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Adult's and children's intuitions about artifact function.



Cow tools

What is the nature of mature artifact concepts?

Is identity based on:

1. The object's current function?
2. Its past history of use?
3. The intentions of it's creator?
4. Identity and function?

Learning Outcomes

- Describe and evaluate the 'design stance'
- Critically evaluate studies investigating the design stance (including various methodologies)
- Evaluate cross-cultural perspectives on the design stance.
- Critically evaluate the role of conventionality.



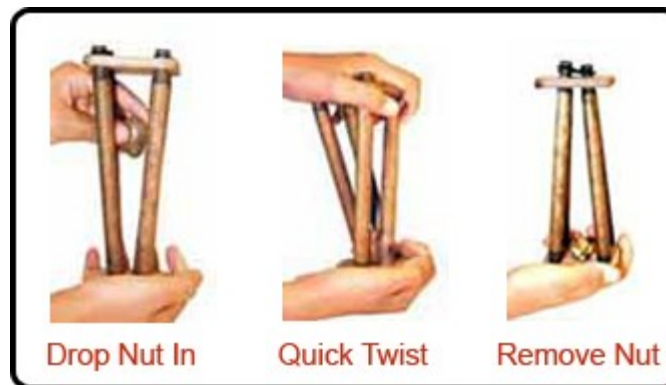
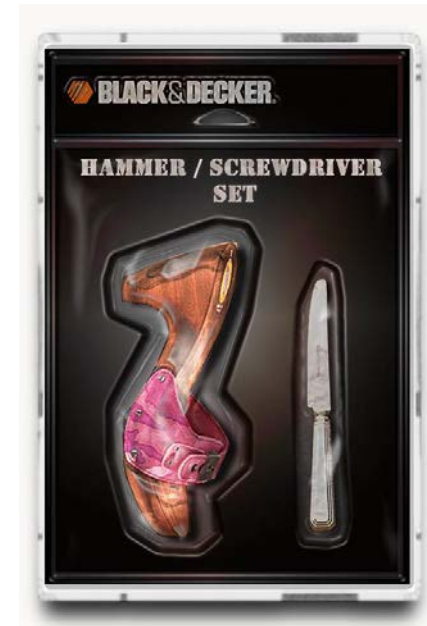
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Physical Affordances

- Mechanical properties of objects (Gibson, 1979)



Categorising on the basis of shape or function?



Psychological Essentialism

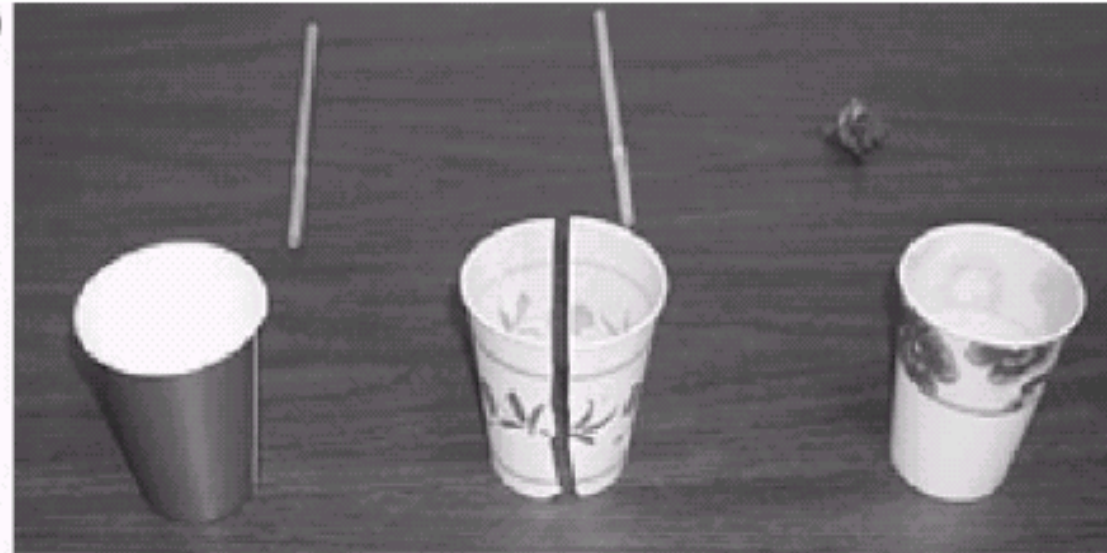
- General Level: psychological essentialism maintains that ordinary categorisation involves a fair amount of causal-explanatory reasoning (Gelman, 2003)
- Just because something looks like a skunk does not mean it is judged like a skunk (Keil, 1989)



- “ It is true that we don’t think of artifacts as having internal essences in the sense of natural kinds. But this doesn’t refute the view that artifacts are seen as having essences in the sense of having deeper causal properties that explain their superficial features and the categories they belong to.” (Bloom, 2000, pg. 163)



Ex: How many cups are there?



Adults say 3

- Remains a cup even if it cannot serve the function of a cup.

Preschoolers say 2

- To be a cup, object must serve function of a cup

Background

- What information is at the core of early artifact representations, and to what extent this information changes over development (see Lawrence & Margolis, 2007).
- Several studies suggest that adult's reasoning about artifacts appears to reflect the adoption of a '**design stance**' (e.g. Dennett, 1987; Disendruck et al., 2003).

Design Stance

- An object's identity is explained in terms of its having been intentionally designed to serve a particular purpose (Dennett, 1987).
- Intended function.....alternative use (violates intended function)...but what is it?



Pitting intended function vs. current function

- When presented with a novel object and told that it was invented for one purpose but later used by someone else for another purpose, adults tend to judge the artifacts based on the creator's intended function.
- Researchers have therefore concluded that adults understand artifacts in terms of the design stance (German & Johnson, 2002; Hall, 1995; Kelemen, 1999; Matan & Carey, 2001; Defeyter & German, 2009).

