Tab 1

Hello,

My name is Shannon Rosbotham, and I am a PhD student in the UCD Cognition, Development and Learning Lab under the supervision of Dr Katie Gilligan-Lee and Associate Professor Dr Michelle Downes.

Please read this information sheet carefully. If you have any questions or would like more details, don't hesitate to ask. It's important that you understand why this research is being done and what it involves before deciding whether you and your child would like to take part.

**What is this research about?**

We know that the ability to reason about space is closely linked to doing well in maths and can even influence the types of careers children might choose in the future, especially in science, technology, engineering, and maths (STEM) fields.

This study is about understanding how children think when solving spatial puzzles (such as mental rotation or spatial scaling) and how this relates to maths performance. We are also interested in whether children's experiences and backgrounds, including aspects such as family context, parents' education and gender, are related to the ways they approach these tasks. Collecting this information helps us understand how different experiences might shape children's thinking and learning.

To explore this, we will ask children to talk through their thought process as they work on the tasks and also answer questions about how they solved them. At the same time, we will use eye-tracking technology to measure where they are looking while completing the problems.

**Why are we doing this research?**

While we know that spatial and mathematical skills are connected, we still don't fully understand how children approach different types of spatial problems or whether they use similar strategies across tasks.

This study aims to explore the ways children solve spatial puzzles and whether the strategies they use are related to their performance in maths. The findings could help us understand how spatial thinking supports learning and whether including more spatial activities in the school curriculum might benefit children's mathematical development.

**Why have you been invited to take part?**

You have been invited to take part because you are the parent or guardian of a child between 8 and 12 years old who has shown interest in our research.

Your child will need to have normal vision or corrected visual acuity (e.g., wearing glasses or contact lenses) to participate.

Your child must also **not** have had the **WIAT** (Wechsler Individual Achievement Test) **administered in the past 12 months**, or be **scheduled to complete it within the next 12 months**, as repeated exposure can affect the validity of standardised test scores.

Children with neurodevelopmental conditions such as ADHD or Autism are welcome to participate as long as they meet the other inclusion criteria.

However, children with a history of brain injury, visual, sleep, hearing, language, or motor disorders, or who were born moderate to late preterm (before 34 weeks' gestation), will not be eligible to take part in this study due to the nature of the eye-tracking and standardised assessments used.

**What will happen if you and your child decide to take part in this research study?**
There are two phases of data collection. Phase one will require you to answer some background questions on your child's development, and this should be completed digitally online at home.

Phase two will require you and your child to come into the Cognition, Development, and Learning Lab at University College Dublin, where your child will complete a set of thinking and problem-solving activities, brief standardised tests, and eye-tracking tasks, and they may be asked to explain how they solved certain problems.

During phase one you will be asked to fill out an online consent form, and perform a screening questionnaire to ensure it is suitable for your child to take part in this study. Following the screening questionnaire, you will be asked to provide some basic demographic information through a short questionnaire. This will include questions such as your child's age and gender, and may also ask about family context, such as number of people in the household and highest level of parental education level. You will then be asked to complete a brief questionnaire about your child's everyday attention and learning skills. These questions are designed to help us understand the different experiences children bring to learning. All responses will remain completely confidential and will only ever be used in anonymised form for research purposes.

You will then be able to choose a convenient time slot for phase two using our online booking calendar. Phase two of the study will take place at the **University College Dublin, School of Psychology, Newman Building, Belfield, Dublin 4**. When you arrive, a member of the research team will meet you and guide you to the lab. The full session will take about one hour, excluding breaks.

When you arrive, a member of the research team will meet you and guide you to the lab. Data collection will be carried out by the **primary researcher (Shannon Rosbotham)**, with assistance from a **student researcher (Beverly Colton)**, both of whom are **Garda vetted** in accordance with UCD child-protection requirements. Only members of the research team involved in running the study will interact with your child.

Upon arriving at the lab, the study will be verbally explained to the child and they will be shown an age appropriate information sheet. Your child will be asked to provide assent. If your child does not wish to participate, the study will not proceed

During the visit, you are welcome to stay with your child in the lab for the whole session, or, if you prefer, you may sit just outside. The lab door will remain open so you can see your child at all times.

Your child will first complete short maths (WIAT-III Maths Problem Solving Subtest) and reading tasks (WIAT-III Word reading Subtest). We will then demonstrate the eye-tracker and adjust it to your child's eyes. Your child will not need to wear any equipment, but they may rest their chin on a chinrest, similar to an optician's exam. This is not restrictive in any way. The eye-tracker will record where your child looks on the screen while they complete the spatial tasks.

Please note that all data collected is for research purposes only, and not for diagnostic or clinical assessment.

