

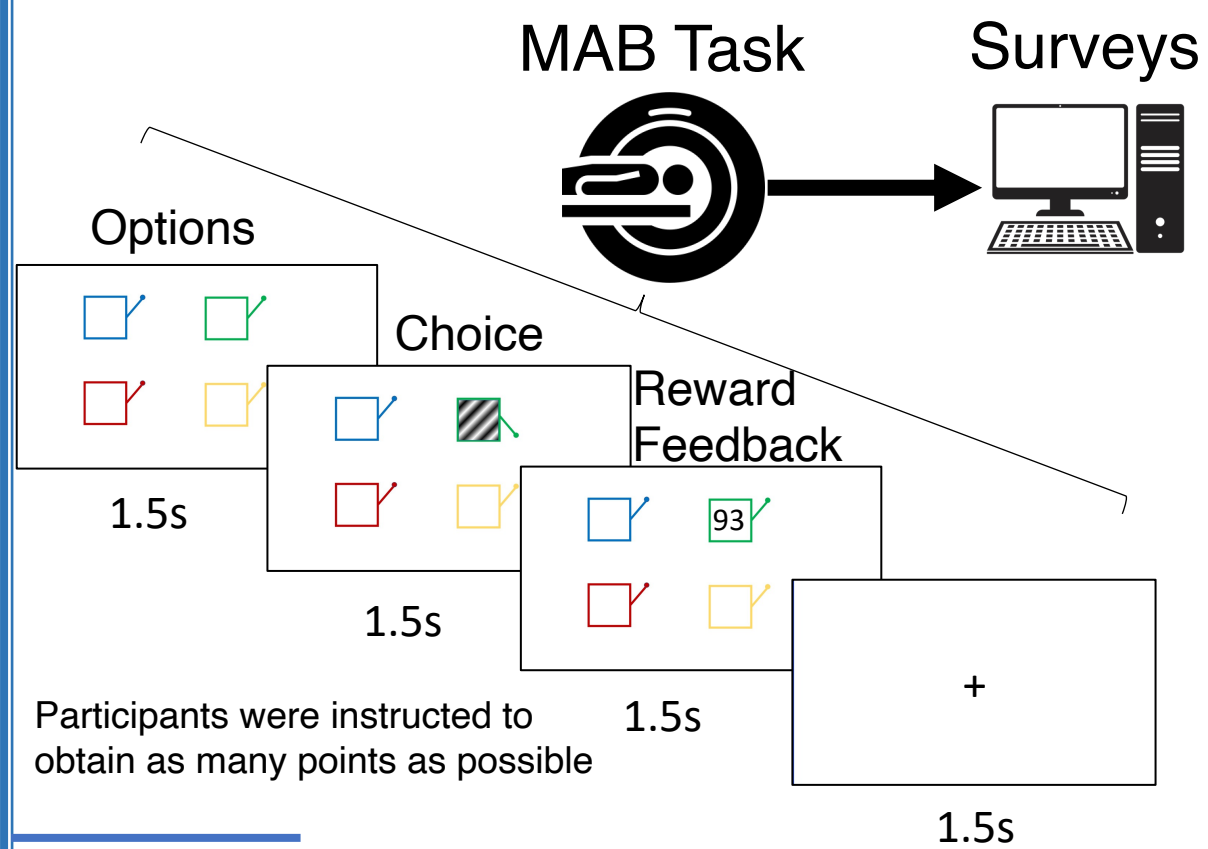
Predicting personality from representations of uncertainty in the brain

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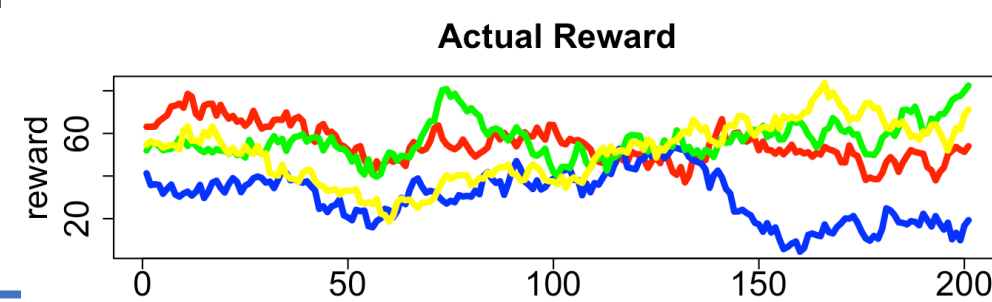
Introduction

Personality has been posited as the fundamental differences in the strategies that people use to achieve their goals¹
Does personality covary with behavioral strategies and neural activity during a multi-armed bandit task (MAB)?

