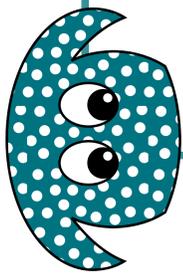


A Closer Look at Shape Bias

An Eye-tracking Study into Mechanisms Underlying Children's Category Formation

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Background

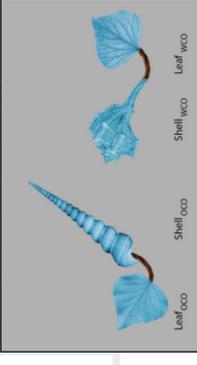
- In word learning, children often demonstrate a **shape bias**: objects that are the same shape are believed to share a label (Landau, Smith and Jones, 1988).
- But other contextual cues can weaken shape bias. For instance, a **texture bias** is more likely when objects have eyes, because animals often move but rarely appear to change texture (Jones et al., 1991).
- For young children, shape and texture bias is stronger for labeled objects.
- At present the underlying mechanism for this process is not well understood.
- However, recent eye-tracking research suggests labels may facilitate categorisation by directing attention towards commonalities between items (Althaus & Plunkett, 2015).
- This leads us to the current study.

Familiarisation stimuli



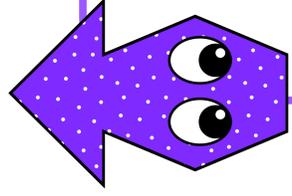
Familiar leaves attracted attention over novel shells only when labeled (Althaus & Plunkett, 2015)

Test stimuli



Aims

- If labels focus attention towards commonalities between objects, does the same mechanism underpin shape bias? Specifically, can it explain why the bias is stronger for young children in the presence of labels?
- We used eye-tracking technology to get a closer look at what children focus on when completing a classic shape bias label extension task.
- We also tried to replicate the finding of Jones et al (1991) to determine if a screen-based eye-tracking task is an effective tool for shape bias research.
- We tested two main predictions:
 - the presence of labels will elicit a shape bias, and a pattern bias may emerge for objects with eyes.
 - labels during the trial will result in greater attention to the similarities between test objects.



Methods

Participants

- 16 children, 34-months to 38-months, recruited from the Lancaster University Babylab database (6 female, mean age = 35.7 months).

Stimuli

- Eight colourful cartoon 'standards' were created, along with a pair of test items: a shape match and a pattern match.
- Each item had a variant with eyes and without.
- Four novel labels were used: vink, noot, teep, zain.

Procedure

- Children attended the lab and watched a five minute video on a computer monitor mounted with a Tobii eye-tracker.
- Each trial had a training phase and a test phase (see images).
- An audio recording of script shown accompanied each trial.
- Each child completed 16 trials (eight unique trials presented twice).
- The first half were presented without a label. Four of the eight items had eyes, so every participant completed four trials for each combination of the 2x2 design.

Eye-tracking Data

- We defined 'Areas of interest' (AOI) for the eye-tracking data as shown below.
- Shape bias was measured by the 'longest look' towards one of the test items.
- Attention to commonalities was measured by proportion of looking time at common features.

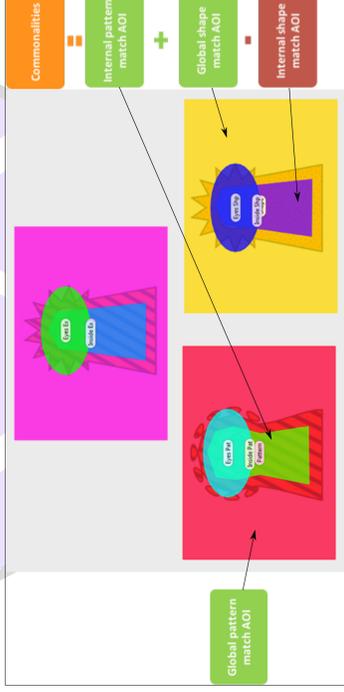
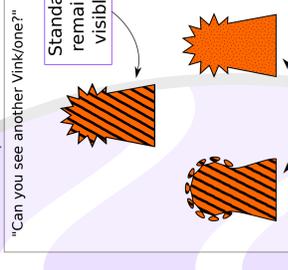


Illustration of training phase for each condition

Label	No Label
"Look! A Vink!"	"Look at that!"
"Look! A Vink!"	"Look at that!"

Example of layout and script for the test phase



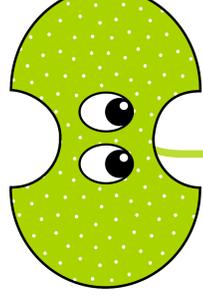
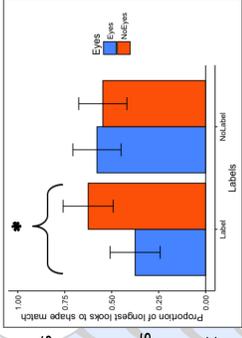
Results

Shape and Pattern Bias

- No overall main effect for Labels or Eyes
- But there was a significant interaction: $F(1,13) = 5.026, p = .043$
- Post-hoc tests confirmed that the shape bias was disrupted by the addition of eyes (so pattern preferred), but only when the object was labeled: $t(15) = -2.8284, p = .0013$

Attention to commonalities

- But we found no significant difference in attention to the similar or different AOIs as a function of labels, for longest look or for proportion of total looking time.

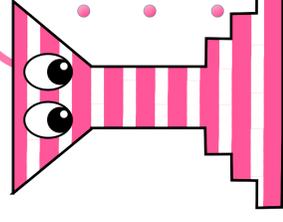


Conclusions

- We were able to replicate the shape-bias findings of previous research and found that **the combination of eyes and labels encouraged children to categorize by pattern instead of shape**. So children may use eyes as a cue to the kind of object they are labeling (i.e. something alive) and change their strategy appropriately.
- However **children didn't look at common features more often in any condition**. It seems unlikely that this process explains shape bias in our task.
- But, in Althaus & Plunkett (2015) infants were trained in the new category first and could not see the example during testing. It is therefore possible that a 'concept' is necessary for labels to focus attention on commonalities.

Take home point

- Eye-tracking with digitally created stimuli is a viable alternative for future shape bias research.
- With digitally created stimuli we can have full control over systematic variations in a way that is more challenging with 3D real world objects.
- Interested in ideas for future research? Pick up a handout!



References

Althaus, N., & Plunkett, K. (2015). Categorization in infancy: labeling induces a persisting focus on commonalities. *Developmental Science*, 19(5), 770-780.
Jones, S., Smith, L. B., & Landau, B. (1991). Object properties and knowledge in early lexical learning. *Child development*, 62(3), 499-516.
Landau, B., Smith, L. B., & Jones, S. (1988). The importance of shape in early lexical learning. *Cognitive Development*, 3(3), 299-321.

Special thanks to



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