Young children’s reasoning about artifact function: an action-protest paradigm

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Artifacts
Intended Design

Intended design function

Alternative function
A bottle – What is it for?
Design Stance

• An object’s identity is explained in terms of its having been intentionally designed to serve a particular purpose (Dennett, 1987).

• Adult’s reasoning about artifacts appears to reflect the adoption of a ‘design stance’ (e.g. Keleman, 1999; German & Johnson, 2002; Matan & Carey, 2001).

• An object’s designed function is central to children’s artifact representation, (see Kelemen & Carey, 2007; Kemler Nelson et al., 2002; Gelman & Bloom, 2000)
Shared Convention

• In the majority of cases the design function and the conventional use usually match (Callanan et al., 2007).

• The way communities use artifacts is just as important as design intentions in children’s artifact conceptualisation (Diesendruck et al., 2010; German, Truxaw & Defeyter, 2007)
Shared Convention

- A long time ago an inventor made the DAX to collect leaves.
- Now MANY people have them. Every day they use them to catch fish.

When a function had changed because many people had adopted a different use from the original function less likely to view the artifact from the design perspective (Siegel & Callanan, 2007).
Violating conventional function

Do young children view atypical functions of artifacts as plain wrong?
Young children’s normative awareness of artifact function
(Casler, Terziyan & Greene, 2009)

• Action-protest paradigm (Rakoczy, Warneken & Tomasello, 2008).

• Demonstration phase – Adult demonstrated the conventional function of familiar and novel artifacts.

• Test Phase – Puppet demonstrated an alternate atypical function.
Toddlers view artifact function normatively

• 2- and 3-year-olds demonstrated normative protests towards a puppet using artifacts in ways that violated conventional function.  
  “No! It’s not for that!”

• Toddlers strongly believe that there are ‘proper’ ways to use objects and any other use is simply ‘wrong’.
Research question

Do young children believe that artifacts embody their conventional/design function across different contexts rendering other plausible uses as completely wrong?
Hypothesis

Conventional function = No protest

Violation of conventional function = Protest
Method

Participants = 80 children

**Three year olds**
N = 39, mean age = 3.7, range 3.1 - 3.9
20 females and 19 males.

**Four year olds**
N = 41, mean age = 4.8, range 4.3 – 4.10
20 females and 21 males.

Children were tested individually.
Sessions were videotaped and lasted 25 minutes.
Conditions

1. Conventional function   -   Idiosyncratic function

2. Conventional function   -   Instrumental function

Order Function Counterbalanced

3. Idiosyncratic function   -   Conventional function

4. Instrumental function   -   Conventional function
Materials

Three familiar objects were used:
Procedure

- Warm up phase – To make child feel at ease with the experimental setting

- First function - Demonstration phase by ‘Sam’ the bear.

- Second function - Test phase by ‘Sally’ the pig.

- Control question - “What is ‘X’ for?”
Table 1:
List of Conditions, Artifacts and Functions in the Demo and Test Phases

<table>
<thead>
<tr>
<th>Condition</th>
<th>Object</th>
<th>Demo Phase</th>
<th>Test Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional - Idiosyncratic</td>
<td>Baby Bottle</td>
<td>Feeding baby</td>
<td>Rolling play dough</td>
</tr>
<tr>
<td></td>
<td>Toothbrush</td>
<td>Cleaning teeth</td>
<td>Brushing doll’s hair</td>
</tr>
<tr>
<td></td>
<td>Crayon</td>
<td>Drawing</td>
<td>Stirring liquid</td>
</tr>
<tr>
<td>Conventional - Instrumental</td>
<td>Baby Bottle</td>
<td>Feeding baby</td>
<td>Drawing circles</td>
</tr>
<tr>
<td></td>
<td>Toothbrush</td>
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<td>Crayon</td>
<td>Drawing</td>
<td>Tapping</td>
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<tr>
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</table>
Condition 3 - Idiosyncratic - Conventional
Results: Overall

- **Test phase**: No significant main effect of function: $F(3, 72) = 0.178; p = .905$
- No significant main effect of age $F(1,72)=0.48$, $p = .540$
- No significant Function x Age interaction ($F(3,72) = 0.80, p = .496$

In all conditions both groups of children showed similar levels of protest towards **any** second function demonstrated.
Figure 1: Mean number of protests in the Conventional-idiosyncratic condition
Figure 2: Mean number of protests in the Conventional- Instrumental condition
Fig. 3: Mean number of protests in the ‘idiosyncratic-conventional’ condition.
Figure 4: Mean number of protests in the Instrumental-Conventional condition

- **3 year olds**: Mean protest score of 4.2
- **4 year olds**: Mean protest score of 3.8

Legend:
- **Demo**: Orange
- **Test**: Blue
Results: Control question

What’s it for?

92% of children generated the conventional function of the three test objects.

To draw  To feed  To brush teeth
• Young children did not view violations of conventional function as wrong *per se*.

• 3- and 4-year-olds understood the first function of each artifact to be the correct one in this context.

• The action-protest paradigm measured protest against the first function or rule provided (Rakoczy et al., 2008).
Discussion

• Young children understand that objects have a stable conventional function.

• Non-conventional functions are not necessarily viewed as mistakes but perfectly feasible alternatives within specific contexts (Rakoczy et al., 2009; Callanan et al., 2007).

• Within rule-governed contexts young children understand that everyday artifacts can serve different functions which may deviate considerably from their conventional use.
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