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Is the dorsal stream engaged in object shape recognition? A ccPAS Registered Report study

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One of the most influential models of visual information processing describes the dorsal visual pathway as not involved in object perception. However, growing evidence highlights the engagement of the dorsal stream in processing some object proprieties, such as global shape. Therefore, there is a lively debate concerning the role of the dorsal stream in this context.

Our work aims to disentangle the contribution of the dorsal stream to object shape recognition by strengthening V1-to-SPL dorsal stream connectivity through an individualized tractography-based cortico-cortical paired associative stimulation (ccPAS) protocol. Moreover, we will investigate whether the behavioral performance in object shape recognition is associated with the anatomo-structural (DTI) and effective (TMS-EEG) connectivity of the dorsal pathway.

Dorsal stream connectivity will be modulated using a ccPAS protocol targeting the endpoint of the dorsal stream, with an inter-stimulus interval (ISI) of 9ms. The effect will be assessed by baseline corrected Inverse Efficiency Scores (IES) values of a two-alternative forced choice match-to-sample visual discrimination task (2AFC MTS), that discriminates global spatial arrangements and local features of objects. Then, we will test if structural and effective connectivity measures of the dorsal pathway can predict the behavioral performance. This study has been submitted as a Registered Report. Given these premises, if the dorsal pathway is involved in shape perception, we expect to observe a significant improvement in performance only in trials testing global shape processing after the ccPAS protocol. Also, we expect to find that structural and functional connectivity of the dorsal stream predict the behavioral performance.

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