Participant Information Sheet

Study title: *Enhancing Spatial Reasoning Ability on Visual Language Models*
Short title: Spatial Reasoning Questionnaire Study
Version: 1.0   **Date:** 28 June 2025

Invitation

You are being invited to take part in a research study. Before you decide, please read this sheet carefully. Feel free to discuss it with friends or relatives and to ask us any questions. Participation is entirely voluntary.

What is the purpose of the study?

We are investigating how people solve picture-based spatial-reasoning problems and how their strategies compare with those used by current visual–language artificial-intelligence systems. Your answers will help us evaluate and improve future AI models.

Why have I been chosen?

You have been approached because you are an English-speaking adult (18–65 years) with normal or corrected-to-normal vision and no history of neurological impairment. About 120 volunteers will take part.

Do I have to take part?

No. Taking part is voluntary. You may withdraw at any time before you submit your answers, without giving a reason and without penalty.

What will happen if I take part?

- You will complete 3**0 multiple-choice spatial-reasoning items** presented in a web browser.
- The task lasts ≈ **15 minutes**; a progress bar and an optional break are provided.
- No names or contact details are recorded.

Will taking part involve any risks or discomfort?

Risks are minimal. Some items are challenging and may cause mild frustration. You can skip any question or withdraw entirely.

Are there any benefits?

There is no direct personal benefit, but your participation will contribute to research on human–AI interaction.

Expenses and payments

None.

How will my data be used?

The University of Liverpool processes personal data for research under the lawful basis of **public task**.

Aspect	Details
Collection	Item responses and timestamps are sent via HTTPS to a Google Firebase (Firestore) database.
Storage	Firestore is hosted on EU servers, encrypted at rest and in transit; only the principal investigator (PI) can access the data via two-factor-secured credentials.
Retention	Identifiable data (participant ID) will be removed after analysis. Anonymised data will be kept securely for **5 years** and may be archived for future ethically approved studies.
Anonymity	No names, IP addresses or direct identifiers are stored. Published results will be aggregate statistics only.
Access	Only the PI and authorised members of the research team will access raw data.
Destruction	Raw Firebase records will be deleted from the database once anonymisation is complete or after 3 months, whichever comes first.

What will happen to the results of the study?

Findings will be written up for conference and journal publication and may be shared as anonymised datasets on public research repositories. Individual participants will not be identifiable.

What if I am unhappy or there is a problem?

If you have concerns, please contact the PI (details below). If unresolved, email the Research Ethics & Integrity Office at **ethics@liverpool.ac.uk** quoting the study title. You also have the right to lodge a complaint with the Information Commissioner's Office (0303 123 1113).

Who can I contact for further information?

Principal Investigator	Xinmiao Huang, Department of Computer Science, University of Liverpool
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Supervisor	Prof Xiaowei Huang, Department of Computer Science, University of Liverpool

Thank you for considering taking part in this study.