Developmental Evidence

- Debate over when the design stance develops
 - Matan & Carey: age 6
 - Defeyter & German: age 6
 - Kelemen: age 4
- Naming of representational artifacts (Bloom & Markson, 1998)

Naming representational artifacts



[Handbook of Research and Policy in ... - Google Book Search](#)

See also paper by Gelman and Bloom (2000) on non-representational artifacts.

Methods

1) Categorization Tasks (“What is it?”)

- Design function rather than current use (Hall, 1995; Kelemen, 1999, Matan & Carey, 2001).

2) Function Assignment Tasks (“What is it for?”)

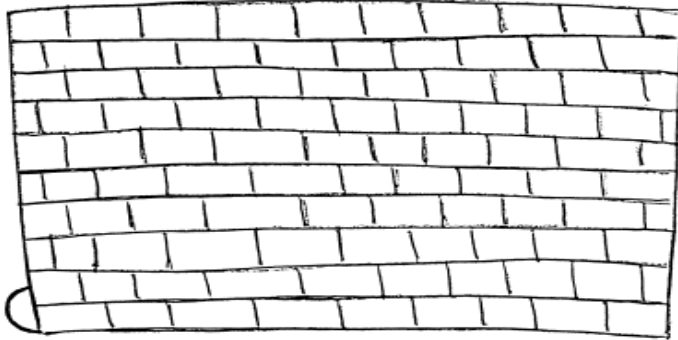


Developmental changes within the core of
artifact concepts

Adee Matan^a, Susan Carey¹

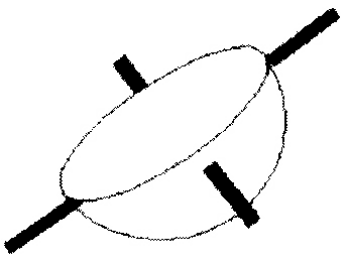
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Cambridge, MA, USA

Received 27 August 1999; received in revised form 26 January 2000; accepted 8 June 2000



Participants told a story about a person who made an object to water flowers (the original intended function) and about another person who was using the object for making tea (the current function).

Adults: Design Stance ✓
6 year-olds: Design Stance ✓
4 Year-olds: Design Stance ✗



Function Judgement tasks



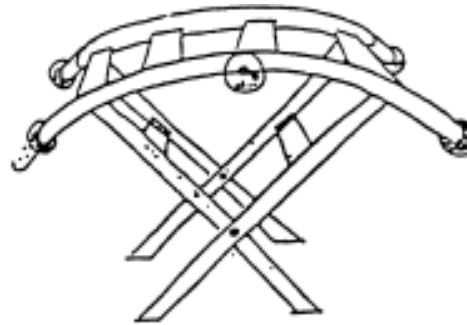
- Adults judge an artifact's function on the basis of the original intentions of the designer over other intentional uses and accidental activities (German & Johnson, 2002; Kelemen, 1999).
- But what about children's function judgements?

The scope of teleological thinking in preschool children

Deborah Kelemen*

Department of Psychology, 441 Moore Building, The Pennsylvania State University, University Park, Pennsylvania, PA 16802, USA

Received 20 November 1998; accepted 2 February 1999



Design Function

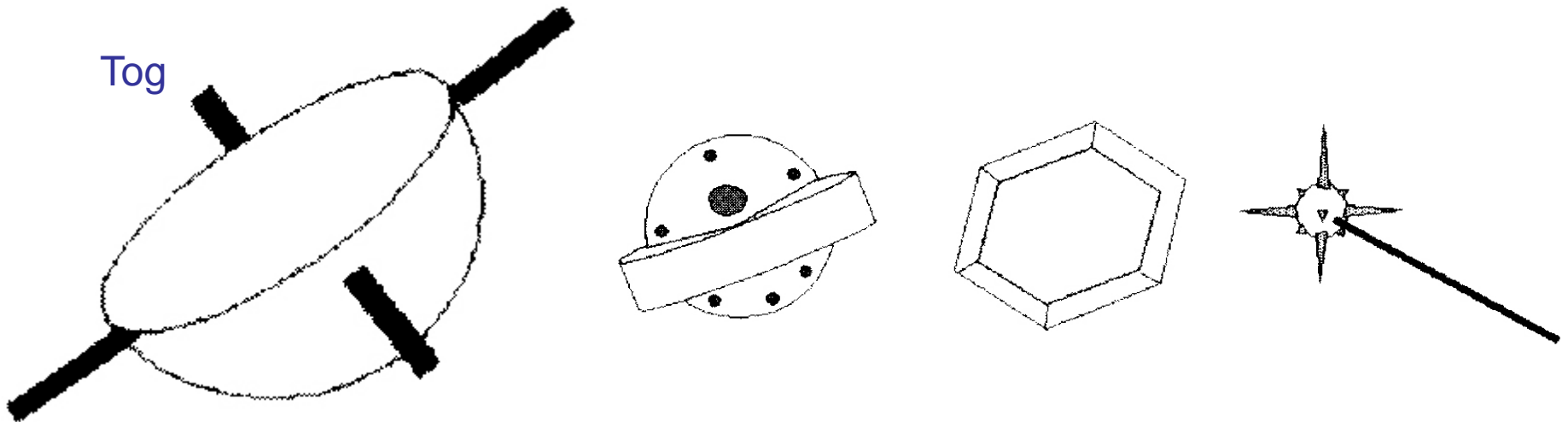
Current Function:
Accidental or
Deliberate

Adults: Design Stance ✓

5 Year-olds: Design Stance ✓

4 Year-olds: Design Stance ✓

German, T. P., & Johnson, S. C. (2002) Function and the origins of the design stance. *Journal of Cognition and Development*, 3, 279 -300.



