Functional Fixedness: A Novel Interpretation?

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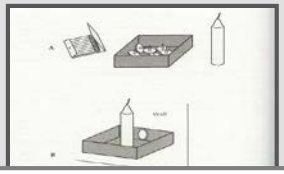
Introduction and Aims

The common interpretation for functional fixedness (Duncker, 1945), suggests that adults' ability to use an artifact for a novel purpose in a problem-solving task is impaired as a result of activating properties relevant to the conventional function of an artifact prior to problem-solving

Fig 1.



Duncker's Candle Problem

The aim of Experiment 1 was to investigate if demonstration of a novel function would impair performance on a subsequent problem solving task.

Experiment 1: Design & Method

The problem solving task consisted of 2 cardboard supports with a gap of 15cms between them. The goal was to join the gap to make a straight and level connection. Solving the task involved participants turning the bucket upside down to rest a 15cm cardboard length on top.

75 participants, mean age 21yrs (SD 2.2) were randomly allocated to one of three cond.

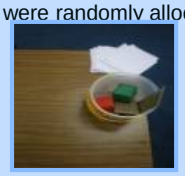


Fig 2. Conventional function condition : *all objects inside the bucket (containment)*

Fig 3. Novel Function condition: *Bucket used as a paper weight*

Fig 4. Control Function Condition: *No function demonstrated for the bucket*

Fig 5. Successful Solution

Two dependent measures were recorded:
(1) % of participants that solved the task
(2) Mean time (sec) spent on task

Experiment 1. Results

DV 1. The percentage (%) of participants that Solved the task

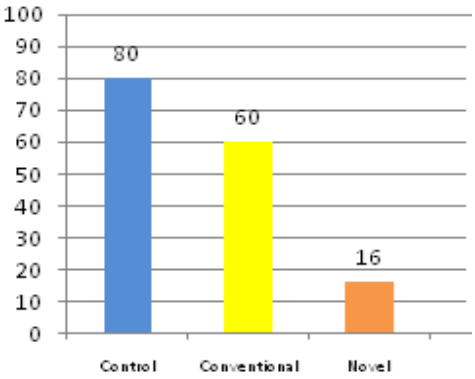


Fig 6. This difference was significant ($\chi 2(1) = 18$, $p < 0..001$), between the control and novel but not between the control and conventional. ($\chi 2(1) = 3.309$, $p = 0.069$)

DV 2. The mean time (sec) spent on the task

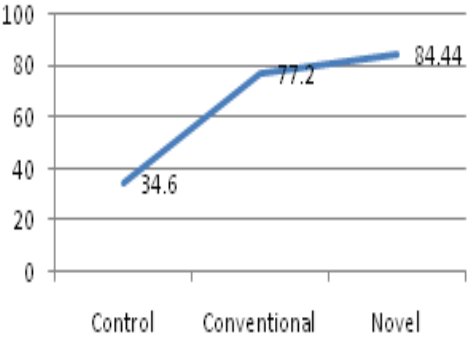


Fig 7. Participants spent significantly longer on the task in both the conventional (p=0.04) and novel (p=0.004) conditions compared to the control conditions

Experiment 2: Design and Method

The aim of experiment 2 was to see if the findings from experiment 1 could be replicated using an alternative problem solving task.

The problem solving task consisted of an electrical circuit board with part of the circuit missing. The end goal was to complete the circuit. Only the target object (spanner) could successfully solve the problem

Two dependent measures were recorded:
(1) % of participants that solved the task
(2) Mean time (sec) to select the target object

Experiment 2: Conditions

Fig 8. Conventional

Fig 9. Novel

Fig 10. Control

Fig 10. Solution

Experiment 2. Results

Table 1.	Solution Reached (%)	Time to Target (sec.) (SD)
Control	95.5	70.50 (79.75)
Conventional	59.1	129.32 (115.64)
Novel	80	126.23 (109.71)

Fewer adults reached a successful solution in the conventional function condition than in the control condition ($X^2(1)=8.282$, $p<0.05$; yet this comparison was not significant in the novel function condition ($X^2(1)=2.057$, p=NS;

Adults took significantly longer to select the target object under both the conventional ($U(22)=157$, $p<0.05$; and the novel function conditions relative to the control condition ($U(20)$=, $p<0.05$

Discussion

When adults are required to generate a novel use for a familiar artifact in a problem-solving task, their performance is impaired (in terms of whether they select the target object first or solve the task).

The findings of the current study challenge Duncker's original assumption that ONLY demonstration of the conventional function can impair problem-solving. Instead, information about object function may be based around plausible goal directed uses for an object.

References

Duncker, K. (1945). On problem-solving. *Psychological Monographs, 58 (ix),* 113.