Boston Children's Hospital
Laboratories of Cognitive Neuroscience

**Emotion Project
Summer 2017 Newsletter**

Introduction from our Principal Investigator, Dr. Charles Nelson

At the Boston Children's Hospital Laboratories of Cognitive Neuroscience, clinicians and researchers alike come together to investigate development and its different trajectories and outcomes. We are interested in understanding what contributes to healthy development in children, as well as ways to help treat children diagnosed with developmental delays and disorders. Additionally, we strive to understand how early experience may shape later brain development, behaviors, and cognition.

The Emotion Project aims to track the development of the ability to recognize faces and distinguish between different types of emotions (happiness, anger, fear etc.) throughout the first year of life and into childhood. By having the same children participate in our study at various time points, we are able to see differences in emotion processing over the course of development. Additionally, we are interested in seeing how the ability to recognize faces and emotions may relate to other behaviors and temperaments. While we are no longer recruiting new families for our study, the 807 children currently enrolled in the Emotion Project will have the opportunity to come back into lab for follow up visits or participate remotely if they have moved out of the Boston area.

Thank you all for volunteering your time and efforts to help us with our research. While providing your child with a fun and interactive experience in our lab, you are also helping to contribute to the growing field of developmental psychology. None of this important work would be possible without you. This newsletter contains updates about our project, as well as some of the exciting new findings that your children helped us to discover.

We look forward to staying in touch and keeping you updated as we continue the project. Have a wonderful start to your summer!

Dr. Charles Nelson
Principal Investigator

Thank you to all of our wonderful families for coming into lab

Infant Predictors of Social Competence in Preschool Children: The Role of Temperament and Neural Correlates of Emotion-Perception over the First 3 Years of Life.
Presented at the 29th annual convention of the Association for Psychological Science, May 2017

Lindsay C. Bowman, Sarah A. McCormick, Alissa Westerlund, Perry B. Dinardo, Anna M. Zhou, Julia Cataldo, & Charles A. Nelson

Navigating the social world we live in can sometimes be challenging, especially at three years old. Social skills and capabilities, such as empathy and helping behaviors, are valuable tools that are constantly developing. Dr. Lindsay Bowman examined the relationship between brain activity when infants process emotional faces, temperament at two-years, and social skills and capabilities at three-years. She looked at questionnaire data

from the Early Childhood Behavior Questionnaire (which parents in our study fill out about their children at two years) in order to get a measure of temperament and the Infant-Toddler Social and Emotional Assessment (which parents in our study fill out about their children at three years) to get a measure of social ability. Because we are still in the middle of testing our group of three-year-olds, the results from Bowman's study will be reanalyzed once all of our three-year-olds have come into lab. Using the data from the children we have seen in lab, Bowman found that a child's ability to control emotions and behaviors (a concept called "effortful control") at age two predicted greater social ability at age three. Additionally, she found that this relationship is even stronger when taking into account brain activity while looking at happy versus fearful faces as an infant. Because of this finding, Bowman suggests that social ability may stem from these earlier face processing abilities.

fNIRS Reveals Distinct Infant Emotional Face Processing

Katherine L. Perdue, Julia Cataldo, Sarah A. McCormick, Alissa Westerlund, Charles A. Nelson
Presented at the Society for functional Near Infrared Spectroscopy's biennial meeting, October 2016

The Emotion Project is quite unique in many ways, one of them being that half of the participants in our study have their brain activity measured using a technique called functional near-infrared spectroscopy (or fNIRS for short). fNIRS is just starting to be used

more widely, and not many studies use this technique with young participants.
After testing groups of 5, 7, and 12-month-olds, we were able to see differences in
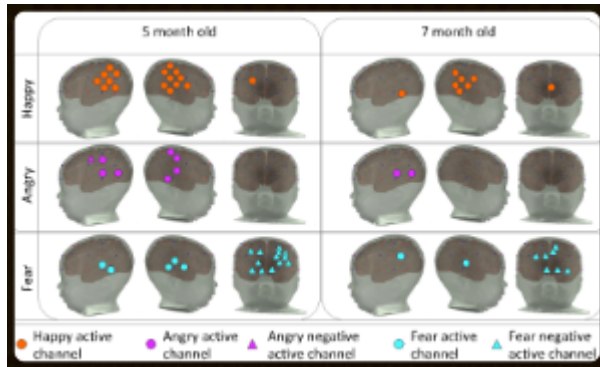
which parts of the brain were active when viewing different types of emotions (happy, fearful, or angry). At each age, brain activation was significantly different depending on the type of emotion the infant was viewing. When 5-month-olds were looking at happy faces, a wide range of brain areas on the sides and back of the head were active, suggesting that infants have seen (and have more experience with) this emotion in their day-to-day lives. However, by 7-months, only the right side of the brain was active when viewing happy faces, suggesting that processing faces becomes more specialized in the brain. At both 5 and 7-months, looking at fearful faces led to brain activity in the frontal part of the brain. Together, these results suggest that infants as young as 5 months are able to tell the difference between different basic facial emotions.

