WELCOME

Another, somewhat unusual, year for the team and our families since our last newsletter! Despite the Coronavirus pandemic, we have plenty to tell you about. Enjoy reading about our progress and what we’ve discovered over the last 12 months.

LETTER FROM THE TEAM

What a crazy year it has been so far. We hope that all of our wonderful Child Scientists have kept themselves healthy and that their parents didn’t go too silly with home schooling. We are certainly missing seeing everyone in the lab. Fortunately, work to get the lab re-opened has begun. In the first phase of re-opening, that started in July, we restarted our eye-tracking studies and the MEFS and gift-wrap tasks from the Brain study. Procedures that do not allow social distancing and require close contact between the experimenter and child, such as NIRS, will be re-started in the second phase of re-opening in late September.

We worked closely with the University Safety Services and Psychology Technical Support to ensure that our facility and procedures are as safe as possible for families, children and our staff when we started testing again. This means following the most up-to-date government guidance as well as implementing new cleaning procedures, installing hand sanitizer in all labs and space partitions in some rooms. We are also limiting the number of people in the lab (and building) at any time. When you visit, you’ll notice these and a number of other differences. For example, in the Smith eye-tracking room where we usually run our Early Language Processing task, we changed the computer set-up to put the experimenter behind, rather than next-to the child and parent. All team members wear clear visors (like Jordan in the picture) and we now do consent in a socially distanced way and we avoid entering testing rooms with parents and children.

There are also changes to the building and campus that will affect visits to the laboratory. The campus has implemented a one-way system both inside and outside buildings. This has resulted in a change to where families will park when they visit the lab. The need to minimize the number of people on campus and in buildings also means that only the participating child and one parent will be able to come to experimental sessions and we will no longer be able to offer a sitting service for siblings. While these changes may make things a bit less convenient, so far visits with our new procedures and protocols have gone well. We appreciate the support of the local community.

Beyond these changes, the team has kept very busy. We have all been working from home since March but we get together for weekly, on-line lab meetings and in smaller, on-line groups to work on data, papers and presentations. Milena, Prerna, Laia and Sam all had successful presentations at the virtual meeting of the International Congress for Infant Studies that was held in July. Part of the move to a virtual conference meant recording the poster presentations and talks so we have made these available for you to watch on our laboratory webpage (http://www.uea.ac.uk/developmental-dynamics-lab/home).

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Jordan, ready to greet our families into labs
Continued

We have also kept home data collection for the brain study going and appreciate the work of our families in collecting LENA and actigraph data and in making exchanges of equipment in a socially-distanced way.

We hope that the virus case numbers in Norfolk will continue to be low and that we will be able to expand data collection in the lab in the Autumn. Nevertheless, we are also beginning the process of looking into online data collection.

We know that a number of our Child Scientists have helped with remote data collection for our studies and others from around the world via posts on our Facebook page. Keep on the lookout for an opportunity to have your say on the redesigned early-years area in the Norwich Castle Keep coming soon!

Take care and stay healthy.

The Developmental Dynamics Team

BRAIN STUDIES - UK AND INDIA

We’ve had another very successful year working on the ‘Brain Study’ in the DDLabs. The study currently has 145 families enrolled. Of these, 71 families have completed all data collection. Hooray! And data quality continues to be excellent thanks to the fabulous efforts of all our children, caregivers, and experimenters.

Of course, COVID-19 has caused real headaches for us, stopping all data collection from March 18 (a rather sad way to start my birthday…). We are hoping to start up some data collection in the coming weeks – our team will be in touch with families as soon as those plans firm up. For now, please know that we are doing our best to move forward in a way that puts everyone’s health in the foreground.

