University of Florida IRB-01
Parent-infant learning dynamics during early shared book reading
Brain, Cognition and Development Lab
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1. Background:

- Shared book reading during the first year of life has been found to have broad developmental benefits for language (Fletcher & Reese, 2005; Karrass & Braungart-Rieker, 2005; Sénéchal & Young, 2008), socio-emotional development (Bus et al. 1997; Xie, et al., 2018), and cognitive abilities (Scott & Monesson, 2009; 2010; Scott, 2011; Pickron et al., 2018; Murray & Egan, 2014).
- Previous research suggests that infants exhibit increased attention and perceptual learning and show more specialized brain responses after parents read them books with specifically labeled (individual-level) names for faces or objects from 6- to 9-months of age (Pickron et al., 2018; Scott & Monesson, 2009; 2010; Scott, 2011). However, books with generic category labels or no labels have shown no benefit to infant learning under 9 months old.
- One mechanism that may contribute to infant learning from individual-level labels during shared book reading is joint attention. Joint attention is a foundational skill that develops during the first year of life and is important for social learning and language development (e.g, Brooks & Meltzoff, 2005; Tomasello & Farrar, 1986; Mundy et al., 2007).
- The goal of the present investigation is to determine the extent to which increased parent-infant joint attention during shared book reading and across different labeling conditions leads to increases in infant visual selective attention and parent-infant neural synchrony in 6-, 9-, and 12-month-old infants.

References Associated with Background Information:

Brooks, R., & Meltzoff, A. N. (2005). The development of gaze following and its relation to language. Developmental Science, 8(6), 535–543. https://doi.org/10.1111/j.1467-7687.2005.00445.x

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Fletcher, K. L., & Reese, E. (2005). Picture book reading with young children: A conceptual framework. Developmental Review, 25(1), 64–103. https://doi.org/10.1016/j.dr.2004.08.009

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Mundy, P., & Newell, L. (2007). Attention, Joint Attention, and Social Cognition. Current Directions in Psychological Science, 16(5), 269–274. https://doi.org/10.1111/j.1467-8721.2007.00518.x

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Pickron, C. B., Iyer, A., Fava, E., & Scott, L. S. (2018). Learning to Individuate: The Specificity of Labels Differentially Impacts Infant Visual Attention. Child Development, 89(3), 698–710. https://doi.org/10.1111/cdev.13004

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Sénéchal, M., & Young, L. (2008). The Effect of Family Literacy Interventions on Children's Acquisition of Reading From Kindergarten to Grade 3: A Meta-Analytic Review. Review of Educational Research, 78(4), 880–907. https://doi.org/10.3102/0034654308320319

Tomasello, M., & Farrar, M. J. (1986). Joint Attention and Early Language. Child Development, 57(6), 1454–1463. https://doi.org/10.2307/1130423

Xie, Q.-W., Chan, C., Ji, Q., & Chan, C. (2018). Psychosocial Effects of Parent-Child Book Reading Interventions: A Meta-analysis. Pediatrics, 141(4), e20172675. https://doi.org/10.1542/peds.2017-2675

2. Specific Aims:

- Using both eye-tracking and EEG methods, the goal of the present investigation is to (1) determine the extent to which infant and parent visual attentional coupling during shared book reading predicts later: a) infant selective attention and b) infant and parent neural coupling. Specific aim (2) is to determine the extent to which books with individually-named characters (e.g., “Boris”, “Fiona”) increases parent-infant joint attention and infant selective attention relative to books with generic labels (e.g., “Bear”, “Bear”) or no labels and whether attention differs by age.