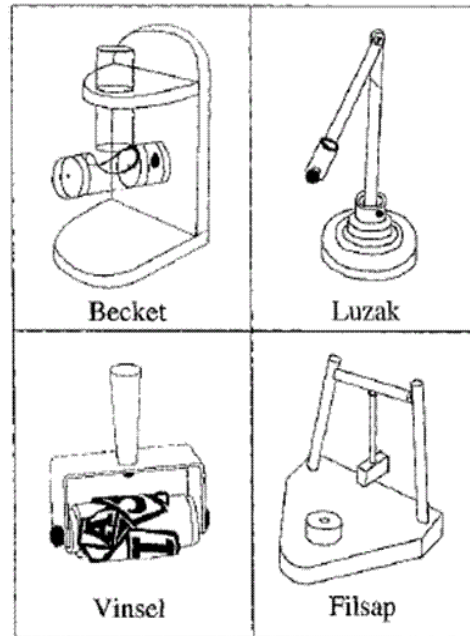
Intentional: “This is a Tog. A long time ago an inventor made the Tog to trap bugs. Now it belongs to someone else. Everyday they use it to collect raindrops.”

Accidental: “...They were carrying it along one day and guess what? They dropped it! When it landed it collected raindrops.”

- Categorisation tasks:
 - Matan & Carey (2001) children did not consistently rely upon design function for categorisation until age **six**.
- Function assignment tasks:
 - German & Johnson (2002) argue children to not give priority to the design function until age **six**.
 - Kelemen (1999; 2005) argues that children under the age of **four** give priority to design.

Categorisation of broken objects

- Kemler-Nelson et al. (2002, Study 4) found that 4 year-olds spontaneously used design function to categorise broken familiar artifacts.
- When using novel objects, children did not spontaneously rely on design function until age 10; although some evidence for 6-year-olds when probed about the design intentions.



Defeyter & German (Cognition, 2009)

Study 1

- In all of the preceding studies (apart from Deb Siegal) researchers have considered the design function in comparison with idiosyncratic use.
- Two issues:
 - Most familiar artifacts are used for the same use – the conventional use.
 - In the vast majority of cases the design function and the conventional use of an artifact match.

Aims of Study 1

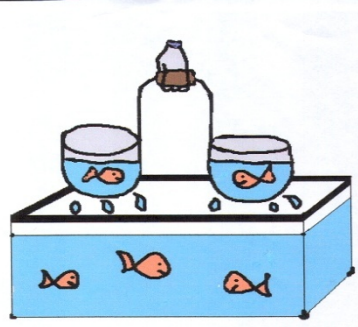
- Investigate the role of design and convention in participants function judgements by manipulating the number of individuals using an artifact for an alternative function to the design function.

Predictions

- Design versus idiosyncratic use (idiosyncratic condition):
 - Adults will favour design.
 - 6-year-olds will favour design.
 - 4- year-olds ?
- Design versus conventional use (conventional condition):
????

Conditions

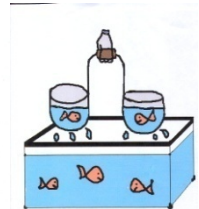
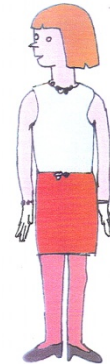
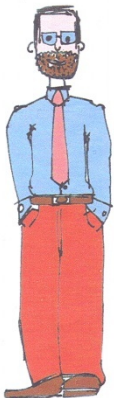
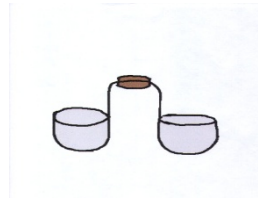
- Participants assigned to either the Conventional condition or the idiosyncratic condition
- In the Conventional Condition: Design pitted against convention use
- In the Idiosyncratic Condition: Design pitted against idiosyncratic use
- *For each condition the presentation order of functions and the object functions were counterbalanced*



Method

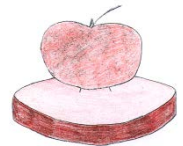
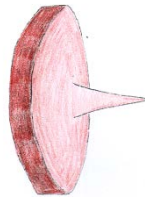
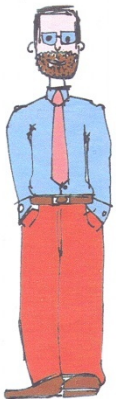
- Pretest
 - 40 adults rated 15 line drawings of novel artifacts. Resulted in 4 test items.
- Participants
 - 40 undergraduate students (mean age 23 years, range 18 -25).
 - 40 4-year-olds (mean age 4-6, range 4-1 to 4-9)
 - 40 6-year-olds (mean age 6-3, range 5-7 to 6-8)

- Design versus idiosyncratic
 - In this condition design was pitted against idiosyncratic function by telling participants stories about artifacts that were designed by A for X but now used by B for Y.



- Design vs. convention

- In this condition design was pitted against convention by telling participants stories in which novel artifacts were designed by A for X but now used by everybody for Y.



