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Episodic Future Thinking in 4-Year-Olds, Poster Symposium: The who, what, where and when of episodic foresight development

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Three and Four-year olds' episodic future thinking skills

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BACKGROUND

What is episodic future thinking?

It is estimated that people spend about a third of their daily lives mentally simulating future scenarios. This ability to project oneself into the future to pre-experience an event is termed *episodic future thinking* (Atance & O'Neill, 2001).

Key components of episodic future thinking

Research with adults have found that the construction of a novel, complex and coherent scene involves the retrieval and integration of information from the semantic and episodic memory systems (Levine & Spreng, 2006). Context has also been shown to play key part here as people imagine future scenarios using previously stored visuo-spatial dimensions of places (Szpunar, Watson & McDermott, 2007; Arzy et al, 2009).

However, there are only a few studies have investigated this ability in young children (Atance & Meltzoff, 2005; Busby & Suddendorf, 2005ab; Russell, Alexis, & Clayton, 2010; Suddendorf, Nielsen and von Gehlen's (2011). AI confirmed this ability emerges in the 3-5 age range. Perhaps the most refined method so far is utilised by Russell et al (2010). In this task, 3- 4- and 5-year-olds played a game of blow football on one end of a table (see Figure 1). At the end of the game children were asked to select 2 out of 6 items (see Figure 2) that would enable them to play this game tomorrow from the opposite, unreachable, side of the table (in blue). They conducted four experiments asking 3-5 year olds children the question in three conditions: *present-self* (control condition), *future-self* and *future-other*.