3. Research Plan / Study Description:

- A parent of the participant will first be asked to complete short questionnaires before coming into the lab. Often infants have a limited attention span so we have parents fill out the questionnaire consent form and online Qualtrics questionnaire prior to coming in to the lab so we can expedite their time spent in the lab. This keeps the infant content and not fussy so ultimately, we can get better data when the experiment begins. This questionnaire is designed to provide us with demographic information about who has participated in our studies. These questionnaires include questions regarding their child’s gender, race and ethnicity as well as questions about the demographics of their family (see attached Child and Parent Demographic questionnaires). This information is voluntary and confidential to the extent provided by law.
- **Day 1**: Parents will read a book to their infants in a small in-lab playroom, as they would at home. Prior to reading, infants and their parent will be fitted with a Positive Science head mounted eye-tracker. In addition, both audio and video recordings of the book reading session will be collected using a table-mounted camera. Books with six different characters, one on each of 6 pages will be used during shared book reading. Two of the characters will be labeled with individual level names (e.g.,“Boris”, “Anis”), two will be labeled with the same category-level name (e.g.,“Cow”) and two will not be labeled. Parents will be seated on the floor with their infant or next to their infant in a high chair. See figure below for outcome measures and time frame for experiments.
- **Day 2:** The participants will return a second day to complete the EEG portion of the experiment. The infant and parent participants will view pictures of faces and/or objects presented with or without sounds while their brain electrical activity (EEG) is recorded in the lab. Here, we employ a “flicker” task and recordings of steady-state visual evoked potentials (ssVEPs) as an index of infant visual selective attention. We will examine the ssVEP power evoked by two overlapping visual objects to quantify the degree of visual attention devoted to learned characters relative to novel characters across labeling conditions. Infants and parents will view ten 6-second trials of two overlapping familiar (from the

book) and unfamiliar characters including the following: 1) Individual-labels: familiar vs. unfamiliar; 2) Category/generic labels: familiar vs. unfamiliar; 3) No labels: familiar vs. unfamiliar

- **Day 2:** For a second EEG recording, we will measure both parent and infant EEG. This time we will be looking for EEG synchrony between the parent and infant by using a similar ssVEP frequency tagging task as above, now using a phase-locking index.
- To record brain electrical activity, a net with recording sensors is placed on the infant's head. In order to help the electrodes accurately measure the infant's brain activity, we will soak this sensor net in an electrolyte solution. The solution contains distilled water, potassium chloride (salt), and baby shampoo. Recording EEG simply picks up the brain activity that is naturally emitted from the scalp and is non-invasive. If the infant does not like wearing the net or is too tired to complete all of these tasks, the family may be asked to return to the laboratory for an additional visit.
- Outcome measures and time frame:

Type	Name	Time Frame	Brief Description
Primary	Infant Visual Fixations	On Day 1	Infant visual fixations will be recorded during shared book reading and duration of attention and joint attention calculated. Three age groups will be examined (6, 9, 12, month olds).
Secondary	Parent Visual Fixations	when their infant is 6-, 9-, 12-months on day 1	In the lab, parent visual attention will be measured across conditions using a head mounted eye-tracker. Duration of joint attention within a spatial window will be calculated in conjunction with infant visual fixations.
Primary	Infant EEG power	On Day 2	Infant EEG power will be measured and compared across conditions and ages.
Secondary	Infant and parent EEG synchrony	On Day 2	Infant and parent EEG synchrony will be quantified and compared across conditions.

- During the study, the parent will be present and near the infant at all times during each session. If the infant fusses or cries and does not wish to look at the pictures and/or read the book, we will take breaks or stop the test. If, at any point or for any reason, the participant family wishes to stop the test they may advise us to stop
- Tasks will be consistent across all ages of participants. Infants and parents will complete the same EEG and eye-tracking tasks.

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4. Describe the Informed Consent Process.

- Upon arrival at the laboratory, participant families are greeted by the experimenter and the study methods and procedure are explained to the parent(s). The consent form is explained to the parent(s) by the experimenter. The parent is then given time to read over the consent forms and ask any

questions that they might have. Once all questions have been answered, the participant's parent and the researcher will sign the infant and parent consent form and the participant family will be offered a copy. All participants will be reminded that they can stop participating at any time and that several breaks will be offered. The potential risk of identification of participants will be explained to parents and parents will be given the option to have their video data excluded for data sharing purposes.