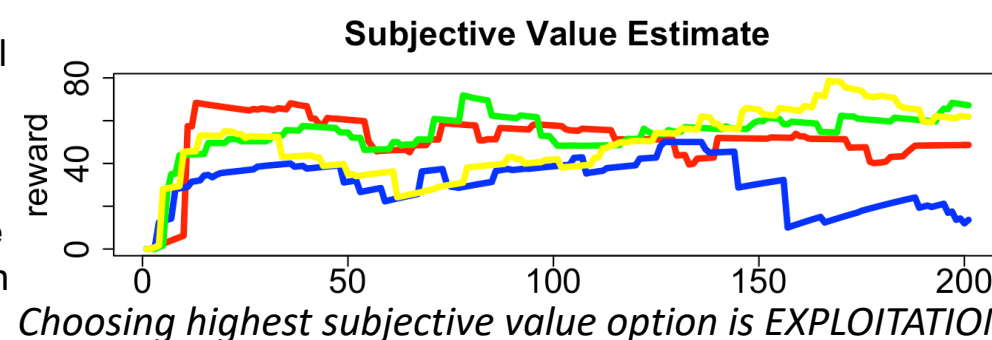
Multi-armed bandit task (MAB)



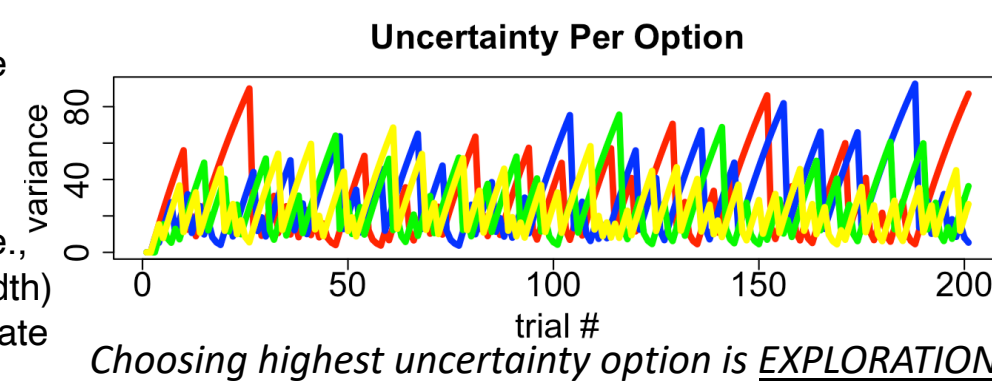
Optimal option changed over time to discourage choosing the same option every trial



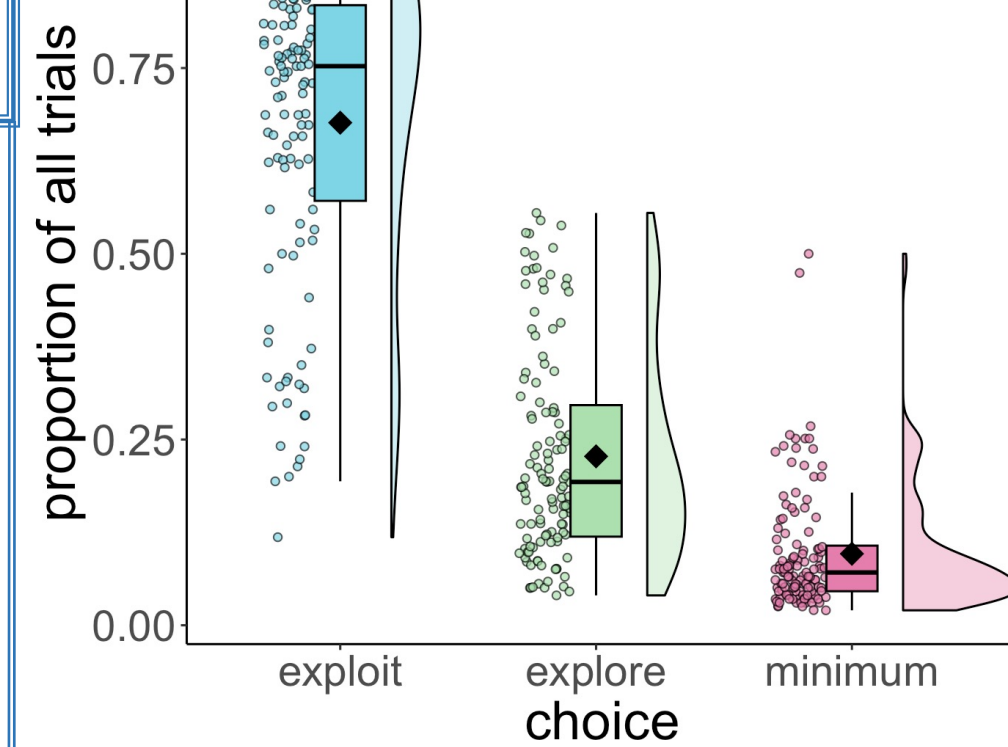
We used a reinforcement learning model to capture people's subjective value estimate for each option on each trial