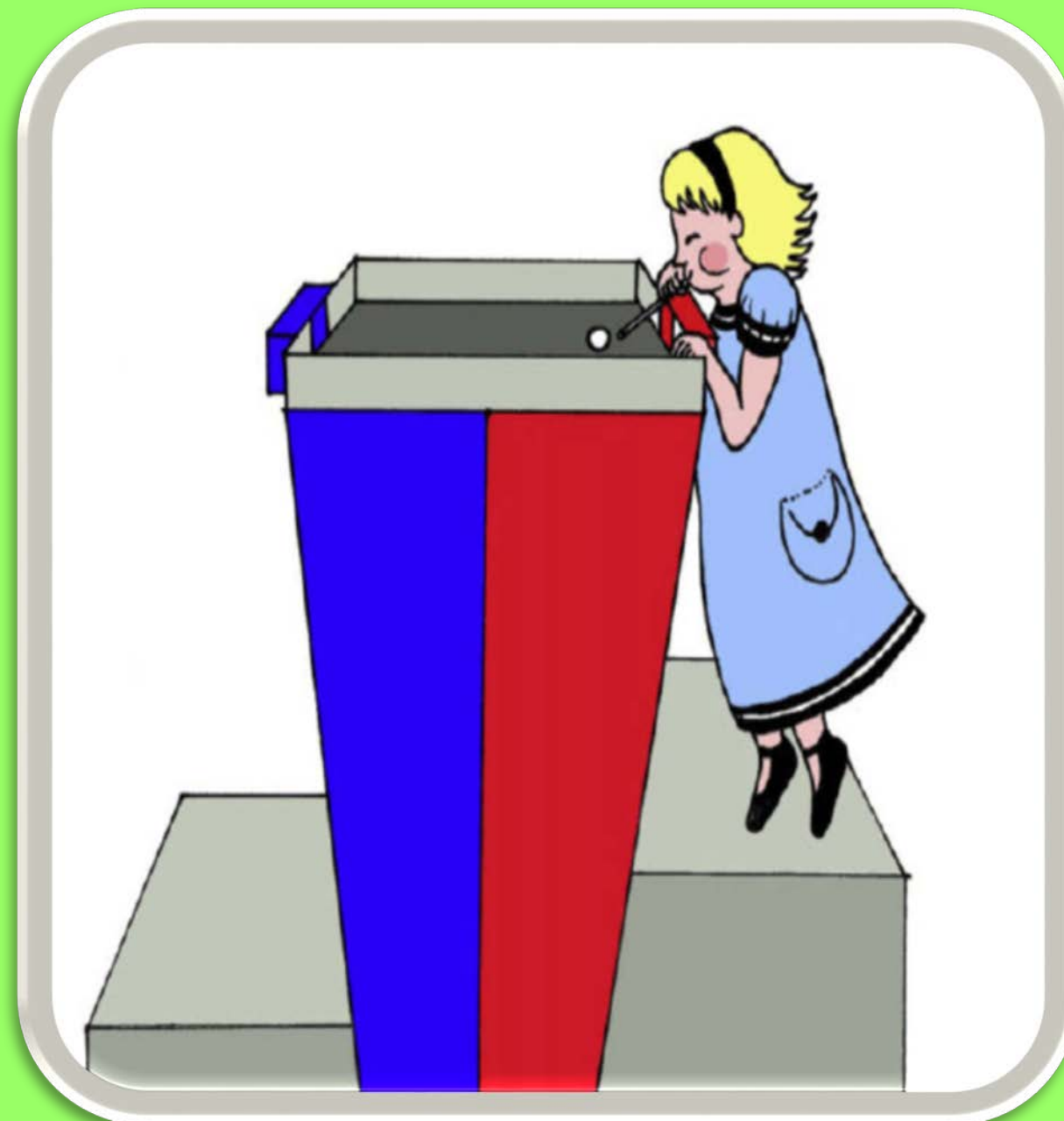


Figure 1. Russell and Colleagues' Blow Football Task

Figure 2. Children choose 2 out of 6 items to use tomorrow



Results:

1. In *present-self* condition all age groups (3, 4 and 5) selected the right 2 items for the next day above chance level
2. In *future-self* condition only children aged 5 selected the right 2 items for the next day above chance level
3. In *future-other* condition, where children were asked what another child would select, both 4- and 5-year olds selected the 2 items above chance.

Limitations:

1. However, the cut-off point chance level s was too low (2/30)
2. The number of children in each test group was only 12
3. It is also possible that having to select 2 out of 6 items may place more cognitive demands on children's executive functions

METHOD AND MATERIALS

Aim of Current Research:

The current series of studies aimed at replicating Russell et al (2010) study by using: a) three novel games with similar design; b) include more children for each study (N=24) and c) use higher chance cut-off point - 0.5/0.66. The studies aimed to discover at what age exactly *episodic future thinking* emerges in pre-school aged children.

Study 1:

Participants: It involved 24, 4-year olds (M=53.6 months)

Conditions: *Future-Self (Look)* – 2 choices

Study 2:

Participants: It involved 24, 4-year olds (M=53.7 months)

Conditions: *Future-Self (Not Look)* - 2 choices

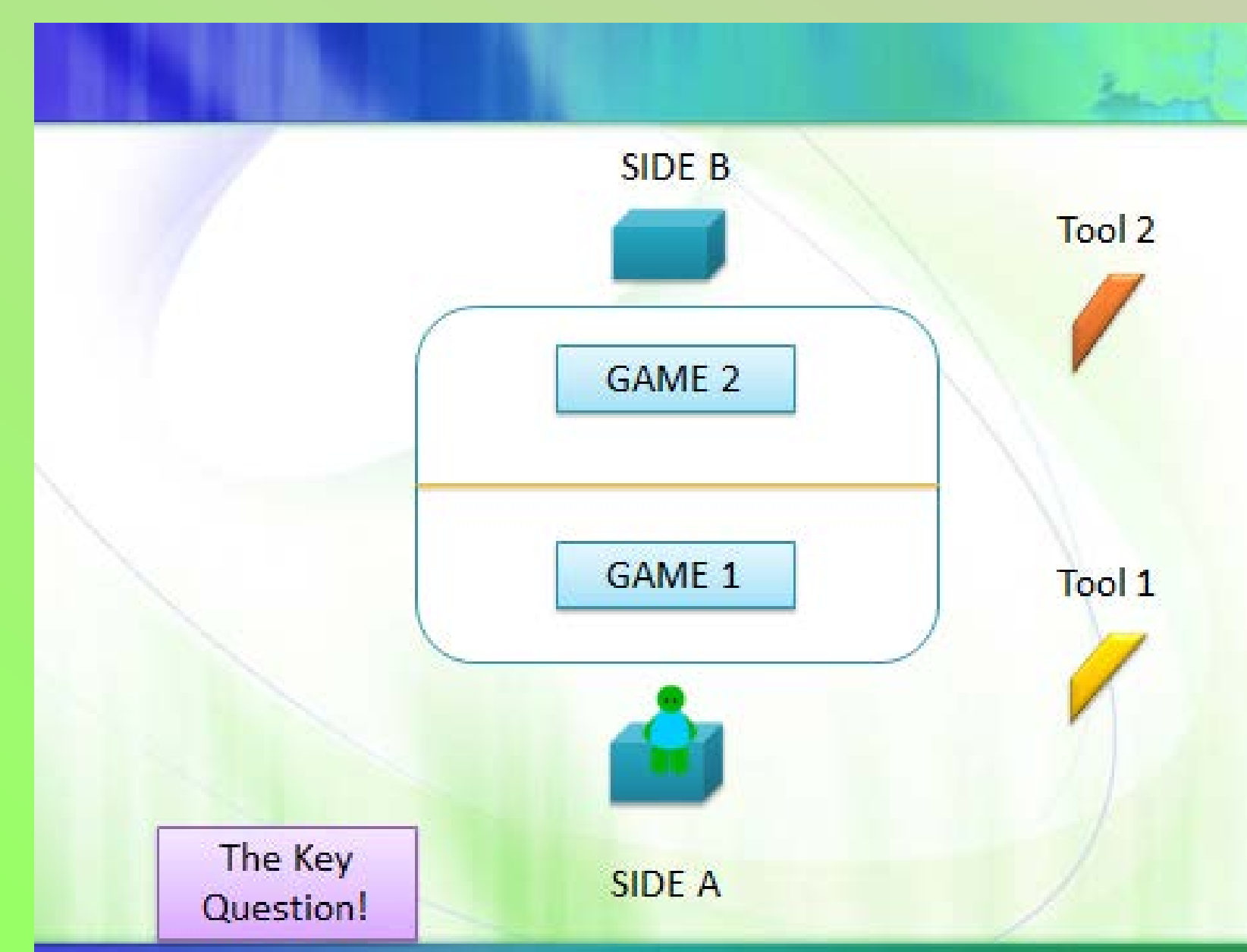
Study 3:

