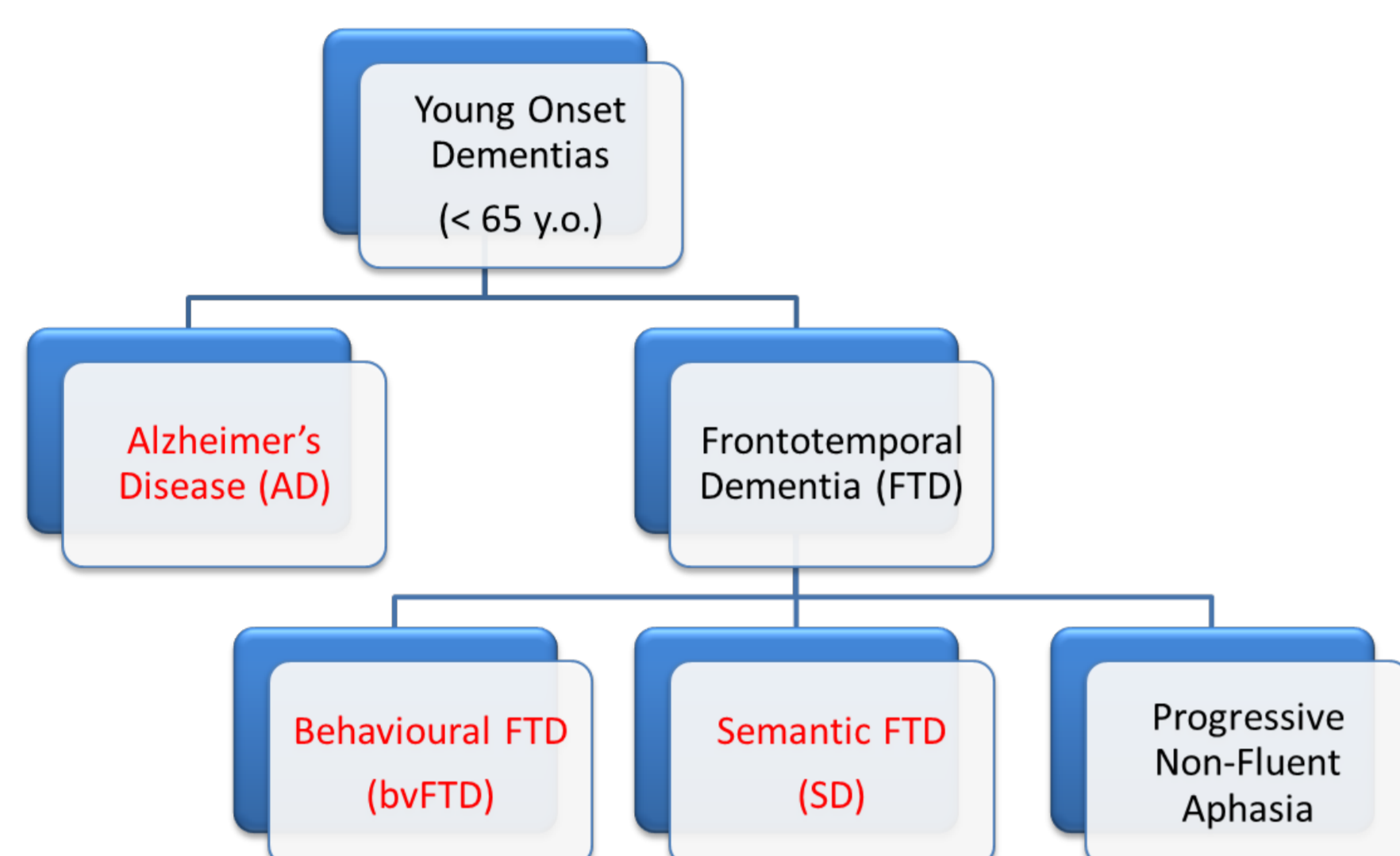




### Background



- AD is the most common form of dementia, typically present with marked memory deficits
- Patients with bvFTD also show memory impairment resulting in diagnostic uncertainty with AD
- Spatial disorientation appears to be unique to AD, but lacks sensitive diagnostic tests

### Aims of the Study

- Develop an ecologically valid assessment of spatial orientation for patients with dementia
- Compare spatial orientation performance in AD and FTD
- Identify neural correlates of spatial orientation

