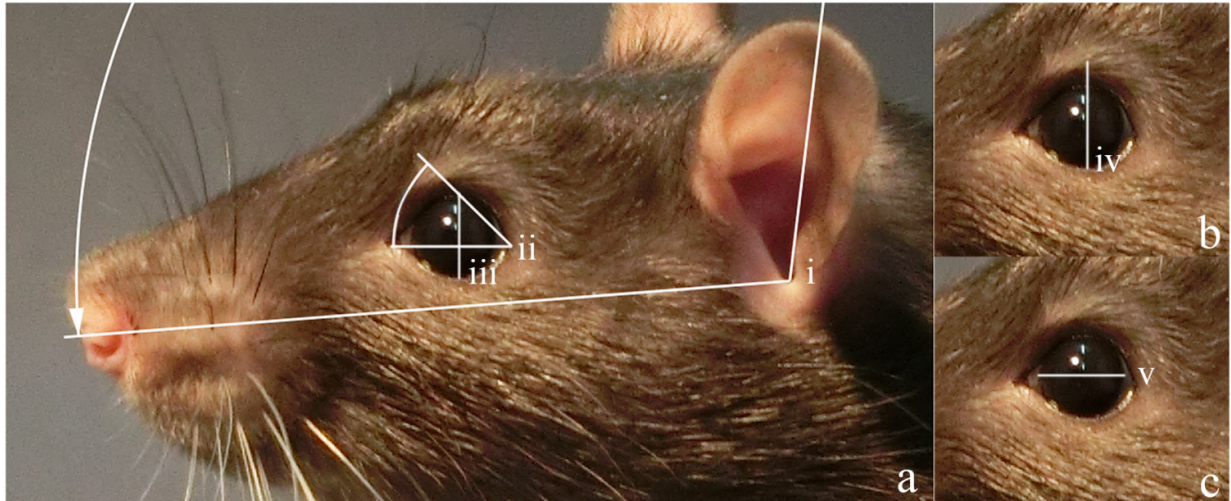


Study suggests rats smile with their ears

December 15 2016, by Bob Yirka



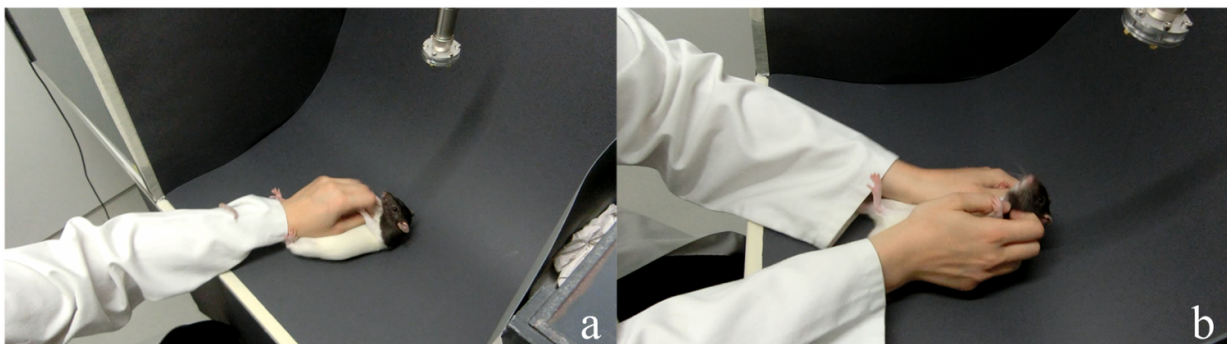
Examples of quantitative measures. a) Ear Angle (i), Eyebrow Angle (ii), and eye height (iii) are illustrated. b) Eyebrow height (iv) is measured from the bottom of the eyeball to the middle of the brow. c) Eye width (v) was the diameter of the visible iris. Credit: *PLOS ONE* (2016). DOI: 10.1371/journal.pone.0166446

(Phys.org)—A team of researchers with the University of Bern in Switzerland has found that as part of feeling happiness, rats undergo a slight physical change. As the team notes in their paper uploaded to the peer-reviewed open access site *PLOS ONE*, the rats under study demonstrated happiness by lowering their ears.

