

Validation of an fMRI-based Olfactory Cue Reactivity Task to Measure the Learned Association between Alcohol Cues and Addictive Behaviour

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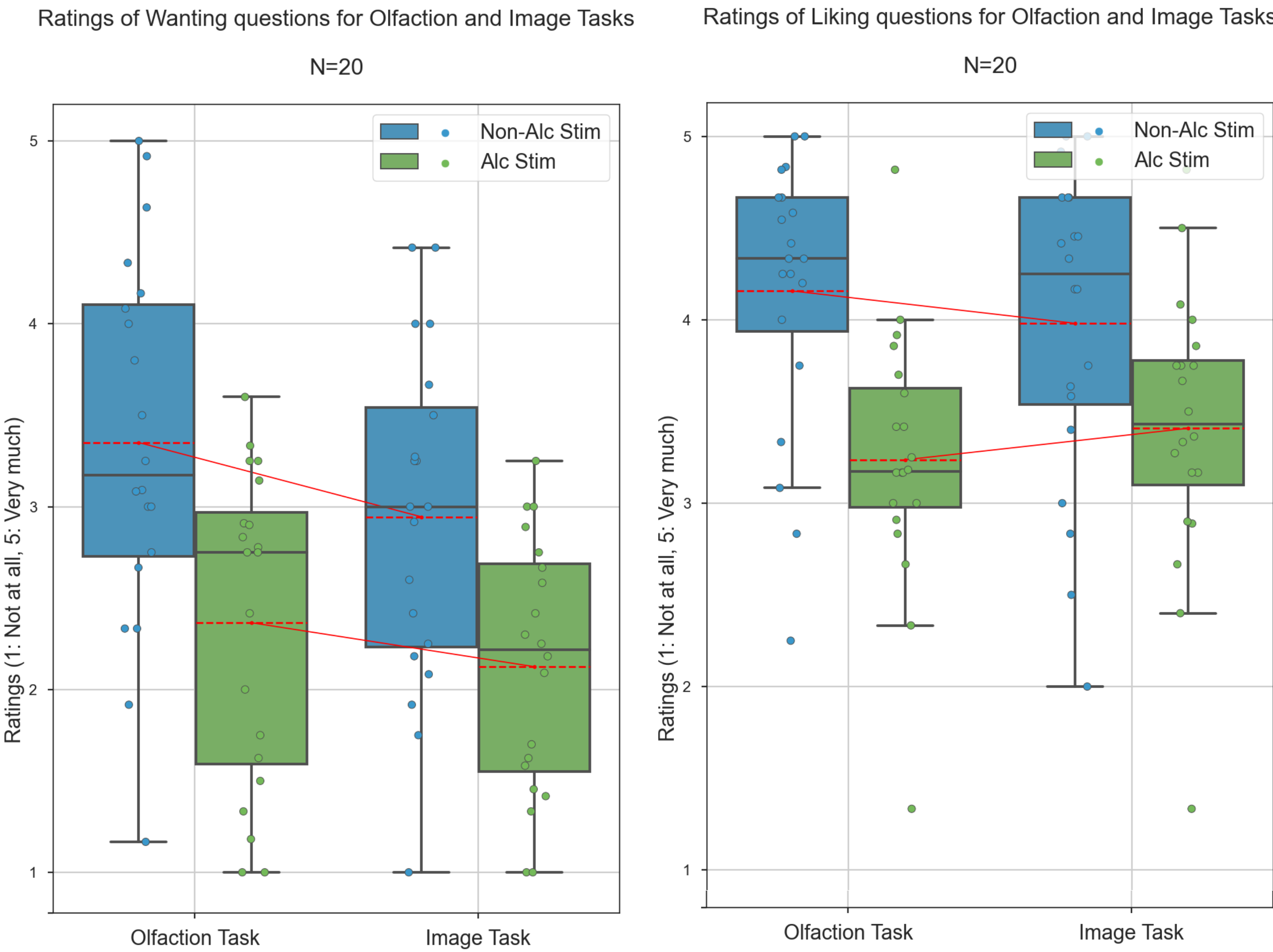
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Aims

- By combining an image and odour based cue reactivity task (CRT), we aim to show the effectivity of olfactory cues compared with the image-only cue reactivity task.
- Goal:** Enhance the measurement precision of the task.

