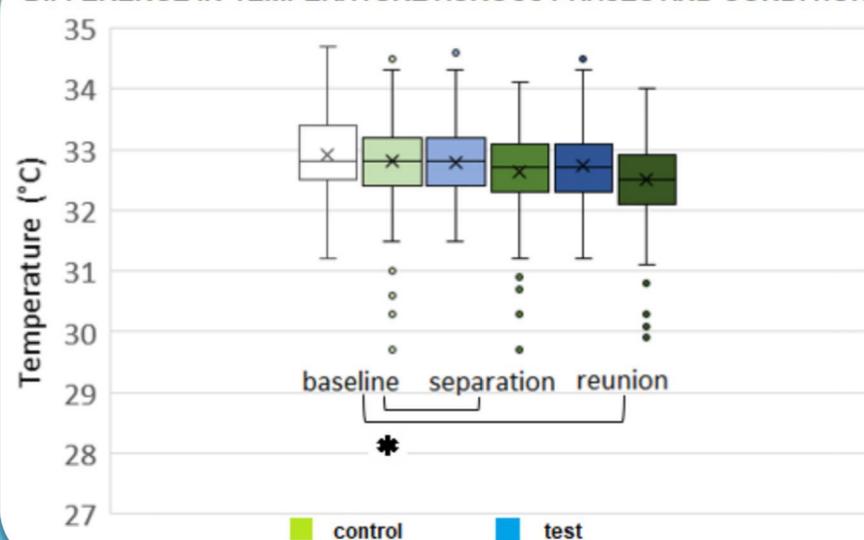


Fig 3. Difference of overall temperature across phases and conditions. Baseline temperature resulted higher compared to separation and reunion. Temperature decreased across phases. Test temperatures resulted higher than control.

RESULTS

- **IRT temperature** significantly differs across phases
- **Baseline temperature** was significantly higher than separation and reunion.
- **Temperature** continuously decreased throughout the experiment
- **Descriptive physiological results** showed temperature fluctuations of over one degree within a minute and throughout the experiment.
- **Validation tests** showed temperature fluctuations, indicating the presence of a malfunction in the equipment.

CONCLUSION

IRT technology is a useful non-invasive method for monitoring physiological changes in animals. However, using IRT for assessing the emotional status of an individual requires proper validation of the equipment, a straightforward experimental set up, and it is context specific.

