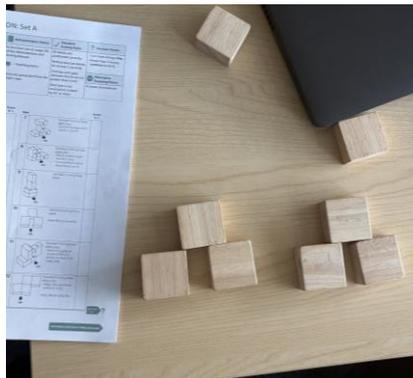


## Reflections on joining the Mathematical Inclusion and Neurodiversity (MathMIND) Project.

*written by Hailey Tai, Tilly Walker and Mollie Cooke.*

### Pre-Testing Training – Hailey Tai

Research at the CoGDeV Lab includes a focus on investigating the development of mathematical skills in both neurotypical development and in children with neurodevelopmental conditions. Understanding these trajectories is critical; for instance, children with Down Syndrome and Williams Syndrome, two core focus populations at our lab, often face significant difficulties in mathematical learning. Further investigation into how these individuals perceive and understand mathematics would help provide insight into effective and tailored education support. Such underlies the Mathematical Inclusion and Neurodiversity ([MathMIND](#)) project, a large-scale research initiative co-led by the University of Oxford, the University of Surrey and UCL, identifying the cognitive skills and classroom environments that best support numeracy in children aged 4 to 9 years with Fragile X, Williams, or Down syndrome. Through direct one-on-one assessments and observations, MathMIND aims to better understand the thinking skills that contribute to strong numeracy for children with these genetic syndromes across primary school, and the school environments that best support their numeracy. As such, in October 2025, placement students Hailey Tai, Tilly Walker, and Oliver Piff, under the supervision of Prof. Emily Farran, officially joined the MathMIND project, as part of the Surrey team. To prepare us for testing independence, the team took part in two intensive training sessions, designed to move us from theory to practice.



*Materials used for Pattern Construction (BAS3) task*

The aim of the first training session was to provide the necessary knowledge to ensure uniform test administration across the researchers who would be working with participants. This serves to eliminate as many procedural variables that could add noise to the variable measured as possible. Prior to the training session, we were sent several manuals detailing the MathMIND project protocols, detailing administration order and procedures, testing materials, as well as data handling procedures, and some basic background information on the tests themselves. For me, being able to read through the manuals prior to meeting the other MathMIND team members was very helpful in demonstrating the practical framework for me to adhere to. I also felt that it was refreshing to be able to listen to the project leaders share their experiences in previous testing waves of MathMIND, with both neurotypical and neurodivergent children.

The second training session took place a few weeks after the first, focusing on the team practising the protocols on one another. Established and experienced research team members took turns playing the role of the children, mimicking specific behaviours seen in previous waves to help us learn how to keep the administration on track when things get tricky. Running the full battery under the guidance of senior

MathMIND leaders was incredibly helpful; they gave us plenty of constructive feedback on our general approach and the way we spoke to the children. It was also a great chance to test-run the props and materials that we'd prepared, which better prepared us for any hiccups that might crop up. For example, we had to connect an external touchscreen to the computer for the some of the tasks so the children could interact with various tasks. We found several instances where the screen didn't play nicely with the PsychoPy software. Having a senior research team member there, since she handled the bulk of the project's coding, was a lifesaver. She helped us fix the bugs that had cropped up since the first session and our own independent practice. By the end of the day, I felt far more confident in our own upcoming testing sessions.



*Preparing the materials for Children's Mental Transformation Task (CMTT)*

### **Testing with Neurotypical Children - Tilly Walker**

In November 2025, placement students Tilly Walker and Oliver Piff spent three weeks at a primary school testing over 20 children in reception and year 1 as part of the neurotypical sample for MathMIND. A battery of 14 tasks, which were a mixture of mathematics, executive function and spatial measures, was administered to each child. Testing was carried out in a series of sessions that lasted around 30 minutes each (with breaks), depending on the child's engagement levels.

We were delighted with how much the children enjoyed completing each task. They found the activities highly engaging, particularly those involving the interactive touch screen, and were keen to show off their maths knowledge with us. We were especially impressed by their knowledge of multidigit numbers; many of them were eager to continue counting well beyond the highest number required by the maths tasks! The tasks were embedded within a story theme about 'Pirate Pete'. The pirate stickers and treasure maps proved to be excellent motivators, and meant that the children were enthusiastic to finish the tasks over the following weeks, and add more stickers to their maps. We found that 'Mister Monkey' was a huge source of excitement for the children: even though he was only required for the first task, he was often brought out when the children needed a break or some encouragement.

Over the course of the three weeks, we quickly became more familiar with each task, and the testing process began to feel more smooth and natural. As we moved away from reading off a script, we were able to engage in conversation with the children more, which helped them feel more relaxed and confident. Furthermore, we quickly learned which tasks worked best on the computer, and which children preferred to view on a physical paper copy. Therefore, we could adapt our testing procedure to better engage the children, making the sessions both more enjoyable and time-effective.

We are grateful to the teachers who were consistently accommodating and understanding throughout the research process; We hope that they will find the outcomes of the research interesting and

meaningful. We also really enjoyed our time testing for MathMIND, and gained valuable first-hand research experience that we will take forward into the final year of our degree and future careers. The children were such a hardworking and bubbly group, which made the experience thoroughly rewarding. We hope they are looking forward to another visit from the Surrey team at the end of 2026!



*Mister Monkey and the stickers used in Pirate Pete's treasure map.*

### **Testing children with genetic syndromes – Mollie Cooke**

Upon completion of the same training, PhD student Mollie Cooke went out to visit two children with Williams Syndrome at their schools, to complete the battery of MathMIND tasks together. Both children were very friendly, welcoming and talkative, so it took little time to build a rapport, which can often be a challenge with the limited time available at a research visit. Activities were completed over two sessions, spread out over two consecutive days. Both children were especially engaged with the British Picture Vocabulary Scale (BPVS) task, a measure of receptive vocabulary, proudly demonstrating their understanding of a broad range of words. Each child's maths learning, as well as their individual variation, and how they were likely to best engage in activities that built their mathematical understanding was also observed systematically. This provided qualitative data to accompany the quantitative data gathered from their performance on the task battery.

While I have experience completing tasks and assessments with children who have genetic syndromes, they were primarily based on measures of language, speech sound production and motor skills. MathMIND provided me an opportunity to explore a component of learning and cognition that I did not have previous experience in and as such, exposure to a range of new assessment measures and skills. It was a valuable opportunity to spend time with the children and build experience undertaking new tasks and assessments.



*Pirate Pete's treasure map*