Participants: It involved 24, 4-year olds (M=47.7 months)

Conditions: *Future-Self (Not Look)* – 3 choices (1 distractor)

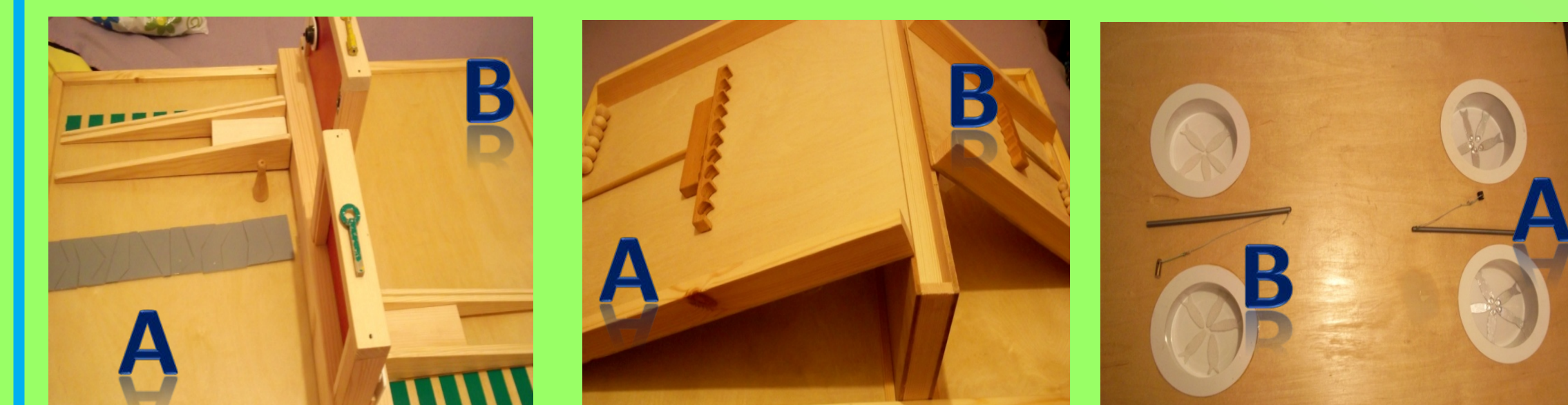
The order of presentation of each game was counterbalanced.

Outline of the main features of all three tasks:



Children played on a table from Side A, using Tool 1. They see the usage of Tool 1, then they try using it to play the game. Next, children move to Side B to check if Tool 1 works for other game. Children see that Tool 1 does not work for Side B. Instead, they observed that another toy –Tool 2 works for other game. Upon seeing this, they return to Side A and continue playing the game. Once the game is finished, children are asked to select a toy for tomorrow when they will be playing the other game, on the other side (Side B).

