Finding your way. How can we help individuals with Williams syndrome to learn a route?

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Large scale route learning in WS

All known research is based on performance on small-scale tasks.
No known research relates to performance on large-scale tasks.

Given the uneven profile of visuo-spatial cognition in WS:

1. Is route learning a relative peak or trough within the visuo-spatial domain?

2. Can we assume that performance on small scale tasks is an indicator of large scale abilities?

3. Can strategies be used to improve route learning ability?

Participant Details

Group	CA (yrs; mths.)	Non-verbal T score (WASI)
	Mean (S.D.)	Mean (S.D.)
WS (n=20)	15;04 (5;02)	50.55 (11.85)
MLD (n=20)	14;11 (5;05)	51.55 (8.62)
TD (n=20)	15:03 (4;09)	

Large scale route task

- Participants guided along a 1km route through Reading University campus, which included 20 turns and four landmarks. Participants retraced the route from memory (guiding the experimenter) and stopped at each landmark to point to the remaining three landmarks (not directly visible).

- Condition 1: No verbal cues
- Condition 2: Verbal cues

Large scale route task

- **Route knowledge**: score out of 20 for number of correct turns

- **Configurational knowledge (pointing to landmarks)**: mean difference (degrees) between pointing estimate and correct direction

- **Strategy examined**: Facilitation by verbal cues

Small scale map task

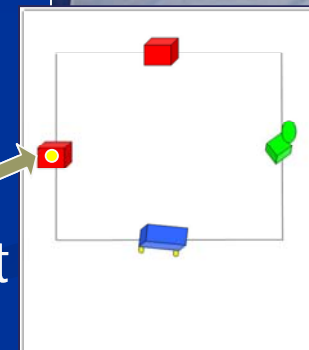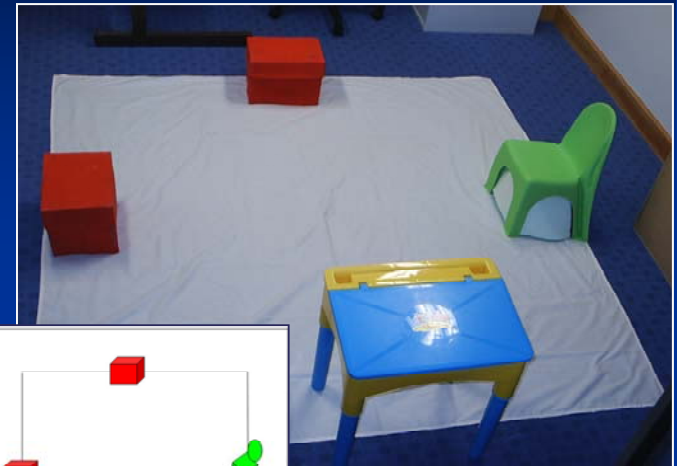## (based on Blades & Cooke, 1994)

2m by 2m area.

Toy hidden under one of four objects.

- Unique objects: desk, chair
- Non-unique objects: red boxes.

Location of toy indicated on map (15cm by 15cm) by yellow dot on correct item

yellow dot

- Cond. 1: layout & map aligned
- Cond. 2: map rotated 180°

- Unique hiding place: knowledge of map–layout correspondence (score out of 6)
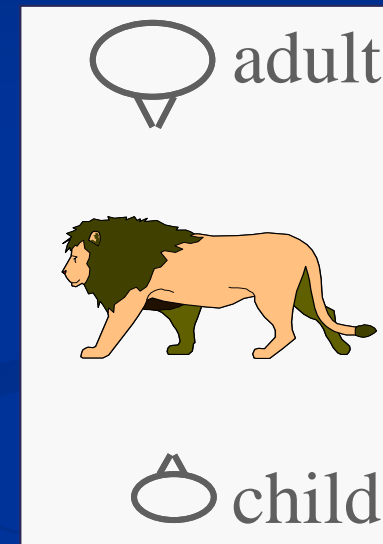- Non-unique hiding place: **configurational knowledge** (score out of 6)

Small scale maze task
(based on Gathercole & Pickering, 2000)

- Predicts **route knowledge** in typical adults (Allen et al., 1996)
- Participant shown route through a maze and asked to recreate it from memory.
- Condition 1: static
- Condition 2: dynamic
- Levels: One wall added per level (two to six walls)
- **score** = number of correct trials out of 20

3 wall trial

Perspective taking task
(based on Massangkay et al., 1974)