### Method

- 58 patients and 23 controls, matched for age & education
- 20 AD, 24 bvFTD, 14 SD
- Cognitive assessment: ACE-R, RAVLT, RCFT, Digit Span
- Assessed for spatial orientation on experimental task
- High-resolution structural brain MRI analysed using voxel-based morphometry in FMRIB's Software Library (FSL)

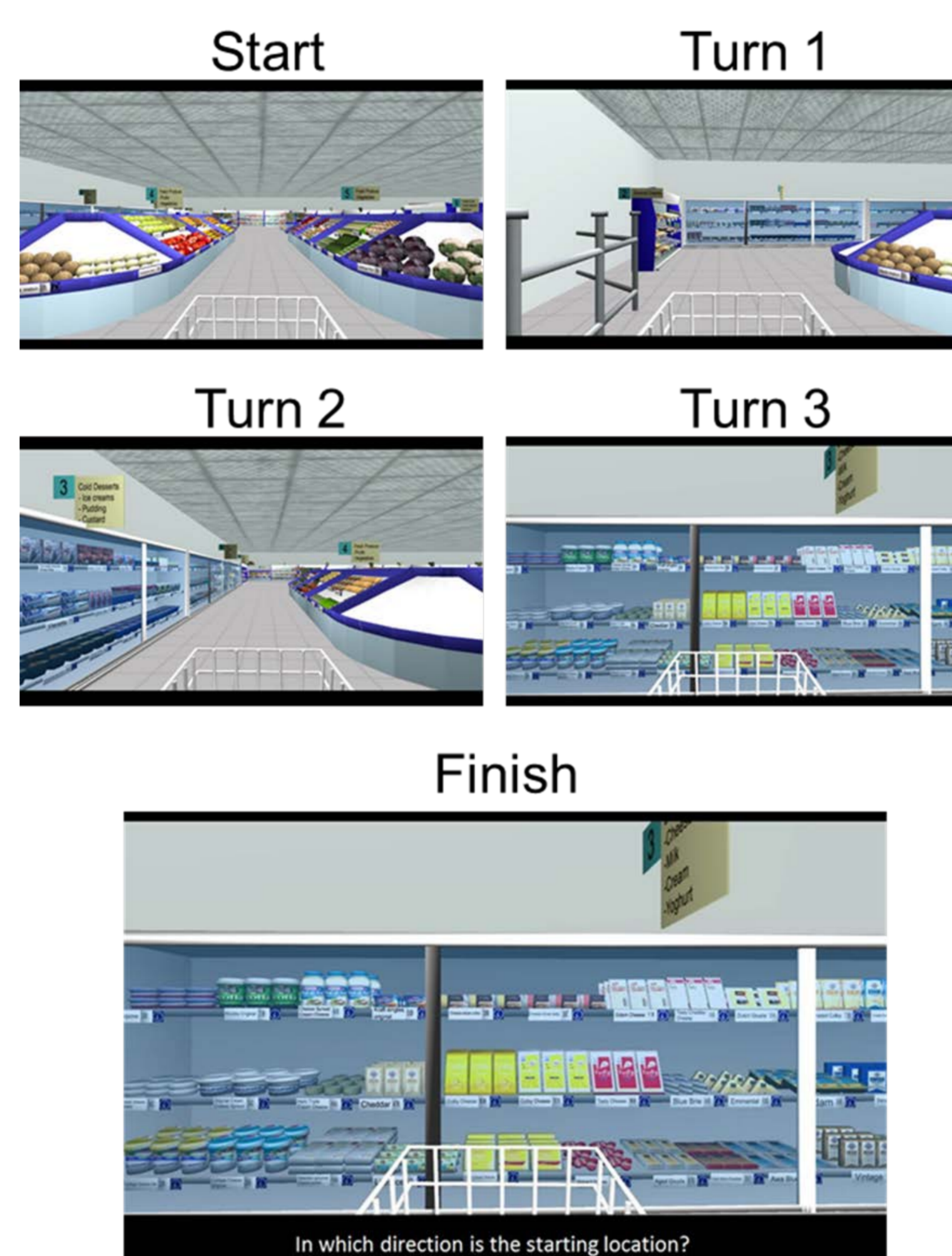
### Neuropsychological Performance

	AD (n = 20)	bvFTD (n = 24)	SD (n = 14)	Controls (n = 23)	Group Effect	AD vs. bvFTD
Age (y.o)	66 (8)	65 (9.3)	65 (8)	67 (3.4)	n/s	n/s
Education (yrs)	12 (3.3)	12 (3.1)	13 (1.9)	13 (3.1)	n/s	n/s
Disease Duration (yrs)	6 (4.8)	6 (4.3)	6 (1.9)	n/a	n/s	n/s
<b>ACE-R:</b>						
Total (/100)	70 (9.1)	82 (10.2)	63 (20.9)	96 (2.4)	*	*
Memory (/26)	12 (4.5)	19 (5.2)	14 (5.8)	24 (1.4)	*	*
Orientation (/10)	7 (2.1)	9 (1.3)	8 (2.7)	9 (0.3)	*	*
<b>RAVLT:</b>						
T1-5 (/75)	25 (6.9)	36 (11.3)	-	54 (8.6)	*	*
30min Delay (/15)	1 (1.6)	6 (4.1)	-	11 (2.4)	*	*
Recognition (/15)	10 (2.8)	11 (2.5)	-	14 (1.3)	*	n/s
<b>RCFT:</b>						
Copy (/36)	25 (7.7)	29 (5.6)	31 (2.6)	32 (3.4)	*	n/s
Delayed (/36)	3 (3.5)	11 (7.8)	12 (7.3)	19 (8.2)	*	*
<b>Digit Span:</b>						
Forward (/16)	8 (1.9)	9 (1.6)	9 (2.6)	11 (2.3)	*	n/s
Backward (/14)	4 (1.4)	5 (1.7)	6 (2.1)	8 (2.8)	*	n/s

