

# Words, faces or tokens? The effect of type of reinforcers and punishers on placebo analgesia induced by operant conditioning

Authors: Helena Bieniek<sup>1</sup>, Przemysław Bąbel<sup>1</sup>

<sup>1</sup> Jagiellonian University, Institute of Psychology, Pain Research Group, Kraków, Poland

Contact: helena.bieniek@doctoral.uj.edu.pl

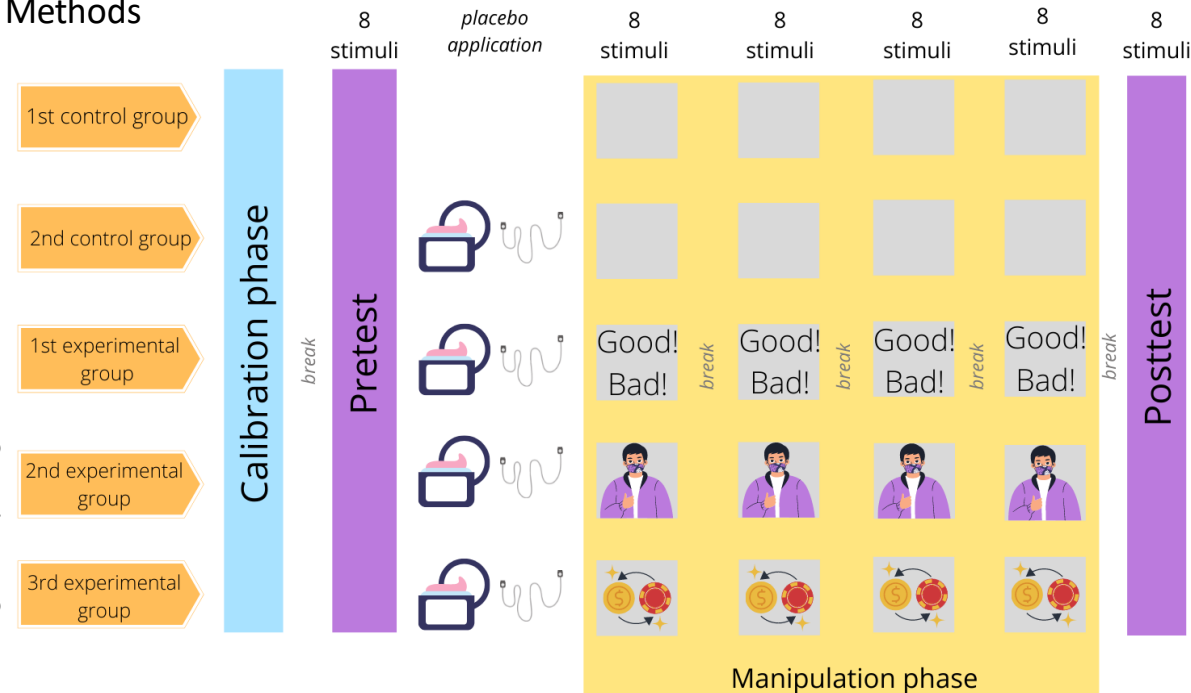


## Aim of investigation

It is well known that placebo effects can be induced by classical conditioning, verbal suggestion or observational learning. However, a recent study shows that placebo analgesia can be also induced by operant conditioning (Adamczyk et al, 2019).

**The aim of our study was to examine how different types of rewards and punishers applied during the operant conditioning procedure influence placebo analgesia.**

## Methods



**Participants.** 150 healthy and pain free participants (18-50 y.o.) randomly assigned to 5 groups: 2 control and 3 experimental (30 participants in each group)

**Pain stimuli.** Thermal heat stimulation administered via a thermode attached to participant's forearm (Thermo Sensory Analyzer TSA-II; Medoc, Israel). Each stimulus lasted ~3 seconds.

**Pain and expectations measurement.** Numerical Rating Scale (NRS) ranging from 0 "no pain" to 10 - "worst pain tolerable in this experimental situation"

**Reward and punishers.** During the operant conditioning phase, different types of rewards and punishers are presented on the screen in experimental groups:

- 1) Words ("Good!", "Bad!")
- 2) Short movies presenting the experimenter expressing approval or disapproval
- 3) Symbols of tokens (the number of added (+5) or taken (-5) tokens)

**Placebo.** Inactive cream with a thyme scent is applied at the participant's forearm under the thermode

**Sham device.** Presented to participants as a device that allows for an objective measurement of pain

**Calibration phase.** Two series of stimuli (one ascending from 40°C till 7 on the NRS and one descending from 7 on the NRS to 0 or 1 on the NRS). Then, the exponential function is used to calculate the temperature corresponding to 5 on the NRS.

**Pretest & Posttest phases.** 8 stimuli of the same intensity (~5 on the NRS) are applied with 5-second interval

**Manipulation phase.** 4 series (of 8 stimuli each) of the same intensity (~5 on the NRS) are applied with a 2-minute breaks in between series.

Before the stimulus application:

- In the 1st control group, there is a break (no placebo administration, no sham device attachment)
- In the 2nd control group, the cream is applied and the sham device is attached
- In the experimental groups, after the rating of pain stimuli, a **reward** (if the rating is lower than the mean rating in the pretest phase) or a **punisher** (if the rating is equal or higher than the mean from the pretest) is applied.

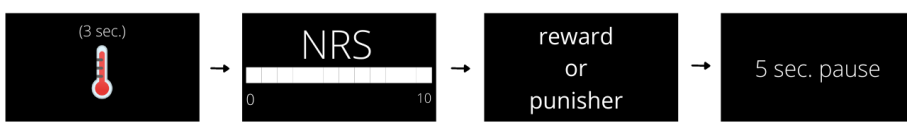


Fig.2. Single trial in the experimental groups during the manipulation phase

## Results and conclusions

The data is currently being collected. Preliminary results will be presented during the poster session.