Selective Social Learning: Emergence, Variations, and New Directions

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Selective Social Learning

Children are selective learners

e.g., Birch, Vauthier & Bloom, 2008; Corriveau, Meints & Harris, 2009; Fitneva & Dunfield, 2010; Jaswal & Neely, 2006; Koenig, Clément & Harris, 2004; Koenig & Harris, 2005a; Scofield & Behrend, 2008

e.g., Birch, Akmal & Framption, 2010; Jaswal & Malone, 2007; Sabbagh & Baldwin, 2001

e.g., Pillow, 1989; Pratt & Bryant, 1990; Nurmsoo & Robinson, 2009
Older preschoolers attribute more knowledge and positive behaviours to previously accurate puppets

- *Who knows that cats can see at night?*
- *Who always shares her toys?*

Brosseau-Liard & Birch, 2010, *Developmental Science*
Older preschoolers can flexibly adjust their learning when multiple cues are available.

Visual access vs. past accuracy

Confidence vs. past accuracy

Brosseau-Liard & Birch, 2011, *Child Development*

Un(der)-explored aspects of selective social learning

• Emergence of selective learning skills
• Variations in selective social learning
  – Individual differences & cognitive underpinnings
  – Motivational / situational variations
Part 1

Developmental emergence of confidence as a cue to imitation
Background

Recent research shows that attention to some reliability cues is present in infancy:

• Infants more likely to imitate or learn from:
  
  – Accurate/reliable labelers
    e.g., Brooker & Poulindubois, 2013; Koenig & Woodward, 2010
  
  – Accurate emoters
    e.g., Chiarella & Poulindubois, 2014; Chow, Poulindubois & Lewis, 2008
  
  – Conventional models
    e.g., Zmyj, Buttelmann, Carpenter & Daum, 2010
  
  – Adults over peers
    e.g., Zmyj, Daum, Prinz, Nielsen & Aschersleben, 2012
Background

One cue that has received relatively little attention is confidence

- Some research shows that preschoolers attend to various indicators of certainty/uncertainty, including verbal and nonverbal cues
  
  e.g., Jaswal & Malone, 2007; Moore, Bryant & Furrow, 1989
Background

Only two studies had previously tested the effect of confidence on selective learning in toddlers:

- 2- and 3-year-olds more likely to imitate someone who currently shows, and has previously shown, nonverbal cues of confidence
  (Birch, Akmal & Frampton, 2010)

- 14-month-olds prefer confident *and* accurate models
  (Zmyj, Buttelmann, Carpenter & Daum, 2010)
Study Design

Participants:
• 18-month-olds: $N=36 \ (M=18m \ 20d; \ 20f, \ 16m)$
• 24-month-olds: $N=34 \ (M=24m \ 19d; \ 18f, \ 16m)$

2 confidence conditions (between-subjects):
• Confident person
• Unconfident person
Method

Experimenter demonstrates confidence (or lack thereof) on every action

- 2 trial types (blocked)
  - 3 actions with familiar objects
  - 3 actions with novel objects
  - Order counterbalanced

- After each action, children given the object and their actions coded for imitation attempts
Examples
Examples
Results:
Combining Familiar and Novel Objects

Brosseau-Liard & Poulin-Dubois, 2014, *Infancy*
Results – Novel Objects

Brosseau-Liard & Poulin-Dubois, 2014, *Infancy*
Results – Familiar Objects

Brosseau-Liard & Poulin-Dubois, 2014, *Infancy*
No effect of object familiarity

Why does confidence affect imitation?

– Different motivations for imitation: learning vs. social engagement
  (e.g., Over & Carpenter, 2013; Uzgiris, 1981)

– If confidence affects infants’ motivation to learn from an individual, only imitation of novel actions should be affected

– If confidence affects infants’ motivation to engage with an individual, imitation of both familiar and novel actions should be affected
Future Directions

• Further exploring the impact of toddlers’ imitation motivations
  – How to manipulate affiliation vs. learning motivation?
Part 2

Selective Social Learning and Theory of Mind
Model characteristics that guide selective learning

• Epistemic cues
  – Can be indicative of knowledge
    • Past accuracy
    • Confidence
    • Perceptual access to information
    • Expertise
Model characteristics that guide selective learning

• Non-epistemic cues
  – Differentiate individuals but not along knowledge dimension
    • Other mentalistic attributes, e.g. benevolence
      e.g., Mascaro & Sperber, 2009; Landrum, Mills & Johnston, 2013
    • Non-mentalistic attributes
      – Physical strength (Fusaro, Corriveau & Harris, 2011)
      – Attractiveness (Bascandziev & Harris, 2014)
      – Cleanliness (Heyman, Fu & Lee, 2013)
Focus: Past labeling accuracy as a cue for novel word learning

Why do children prefer to learn new words from accurate over inaccurate labellers?
Epistemic account

• Children attribute enduring differences in word knowledge to informants based on their prior labeling behaviour

• Evidence for this account:
  – Links with exposure to language with evidential grammatical forms (e.g., Turkish)
    • Lucas, Lewis, Pala, Wong & Berridge, 2013
  – Children’s explicit statements
Why did she call the car “a shoe”? 