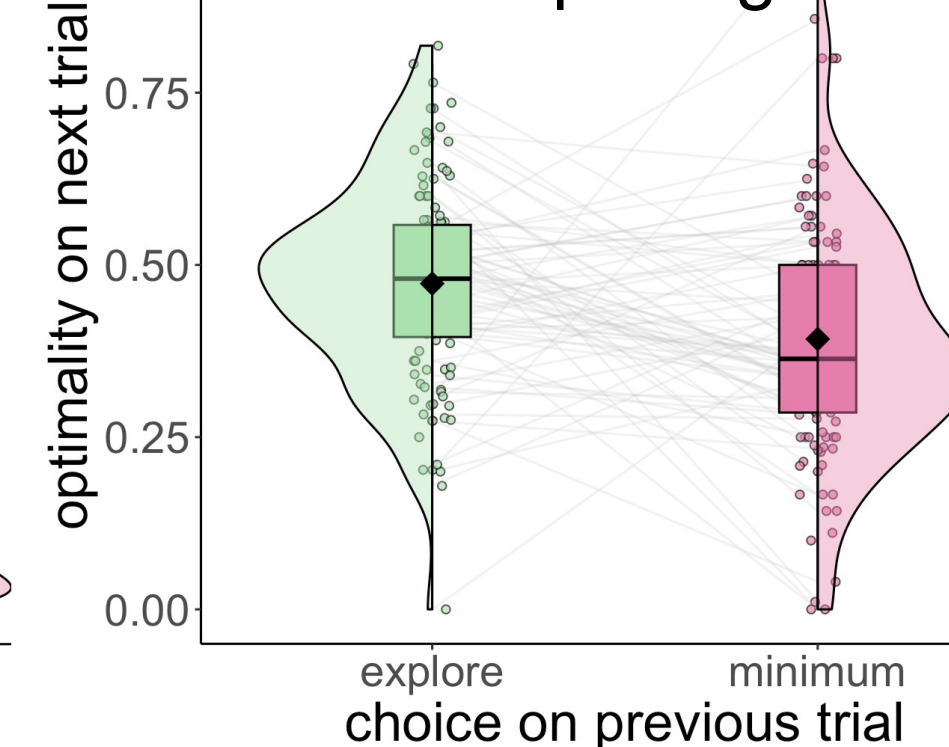
The model's predictions are distributions, allowing us to model one's uncertainty (i.e., distribution width) for each estimate as well



