

Effects of posterior-anterior shift in the aging brain on creativity: A combined ICA and resting-state fMRI study

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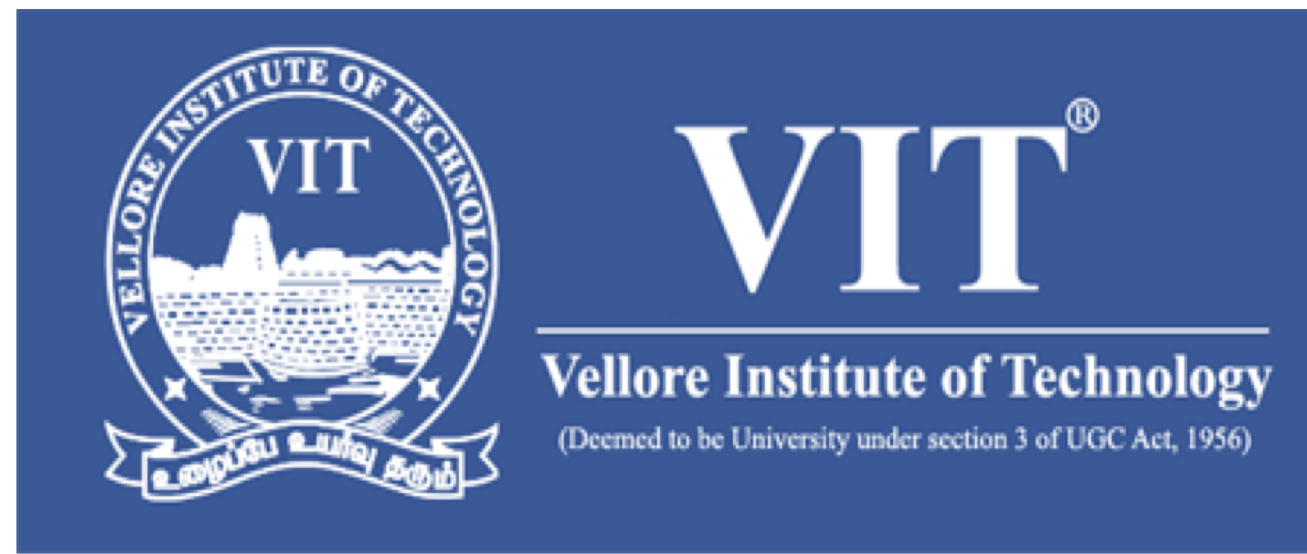
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AIMS

- To implement independent component analysis (ICA) to decompose the resting state fMRI data into resting state networks (RSNs),
- To understand effects of posterior-anterior shift in aging (PASA) on creative brain
- To investigate the role of cerebellum in creativity for younger and older adults.

INTRODUCTION

- Creativity: mental ability to produce unusual but useful thoughts which help to solve problem¹.
- Posterior-anterior shift in aging: the effect of aging during a task based fMRI study².
- The association between creative cognition and cerebellum is unknown.
- Previous resting-state fMRI (rs-fMRI) findings suggested involvement of the default mode network (DMN) and salient network during a particular creative task like AUT and at rest^{3,4}.