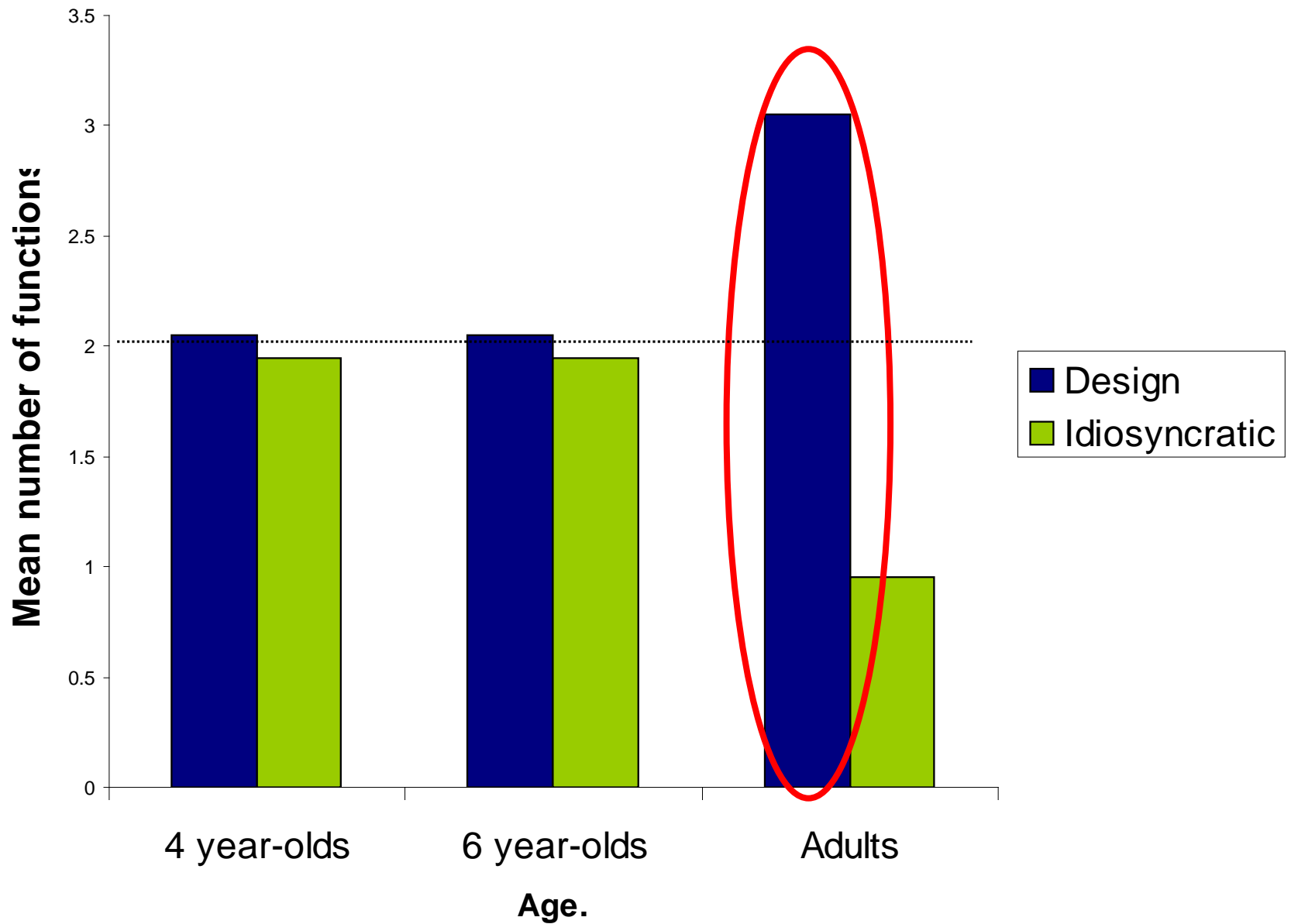


Figure 1: Mean number of design function judgements when pitted against idiosyncratic functions according to Age.

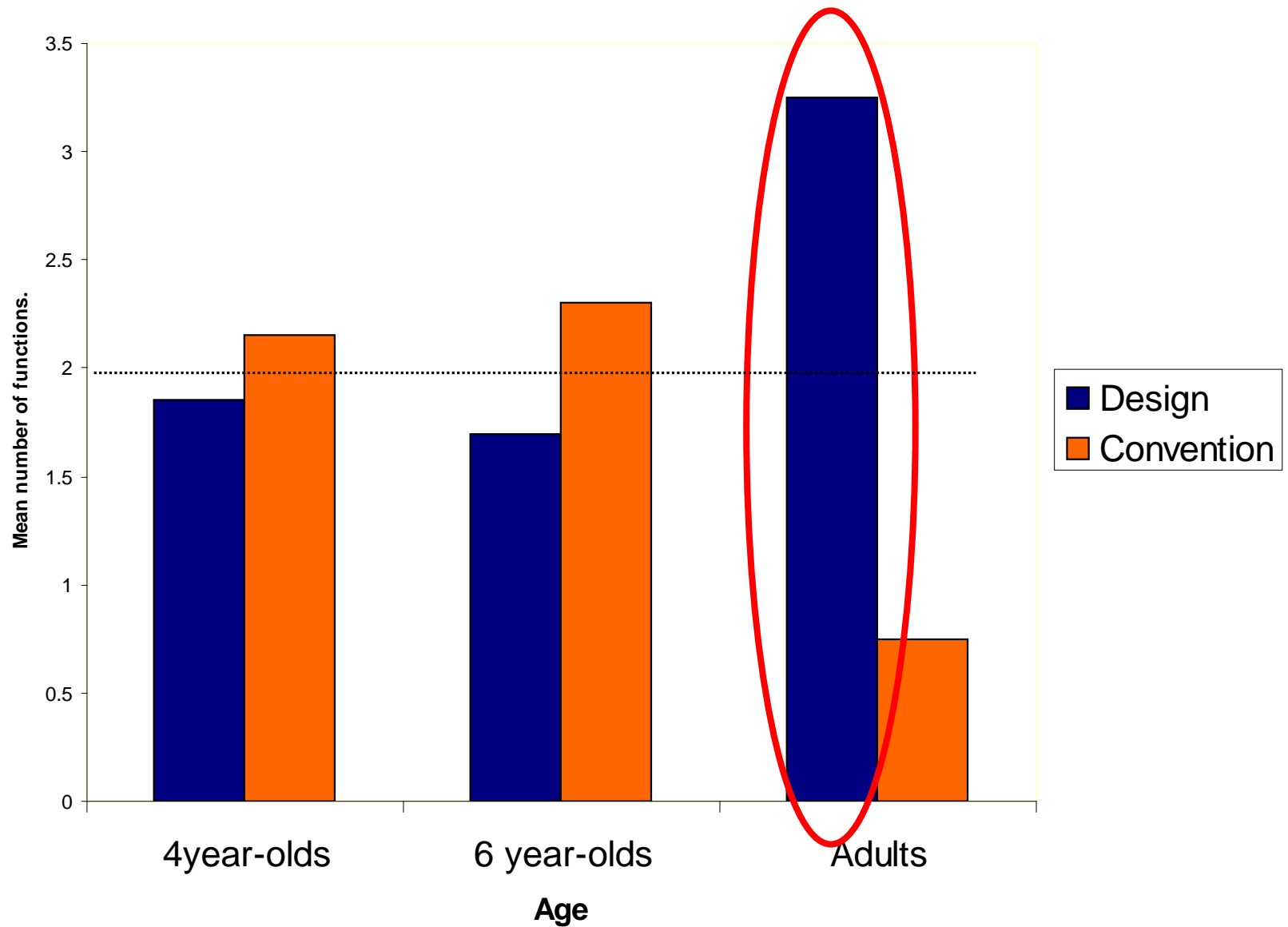
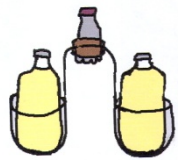
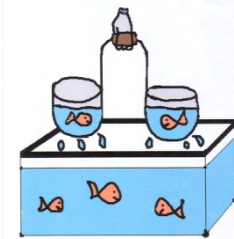