5. Describe the Data You Will Collect:

- Adult and infant participants will participate in a study involving eye-tracking and electrophysiological methods. Data will include: questionnaire data, electrophysiological data (EEG recordings), video and audio recordings of parent and infant behaviors, and visual fixation eye-tracking data from both parent and infant. For the questionnaires, demographic information including race, ethnicity and gender will be collected. All data (e.g., computerized files of recordings and responses, demographic information) will be kept confidential to the extent provided by law and will be maintained confidentially on a password protected and encrypted computer in a locked room.

6. How the Sample Size is Determined:

- Power, effect-sizes, and retention rates from Scott's previous EEG investigations were used to estimate samples sizes. we conducted two power analyses using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009).

- First, assuming a repeated-measures ANOVA with within-subject factors of character label (individual label, generic label, control) and between-subject factors of age(6-, 9-, 12-months) and a medium effect size of d = 0.3 and power of .80 each group should consist of at least 39 participants. Second, for regression analyses, the power analysis was focused on whether parent infant joint attention scores predicted infant learning (as measured by ssVEP power).

- With a medium effect size of f2 = .15 (Cohen, 1988) and power of .80, the sample should include 55 subjects.

- Given that we plan to collapse across age for this analysis, our estimated sample size of 60 per age group should be sufficient. In addition, we expect a 70% retention rate based on previous cross-sectional infant EEG investigations conducted in Scott's laboratory and so recruiting 60 per age groups should allow for both analyses to be well powered.

References Associated with Sample Size Information:

Cohen, J. (1988). Statistical Power Analysis for the Behavioral Sciences (2nd ed). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1:Tests for correlation and regression analyses. Behavior Research Methods, 41(4), 1149–1160. https://doi.org/10.3758/BRM.41.4.1149

7. Please List all Locations Where the Research Will Take Place:

- All the research will take place in the Brain, Cognition, and Development Laboratory, located in the Psychology building at The University of Florida. 945 Center Drive, Gainesville, Florida 32611

8. Describe How Participant(s) Will Be Recruited:

- We will advertise on UF websites (Scott's Lab and the Department of Psychology Websites) and in local newspapers.

- Flyers and brochures will be posted in approved locations in local daycares, hospitals, clinics, birthing centers, libraries, churches, and family centers.
- Scott's lab group will recruit by setting up informational tables and child-friendly actives (brain coloring) at local libraries, museums, and events.

- Scott's lab will work with local community groups, including the Ounce of Prevention Fund of Florida, Florida Health Babies of Alachua County, and the Southwest Advocacy Group (Gainesville, FL), to recruit additional families from unrepresented groups. We will post fliers and brochures, have information tables at community events, and work with community group staff to identify additional recruitment avenues. We will contact these local groups and when they have a community event, we will set up a table where we hand out our brochures and flyers and ask people if they would like to be contacted to participate in our research. We will have the people who are interested fill out the BCD Lab Database Contact Permission Form, which provides their consent to put them into the database so we can contact them about our study.

- Recruitment will also occur via word of mouth and parents who participate will be asked to let their friends know about our research.

- The BCD Lab Infant Database (IRB#: IRB201601509) will be used to contact families who have already expressed interest in research participation and whose children are the appropriate age for this study.

- We will not begin recruiting or running subjects for this study until the University of Florida has reinstated in-person human research because of COVID-19. Once the university states that we are clear to begin running participants, we will continue our disinfection and cleaning after every participant comes into the lab and continue to wash our hands before and after experimentation.

Maximum Number of Participants (to be approached with consent): 360 total, including 180 infants and 180 adult parents - 60 dyads at each age (6-, 9-, and 12-months)

Amount of Compensation: $20 plus a small toy (worth $5), $10 after each session and the small toy is given at the end of the second session.

Age Range of Participants: Infants 5.5-12.5 months old, Parents 18-65 years

Exclusion/ Inclusion Criteria:

- Infants will be included if they are typically developing and between 5.5 and 12.5 months of age, as well as their caregiver.
- Infants who were born more that 14 days premature are excluded.
- Infants who with a history of neurological or visual deficits are excluded.
- Infants with a history of seizures or a disorder that includes risk of seizures are excluded.
- Infants with a parent that has a history of seizures of a disorder that includes risk of seizures are excluded.
- Parents with a history of seizures or a disorder that includes risk of seizures are excluded.