Behavioral Results

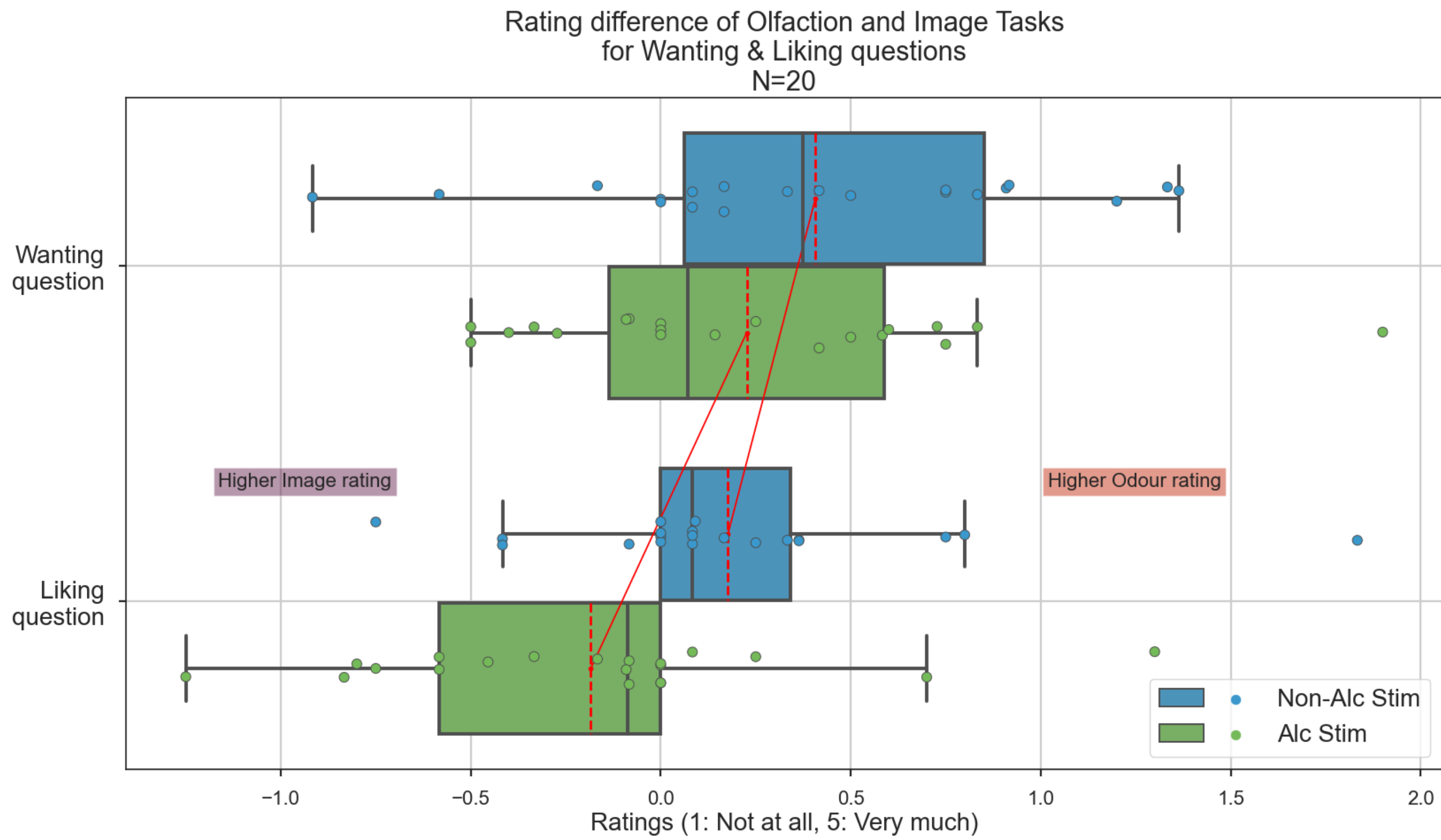
- Participants were asked how much they wanted and liked the items they had smelled and observed (1: Not at all, 5: Very much)



ANOVA for Wanting			
Var	F	p-val	np2
Stim types	17.352	0.001	0.477
Task types	10.545	0.004	0.357
Stim X Task	0.928	0.347	0.047

