Saivydas Villani1,2, Ahmadreza Tajari3, Katherine R. Storrs4, Reuben Rideaux5, Thomas S. A. Wallis6,7, William J. Harrison8, Roland W. Fleming7,9, Guido Maiello1 AFFILIATIONS 1University of Southampton, 2Aarhus University, 3Forschungszentrum Jülich, 4University of Auckland, 5The University of Sydney, 6Technical University of Darmstadt, 7Centre for Mind, Brain and Behaviour (CMBB), Universities of Marburg, Giessen and Darmstadt, 8University of the Sunshine Coast, 9Justus Liebig University Giessen





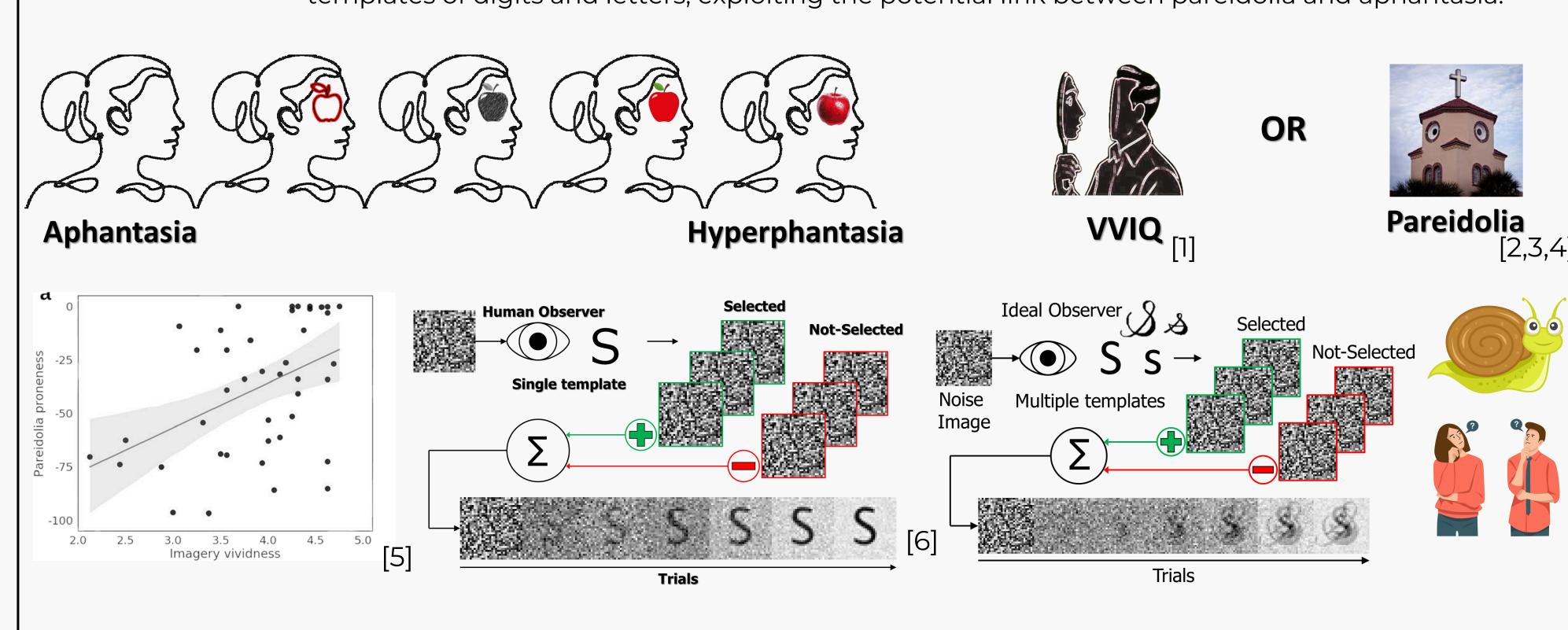
Training Trials

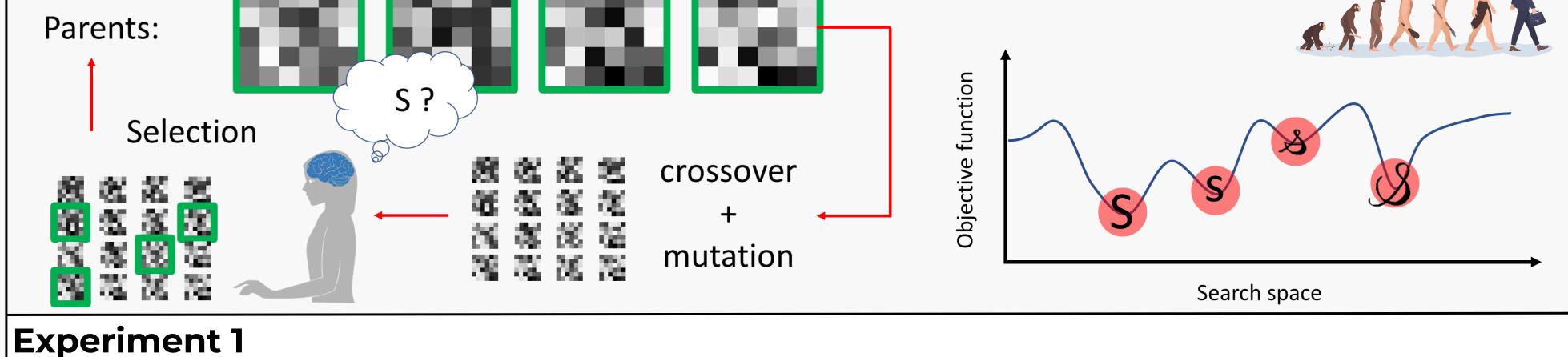