Neural Correlates of Emotional Face Processing in Early Childhood

Sarah A. McCormick, Alissa Westerlund, Lindsay C. Bowman, Anna M. Zhou, Julia K. Cataldo, Charles A. Nelson
Presented at the Society for Research in Child Development's biennial meeting, April 2017

During our three-year visit, kids view similar emotional faces to what they saw at infancy. However, the angry and fearful faces they see vary in emotional intensity, meaning that some of the faces will look angry, for example, but some faces may appear angrier than others (same is true of fearful faces). Researcher Sarah

McCormick was interested in examining the EEG recordings of our three-year-olds to see both how the brain responds to emotional faces at that age and if the brain responds differently to different emotional intensities. McCormick found several interesting results when looking at the data. Firstly, she found that the right side of the brain had a stronger response to all emotions and emotional intensities than the left side of the brain. She also found that the brain responded more strongly to higher intensity negative emotions (angry and fearful) than to lower intensity negative emotions.


From her results, McCormick was able to conclude that three-year-olds have the ability to not only distinguish between different types of emotions, but that there are certain brain networks that are likely sensitive to different emotional intensities.

🌍 Emotion Project Across the 🌍 Country
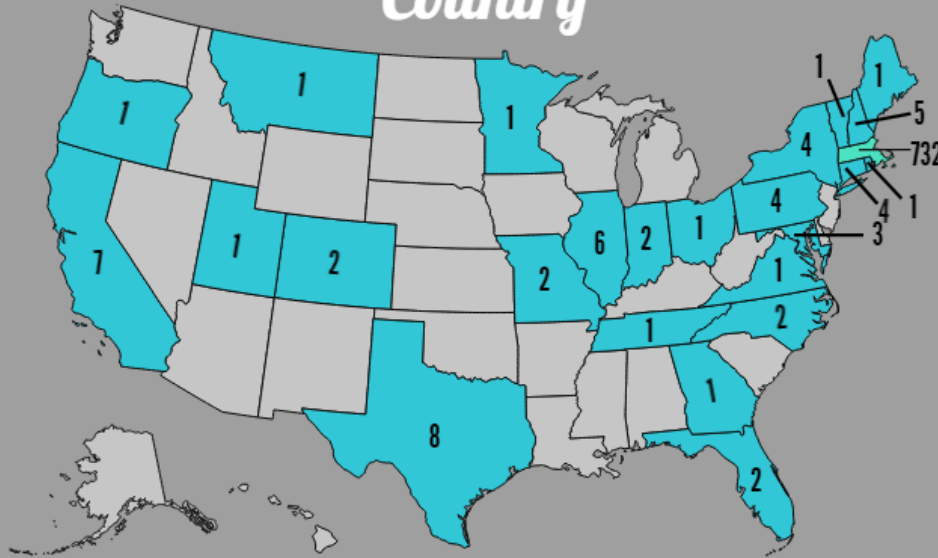
...and 13 international families!

~ FEATURED FAMILY ~

INTERVIEW WITH KATHERINE PERDUE
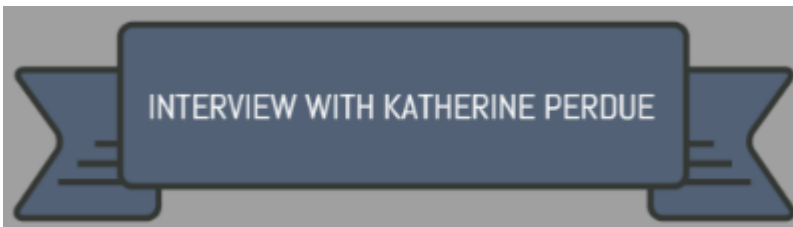
Katherine Perdue, PhD, is a Research Associate on the Emotion Project and mom to Leo, an fNIRS participant in the project. Research Assistant Anna Fasman sat down with Katherine to talk about what it is like to be both a parent in the Emotion Project and behind the scenes as a researcher.

Q: How does being a mom on the Emotion Project change or affect the way you approach the science?

A: Once you see your own baby participate, you get a different idea for what babies will be thinking. As a scientist on the project you have a general idea about what babies are thinking, but if you know your own baby really well, then you can understand better how he's reacting under the circumstances. I know Leo's personality so I could understand things that he found challenging or things that he liked to do, and that informed my ideas about what other babies were thinking or doing during our experiment, which was really interesting.

Q: What is one thing you would want other Emotion Project families to know?