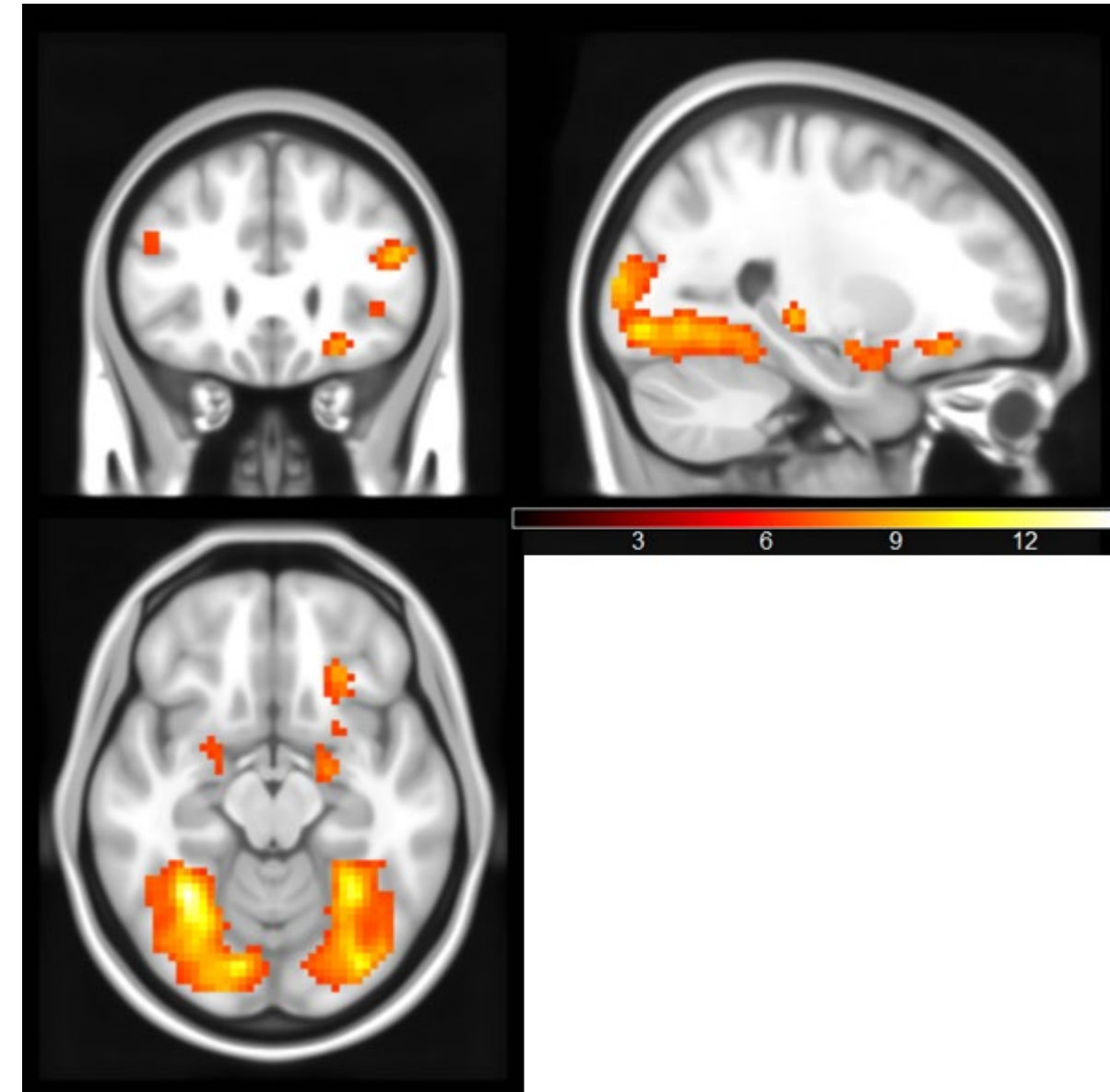
ANOVA for Liking			
Var	F	p-val	np2
Stim types	16.986	0.001	0.472
Task types	0.001	0.982	0.000
Stim X Task	0.607	0.004	0.360