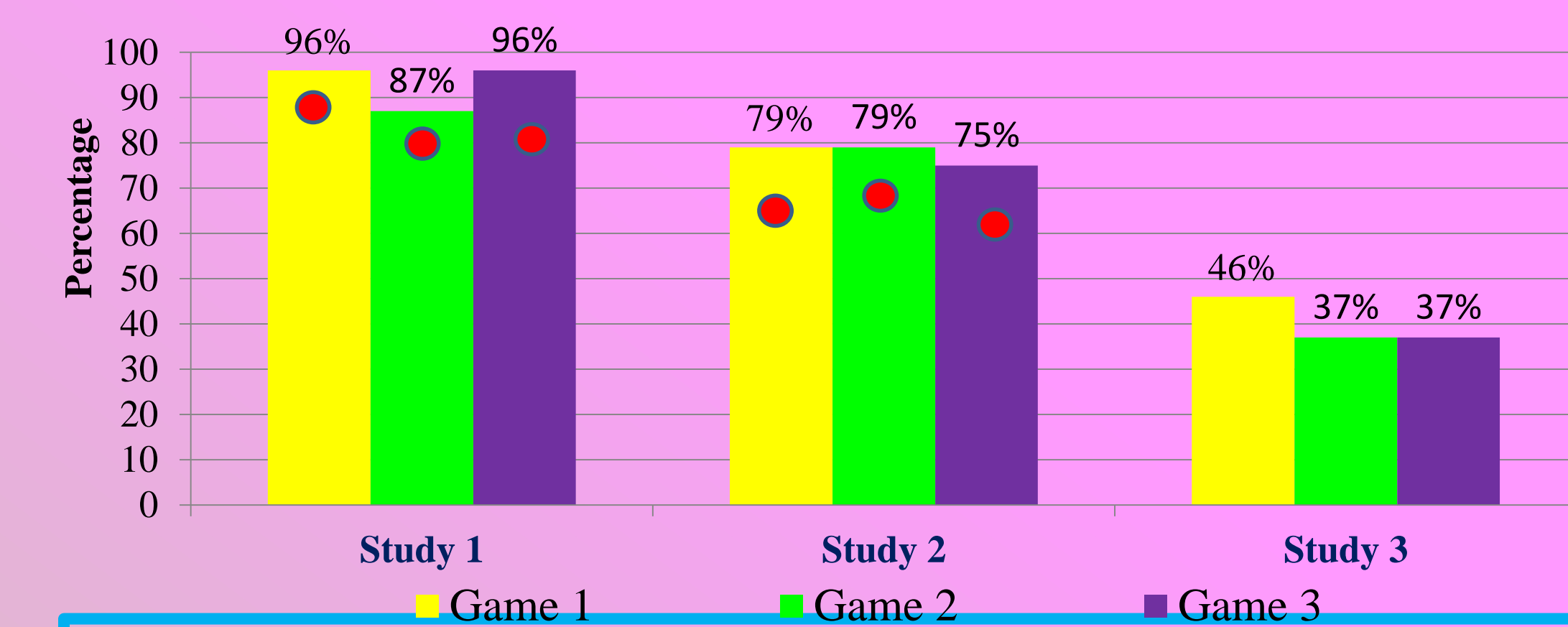
Game 1 Game 2 Game 3



Game 1 – Tool 1 is Yellow Key, Tool 2 is Green Key (Tool 3- Blue Key)
Game 2 - Tool 1 is Big Rake, Tool 2 is Small Rake (Tool 3- Medium)
Game 3 – Tool 1 is Magnetic Fishing Rod, Tool 2 is Velcro Fishing Rod (Tool 3 is Plastic Fishing Rod)

RESULTS:

Four-year olds' pass rates (%) for each study at each task -future self condition



Study 1: Children performed significantly above chance for all games:

Game 1: $p < 0.001$; **Game 2:** $p < 0.001$ and **Game 3:** $p < 0.001$

Study 2: Children performed significantly above chance for all games:

Game 1: $p = 0.007$; **Game 2:** $p = 0.007$ and **Game 3:** $p = 0.023$

Study 3: Children did not perform significantly above chance for any game:

Game 1: $p = 0.132$, **Game 2:** $p = 0.392$, and **Game 3:** $p = 0.392$

The fact that Study 3 which involved the use of 3 items (incl. distractor) did not yield significant results suggests that children may not be necessarily choosing the right item by projecting themselves in the future. They may well select it as it is simply new or different. Yet, in Study 3 two children, aged 55 and 56 months did select the right toy irrespective of the presence of the distractor.

Table 1. Mean number of correct answers across the three games in Experiments 1 and 2

Experimental Conditions	Mean Correct	Standard deviation	Significance
Exp. 1 (future-self, look) – 2 choices	2.79	0.42	$p < 0.001$
Exp. 2 (future-self, away) –2 choices	2.33	0.64	$p < 0.001$
Exp. 3 (future-self away) – 3 choices	1.21	0.98	$p = 0.157$

There is a significantly higher mean number of correct answers for Studies 1 & 2 only!

FUTURE DIRECTIONS:

1. The current results appear to suggest that episodic future thinking may be appearing at the later stages of age 4. This is an earlier age to what Russell et al (2010) originally found in their sample.
2. Nevertheless, there remains the possibility that children are selecting the items for tomorrow's use on the basis of semantic reasoning, perhaps, combined with episodic future thinking.
3. The next step would be to consider a bit more sensitive type of design for all three games so that each game is solely (or mostly) solvable on the basis of mentally projecting the self in the future (the next day)

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