Figure 2: Mean number of design function judgements when pitted against convention according to Age.



Looking within each age group.



Adults:

- Significant preference for design over convention; $t(19) = 4.80, p < 0.001$
- Significant preference for design over idiosyncratic; $t(19) = 4.97, p < 0.001$.

4 year-olds:

- No preference for design over convention; $t(19) = 0.448, p > 0.05$.
- No preference for design over idiosyncratic use; $t(19) = 0.160, p > 0.05$.

6 year-olds:

- No preference for design over convention; $t(19) = 0.88, p > 0.05$.
- No preference for design versus idiosyncratic; $t(19) = 0.17, p > 0.05$.

Discussion

- Adults clearly weigh design over both idiosyncratic use and conventional use.
- Children: No evidence of a 'design stance'.
 - No evidence of a 'conventional stance.'
 - Did they understand the task?

The question asked: What's it really for?

- Do children understand the question?
- German & Johnson (2002).

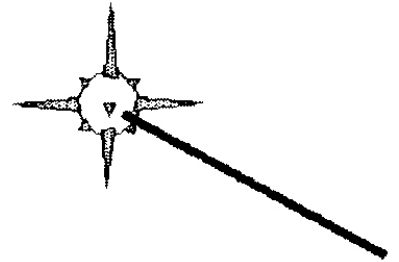
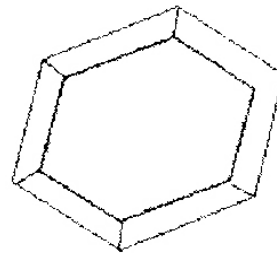
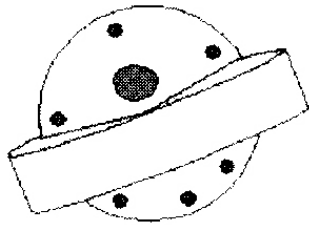
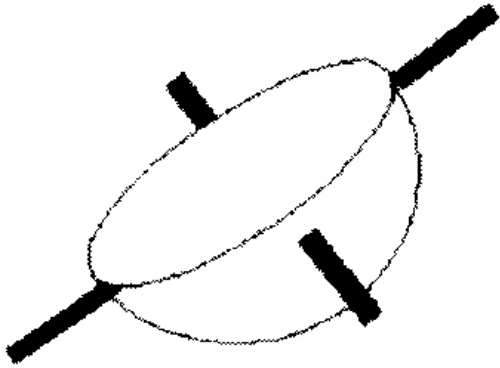
Present study:

- Design vs. idiosyncratic - only 40% adults consistently favoured the design function over the idiosyncratic function.
- Design vs. convention - 50% adults consistently favoured the design function over the conventional function.

Conventional use studies by Debbie Siegal

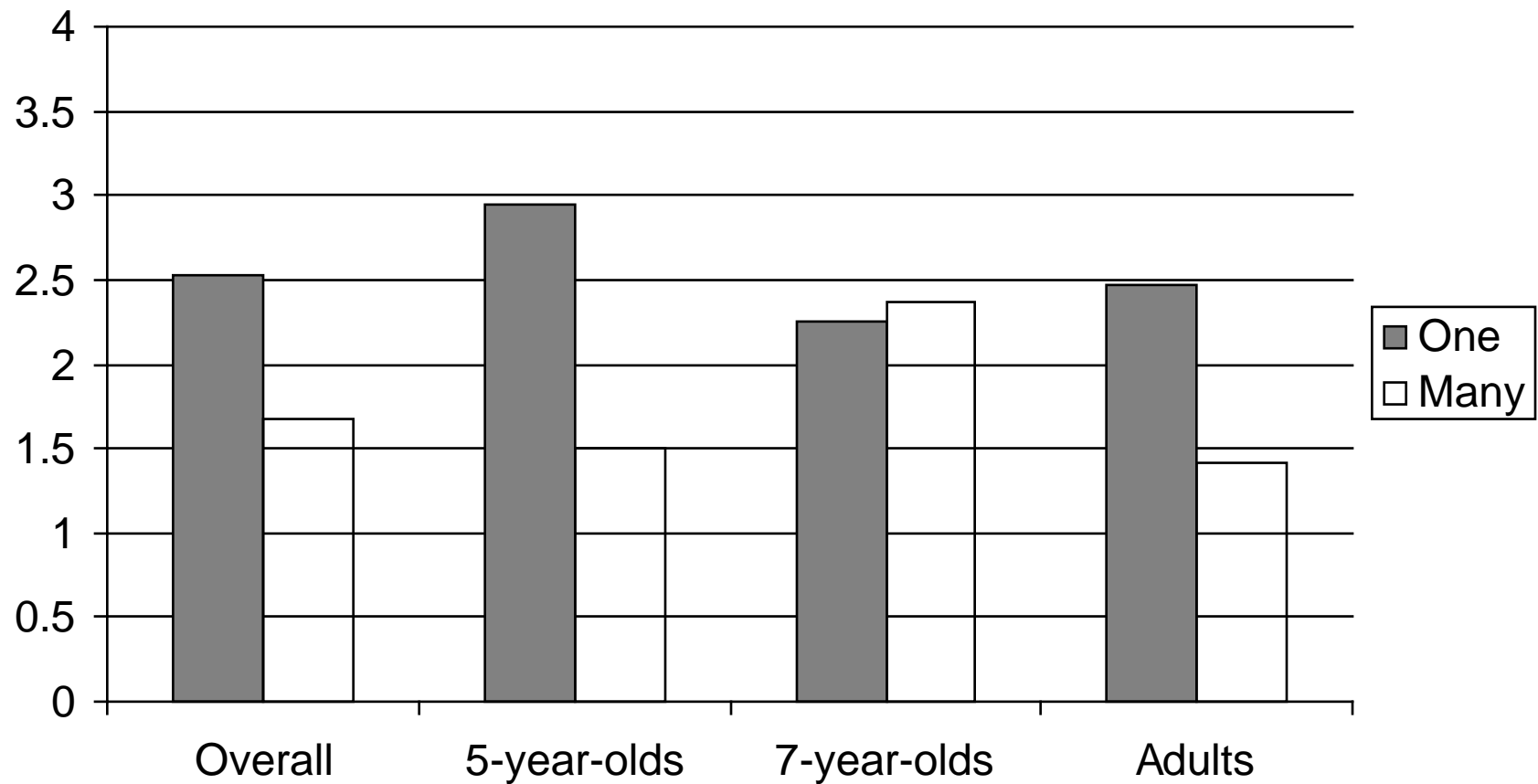
- Children learn about artifacts through observations of how “we” use them (Tomasello et al., 2005).
- Costall (1995) Socialising Affordances
- Siegal & Callanan (2005)

