Research from Emily Farran and her group

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Route learning; the importance of landmarks (funded by Autour des Williams, France)

In the last WSNews we had just started a study to investigate how well people with WS use the information provided by landmarks, when learning a new route. Jo Van Herwegen visited many of you to take part in this study, and we would like to thank you for taking part. We used a virtual environment, presented on a computer screen (like a video game) to investigate the relative importance of coding the visual identity of landmarks (e.g. a post box, a park bench) and the spatial location of each landmark (e.g. on the left, on the corner) for successful learning of a new route. We also manipulated how useful the landmarks were. Some landmarks were at corners and so were useful for remembering which direction to turn. Less useful landmarks were mid-way along paths.

Figure 1: A view of the maze showing 3 landmarks

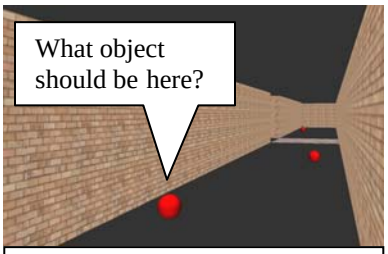

Figure 2: landmark visual identity test

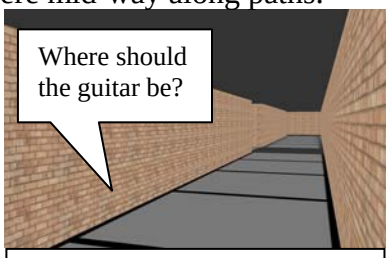

Figure 3: landmark spatial location test

People with WS were able to learn a route through a virtual environment, and needed the same number of learning trials as typically developing children, although they did show an unusual pattern of errors. In addition, their learning in the first maze transferred to the subsequent mazes. That is, they were able to build a strategy for learning routes in the first maze, which they then used in subsequent mazes. This suggests that in the real world, with repeated experience individuals with WS can slowly improve their ability to learn their way around. Once participants had learnt the route, we tested their landmark memory. The WS group showed poorer memory for landmarks than the typically developing group. Specifically, the WS people found it more difficult to remember *where* a landmark was than *what* it was. Importantly, the WS group used a useful strategy in that they showed stronger memory for the more useful landmarks (landmarks on corners), which suggests that when learning a route, people with WS pay more attention to information that will best help them to learn the route. This is a very useful strategy and shows that, in the real-world, pointing out landmarks will help people with WS to remember a route. For example, pointing out that there is a post box on the corner or saying that you know which way to go at the junction, because you know you need to turn in the direction of the newsagent, and not in the direction of the bakery.

Over the next three years, we will continue investigating the use of landmarks in WS, but we will also investigate other aspects of route learning, namely knowledge of the sequential order of the turns and landmarks, and the development of a cognitive map (spatial relationships between landmarks and places in an area). We will then develop training techniques which will be designed to improve route learning abilities in WS.

Drawing studies
Kerry Hudson

I am currently in the process of running a series of studies investigating various aspects of drawing in WS. Thank you to everyone who has taken part so far. I am yet to collect data from typically developing children for comparison but so far data from participants with WS are very interesting. Evidence suggests that when copying a picture or pattern of blocks that people with WS do not look frequently between what is being copied and their own copy. My current study has so far shown that participants are looking at a house that is being copied about once every thirty seconds, thus infrequent looking may be one cause of drawing errors in WS. Participants have also being drawing and describing an elephant in order to see if knowledge of the elephant is borne out in drawing and whether descriptions are more detailed than drawings. So far participants have produced some cohesive drawings (see Figure 1). This disputes local processing bias hypothesis, i.e. that people with WS produce lots of parts but do not pull these together in a recognisable configuration. I have also been looking at the influence of drawing a single vertical, horizontal or diagonal line within a square at various orientations. This determines whether the angular cues provided by the frame can be ignored or influences the angle that the line is copied at. When the line and square are clearly different, people with WS are able to overcome the cues provided by the frame, when the angle of the line and the square are perceived as similar then the line is drawn more akin to the square than type of line that was to be copied. A final study is attempting to facilitate drawing of complex shapes consisting of one, two or three shapes. Throughout studies in my PhD, drawings that require understanding of the relationship between many parts have been difficult for people with WS. Facilitation by asking participants to complete half of each shape, join dots, link edges of shapes and start drawing at set points have been compared to when no assistance is given when copying black and coloured figures. Interestingly, so far the most accurate drawings have resulted from providing participants with the edges of each shape. This is exciting as drawing of complex shapes can therefore be prompted and this may be useful for remediation techniques for drawing and handwriting.

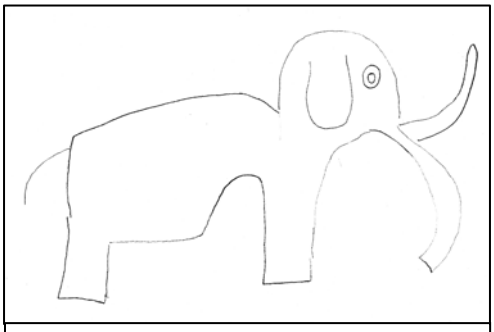

Figure 1: An elephant, drawn by a participant with WS

Processing moving vs. static object properties
Susie Formby

I am now in the final year of my PhD. I will be recruiting people over the summer months (aged 8-18) to take part in the last of my studies. A distinction has been made in the literature between two areas of the brain; the ventral stream which processes the identity of items; and the dorsal stream which is related to the processing of motion. It has been suggested that in WS, the ventral stream development is typical, but that dorsal stream development is atypical. To further investigate this hypothesis, I will repeat my earlier studies which investigated visual search for a target defined by colour and shape or by size (ventral stream stimuli) and compare performance on these tasks with visual search performance for a target defined by speed and direction (dorsal stream stimuli). We found few differences in visual search between people with WS and typically developing (TD) individuals for the ventral stream stimuli, supporting the argument that ventral stream processing is not a specific weakness in WS. In contrast, we would expect poorer performance in the WS than the TD group with the dorsal stream stimuli. In typical development, younger children have longer reaction times in visual search times than older children. We will investigate whether chronological age, non-verbal ability, visual attention or working memory can predict performance in our groups. I would like to thank everybody who has taken part in my research to date.

Colour perception and colour categorisation
Matthew Cranwell

I am 3 years into my undergraduate BSc in psychology at the University of Surrey and am currently working on a research placement under the supervision of Emily Farran. I am investigating colour perception and categorisation in individuals with Williams Syndrome. This study is about to start and I will be visiting a number of people with WS very soon. Each person with WS will complete 4 short tasks. The first is using a standardized test of colour discrimination called the Farnsworth Munsell-100 Hue test. This test involves the person placing coloured caps in order along a gradual transition between two colours. The second task is a visual search task. In this task, participants are asked to find all of the circles that are the same colour as a target colour. Research has shown that finding a coloured circle among the same coloured distracters (e.g. finding a green among different green circles) takes longer than finding a coloured circle among a different colour (e.g. a blue among greens) even when the perceptual difference between each colour pair has been carefully measured to be the same. The final two tasks are both naming tasks where participants are asked to name a presented colour using visual or verbal cues. The naming task will be used to see where the colour boundaries for people with WS lie. Colour research is important and can have applications to learning through the use of visual aids. If individuals with WS show unusual colour perception, or have difficulty discriminating between certain colours then this is important for the way in which colours are used in school and at home for people with WS. I would like to thank all the participants with Williams Syndrome for taking part.