Distribution of Choice Types



Benefit of Exploring

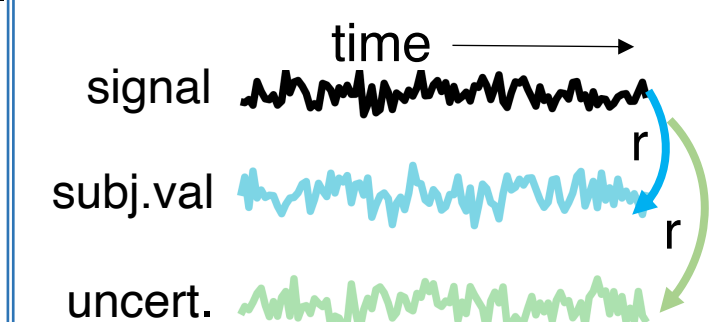


No Relationship between MAB behavior & Personality

Optimal Choice on trial t after Choosing Minimum Option on trial $t-1$	0.05	0.01	-0.07	0.08	0.02	0.18	-0.03	0.25	0.03	-0.08	-0.07
Optimal Choice on trial t after Exploring on trial $t-1$	0.15	0.02	0.04	0.01	-0.02	-0.05	-0.09	-0.01	-0.02	0.13	0.01
Proportion of Minimum Value Option Choices	-0.07	-0.1	-0.05	-0.06	-0.11	0.08	0.11	-0.06	0.1	0.09	0.03
Proportion of Exploratory Choices	0.01	-0.25	-0.17	-0.15	-0.21	0.05	0	-0.17	0.06	0.18	-0.03
Proportion of Exploitation Choices	0.02	0.2	0.14	0.12	0.18	-0.06	-0.04	0.14	-0.08	-0.15	0.01
	Avoidance Behavior	Approach Behavior	Drive	Fun-seeking	Reward-seeking	Impulsivity	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness

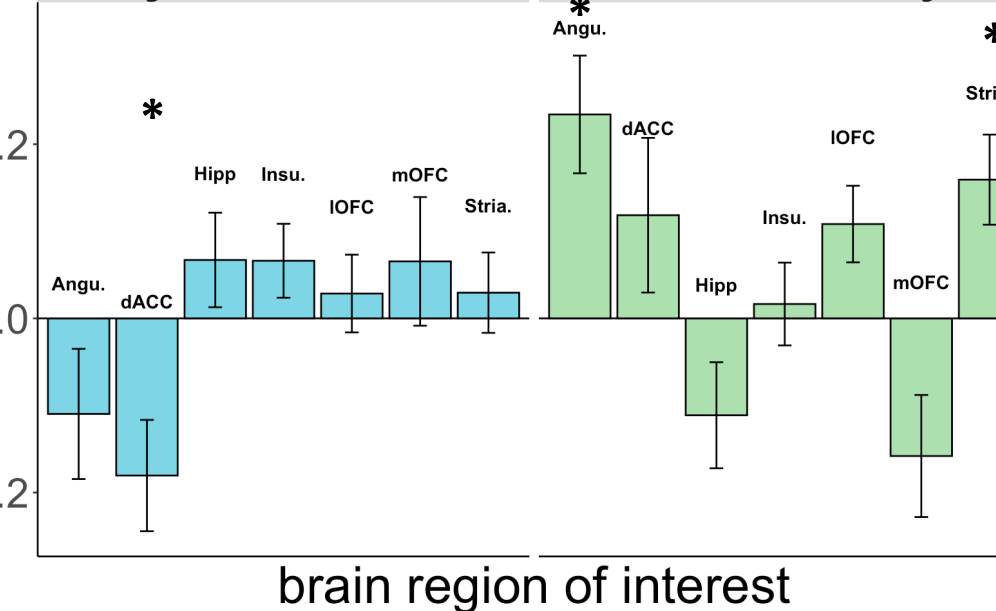
correlation scale: 0.2, 0.1, 0.0, -0.1, -0.2

Does the brain track subjective value and uncertainty?