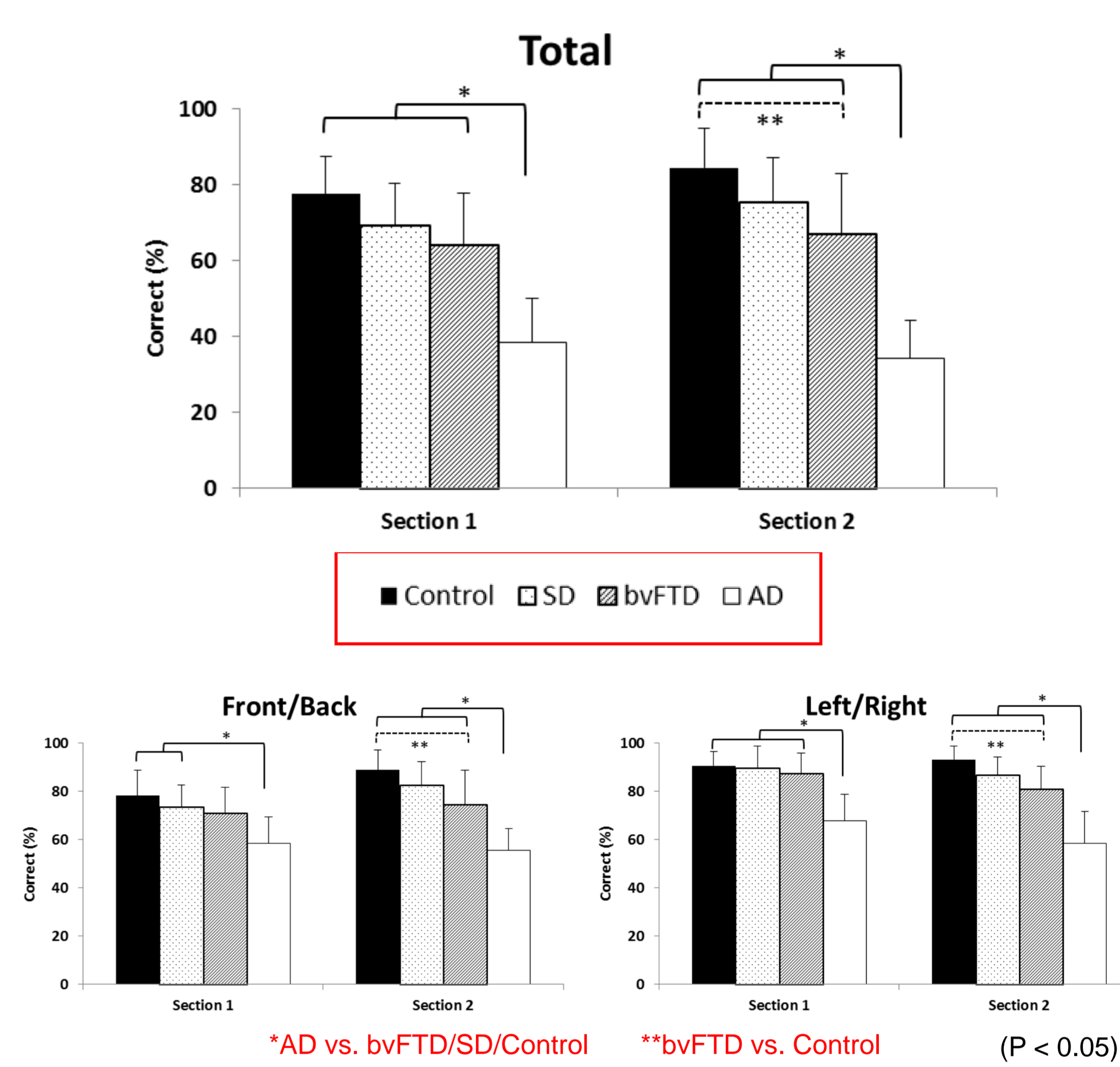
\* Indicates significance at P < 0.003

- Memory significantly impaired in AD and FTD patients

### Virtual Supermarket Task

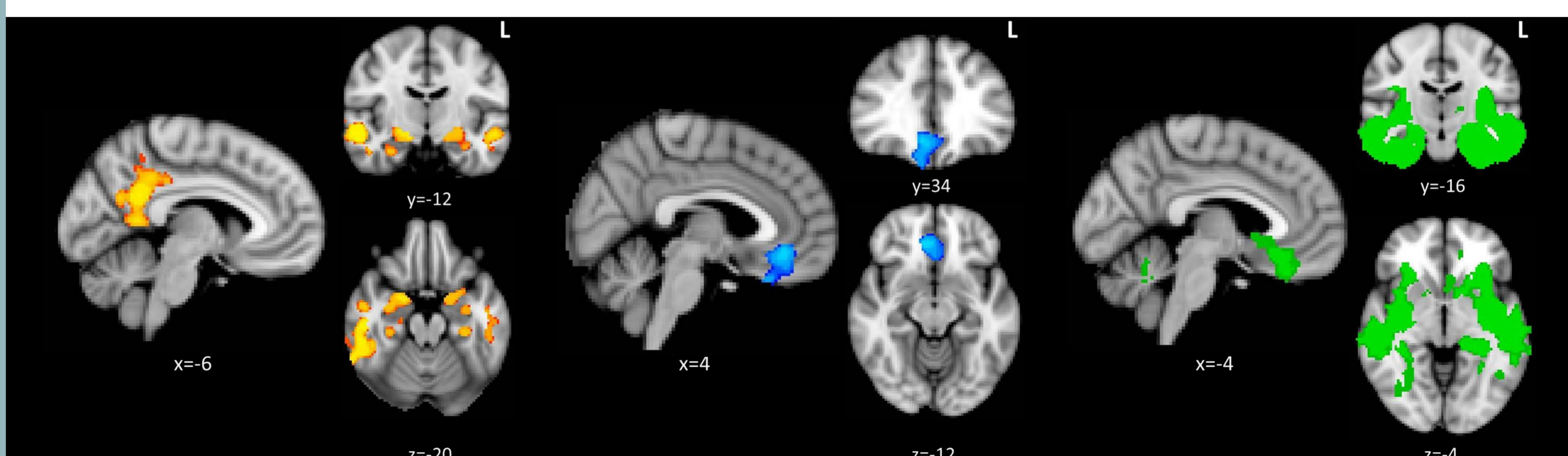


- Participants shown short videos moving through a supermarket
- Explicitly asked to keep track of direction
- 2 Sections with 7 trials each:
  - (1) 7, 20s, 3 turns
  - (2) 7, 40s, 5 turns

