Context

- The base of proper cognitive functioning is the dynamic interaction between different neuropsychological domains [1].
- There is anatomical evidence suggesting the connections between regions engaged in episodic memory and language [2].
- Lesions in language regions can manifest in memory domains [3].
- Language and memory networks converge towards integrative hubs mainly in the left temporal lobe [4] so joint language-and-memory deficits are especially common in temporal lobe epilepsy patients [5].

GE2REC protocol and the results

1. Develop a protocol that would allow to assess language and memory in interaction and interplay.
2. Validate that the protocol can map language-and-memory network.

Methods

- Twenty right-handed subjects (9 females, M_age = 21) were tested with GE2REC protocol.
- The fMRI data were acquired at 3T MR imager.
- Functional runs: gradient-echo/TE2° weighted EPI method (42 adjacent axial slices parallel to the bicommissural plane, sequential mode, slice thickness: 3mm, voxel size 3x3 mm, TR = 2.5 s, TE = 30ms, flip angle = 82°).
- Anatomical scan: 3D T1-weighted high-resolution using a 3D T1TFE (field of view = 256 × 256 × 160 mm; resolution: 1 × 1 × 1 mm; acquisition matrix: 256 × 256 pixels; reconstruction matrix: 256 × 256 pixels).
- Data processing:
  - Spatial pre-processing steps (SPM12)
  - Statistical analyses: GLM first level → second level
  - Behavioural data analysis – correct recognition/rejection during the recognition run.

Conclusions

- Results corroborate the ability of GE2REC to robustly activate a fronto-temporo-parietal language network together with temporal mesial, prefrontal and parietal cortices during memory tasks.
- Activations during recognition may reflect employment of verbal strategy which backs up the difficulty to disentangle language and memory processes.
- The results could suggest that hippocampus connects the language-and-memory network.
- GE2REC is useful because it:
  - requires interaction of language-and-memory processes and jointly maps their neural basis (Fig.5);
  - explores encoding and retrieval, managing to elicit activation of mesial temporal structures;
  - is short and easy to perform, hence being suitable for clinical settings in addition to fundamental research;
  - has an ecological dimension in terms of tasks;
  - can be particularly important for patients with temporal lobe epilepsy.

References


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