MATERIALS AND METHODS

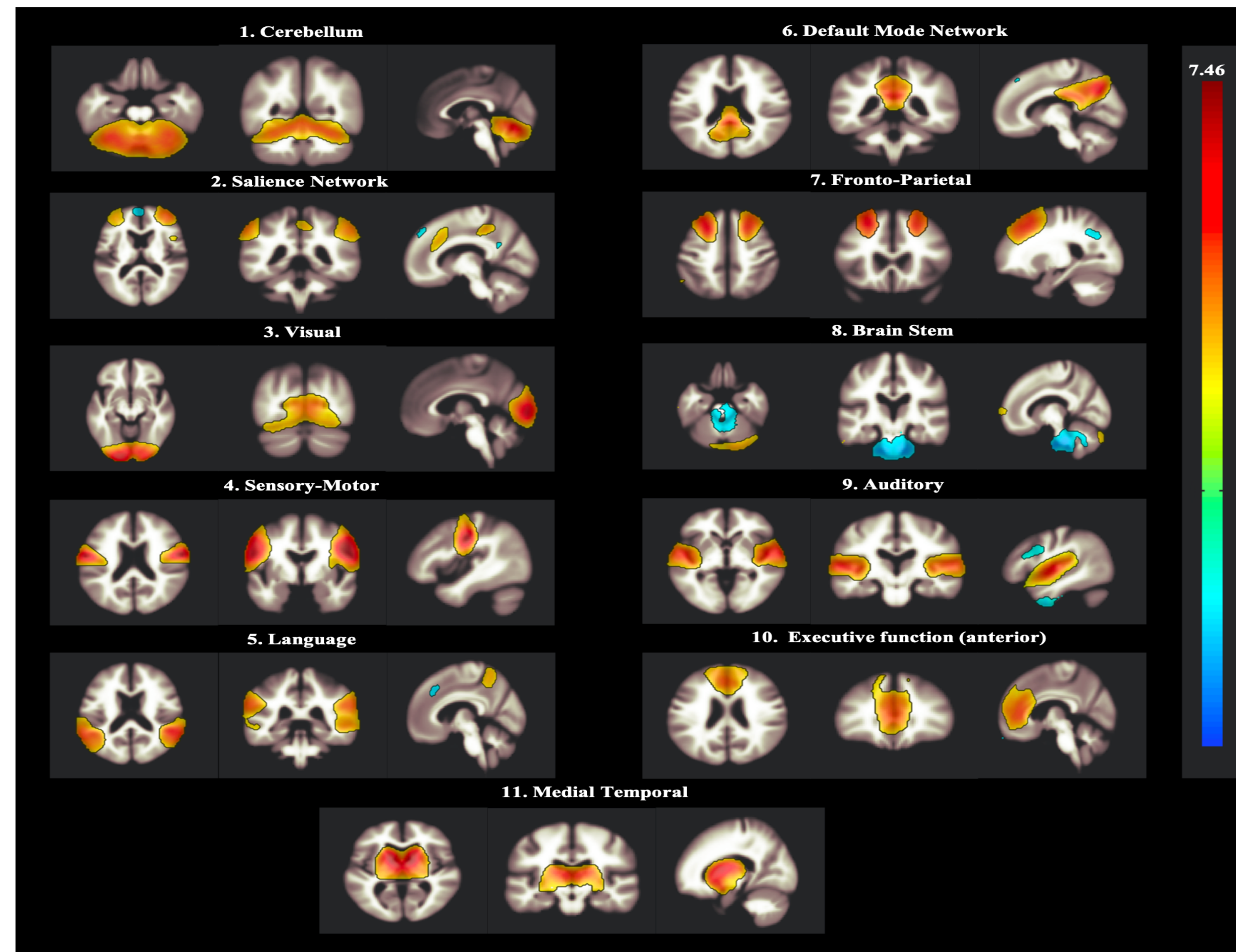
MRI Parameters and Images Processing

- A 3T Siemens MRI Scanner (magnetron Trio, Siemens, Germany) for fMRI data acquisition.
- TR/TE: 2000ms /30 ms
- The functional data was slice time corrected, motion corrected and normalized spatially using MNI template and smoothed using 8 mm³ Gaussian kernel FWHM. All the fMRI data was pre-processed and analyzed in CONN using MATLAB 2018b.
- Group-ICA was used to decompose the rs-fMRI data and various resting state networks were identified. The number of components chosen was 30.
- The rs-fMRI data was band pass filtered between 0.008Hz to 0.09Hz.
- Functional connectivity measures were calculated and ROI analysis was performed on the obtained RSNs.