A: The fact that we see different brain responses to different emotions at such an early age is so surprising. Babies as young as 5 months and even at 7 and 12 months have brains that are doing so much that we can't see as a parent. I know from looking at the data that babies are really interested in happy faces and I love seeing that because I think about how I've been smiling at my baby the whole time and now his brain is recognizing that. It's all really cool.

Q: What is your favorite part of working both on the Emotion Project and in the LCN in general?

A: It's fun to be involved in a project that brings in so many families, so we get to see so many different types of people. Working with such a large data set is also a huge privilege. We're just so grateful to everyone for coming in – it's unprecedented to see this many infants in one study, so that is probably my favorite part of the project.
In general, I love the breadth of projects that are in the lab. We study everything from emotional face processing in Boston to social cognition and learning in Bangladesh, as well as all of our projects relating to autism. There's a wide spectrum of work relating to neurodevelopment, and it's rewarding and exciting to be involved in all of it.

Q: What was the most memorable part of your infant visit with Leo?

A: Seeing my husband participate in the experiment because I see the work we do every day, but he doesn't. To see his impressions of what I've been doing throughout my time [in the Nelson Lab] and to see him be the parent and how that works in our study, that was really fun. I also loved seeing my own baby really interested and participating in the experiment.

Q: What has been your favorite part of being a new mom?

A: Seeing Leo's personality emerge over this first year [and a half]. As soon as he was approaching 12-months, we could really see it. He's always completely gung-ho and interested in trying new things. He throws his entire body into exploring whatever it is that he's found. He's so persistent in a way that I think adults are often not. We know that if we try something twice and we can't do it, it's probably not going to work -- but he doesn't know that so sometimes when he tries something ten times, it will work the tenth time!

Q: What about the Emotion Project made you decide to participate with Leo?

A: There were a few reasons. First of all, it was very important to me to contribute to the project myself because we have all of these wonderful families that take the time to come in and participate, so I really wanted to do that, too. Some friends of mine have participated in the study as well, so part of the reason I participated was so I can talk about it with them, along with showing my husband what I was doing at work. Last but not least, I know what is in the three-year follow-up and I thought that would be really fun to do with Leo!

Comings and Goings

RUBY ALMANZA, Research Assistant

Ruby graduated from Harvard College in December 2016 with a concentration in neurobiology and a secondary in global health and health policy. She is originally from Montgomery, Texas, but moved to the Boston area for her undergraduate work. Before working on the Emotion Project, Ruby wrote her senior honors thesis using data from the Bangladesh Project looking at neural inflammation and its effects on development in Bangladeshi children. When she isn't in the lab working with our awesome families, Ruby can be found going on a run or enjoying a cup of coffee in a local coffee shop. She is very excited to meet all of the families coming in to lab!

MEGHAN COLPAS, Research Assistant

Meghan recently joined the Nelson Lab as a Research Assistant in June 2017 after graduating from the University of Massachusetts, Amherst with a B.A in Psychology and a minor in Sociology. At UMass, she worked in the Learning Lab, a developmental psychology research lab that studies how children learn to regulate their behavior and emotions. For her senior thesis, she collaborated with the Parenting Across Cultures project, a longitudinal

study in nine countries, in which she investigated the impact of violence exposure on parenting and the mental health of youth in Kisumu, Kenya. She is excited to be joining the Emotion Project and working with the incredible staff and families through the LCN.

HANNAH BEHRENDT, Post-Doctoral Fellow

Hannah graduated from the Johannes Gutenberg University Mainz, in Germany, with a degree in Psychology in 2013. Recently, Hannah completed her PhD studies at the Department of Child and Adolescent Psychiatry, Psychosomatic and Psychotherapy at the University Hospital RWTH Aachen, Germany, studying the impact of maternal depression following childbirth on early mother-child interaction. After working on the Emotion Project team as a Fulbright visiting researcher May-October 2016, Hannah is very excited to be back in Boston and looks forward to meeting more families!

ANNA ZHOU, Research Assistant

After working on the Emotion Project as a research assistant for two years, Anna will be leaving the LCN to start a PhD program in Developmental Psychology at Pennsylvania State University with a specialization in cognitive and affective neuroscience. Anna will be working in the Emotion Development Lab under the mentorship of Dr. Kristin Buss to continue studying the development of emotion and emotion regulation skills in babies and children. She is excited for the next step in her career, though she already misses the

Emotion Project team, staff at the LCN and
all of the babies and children that have
participated in the Project!

See you again at 5 and 7!

We've recently received funding to follow-up with
all of our families again when the kids turn 5 and 7
years old!

We can't wait to see you all again, and look forward
to staying in touch as the kids get older!

Additional thanks to our wonderful team of undergraduate students:

Katie Vincent, Marissa Rodriguez, Zarin Rahman, Doo-yun Her and Sharmetha Ramanan!

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