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

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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 to solve problem[1].
- Posterior-anterior shift in aging: the effect of aging during a task based fMRI study[2]
- 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[3,4]

## MATERIALS AND METHODS

### MRI Parameters and Images Processing
- A 3T Siemens MRI Scanner (magnetron Trio, Siemens, Germany) 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

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

## RESULTS
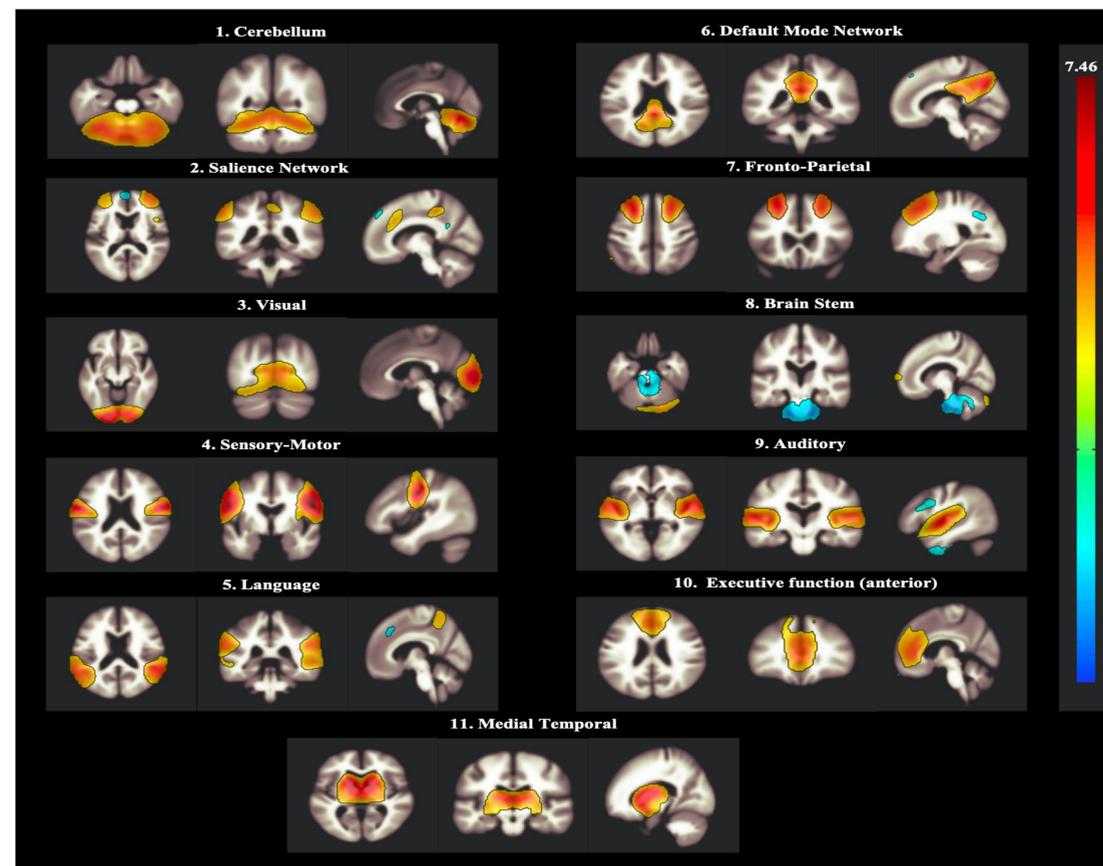


- CAQ-related connectograms demonstrated that older adults with higher CAQ scores showed stronger connectivity.
- In the cerebellar regions, old adults tend to use more sub-regions to get an insight of a creative thought.
- Younger adults on the other hand use the prefrontal cortex, parietal regions and sub-regions of cerebellum.
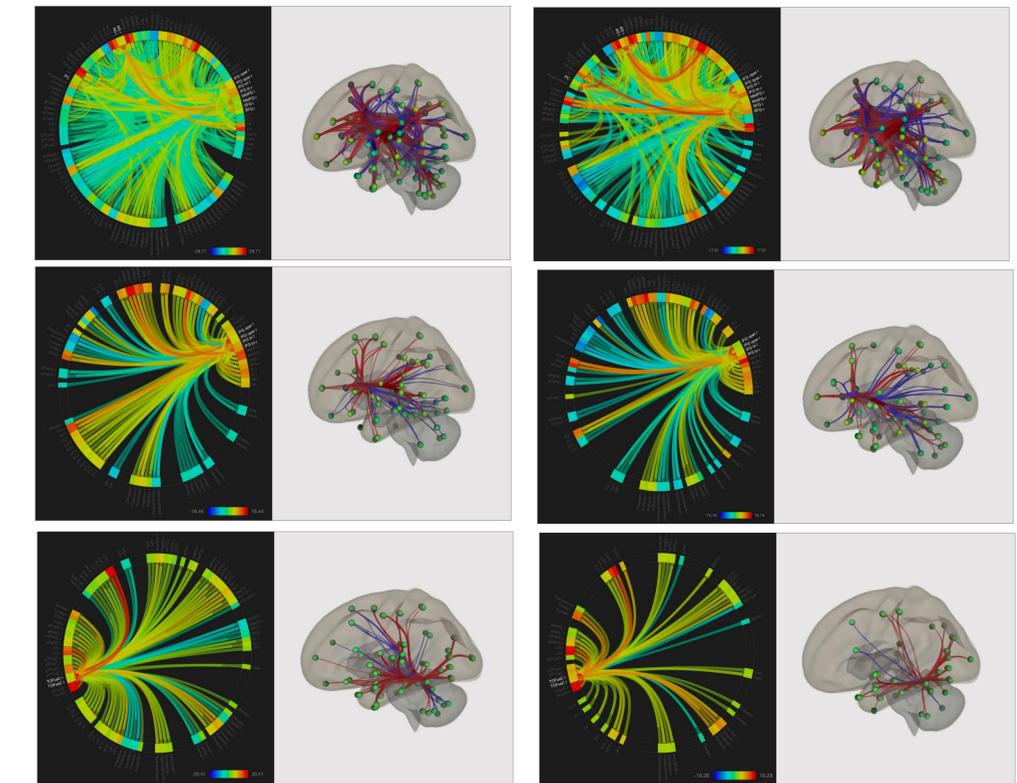
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