9. Possible Discomforts and Risks:

- Only minimal risk inherent in standard clinical procedures for recording EEG in humans and using eye-tracking methods are involved in the proposed studies. All electrical equipment involved is approved for clinical research use and has been installed with attention to proper grounding. The electrode application procedures have not resulted in any known significant damage to skin. The only possible discomforts are sensitivity or allergic reaction to the saline solution (itchiness: occurs very rarely <1%), pink marks on the skin after the snug-fitting net is removed, and a small amount of conducting solution remaining in the hair until rinsed.
- Due to the length of some of the EEG and eye-tracking sessions (approximately 45 minutes to 1-hour total for infant participants), there is a risk of participant fatigue. However, we offer several breaks during each session, participants are closely monitored, and participation in any one component of the experiment takes between 5-15 minutes. If infants become consistently fussy, we will end the testing session.
- Due to the flickering nature of the stimuli there is a potential risk for individuals with Photo Sensitive Epilepsy (PSE). PSE is a form of epilepsy in which seizures are triggered by visual stimuli that form patterns in time or space, such as flashing lights, bold, regular patterns, or regular moving patterns. If anyone in the participant's immediate family has a history of seizures or PSE, this may be an applicable potential risk. To reduce the risk of seizures, we will ask all participants whether or not they have a history of PSE and we will not test those who report having such medical history.
- Psychological risks are also minimal since no pressure or stress is applied at any time. Participants will be given several breaks and are free to discontinue participation at any time.
- Confidentiality will be protected by publishing results in group form only and by storing data apart from any personal information. Data is coded according to arbitrarily assigned subject numbers and stored on password protected and encrypted computers in a locked lab. During the course of this investigation, only approved laboratory research staff have access to this data. The data files also contain information about the subject's gender, age, and race. The subject's name is recorded to ensure appropriate compensation (payment or credit), but kept separately from the data in a secured area.
- Videos of behavior and all data will be uploaded to Databrary, although de-identified, this may increase the risk of identification of individual participants. The potential risk of identification of participants will be explained to parents and parents will be given the option to exclude their video data. Data and stimuli products from this study will be made available without cost through Databrary. Databrary (databrary.org) funded by NSF and NICHD, is a web-based, secure

library for developmental research stimuli, videos and data. This is approved as a Data Use Agreement with the University of Florida (AGR00006970). All uploaded data will be de-identified prior to upload and participants must consent to their data being included. Study-specific code used to process and analyze the data will be available via GitHub.

De-identified eye-tracking video data of infants and parents will be available to authorized Databrary Researchers. Although data will be de-identified, images of infants and their parents may be included in the video data. Parents of participants will be informed that making the video available on Databrary increases the risk that they or their infants may be identified even though there are no names associated with any files. Parents will be informed of this risk and will have the option of excluding their videos at any time. Videos uploaded to Databrary will be viewable and downloadable to authorized users who have been granted secure access. Only researchers with Principal Investigator status from institutions with Institutional Review Boards or similar review entities, or researchers affiliated with Principal Investigators, will be authorized for access. As part of the registration process, users must agree to the conditions of use governing access to the public release data, including restrictions against attempting to identify study participants, destruction of the data after analyses are completed, reporting responsibilities, restrictions on redistribution of the data to third parties, and proper acknowledgement of the data resource. Registered users of Databrary receive user support, as well as information related to errors in the data, future releases, workshops, and publication lists.

Data in Databrary will be preserved indefinitely in a secure data storage facility at New York University (NYU). The facility is managed by the university's Information Technology Services department. Central IT staff handle storage, network, and backup systems. NYU maintains a mirror copy and does routine tape backups, both stored off site. Data and metadata stored in Databrary are subject to the security policies and best practices implemented by NYU. For more information about these policies and services, please visit NYU ITS Computer & Network Security at http://www.nyu.edu/its/security/. Contact PD/PI: Scott, Lisa

- There are no other known or suspected risks to participants beyond the risks encountered in daily living.

10. Possible Benefits:

- There are no direct benefits to the participant.

11. Conflict of Interest:

- There are no conflicts of interest.