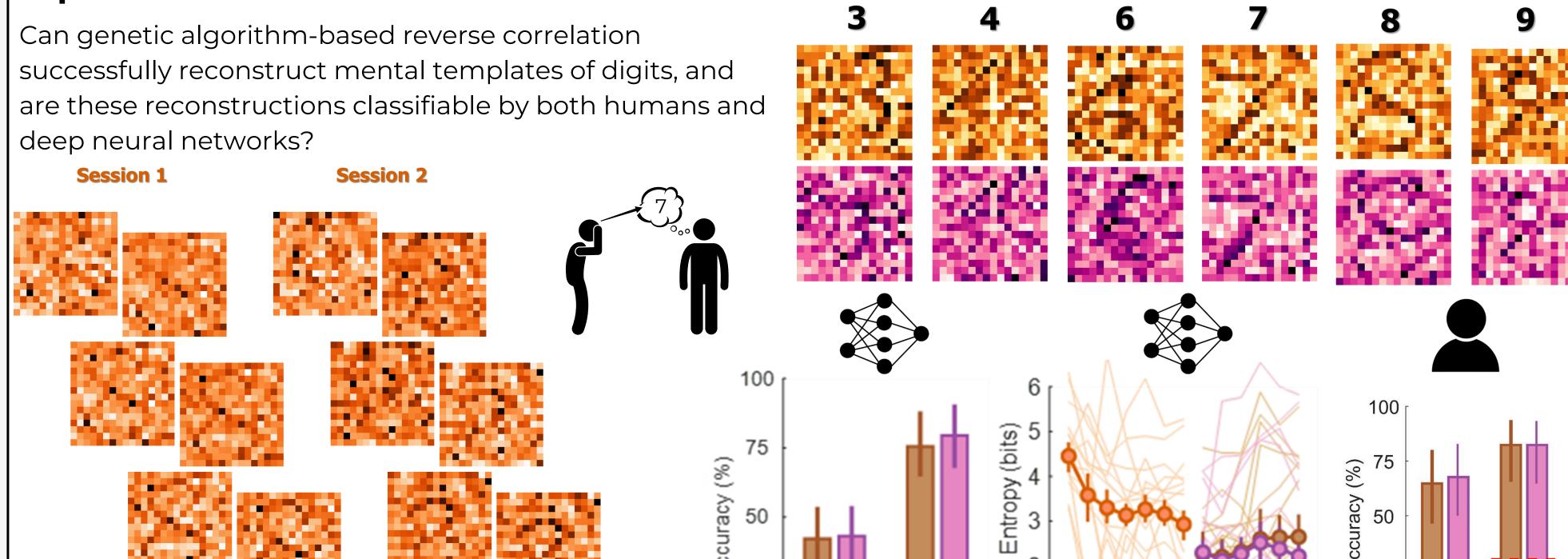
## Decoding Mental Images: Combining Pareidolia, Genetic Algorithms, and Deep Learning for Objectively Quantifying Mental Imagery

## Background

Aphantasia, the inability to form voluntary mental images, has primarily been assessed through self-report methods. This study explores objective assessment techniques by developing a pareidolic-visual task using genetic algorithm-based reverse correlation to reconstruct mental templates of digits and letters, exploiting the potential link between pareidolia and aphantasia.







