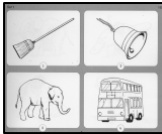**Some recent work …**

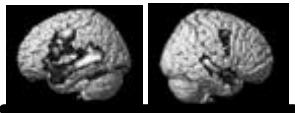**Structural and functional correlates of vocabulary knowledge**

Richardson *et al.* (in press) Journal of Cognitive Neuroscience

- Cross-sectional lifespan trajectory 7 to 75 years
- Structure **and** function
  – Functional tasks: listening to and reading sentences and words
  – Vocabulary task:
  British **P**icture **V**ocabulary **S**cale – II **(BPVS-II)**

**Correlation between vocabulary and activation**

activation for sentences

- Functional activation processing sentences and words

- Correlation between vocabulary knowledge and brain activation for sentences and words
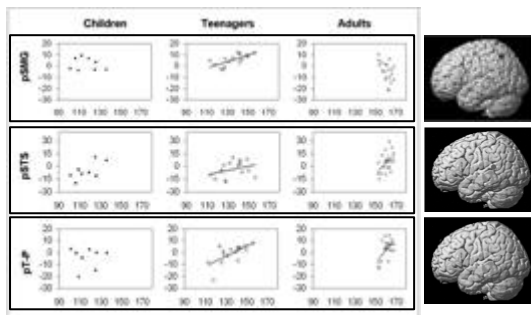
Structural analysis

- **pSMG Region of Interest (ROI):** Significant positive correlation between vocabulary score and grey matter density in **adolescents only,** the pSMG was **not detected across lifespan**

Structural analysis of adolescents — pSMG
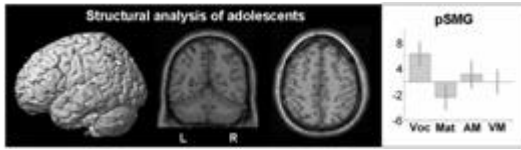
Structural and functional analyses across lifespan

Analyses across lifespan — Functional activation — Grey matter — pSTS — pT-P
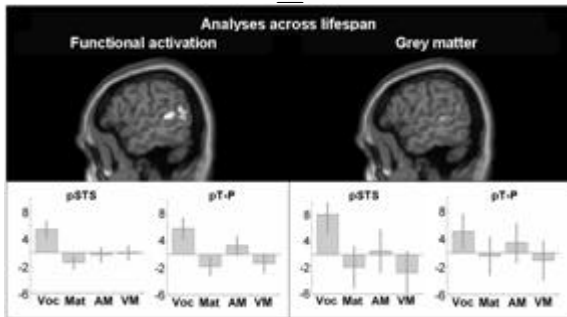
Vocabulary and brain structure: lifespan trajectories

Children — Teenagers — Adults — pSMG — pSTS — pT-P

**Could the age effects account for
different trajectories in temporal and
parietal regions across lifespan?**

Change in grey matter density over age
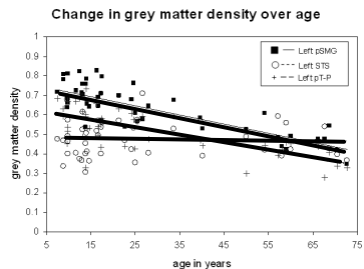
Results Summary

- **3 Regions:**
  - **pSMG:** structural adolescents only (no functional activation in pSMG)
  - **pT-P:** structural and functional across lifespan
  - **pSTS:** structural and functional across lifespan

- **Contrasting temporal and parietal effects**
  - *Explanation?*

    the effects in temporal and parietal areas are driven by different modes of learning

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- left pT-P area is linked to syntactic and semantic processing
- the pSTS interfaces between semantic associations and speech production

  - Increased functional activation and grey matter density in the temporal regions for those with high vocabulary may reflect learning by context.

- left pSMG is only active during tasks that involve word learning rather than passive tasks, and correlated with grey matter in adult bilinguals and teenage monolinguals

  - Learning by lexical or conceptual equivalents