**Research Plan:**

The development of mental simulation as a strategy for solving problems with multiple alternatives

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**Background & Motivation**

- When deciding between multiple courses of action, we can simply pick one and try it out. Or, we can mentally try out the options prior to acting (i.e., mental simulation).
- As adults, we readily engage in mental simulation across several domains [1-3].
- Despite a recent surge of interest in the development of the ability to represent and prepare for alternative possible events [4,5], little work has investigated how children approach problems in which they are faced with a choice between multiple alternative courses of action.
- Children from around 4 years have some capacity to consider basic alternative actions [6], mentally project themselves into the future [7], and recognise that multiple future outcomes are possible [4,8].
- On other tasks however, younger children (4-5 years) are quicker to act on tasks requiring planning [6] and more likely to explore risky options [9] than older children and adults, suggesting, perhaps, a lack of mental simulation.

**Research Aims:**

1. examine developmental changes in the use of mental simulation when solving problems with multiple options;
2. investigate the influence of resource availability on the tendency to simulate vs. act without simulating across development

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**Materials & Procedure – Computerised vertical maze task**

**Block 1:** Aim is to get ball into blue box; only 1 ball available

- "Which colour hole do you want to drop this ball into?" (green/left is correct)
- 20 trial-unique configurations (via manipulation of diagonal pieces' orientation & blue box location)

**Block 2:** Aim is to fill blue box with 3 balls. Manipulate no. balls available between-participants: minimum required (3) vs. excess (5)

- 3-ball condition example
- "Which colour hole do you want to drop this ball into?" (orange/middle is correct)
- 20 trial-unique configurations

**Measures:**

For each trial:
- Success (ball reaches box) or failure (ball misses box)
- Ball chosen (colour; left, centre or right)
- Response latency (time between end of question & child choosing a ball)

For each ball:
- Maze entrance chosen (correct or incorrect; left, centre or right)
- Response latency

End of each block: Reported strategy (response to open question about approach used; coded as simulate/not simulate)

**Analysis**

GLMMs with trial outcome (success/failure) as a binary outcome variable; age (months), latency to act (ms), reported strategy (simulate/not simulate); and trial number as predictors; participant ID as a random factor.

Block 2 additional predictors: no. balls available (min/excess); no. balls used (3-ball condition only)

**Predictions**

**Block 1:** Age (older), response latency (longer) and reported strategy (simulate) will be predictive of success

**Block 2:** In addition to the above: response latency will be longer in the 3-ball vs. 5-ball condition (especially for 1st ball); older children will use fewer balls than younger children in the 5-ball condition

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**Acknowledgements**

This research is funded by BA/Leverhulme Trust Small Research Grant SRG20201210008

**References**