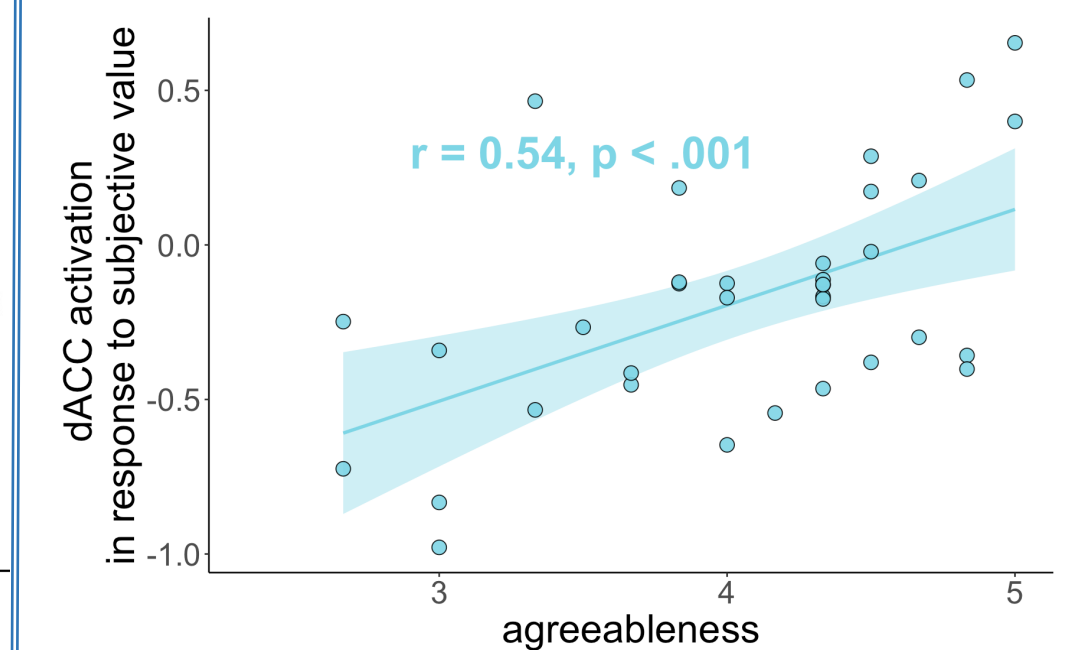


effect of regressor on neural activity (β s)

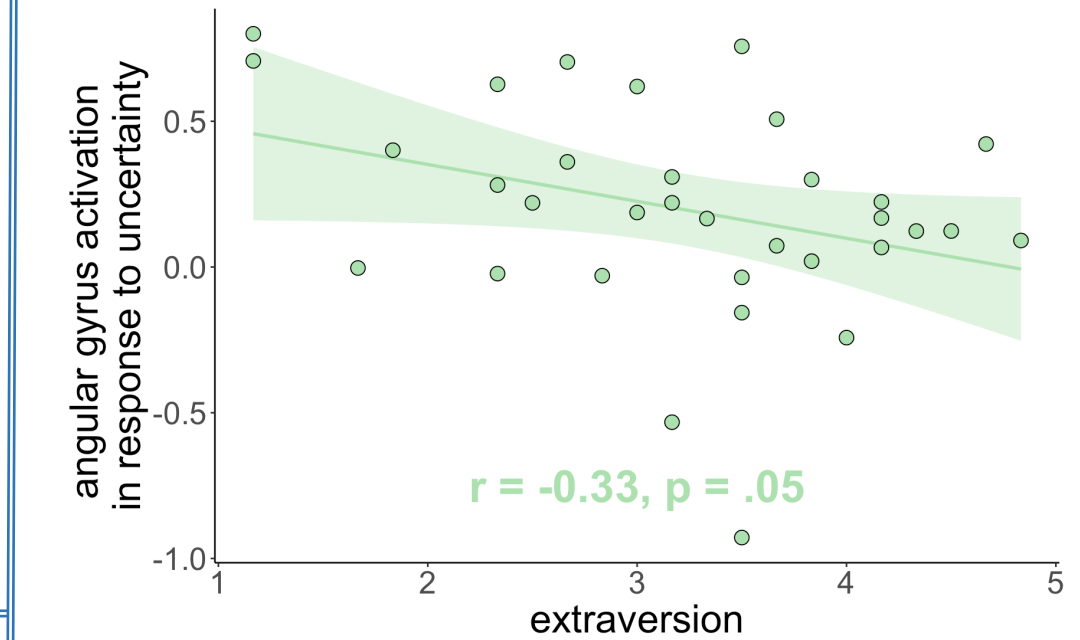
subjective value uncertainty



Does neural activity tracking subjective value and uncertainty predict personality?



dACC signal negatively correlates with value, but only in participants with lower agreeableness scores



Angular gyrus tracks uncertainty, but only in introverts; extraverts have reduced uncertainty signal

Discussion

Neural signals of value and uncertainty during reinforcement learning may covary with personality traits

References: ¹Buss, DM (1991), *Ann Rev Psychol*, 42: 459-91; ²Vassena, E et al (2017), *Front. Neuro*, 11(316); ³Dezza, IC et al. (2022), *eLife*, 11,e66358; ⁴Dohmatob, E et al. (2020), *Hum. Brain Mapp.*, 41; ⁵Brandman, T et al. (2021), *Comm. Bio.*, 4:79.