Rating difference of Olfaction and Image Tasks for Wanting & Liking Questions

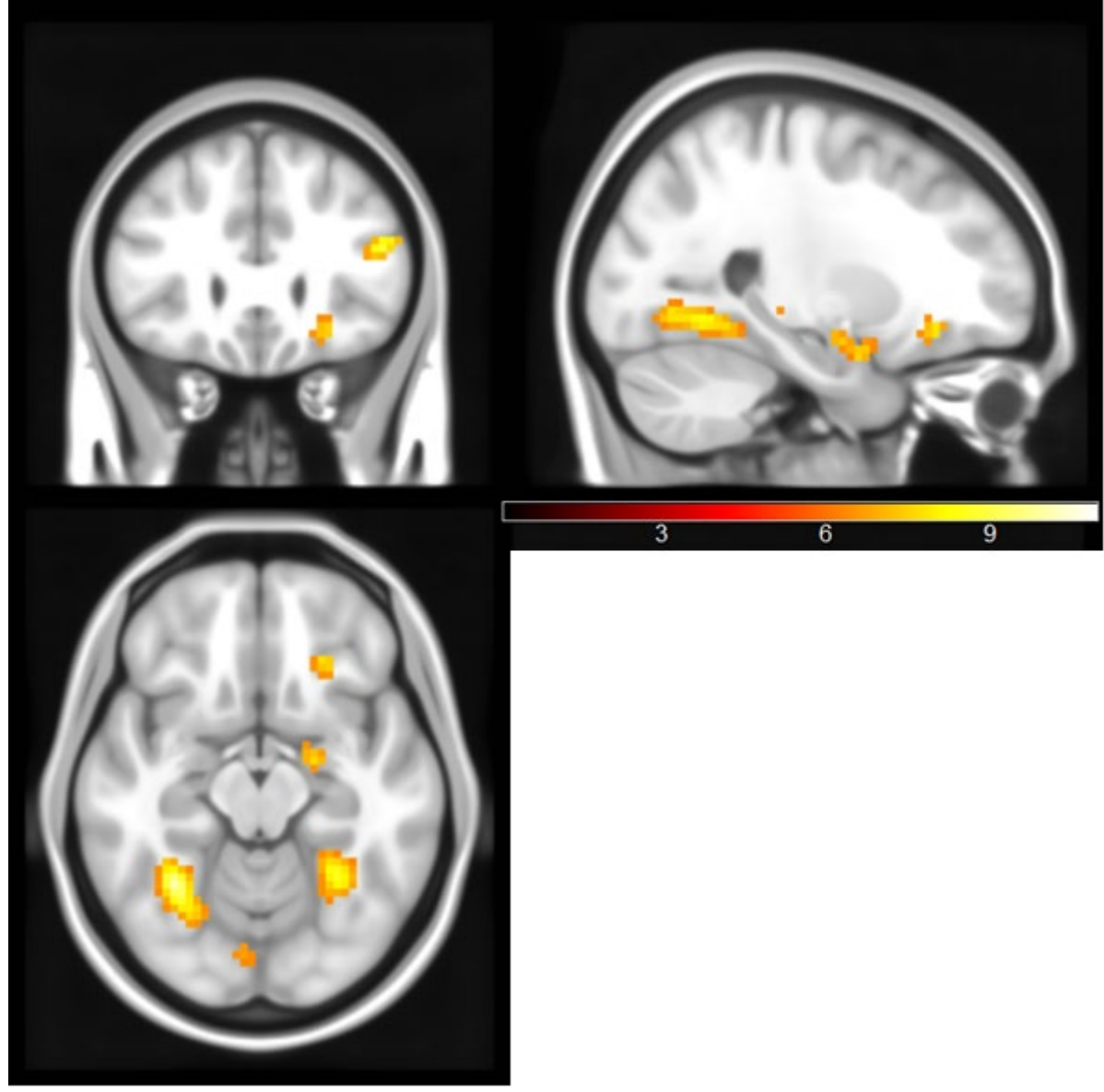
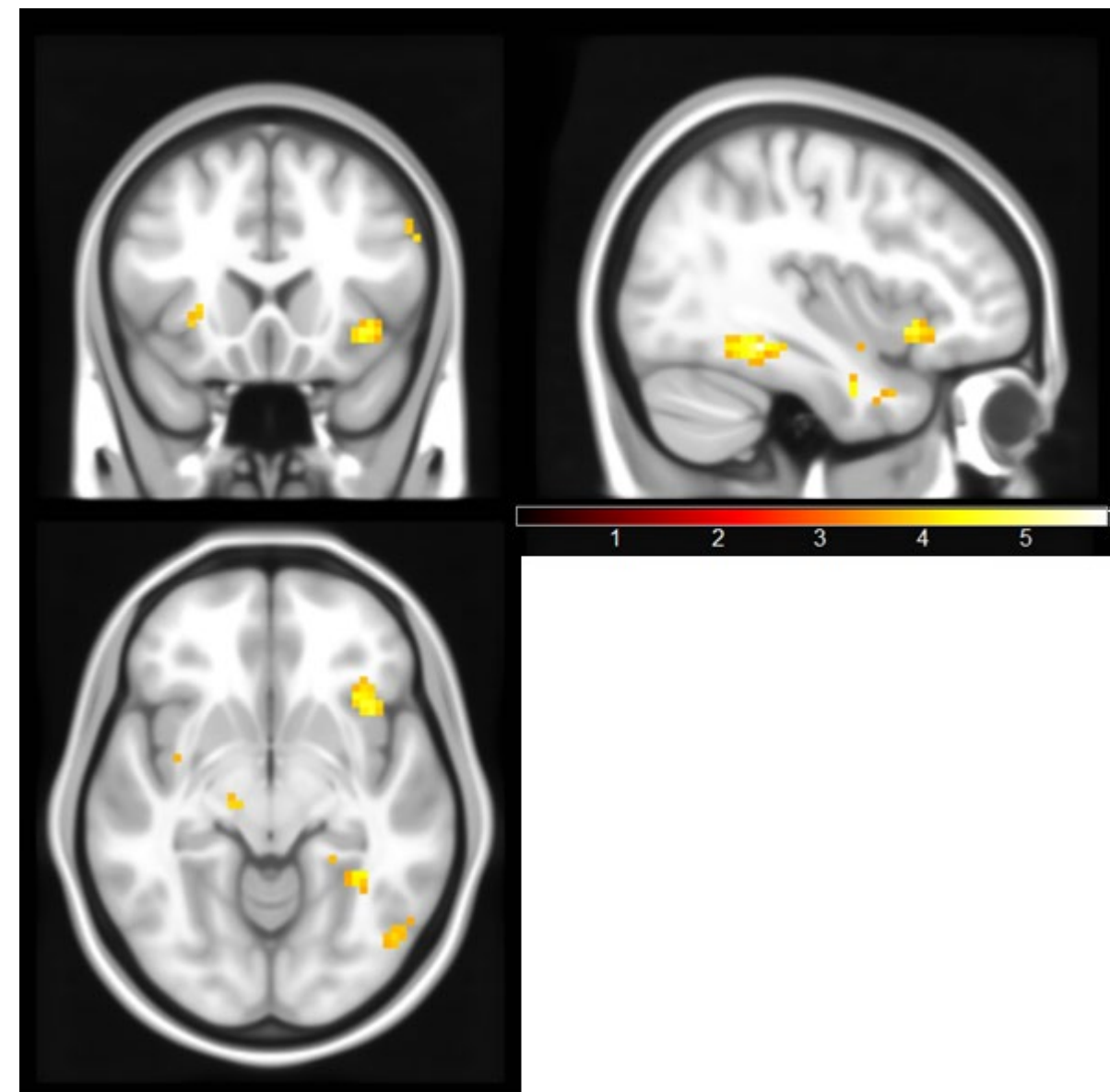