Siegal & Callanan (2005)

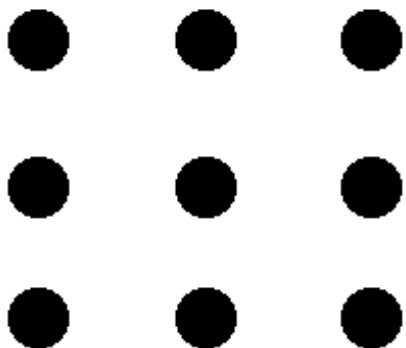


One person condition vs. many people
condition

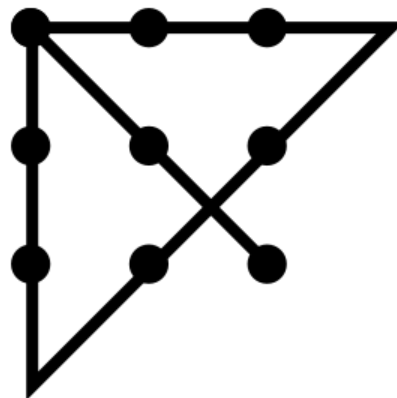
Siegal & Callanan...Results Expt. 1



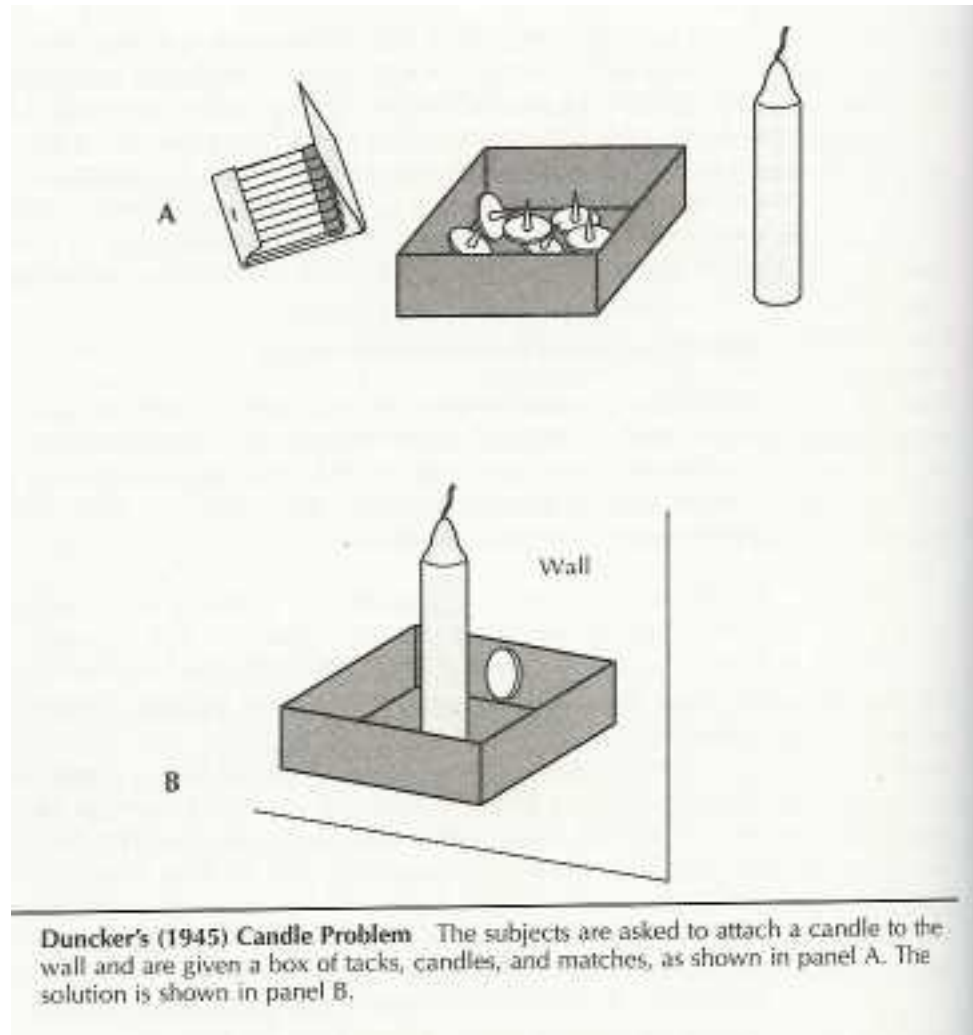




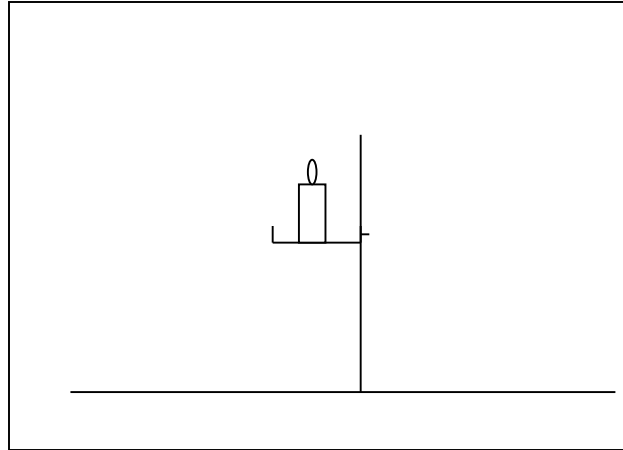
connect the dots by drawing four straight, continuous lines that pass through each of the nine dots, and never lifting the pencil from the paper.