- Lack of knowledge or information access: 16 children
- Joke, trick: 1 child
- Other / No response: 8 children

Brosseau-Liard & Birch. unpublished data
Alternative accounts

• Non-epistemic accounts: Children do not interpret the difference in verbal accuracy in terms of word knowledge
  – Attribution of helpfulness
  – Attribution of ingroup status, normativity
  – No mental attributions whatsoever – “bad output”
Theory of mind and selective learning

• Positive correlations have been reported between theory of mind measures and some selective learning tasks
  • E.g., DiYanni & Kelemen, 2008; DiYanni, Nini, Rheel, & Livelli, 2012; Fusaro & Harris, 2008; Lucas, Lewis, Pala, Wong & Berridge, 2013
    – Though not by all
      • E.g., Pasquini, Corriveau, Koenig & Harris, 2007

• These positive correlations are expected if selective learning depends on attributions of knowledge

• These correlations are likely to be specific to situations where a child is using an epistemic strategy
Goals of the present study

- Compare the relationship between theory of mind skills and two selective word learning conditions:
  - Past labeling accuracy (epistemic cue)
  - Physical strength (non-epistemic cue)

- Hypothesis: Selective word learning is driven by...
  - Epistemic reasoning when based on past labeling accuracy
  - Non-epistemic reasoning when based on physical strength

- Prediction: Theory of mind will predict selective word learning based on past labeling accuracy but *not* based on physical strength
Method

Participants: $N=65$ (38 males), 3,5-4,10 ($M=4,2$)

3 tasks (within-subjects):

• Selective word learning task: Accuracy (3 trials)
• Selective word learning task: Strength (3 trials)
  – Order counterbalanced
• Theory of mind (ToM) scale (4 trials)
  – Always administered between the two selective learning tasks
Selective Learning - Accuracy

That’s a car!

That’s a spoon!

That’s a cat!

That’s a cow!
Selective Learning - Accuracy

That’s a mirp!
That’s a jid!
That’s a bleem!
That’s a waze!
Selective Learning - Strength
Selective Learning - Strength

That’s a roaf!
That’s a nim!
That’s a hep!
That’s a lidge!
ToM Scale

• 4 easiest tasks from Wellman & Liu (2004)
## Results

<table>
<thead>
<tr>
<th>Task</th>
<th>Range</th>
<th>M</th>
<th>SD</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accuracy</strong></td>
<td>0-3</td>
<td>2.28</td>
<td>0.98</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>Strength</strong></td>
<td>0-3</td>
<td>1.28</td>
<td>1.22</td>
<td>.145</td>
</tr>
<tr>
<td><strong>Theory of mind scale</strong></td>
<td>0-4</td>
<td>2.46</td>
<td>1.06</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

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The graph shows the results of the ToM Scale—per trial, with % pass ranging from 0 to 100. The tasks include Diverse desires (85%), Diverse beliefs (68%), Knowledge access (57%), and False belief (35%).

Brosseau-Liard, Penney & Poulin-Dubois, 2015, *BJDP*
## Results

<table>
<thead>
<tr>
<th>Selective Learning Task</th>
<th>Adjusted R²</th>
<th>Predictor</th>
<th>β</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>.112*</td>
<td>ToM Scale</td>
<td>.243</td>
<td>.043*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Age in Months</td>
<td>.289</td>
<td>.017*</td>
</tr>
<tr>
<td>Strength</td>
<td>-.029</td>
<td>ToM Scale</td>
<td>-.005</td>
<td>.969</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Age in Months</td>
<td>-.054</td>
<td>.674</td>
</tr>
</tbody>
</table>

Brosseau-Liard, Penney & Poulin-Dubois, 2015, *BJDP*
Discussion

• Theory of mind predicts selective word learning based on past labeling accuracy
  – Controlling for age
  – Congruent with past findings with various epistemic cues and learning domains
    • E.g., DiYanni, Nini, Rheel, & Livelli, 2012; Fusaro & Harris, 2008; Lucas, Lewis, Pala, Wong & Berridge, 2013

• Predictive value specific to labeling accuracy
  – Not generally greater selectivity from children who are better at theory of mind
Discussion

• Results consistent with our hypothesis
  – Prior labeling accuracy: interpreted in epistemic terms
  – Physical strength: interpreted in non-epistemic terms
• BUT not definitive evidence – more research needed!
Future Directions

• Two variables:
  – Domain similarity
  – Epistemic vs. non-epistemic cue
  – Both may result in increased use of mental state reasoning in selection of informants

• Specificity of the contribution of theory of mind (versus other cognitive skills)
  – Age and ToM together only accounted for a bit over 11% of variance on accuracy task

• What about other epistemic and non-epistemic cues?
Ongoing study – Individual differences in selective learning

• Are there consistent individual differences across selective learning tasks?
• If so, how do these relate to various cognitive skills?
• 3 selective learning tasks
  – Confidence
  – Visual access
  – Past accuracy
• Correlates
  – ToM Scale, Inhibitory control, Working memory
  – Behavioural tasks & parental reports
Preliminary results (with $N=53$)

- To date, no correlation between the different tasks (all $rs < |.2|$)
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