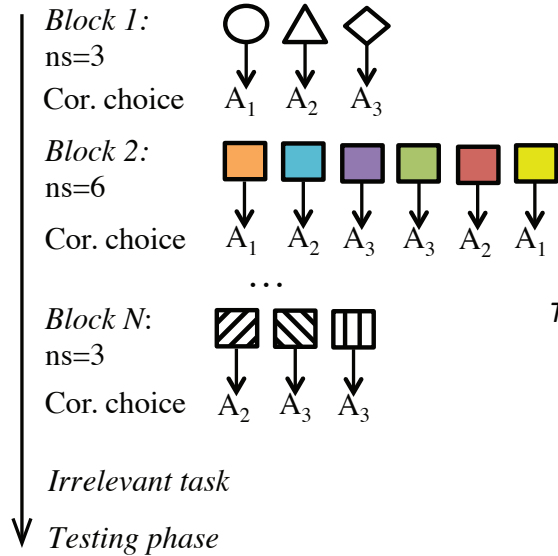


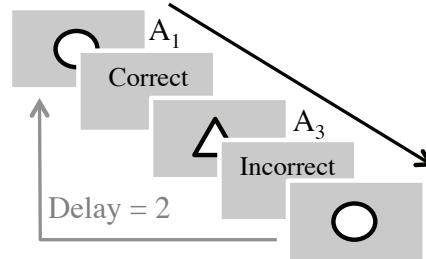
# The tortoise and the hare: interactions between reinforcement learning and working memory.

Anne GE Collins

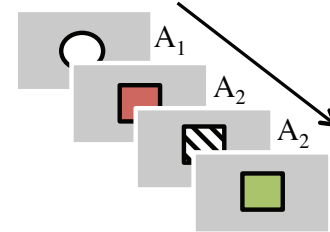
## A) Protocol



## Learning phase Block 1: 2 trials example



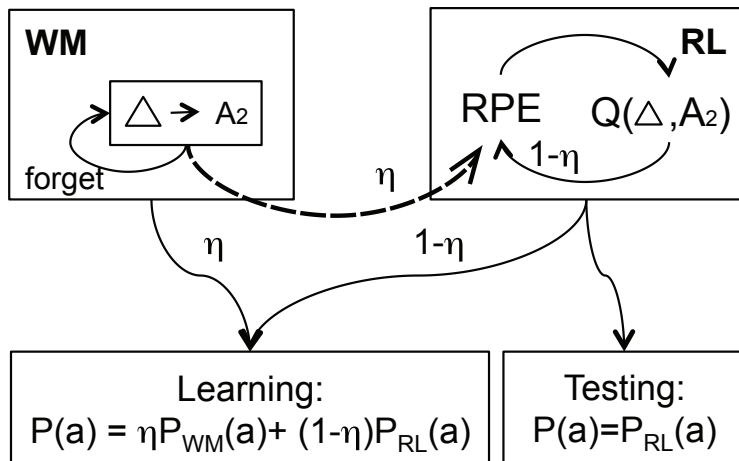
## Testing phase



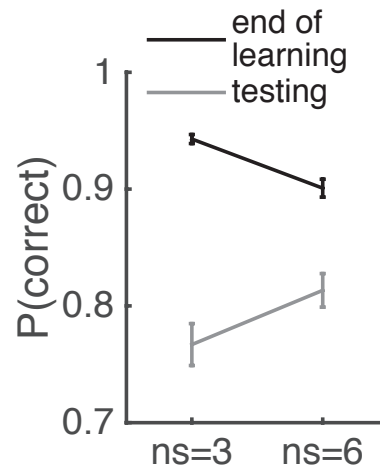
Learning few stimulus-action associations in parallel is easier than learning many (A). This is because we can use working memory (WM), rather than only relying on reinforcement learning (RL).

However, associations learned the “hard way” turn out to be better remembered in the long term (C). This shows that using WM to learn faster comes at the cost of less durable encoding.

## B) Model Schematic



## C) Experimental Results



This can be captured by a computational model (B) with interactions between WM and RL: WM’s ability to predict outcomes makes rewards less surprising, and so RL learns more slowly from them.