

## Facing a Novel Problem: When Children are not Able to Innovate

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### 1. Introduction

When faced with a problem, children are expected to combine pieces of information to solve the problem. Sometimes, especially in novel tasks they fail (McGuigan, 2013). One of the ways children solve problems is imitating adults. Imitation researchers add demonstrations to the task in which objects are present and test how they use information coming from adults. In some of the imitation studies (Whiten et al., 1996, Lyons, Young & Keil, 2007), children copy irrelevant actions of the experimenter even implied not necessary, such as the experimenter leaves the room or names the irrelevant actions as silly. These studies indicate that children tend to copy adults' behaviour without questioning its functionality. There are other studies contradicting that children are mindless copiers (Flynn & Whiten, 2008).

The task used in this study was a replication of Beck et al.'s (2011) tool innovation task. In this task, the goal is to take a sticker from inside a tall and narrow tube. To manage this, children need to innovate a hook from material given. Most of the 4 to 5 year olds fail to innovate. And then, the experimenter intervenes, she shows a pre-made hook to the child. This way, many of the children who could not innovate the tool makes it via copying and succeeds.

I proposed that children in this age group tend to copy adults' demonstration unselectively when faced with a difficult problem. To test this, I extended the task with a new demonstration phase with the same object. Half of the children who failed to innovate was shown a J shaped tool as in the original study. To the other half, I showed a dysfunctional U shaped tool.

### 2. Method

Sixty 4 to 6 years old children recruited from nine pre-schools in Izmir-Turkey attended to the study. Children who failed to innovate were assigned to J and U conditions so that in each condition there would be equal number of children in equal ages.

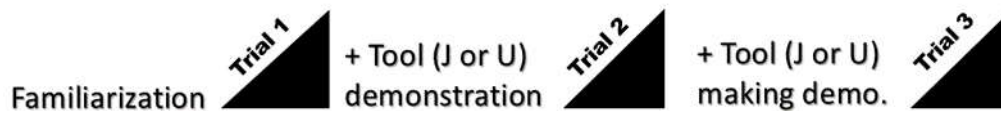
In the main task, children were shown the tube with the bucket in the bottom containing a sticker (Beck et al., 2011). The experimenter said: "Do you see the sticker inside? If you can get it out of there, it will be yours. These are the material that will help you" in Turkish. The piece of string and the bendable stick next to the apparatus was pointed. See: [Figure 1](#). The ones who failed in the first trial was demonstrated a pre-made tool, which is a J shaped or U shaped bendable stick. Then the second trial begins. The ones who failed in this second trial was demonstrated a J making demonstration or a U making demonstration. Then, the third trial

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begins. For the second and the third trial, 30 seconds were given. Children’s copying behaviour and success in the second trial and third trial were coded.

**Figure 1. Phases of the task**



We conducted  $\chi^2$  (chi-square) analysis on copying levels of participants for both trials (Trial 2 and 3).

### 3. Results

Results are given in Table 1. In the second trial, 8 children out of 29 (27%) who saw J shaped pipe-cleaner copied and 5 children out of 27 (22%) who saw U shaped stick copied. Copying levels did not significantly differ across J and U conditions  $\chi^2(1, n=56)=0.64, p=.422$ , demonstrating no effect of condition on copying behaviour.

In the third trial, there were no effect of condition (J or U) on level of copying. In U group which consisted of 22 children, 6 (23%) copied. In J group which consisted of 21 children, 10 (48%) copied. This difference across conditions did not reach statistical significance,  $\chi^2(1,n=43)=2.93, p=.087$ .

However, success levels was similar for the second trial,  $\chi^2(1, n=56) =0.64, p=0.422$ ). Of 29 children who saw a pre-made J, 8 succeeded. Of 27 children who saw a pre-made U, 5 succeeded.

**Table 1.** Frequency of copying behaviour and success following different levels of demonstrations

		Copying (and success)			
		Trial 2. After tool demonstration	Trial 3. After tool making demonstration	Rest of children*	
Condition	J	29	8 (8)	10 (10)	11
	U	27	6 (5)	5 (1)	21

### 4. Conclusion

One explanation of children’s copying adult’s behaviour without considering the affordance of it is social motives (Over and Carpenter, 2012) such as attending social interaction or eliminating social pressure. Another explanation is (Fridland & Moore, 2015) children’s

taking the action of the adult as goal directed or they may be using trial-error as a learning strategy.

To conclude, children are dependent to adults when solving novel problems. However, they benefit from it as seen in similar success levels found. Children are watching adults and copying their behaviour even not seeing the outcome of it. This study highlights the importance of being careful about our acts when a child is present and supports this idea especially for difficult tasks.

**Keywords:** Problem Solving in Children, Copying, Demonstrations, Tool Making.

**JEL Codes:** D9. D91.

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