As the researchers note, a multitude of studies have been conducted by scientists attempting to learn about the experience of pain or other

[negative emotions](#) in rats and other animals—if researchers were aware of the pain they may be causing a rat or other test animals, they may be more likely to alter experiments to reduce animal suffering. But, as the researchers also note, very little research has been done to learn about more positive states in rats and other animals. People know when a dog is happy, for example—such pets are quite demonstrative—but how can a person tell if a pet or lab rat is happy or sad, or simply existing continually in a non-emotional state? By looking at its ears, apparently, according to the researchers with this new effort.

Prior research has suggested that rats like to have their bellies tickled—they come back for more and emit a noise (in a range too high for humans to hear) that some researchers have compared to laughing. Because of that, the researchers use tickling as a basis for testing happiness in rats. They selected 15 male Lister hooded [lab rats](#) and subjected them to two types of environmental experiences they labeled as either positive or negative. The positive experiences consisted of sessions of tickling by one of the researchers; the negative experiences were more harsh—the rats were put in another room where they were subjected to random blasts of white noise. During both types of experiments, microphones were used to record vocalizations by the rats and observations were made of physical features, particularly changes to faces.



Tickling procedure. The one-handed tickling procedure (a) consisted of one-handed repeated pinning, while rapidly stimulating the underside with the fingertips. The two-handed tickling procedure (b) consisted of scooping and supporting the animal with both hands, while vigorously tickling the sides and nape of the neck with the fingertips. Credit: *PLOS ONE* (2016). DOI: [10.1371/journal.pone.0166446](https://doi.org/10.1371/journal.pone.0166446)

The researchers found that the rats undergoing tickling vocalized more and their ears became droopier and pinker—they exhibited no discernible reactions during the [negative experiences](#). The researchers attributed the lowered ears to the [rats](#) being in a more relaxed state, but they were not clear on the reason for the pinker [ears](#)—they suggested it could have been a sign of happiness or simply increased blood flow due to the small degree of physical exertion that went along with laughing while being tickled.

More information: Kathryn Finlayson et al. Facial Indicators of Positive Emotions in Rats, *PLOS ONE* (2016). DOI: [10.1371/journal.pone.0166446](https://doi.org/10.1371/journal.pone.0166446)

Abstract

Until recently, research in animal welfare science has mainly focused on negative experiences like pain and suffering, often neglecting the importance of assessing and promoting positive experiences. In rodents, specific facial expressions have been found to occur in situations thought to induce negatively valenced emotional states (e.g., pain, aggression and fear), but none have yet been identified for positive states. Thus, this study aimed to investigate if facial expressions indicative of positive emotional state are exhibited in rats. Adolescent male Lister Hooded rats (*Rattus norvegicus*, N = 15) were individually subjected to a Positive and

a mildly aversive Contrast Treatment over two consecutive days in order to induce contrasting emotional states and to detect differences in facial expression. The Positive Treatment consisted of playful manual tickling administered by the experimenter, while the Contrast Treatment consisted of exposure to a novel test room with intermittent bursts of white noise. The number of positive ultrasonic vocalisations was greater in the Positive Treatment compared to the Contrast Treatment, indicating the experience of differentially valenced states in the two treatments. The main findings were that Ear Colour became significantly pinker and Ear Angle was wider (ears more relaxed) in the Positive Treatment compared to the Contrast Treatment. All other quantitative and qualitative measures of facial expression, which included Eyeball height to width Ratio, Eyebrow height to width Ratio, Eyebrow Angle, visibility of the Nictitating Membrane, and the established Rat Grimace Scale, did not show differences between treatments. This study contributes to the exploration of positive emotional states, and thus good welfare, in rats as it identified the first facial indicators of positive emotions following a positive heterospecific play treatment. Furthermore, it provides improvements to the photography technique and image analysis for the detection of fine differences in facial expression, and also adds to the refinement of the tickling procedure.

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