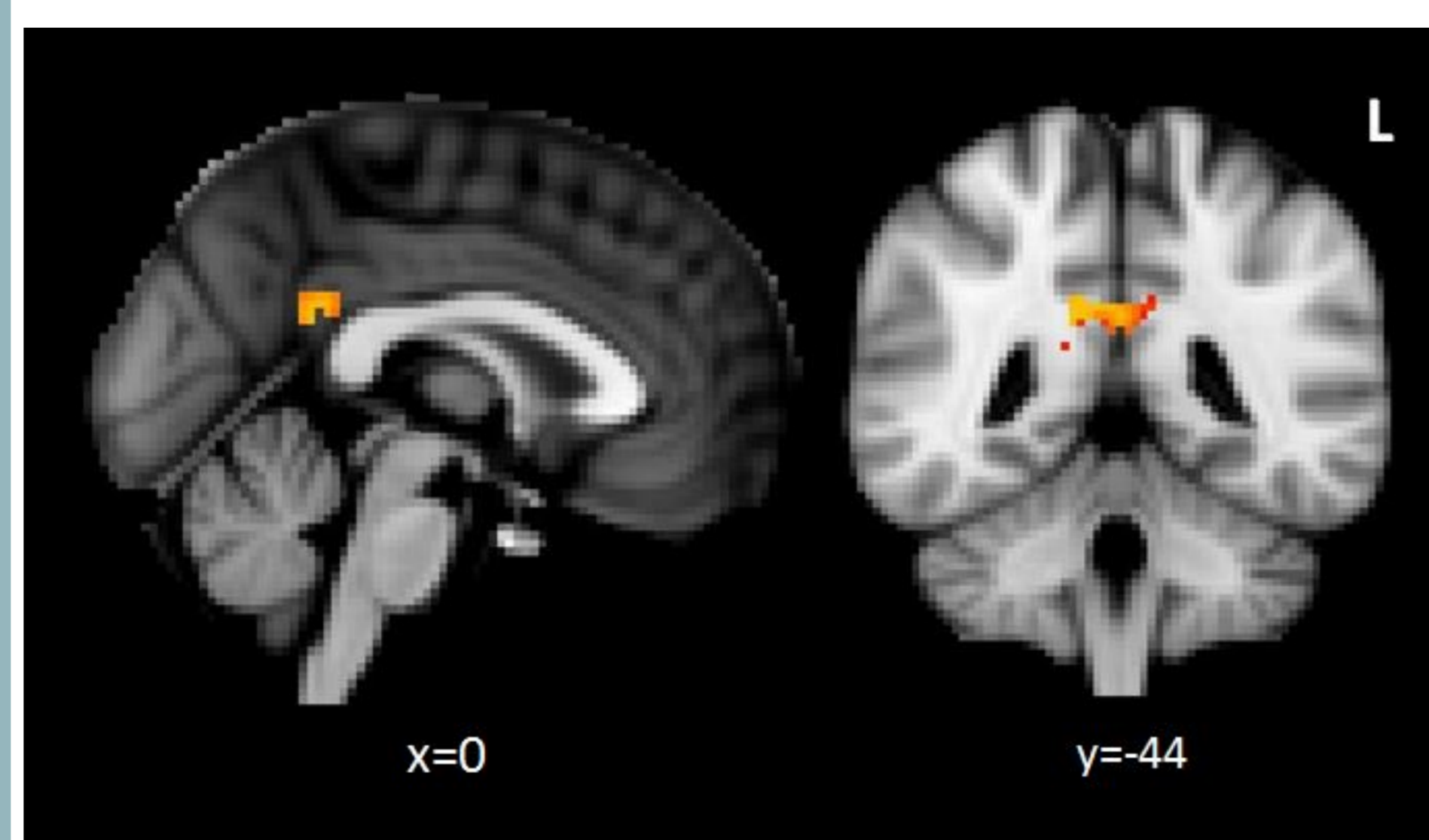


- 'Total' correct orientation based on 2 principal directional components (front/back & left/right)
- Controls > AD on all components
- Controls > bvFTD only with ↑ task difficulty
- Semantic FTD patients showed intact spatial orientation

