

# RATS CHIRP WITH THEIR MOUTH FULL!

*DURING AN EXPERIMENTAL MEAL, ADULT MALE WISTAR RATS EMITTED FLAT ULTRASONIC VOCALISATIONS (USVs) UPON FEEDING*

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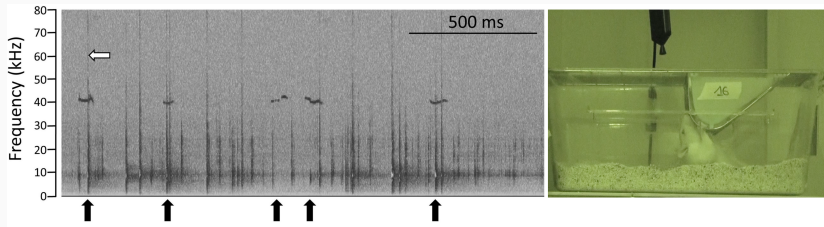
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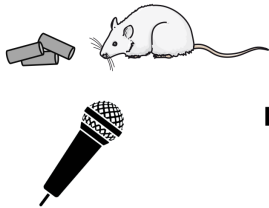
**Workshop USV for the people, and the rodents**

Mon. 29 Apr. 2024

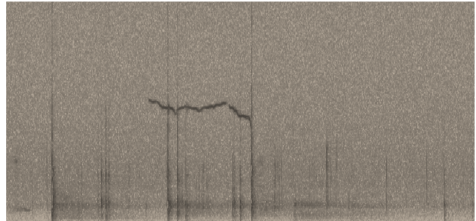
# USV COINCIDE WITH FEEDING BEHAVIOUR



- Rats produce ultrasonic vocalisation (USVs) that can be classified into different types, based on their average frequency
- USVs around 50 kHz are linked to activation of brain reward pathways, during **anticipation** or **experience** of reward
- ? Does feeding affect USV number?
- ? Are specific USV associated with feeding behaviour?



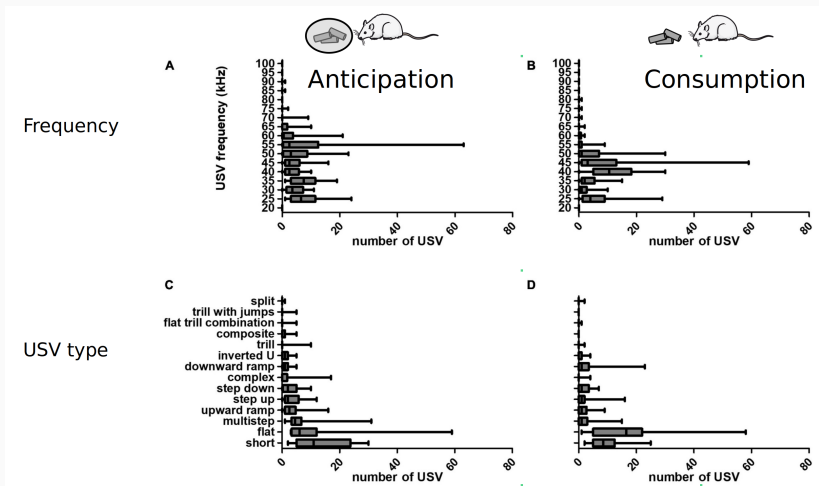
USV and video recording



USV detection on spectrograms

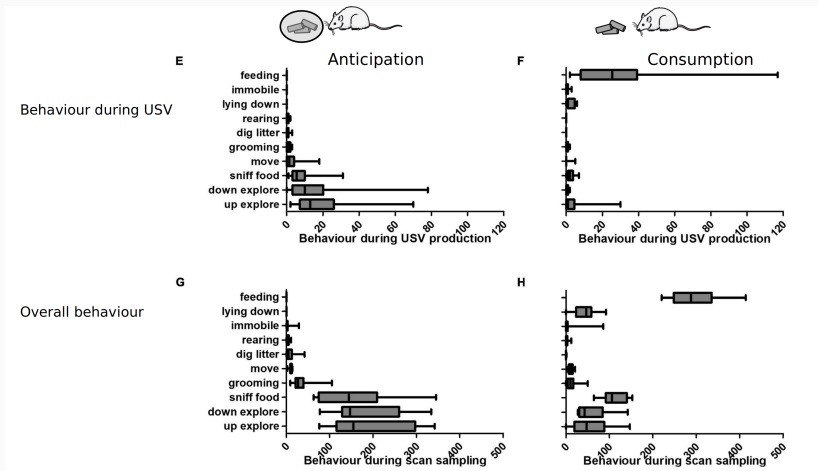
- We recorded USVs from **14-week old** rats refeeding after mild food deprivation (17 h overnight fast).
- Recording consisted of a **10-minute consummatory phase**, which was preceded by a **10-minute anticipatory phase**.
- Frequentist and Bayesian (Monte Carlo shuffling) statistical analyses → **investigate the relationship between USV emission and rat behaviour**.

# RESULTS 1/3 : USV PROFILE CHANGES DURING THE EXPERIMENTAL MEAL



- The **total quantity of USVs** did not vary in response to food consumption.

# RESULTS 2/3 : WHAT WERE THEY DOING WHILE VOCALISING ?



- Instead, it was the **subtype of USV produced** that changed → **flat USVs of a frequency around 40 kHz**

*Logistic regression model : USVs produced during feeding had a predicted frequency of 44 kHz ( $p = 0.016$ )*

# RESULTS 3/3 : ASSOCIATION FEEDING & FLAT USVs 40 KHZ

			↓				↓						
→	Feeding	1.4	0	2.4	-1.7	-1.3	-2.1	0.4	-2.4	1.3	-2.3	-0.8	-1.7
	Immobile	-0.3	0.7	-2.3	-0.1	-0.4	2.6	0.2	-0.1	1.2	1.1	-0.1	-0.6
	Lying down	-0.6	1	0.3	-0.2	0.5	-0.8	-1.2	-0.3	-0.6	0.2	2.8	1.1
	Grooming	-0.3	0.7	-0.8	-0.1	-0.4	1	-0.7	-0.2	1.1	-0.6	-0.1	1.2
	Sniffing	-0.6	0.6	-0.4	-0.3	0.3	1.1	0.5	-0.4	-1.5	1.3	-0.4	-1.5
	Down explore	-0.3	0.6	-1.1	-0.1	-0.4	-0.7	0	-0.2	-0.6	2.6	-0.2	1
→	Up explore	-0.8	-1.7	-2.5	-0.3	2	1.6	0.8	4.5	-0.5	0.7	-0.4	2.1
		Complex	Downward ramp	Flat	Flat-trill combination	Inverted U	Multistep	Short	Split	Step down	Step-up	Trill	Upward ramp

- **Monte Carlo shuffling** : rearranging the data many times → 10 000×
- Comparing observed pattern to the ones found in the shuffled data...
- **Confirm the likelihood that the observed pattern (association feeding & flat USVs 40 kHz) could have occurred by chance.**

In adults rats, USVs emitted upon food consumption were **predominantly flat shaped USVs of 40–45 kHz frequency**

Champeil-Potokar G, Kreichati L, Rampin O, Denis I, Darcel N and Bombail V (2023) Rats chirp with their mouth full : During an experimental meal, adult male Wistar rats emitted flat ultrasonic vocalisations upon feeding. *Front. Behav. Neurosci.* 17 :1089631. doi : 10.3389/fnbeh.2023.1089631

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