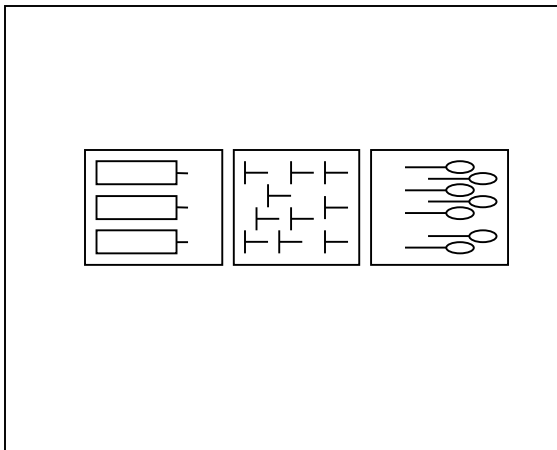
Problem Solving: Functional Fixedness



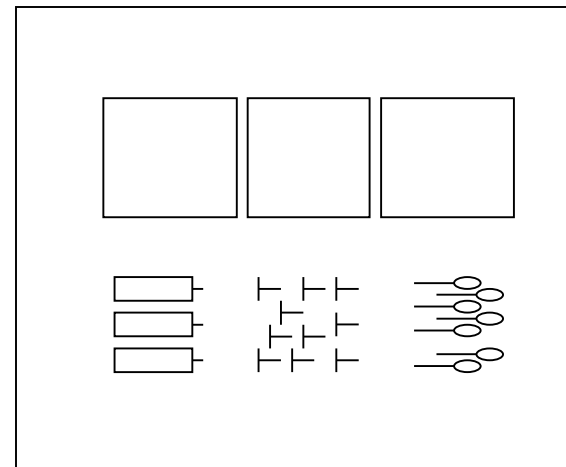
1. That core (whatever information it is based on)
appears to play a role in function based problem solving



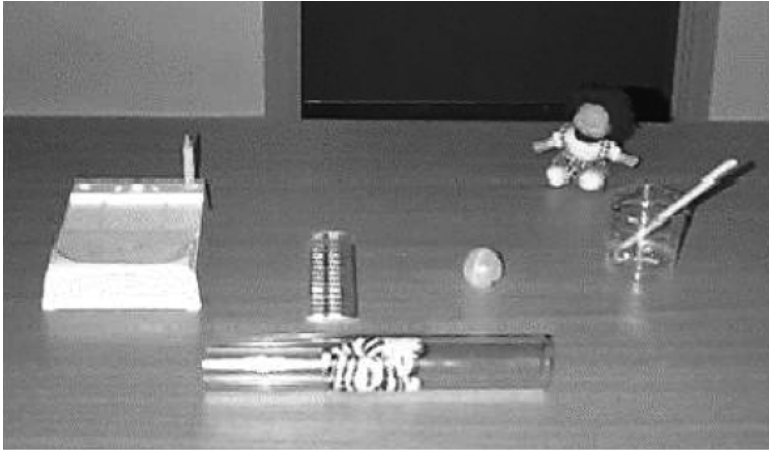
Function demonstrated



Control



Defeyter & German (2003)

