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Leveling the Playing Field: Environmental Uncertainty Eliminates the Socioeconomic Gap in Working Memory

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Title: Solving problems and drawing solutions: a cross-linguistic study of ordinality in numerical cognition (Malayalam and Japanese)

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Languages vary in how they describe time. Some use spatial metaphors, others use quantity metaphors. But do languages merely describe time differently, or do they actively shape how we reason about it? Building on prior work on ordinality in numerical cognition and theories of linguistic relativity, this cross-linguistic study investigates whether temporal metaphors influence the perception of ordinality in math problems by using diagrams and strategy choice as externalised representations of thought. We tested 306 participants (children and adults) across two languages: Japanese (distance-metaphors) and Malayalam (quantity-metaphors). Participants solved arithmetic word problems admitting two distinct strategies, and created explanatory drawings. We examined whether the degree of ordinality in participants' drawings predicted their strategy use, and whether this relationship varied across languages and age groups. Results are discussed in light of the linguistic relativism debate and what they say about the role of language in shaping the development of mental representations.