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Exploring the Impact of Food Choice on Brain Responses to Sweet Drinks using fMRI

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Eating behavior is influenced by automatic responses to contextual food cues[1]. For example, the easy availability of tasty foods can stimulate eating behaviors by enhancing the reward experience. Such working hypothesis is supported by a previous study demonstrated that providing choice resulted in higher levels of both food liking and food intake compared to situations where individuals were randomly assigned a dessert option[2]. To address this issue, we conducted a study involving human participants who were asked to assess the pleasantness of sweet commercial beverages in both repeated free-choice and forced-choice conditions. Participants judged pleasantness after drinking sweet commercial beverages in repeated free- and forced-choice conditions. High-resolution fMRI and multivariate pattern analysis techniques [3,4] were employed to examine how choice influenced the spatial patterns that encode categorical information related to the drinks (taste/flavor, likings). By utilizing actual tasteful stimuli instead of relying on food images [5], our results point at population-level several significant modulations of cortical representations due to choice.

To identify the network of brain regions associated with a specific aspect of food behavior, it is necessary to measure variables that can be categorized into distinct behavioral categories. Are the likings measured during an fMRI experiment reliable enough to accurately define categories of pleasantness and subsequently decode the brain's reward-related subprocesses at the individual level and what could be done to enhance their validity ?

1. Cohen DA, Babey SH. Contextual influences on eating behaviours: heuristic processing and dietary choices: Contextual influences on eating behaviours. *Obes Rev*. 2012;13(9):766-779. doi:10.1111/j.1467-789X.2012.01001.x

2. Parizel O, Sulmont-Rossé C, Fromentin G, et al. The structure of a food product assortment modulates the effect of providing choice on food intake. *Appetite*. 2016;104:44-51. doi:10.1016/j.appet.2015.11.018

3. Kriegeskorte N, Goebel R, Bandettini P. Information-based functional brain mapping. *Proc Natl Acad Sci*. 2006;103(10):3863-3868. doi:10.1073/pnas.0600244103

4. Kriegeskorte N, Douglas PK. Interpreting encoding and decoding models. *Curr Opin Neurobiol*. 2019;55:167-179. doi:10.1016/j.conb.2019.04.002

5. Yeung AWK. Affective value, intensity and quality of liquid tastants/food discernment in the human brain: An activation likelihood estimation meta-analysis. 2018:11.