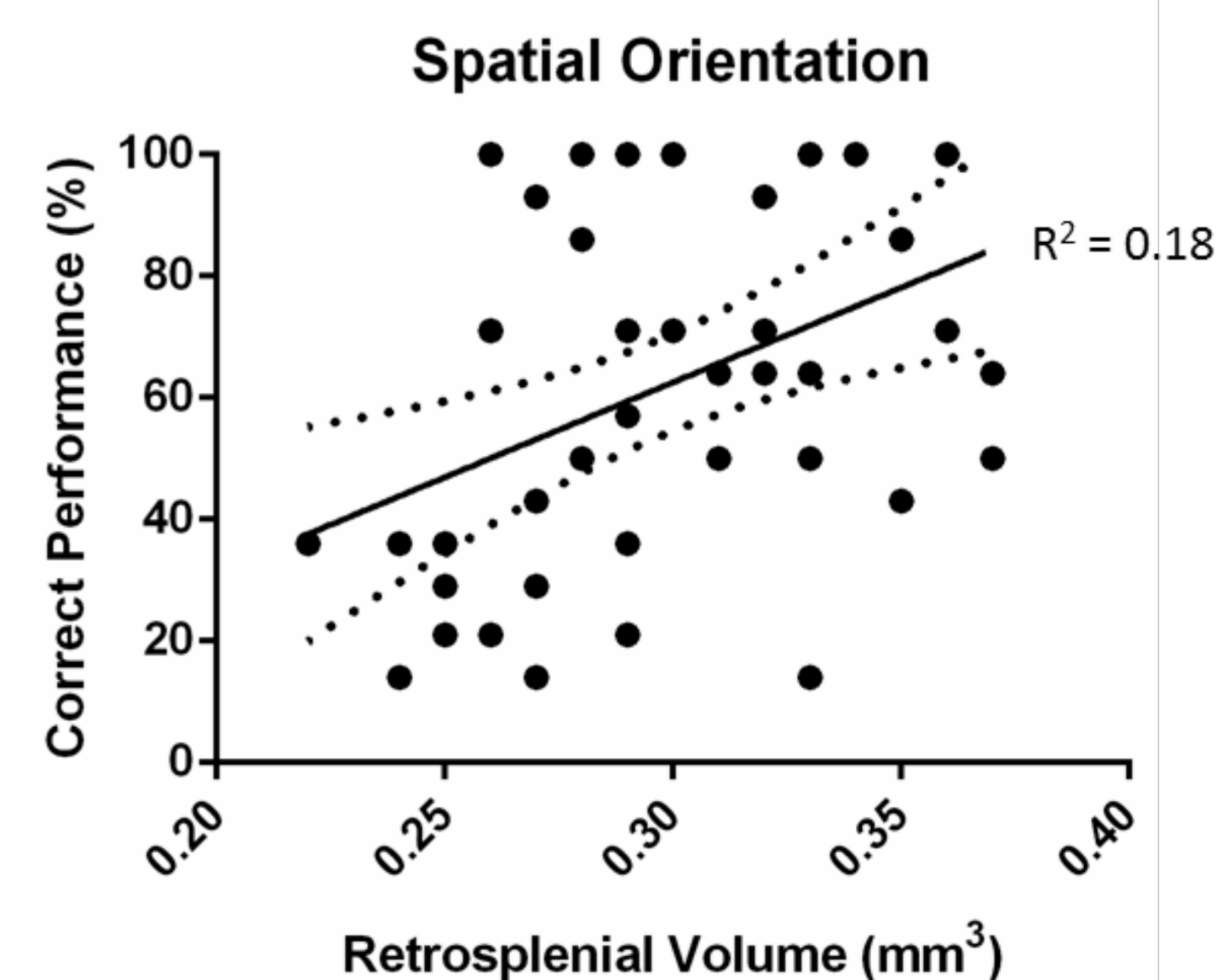
### Structural Imaging \* Grey matter brain changes in dementia patients compared to controls (FWE, P < 0.01)



### Neural Correlates of Spatial Orientation



- Retrosplenial cortex correlates with spatial orientation performance



### Conclusions

- The virtual supermarket task is a practical tool for assessing spatial orientation in dementia populations.
- Patients with FTD show significant memory impairment, but preserved spatial orientation.
- Spatial orientation is dependent on memory processes, but is subserved by retrosplenial regions rather than the hippocampus.