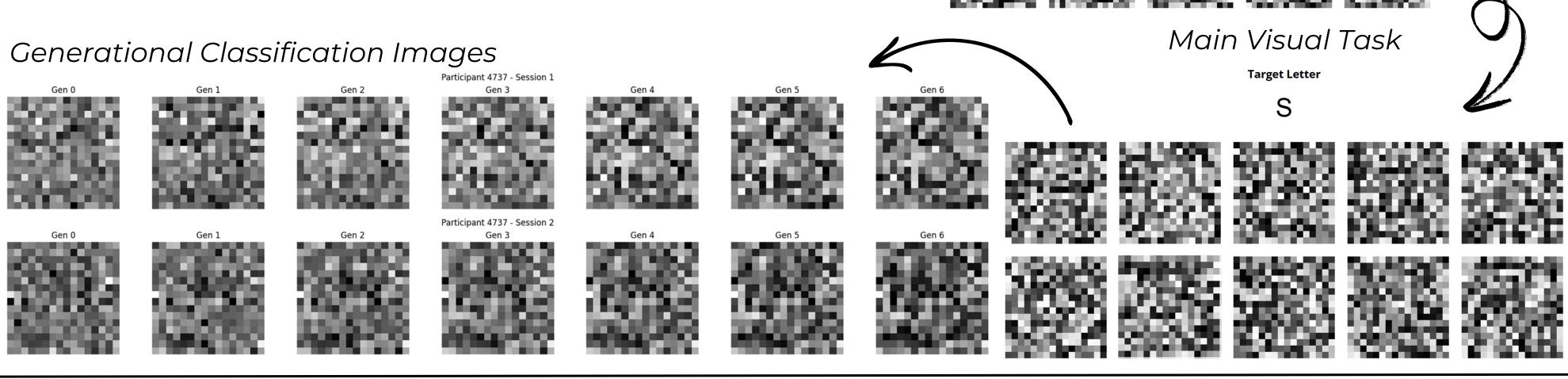
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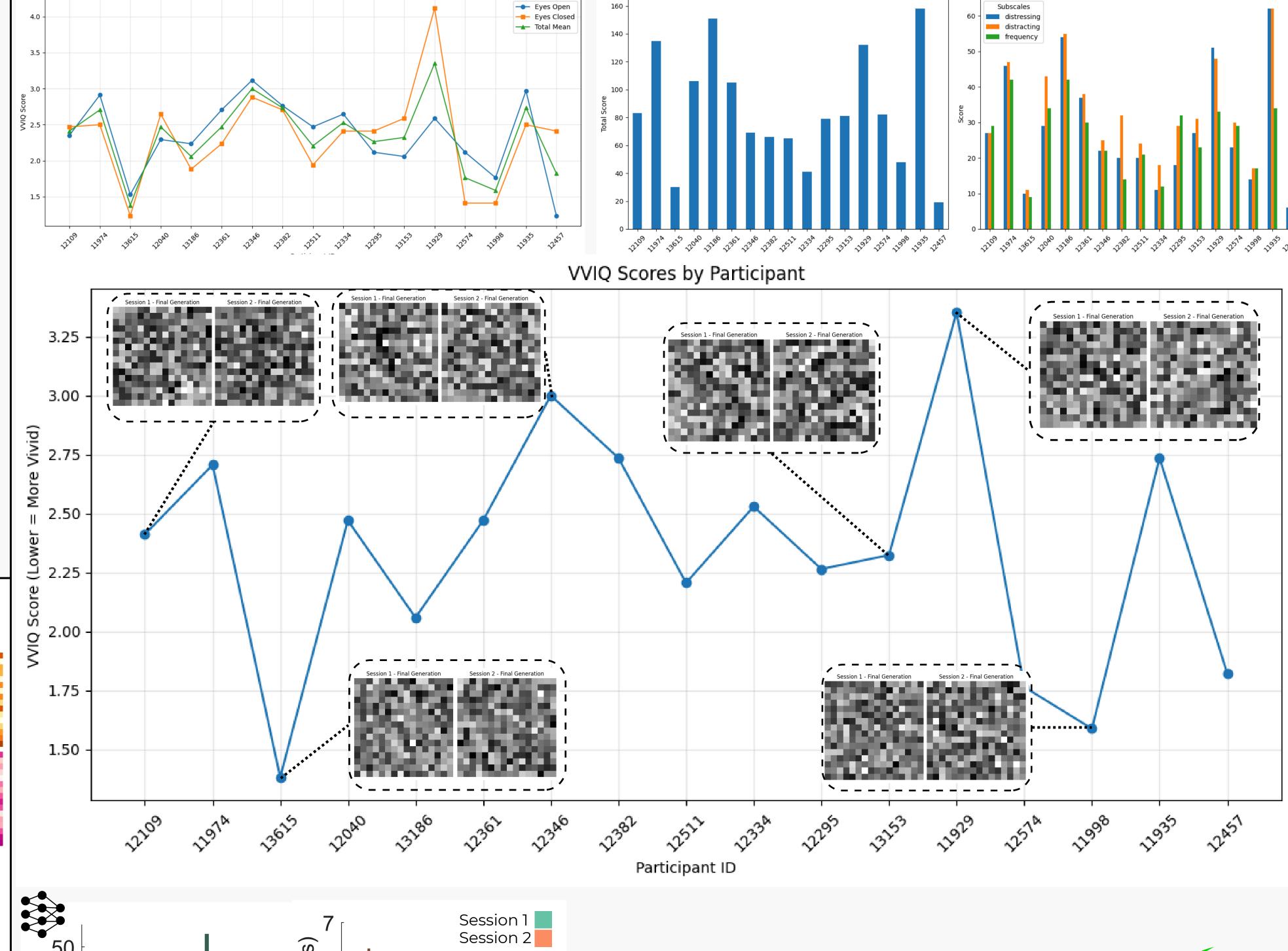
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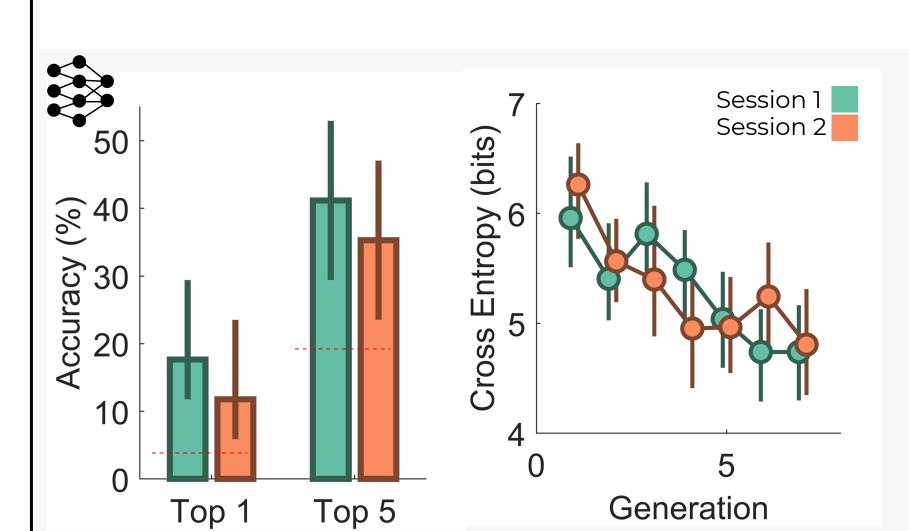
Generation

## Experiment 2 Building upon Exp1's findings that GA reverse correlation can reconstruct mental templates, Exp2 aims to disentangle the relationship between reconstructions and mental visual imagery. By enforcing a single template and providing a

target example, we investigate whether self-report markers of mental imagery predict reconstruction quality.







Could participants reconstruct the letter 'S'?

Can this letter be classified by DNNs?

Are these reconstructions related to self-reported vividness of mental imagery?





<sup>[3] -</sup> D. S. Schwarzkopf, "What is the true range of mental imagery?," Cortex, vol. 170, pp. 21-25, 2024. [4] - L. N. Bouyer and D. H. Arnold, "Deep Aphantasia: a visual brain with minimal influence from priors or inhibitory feedback?," Frontiers in Psychology, vol. 15, Article 1374349, 2024.

Faster than Standard Reverse Correlation? 🗸

Able to reconstruct mental templates? 🗸

At all related to mental visual imagery? 🚜

Top 3

Results