The full visit in the UCD lab will take approximately one hour, excluding breaks. To thank you and your child for your time, we will provide a **€10 voucher** to help cover potential travel costs. Your child will also receive a small token gift (e.g., colours or stickers) and a "Child Scientist" certificate for taking part.

**How will your data be used?**

The study results will form part of Shannon Rosbotham's PhD dissertation at UCD. Findings may also be presented at conferences, published in scientific journals, and shared online so that other researchers and the public can read about them.

Your child's data will be **de-identified** and linked only to a randomly generated code. Data will be stored securely on a password-protected computer and uploaded (anonymised) to an **EU-based server** (Open Science Framework). Identifiable information (e.g., names, emails, consent forms) will be stored separately and deleted at the end of the data collection period.

**How will you and your child's privacy be protected?**
Any information we collect from you will be stored on a password-protected computer and all identifiable data will be deleted at the end of the study period. After we remove any personally identifiable details in the study data, it will be labelled with a unique code number specifically allocated to you. Researchers who do not need to know who you are will only be able to see the code number and not your contact details.

Anonymous data only will be shared with collaborators and be made available indefinitely on an open science platform for future research. The audio recordings will be deleted at the completion of this study.

The consent forms which contain your name and your personal contact details (email addresses) will be stored separately from the study data collected in the study sessions. These data will be destroyed at the end of the data collection period. The only time that your personal information will be shared is if there are any safeguarding concerns for a participating child in accordance with the UCD Child Safeguarding Statement.

**Data Protection Statement**
Your data will be processed in accordance with the General Data Protection Regulation 2018 (GDPR). If you would like more information about how your data will be processed in accordance with GDPR please visit the link: www.ucd.ie/gdpr. If you have any questions or concerns about how your data will be managed and stored, please contact my academic supervisor, Michelle Downes (michelle.downes@ucd.ie).

**What are the benefits of taking part in this research study?**
There are no direct benefits to you or your child. However, the study may be a fun and interesting experience, and you will be contributing to important research on children's learning and development.

As a thank you and acknowledgement of expenses incurred to participate you will be provided with a 10€ voucher and your child will receive a small token and a child scientist certificate.

**What are the risks of taking part in this research study?**
Neuropsychological tasks can be a fun and enjoyable experience for children but there is the chance that your child may get bored or restless.

The experiment is designed to address our aims in a way that minimises risk, inconvenience, and discomfort. There is a risk that your child may experience feelings of tiredness or fatigue, but they will be informed that they are able to take a break at any time during the study. Your child is welcome to stop the study at any time, and you can also request to withdraw at any time.

Moreover, we will treat your data securely and with respect in accordance with UCD policies and with GDPR. In the unlikely event of a data breach, we will report the problem immediately and follow UCD policy and GDPR rules. We work in accordance with the UCD Child Safeguarding Statement which you can view here: ucd.ie/registrar/t4media/UCD Child Safeguarding Statement.pdf and all members of the research team who will interact with your child are **Garda vetted** in accordance with UCD child-protection requirements.

**Can you change your mind and withdraw from the study?**
Yes, if at any time you or your child does not want to partake anymore, this is no problem at all, and we can stop the study. You and your child can withdraw fully at any time and request that we delete all of the data that we collect.

However, once the data have been anonymised, it will not be possible to delete your data anymore. Your data will have been anonymised at the end of the data collection period.

**How will you find out what happens with this project?**
You can visit https://www.gilliganleelab.com/ or by emailing the researcher to get updates about the project, where we will be updating it with findings when the research is complete. We will also be updating our social media pages, including Instagram and Twitter, which you can also access any time. We encourage you to keep this information sheet and our contact details below in case you do wish to get in touch with us regarding the study.

**What if I am worried about my child's development and progress?**

Two Subtests of the Wechsler Individual Achievement Test (WIAT-III) are being administered by a research student in this study for research purposes, and not clinically, to explore reading and mathematics ability in children. The administrator is not qualified to give any clinical advice. In the unlikely case where the child who scores substantially below age-expected norms for either subtest the investigator will share a standard letter with parents for their information only. If you are concerned that your child's development may be delayed, you can speak to your GP or Public Health Nurse.

**In the unlikely scenario that your child has been recently administered the WIAT-III you should inform the research team. Similarly, if your child is due to be administered the WIAT-III as part of a clinical assessment in the next 12 months you should let the team know as it may impact interpretation.**

**Contact Details:**
If you have any further questions, please get in touch with:


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- **Associate Prof. Dr. Michelle Downes**
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- **Dr. Katie Gilligan-Lee**

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Thank you for reading this information sheet and for considering taking part in this study.