Emergence Of Shared Attention
In Naturalistic Infant
Yuri You, Gedeon Deák, Hector Jasso,
Department of Cognitive Science,

Abstract
- Attention sharing facilitates language development, social interaction, and learning within most social contexts. How do attention-sharing skills emerge during the first year?
- Although infant-parent interactions are well-structured, we do not know how this structure helps infants learn joint attention skills like gaze-following and point-following.
- In a quasi-naturalistic observation of play between infants (3-11 months) and caregivers, we coded attention shifts, shared attention states, and parents’ behaviors preceding attention-sharing. Results show that caregivers’ manual actions (pointing; holding) compel infants to join in shared attention.

Background
- Theories that attribute attention-sharing to innate modules (Baron-Cohen, 1995) have serious flaws (Deák & Triesch in press).
- Recent accounts (Moore & Corkum, 1994; Nagai, 2003; Triesch et al, in press) focus on neurally plausible, learning-based models of development. Such models:
  - describe social input to infants as sharing skills emerge;
  - detailing partial skills as intermediate products of learning

Specific Questions
- How are infants’ and caregivers’ attention distributed?
- How much attention-sharing occurs in natural play interactions?
- What caregiver actions get infants’ attention?
- Do CGs “bootstrap” shared-attention by imposing objects in infants’ line-of-sight?
- How does CG’s gaze, versus manual actions (pointing, waving, tapping) get infants’ attention?
- What events precede shared attention?
  - ex: mutual gaze?
- How do these interactions change as infants get older?

Method
- Participants
  - N = 30 healthy infants: 3-5 months (n = 10), 6-8 months (n = 11), 9-11 months (n = 9), with caregivers (CG). Three other infants’ videos were unusable. See Table 1 for more information.
- Design
  - Dyads were videotaped (15 min) in free play and in Object Play interactions. Only Object Play data are presented here.
- Procedure
  - Two researchers visited family’s home & recorded 15 min of digital video. One camera focused on I; the other on CG (Figure 1). In Object Play CG tried to get infant interested in a toys placed at various locations. Interactions were untimed and dyad-controlled.
- Coding
  - Behaviors coded at intervals of 0.1 sec include:
    - Dyadic attention state (e.g., shared, mutual gaze, looking away)
    - Caregiver’s direction & target of gaze
    - Caregiver’s manual actions (location & shape of hand)
    - Reliability (n = 6): CG’s gaze: Χ² = .78; infants’ gaze: Χ² = .71.

Results: Attention Distribution
- How dyads’ attention is distributed: Figure 2
  - Mean = 34% of time in shared attention
  - CG spends most time monitoring Inf. and manipulating objects to get Inf.’s attention
  - Age differences were not significant

Acknowledgements
- Support was generously provided by the M.I.N.D. Institute at UC-Davis, and the National Alliance for Autism Research (NAAR)
- Many thanks to Karen Au, Anna Krasno, Maggie Fan, Austin Hilliard, Leigh Sepeta, Louisa Salisbury, & Jochen Triesch for outstanding assistance.
From 3 To 11 Months Of Age

-Parent Interactions

Christof Teuscher, & Catherine Wood

University of California-San Diego

Results: Predicting Shared Attention

- What preceded infant following CG’s attention? Figure 5
- Proportions of preceding dyadic attention states are mostly similar to proportions of time spent in each state. [* = exception]

Table 1

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Mean (days)</th>
<th>Range</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-5 months (n = 10)</td>
<td>127</td>
<td>100-51</td>
<td>6 girls, 4 boys</td>
</tr>
<tr>
<td>6-8 months (n = 11)</td>
<td>212</td>
<td>174-236</td>
<td>9 girls, 2 boys</td>
</tr>
<tr>
<td>9-11 months (n = 9)</td>
<td>304</td>
<td>261-343</td>
<td>5 girls, 4 boys</td>
</tr>
</tbody>
</table>

Figure 1: Gaze-Following 8-Month-Old

5:44.87 Mutual Gaze
5:45.01 Mom looks at an object
5:45.27 Infant follows Mom’s gaze
5:46.50 Gaze alternation or resume mutual gaze

Results: CG Actions

- Which actions led infants to follow gaze? Figures 3 and 4
  - Little gaze-following despite many CG gaze shifts; higher ratio of point-following [Fig. 3]
  - No gaze or point following in young infants
  - Object motion is most compelling [Fig. 4]

Figure 3

Figure 4

References