- Predicts **configurational knowledge** in typical adults (Allen et al., 1996)
- Participant opposite experimenter.
- Do you see the lion the right-way-up or upside-down ?
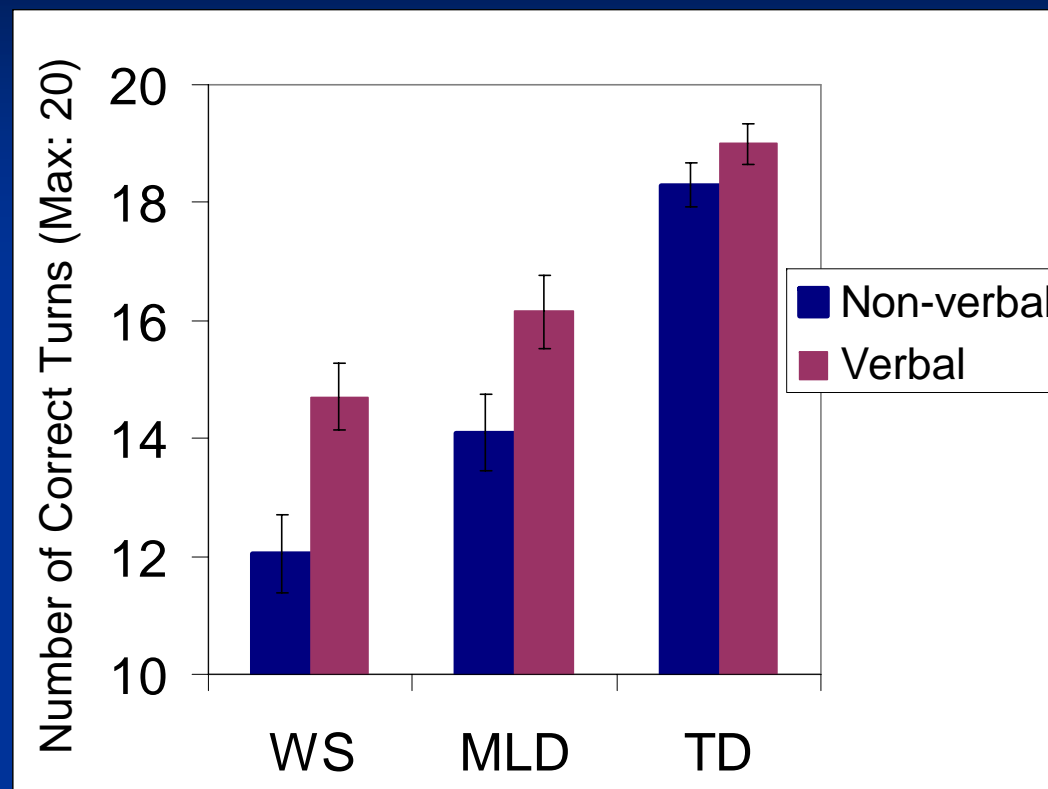- Do I see the lion the right-way-up or upside-down?

- **Configurational knowledge**: experimenter viewpoint trials

Results

- Large scale route task
  - route knowledge
  - configurational knowledge

- Small scale tasks
  - Map task – configurational knowledge
  - Maze task – route knowledge
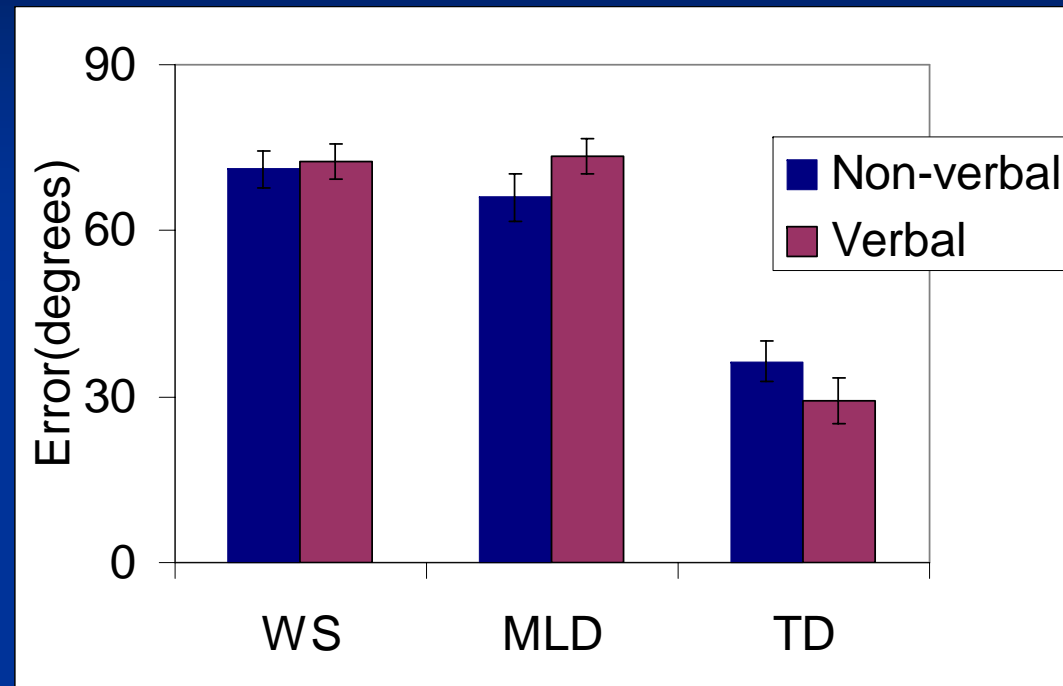 - Perspective taking task – configurational knowledge