Participants

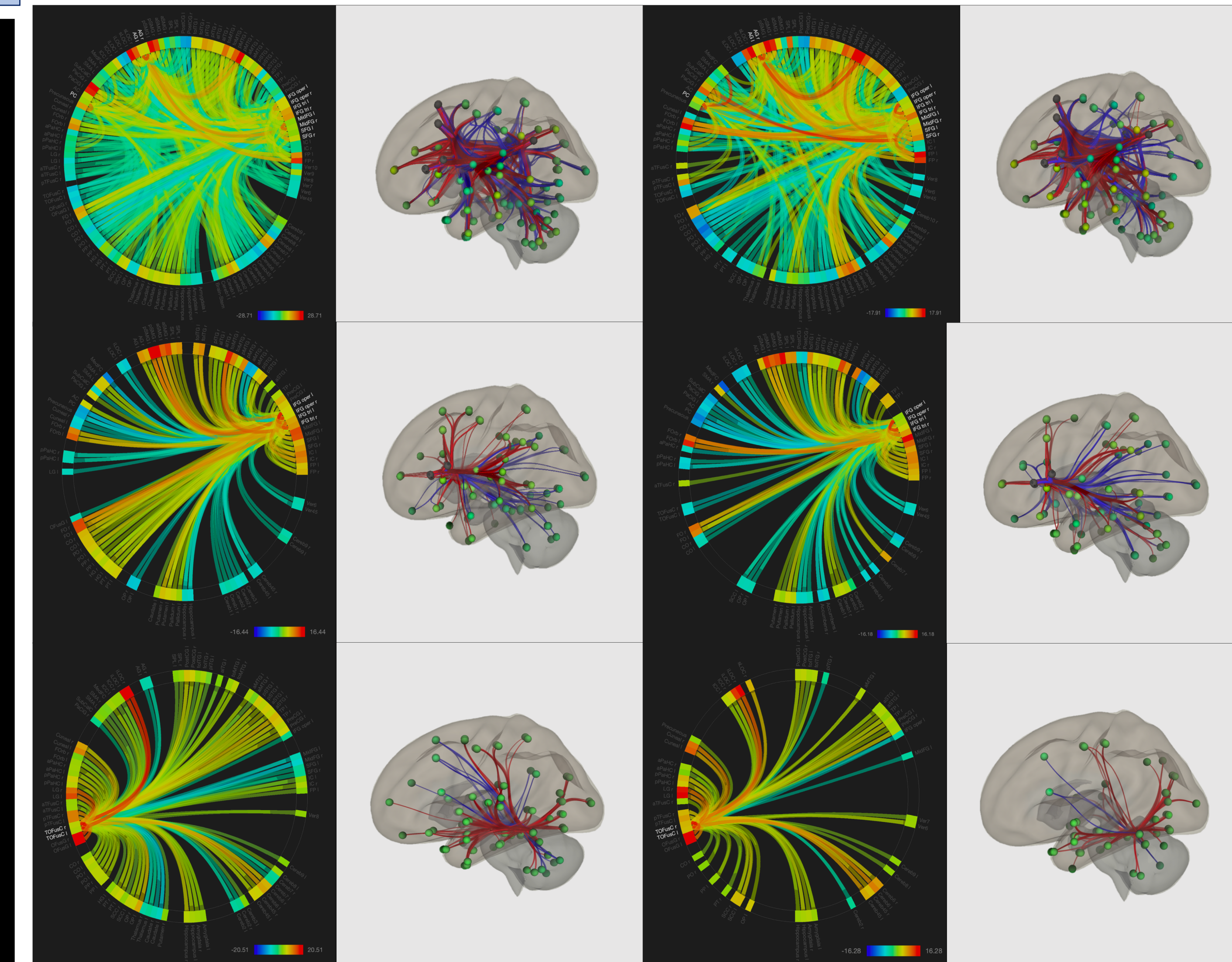
- 34 Older adults (24 females) & 21 Younger adults (10 females).
- Creativity assessment questionnaire was provided to the participants.

FUNCTIONAL MRI RESULTS



- The study exhibited reverse PASA effect indicating posterior activity in older adults and younger adults using frontal area.
- CAQ related connectograms demonstrated that older adults with higher CAQ scores indicated stronger connectivity.
- In the cerebellar regions, old adults tend to use more sub-regions to get an insight of a creative thought.
- Younger adults on the other hand use the pre-frontal cortex, parietal regions and a few cerebellar regions.

RESULTS



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