Sources of Information in the Acquisition of Principled Properties

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Background

- *Kind concepts*, like *dog* or *river*, are universal across the human species, and allow us to represent a token as one of indefinitely many tokens of that kind.
- The structure of kind concepts is such that all kinds have principled properties (Prasada & Dillingham, 2006; 2009).
- *Principled properties* are properties fundamental to what it means to be a member of a kind.
  - e.g. HAVING STRIPES for zebras
  - e.g. HAVING A HANDLE for hammers
- Principled properties can be contrasted with statistical properties, which are merely associated with a kind.
  - e.g. RED for barns
- Principled properties, but not statistical properties:
  - generate *normative violation* when absent in a kind member.
  - license *formal explanation* ("[token] has [PROPERTY] *because* it's a [kind member]")
- Recent work shows that children as young as age 4 already represent principled properties as part of their kind structures (Haward et al, 2015).
- So far, there has been little work on how principled properties are acquired.

Our Question

What types of information are used to set up a property as principled for a kind?

1) Domain information

- The types of properties that tend to be principled may differ by domain.
- Word learning literature suggests (Booth & Waxman, 2002):
  - For animates, both STUFF- and PART-related properties tend to be principled.
  - For artifacts, PART-related properties are favored over STUFF-related properties.

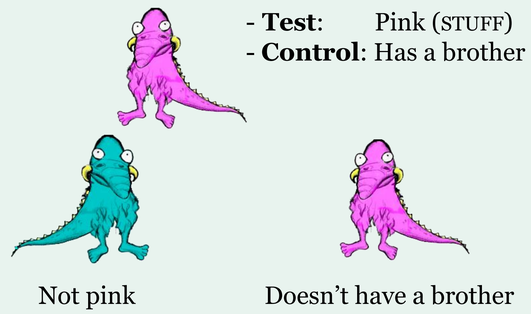
2) Formal explanations

- Since only principled properties license formal explanations, presenting a novel property using a formal explanation may provide a cue that the property is principled.

Exp 1 domain information

- *Participants* – 4 & 5 yo (n=18), 7 & 8 yo (n=17), adults on MTurk (n=35)

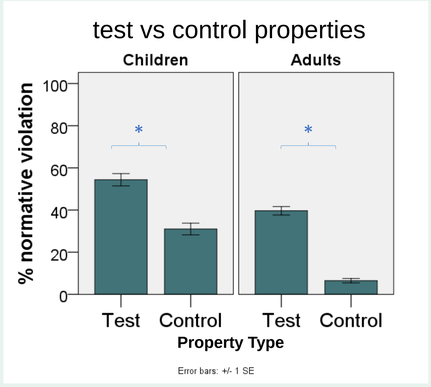
IVs
Domain animate vs artifact
Test property STUFF vs PARTS



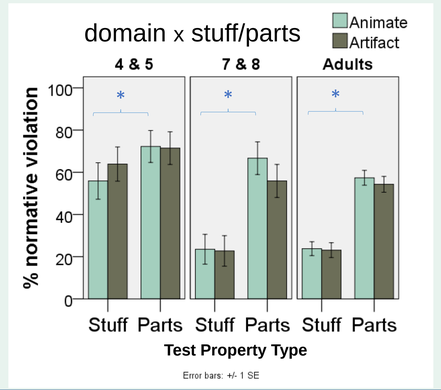
DV Does that mean there is **something wrong** with this Blick?

Prediction- *Animates*: STUFF & PARTS generate high proportion of normative violations; *Artifacts*: PARTS, not STUFF, generate high proportion of violations.

All ages judged test properties *as more likely to be principled* than control properties.



All ages favored *PART over STUFF properties* across both domains.



Exp 2 formal explanations

- *Participants* – adults on MTurk (n=78)

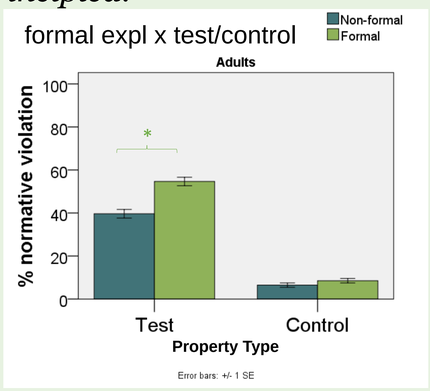
- Same design as Experiment 1, except:

Formal vs non-formal

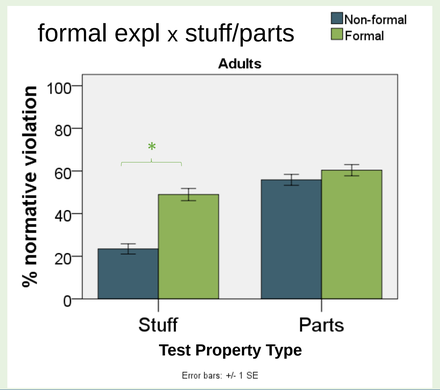
- **Non-formal** (n=35) - half of participants had the test property introduced with a conjunction
  - "It is pink. It is pink, and it's a Blick."
- **Formal** (n=43) - half of participants had the test property introduced with a *formal explanation*
  - "It is pink. It is pink, *because* it's a Blick."

Prediction- Test properties generate a higher proportion of normative violations when introduced with a *formal explanation*.

Test properties that were explained formally were *more likely to be set up as principled*.



Specifically, formal explanations mainly *boost STUFF properties*.



Brief results

- PART properties appear to be favored as principled more so than STUFF properties, **regardless of domain**.
- **Formal explanations** increase the likelihood that a property will be set up as a principled property.

Discussion

- Properties chosen in this study as STUFF-related (i.e. COLOR, PATTERN) appear to be *indirect* cues to STUFF, while the PART properties (e.g. LEGS) are more directly interpretable as parts.
  - Future studies could explore how more directly STUFF-related properties (e.g. HAVING FUR) are set up across domains.
- What other types of properties might differ by domain?
- What other types of information besides domain and formal explanation (e.g. causal information, linguistic information) might be involved in setting up a principled property?

References

Booth, A. E. & Waxman, S. (2002). Word learning is 'smart': evidence that conceptual information affects preschoolers' extension of novel words. *Cognition*, 84, B11-B22.

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