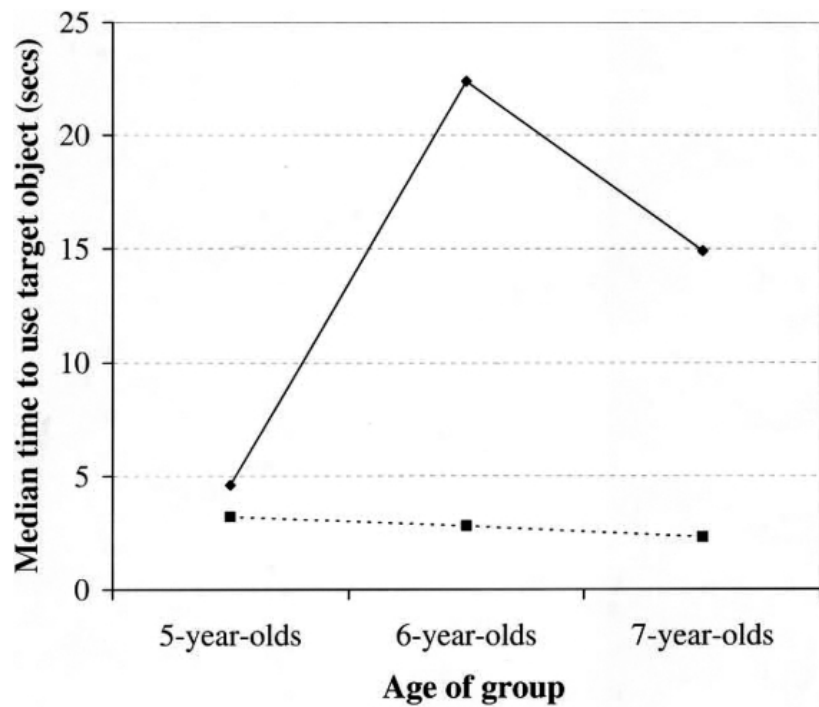


A

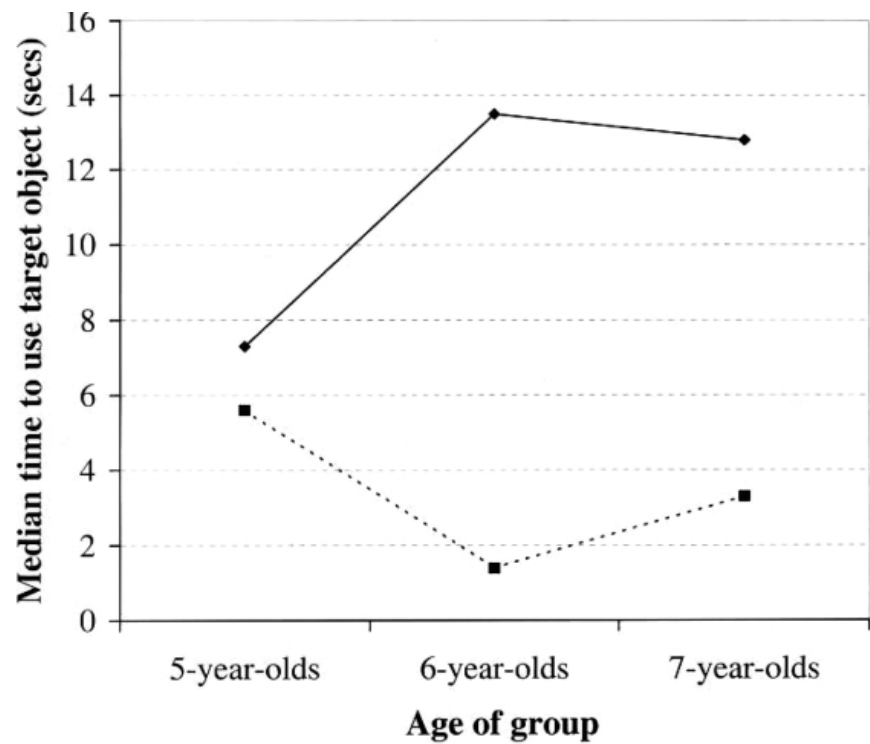


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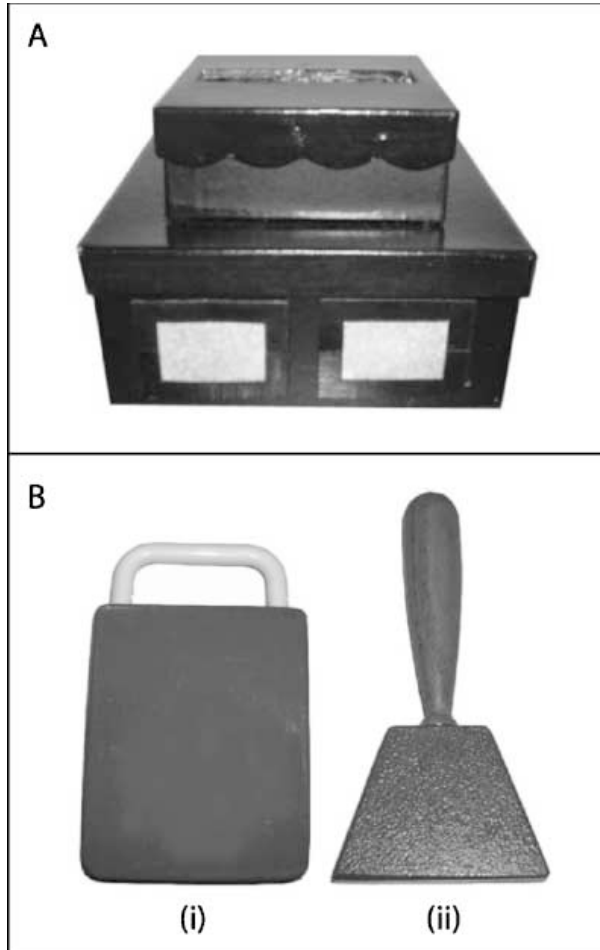


—◆— Function demonstration ···■··· Baseline



—◆— Function demonstration ···■··· Baseline

Casler & Kelemen (2005)



Mutual exclusivity to functions?

Immunity to functional fixedness in young children

YES

Defeyter and colleagues

Birch, Vauthier & Bloom
(2008)

Keil (2008)

Siegal (in press)

NO

Kelemen (2004)

Kemler Nelson

Normativity

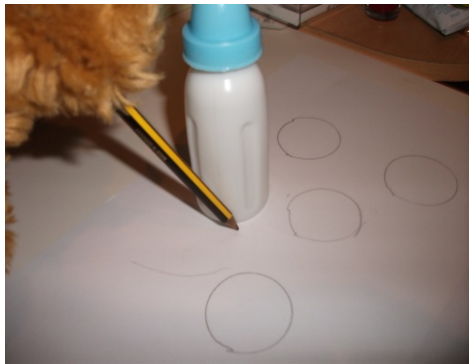
- Hannes Rakoczy: Protest Paradigm (Games)



Cassler (2009)



Defeyter & Underwood (in prep)



Are children protesting because puppet uses the object in a manner that is different to the demonstrated function (regardless of whether it is the design function?)