fMRI Results

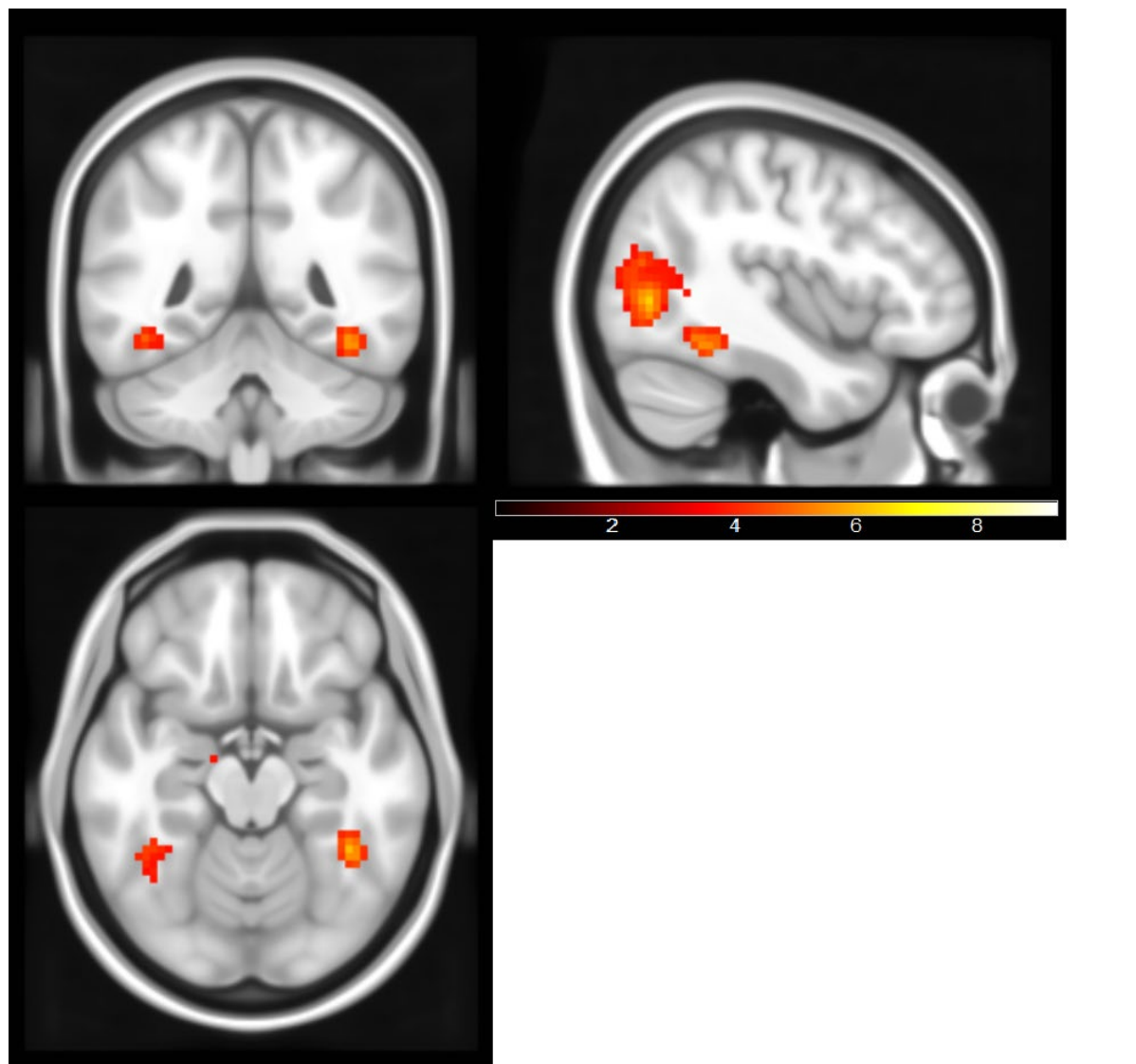
- OdourTask > Baseline
 $p < 0.05$ FWE, $k = 0$ voxels
- Duration = 0sec stick func.
- OdourTask > ImgTask
 $p < 0.05$ FWE, $k = 0$ voxels
- Duration = 0sec stick func.



- Alc. > Non-Alc.
 $p < 0.001$ unc., $k = 0$ voxels
- Duration = 0sec stick func.



- Alc. > Non-Alc.
 $p < 0.001$ unc., $k = 0$ voxels
- Duration = 20sec boxcar



Why impulse activation function?

Olfactory brain regions elicit responses towards cues in the first few seconds after the odour was registered by the individual[1]. Hence an impulse-like stick activation function to capture the olfaction related effects.

Discussion

- Alcoholic stimuli did not elicit convincingly higher responses
- Possible reason: Pleasantness of non-alcoholic stimuli dominating alcoholic stimuli
- Nonetheless, the addition of olfactory stimuli elevated the neural activations towards the cues

Iteration II

A second iteration is currently running with an ambiguous[2] odour combined with boring objects from THINGS[3] database to eliminate the pleasantness effect.

Literature

[1] Poellinger, A., Thomas, R., Lio, P., Lee, A., Makris, N., Rosen, B. R., & Kwong, K. K. (2001). Activation and Habituation in Olfaction—An fMRI Study. *NeuroImage*, 13(4), 547–560. <https://doi.org/10.1006/nimg.2000.0713>

[2] Hebart, M. N., Dickter, A. H., Kidder, A., Kwok, W. Y., Coriveau, A., Wicklin, C. V., & Baker, C. I. (2019). THINGS: A database of 1,854 object concepts and more than 26,000 naturalistic object images. *PLOS ONE*, 14(10), e0223792. <https://doi.org/10/gjzf9s>

[3] Bestgen, A.-K., Schulze, P., & Kuchinke, L. (2015). Odor Emotional Quality Predicts Odor Identification. *Chemical Senses*, 40(7), 517–523. <https://doi.org/10.1093/chemse/bjv037>