Large scale route task: Route knowledge
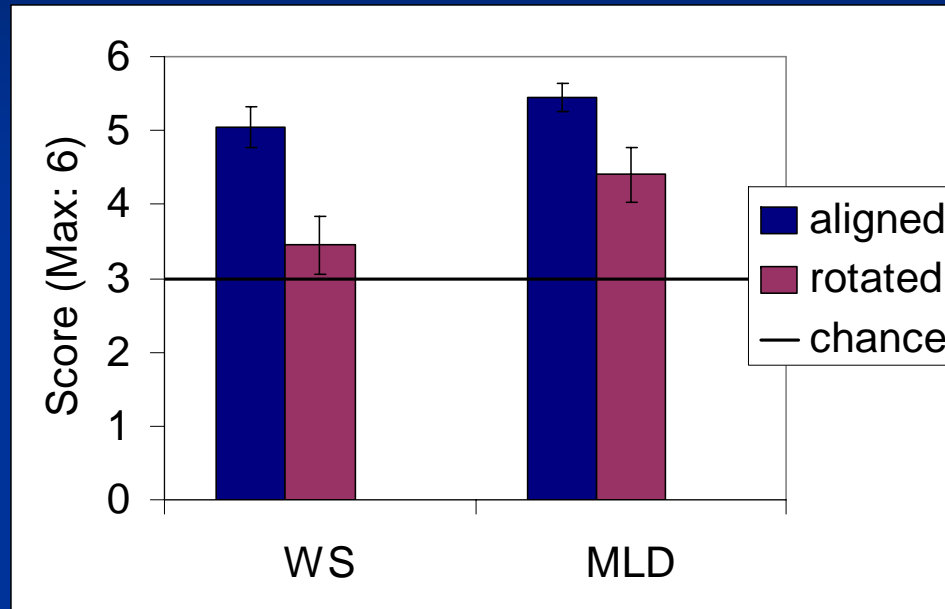

WS< MLD < TD

Verbal > Nonverbal

Large scale route task: Configurational knowledge

WS, MLD<TD; WS=MLD

Verbal = non-verbal
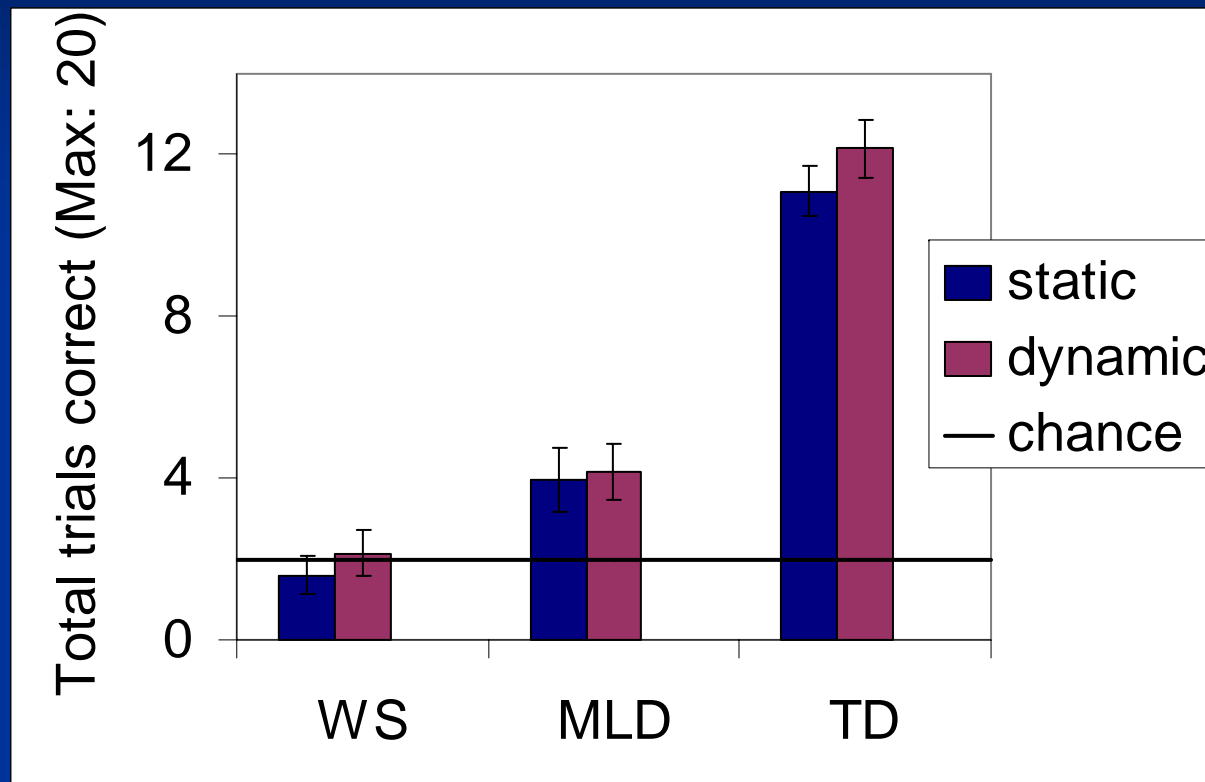
Small scale map task: configurational knowledge

TD ceiling

WS chance (rotated only)

WS < MLD (marginal)

aligned > rotated

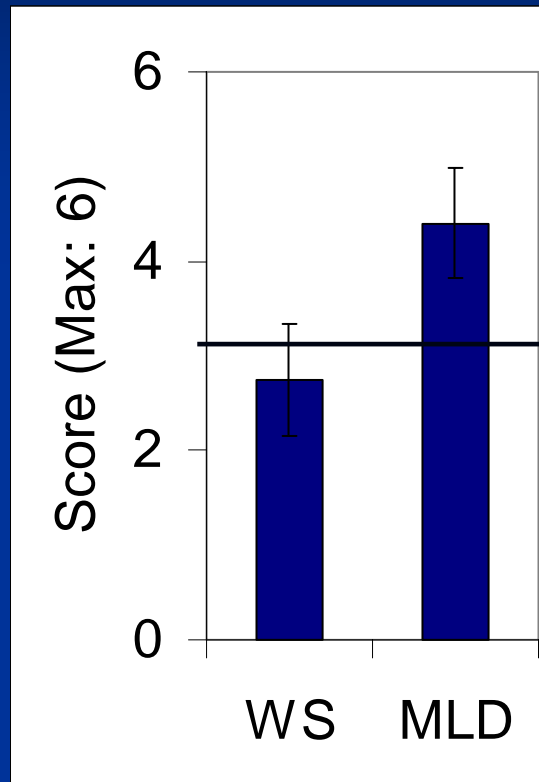# Small scale maze task
(predictor of route knowledge)

WS: chance

WS< MLD < TD

dynamic = static

Perspective taking task:
predictor of configurational knowledge

TD: ceiling

WS: chance

WS < MLD (marginal)

Correlations between large scale route task and small scale tasks

WS – route knowledge correlated with map, maze and perspective tasks

- configurational knowledge correlated with map and maze tasks

MLD – route and configurational knowledge correlated with maze task

TD – no correlations (but some ceiling performance)

Conclusions

Is route learning a relative peak or trough within the visuo-spatial domain?

- Route knowledge is a relative weakness in large scale and small scale tasks (WS<MLD, WS group sometimes at chance, which could attenuate effect)
- Level of configurational knowledge is as predicted by general visuo-spatial cognition on large scale tasks (WS=MLD), but may represent a relative weakness on small scale tasks (WS<MLD).

Can we assume that performance on small scale tasks is an indicator of large scale abilities?

- Performance on small scale tasks is not always predictive of real world or large scale ability.

Can strategies be used to improve route learning ability in WS?

- Yes

Verbalising a route is a successful strategy for improving route knowledge in WS, to a similar extent as MLD controls.

Thank you