I thought I would spend this year’s update focusing on our study in India. As you may know, the INDIA (Infant Neural and Dyadic Interaction Assessment) Project is looking at early brain and behavioural development in 240 families from Northern India. We’re using brain measures, eye-tracking tasks, mum-child play sessions, and other assessments to look at early development in a non-Western culture. The question is whether working memory develops in a similar manner as in the UK and how cognition and the brain are impacted by poverty. This work is being done jointly with the Community Empowerment Lab – our partners in this journey (https://www.community.org.in/).

The first big result from our recent work is that visual working memory – children’s ability to hold a set of coloured objects actively in mind – develops in a comparable way in India. Children successfully detect changes in objects when we present them, and they do so even when we challenge them by showing multiple objects at the same time.

A second key result is that we can predict children’s working memory abilities at 18-21 months from their working memory abilities at 6-9 months. This is exciting as it opens the door to early interventions, that is, we might be able to detect which kids are ‘at risk’ as early as 6 months of age.

Finally, we’ve been digging into the factors that put kids at risk. So far, we’ve discovered that children who are smaller than expected for their age have poorer working memory abilities. Reversely, children who show a positive growth curve and have better nutrition, have better working memory abilities. We’re also starting to see links between air quality and cognition: children who grow up in homes in poorer air quality show poorer performance in our working memory task.

It’s important to stress the positive picture that is emerging from this work: we can assess who is at risk as early as 6 months and potentially implement interventions targeting aspects of the environment we know matter like nutrition and air quality. Perhaps when we put these multiple factors together, we can lift all children up! That’s our hope. And your time and energy in the DDLabs is helping us make the discoveries needed to create this positive future.

Collecting dyadic play data whilst having fun in the labs in India
Like millions of other parents up and down the country, I’ve been doing the ridiculous balancing act of working from home during the pandemic whilst trying to homeschool my four children (aged 13, 10, 5 and 3). I will confess that as lockdown approached I had some ludicrous utopian vision of working from home while my children studiously and independently got on with their education. Well that Enid Blyton fantasy completely shattered at about 9.05am on day one.

My average day consists of:

Trying to wrestle my 3 and 5 year-old into pants just in case there is an unplanned zoom call from work or an Amazon delivery driver turns up;

Playing excuse tennis with my eldest daughter with her claiming she has not been set any work, that she has completed it, that she did it last year, that the computer has not saved it, then her brother has eaten it, then the dog has drawn on it before huffing and doing the work;

Playing hide and seek with my other daughter who is hiding under a blanket somewhere with the iPad, hoping she will escape detection amongst all the mayhem.

At some point after lunch I ceremoniously announce the day a success because no-one has killed or maimed another and they all proceed to go on an afternoon YouTube bender while I start work.

With the labs closed there has been no research going on so my days focus now on data processing and analysis. What has helped keep me sane has been the daily conversations I am having with our fabulous families who help us with our research. They have been a great support, reminding me that I am not alone in what I am going through and that it’s always gin o’clock.

Things I have learnt from lockdown:

- Joe Wicks is a nice guy with a good heart but he can do one.
- It’s not possible to make your children stupider…I hope
- Teachers are amazing.
- A continuous supply of bourbon biscuits can make most things happen.
- It is not possible to die from listening to your kids talk about YouTube videos, whatever it might feel like.
- Hell really is being stuck in a house when a 3 year old should’ve taken a nap, but didn’t, and just got triggered by a sibling looking in their general direction… for 100 days in a row.
- I’ll never get round to it when I have more time…face it, I’m just lazy.
- Never again will I fear the six week summer holidays.
- Gin makes most things better!

3RD YEAR UNDERGRADUATE EXPERIENCES WORKING IN DDLABS

Rosie Smith

I really enjoyed my time working in the lab throughout my summer internship last year and for my 3rd year project. I learned a lot about research in my psychology lectures, so it was very interesting to see the lab’s research processes first-hand and learn how to run experiments myself. Everyone in the lab was very friendly and made me feel welcome, and I was really impressed by the technology used for the different projects. I’m now continuing my studies at the UEA to complete the PGCE qualification.
VISUAL PAIRED ASSOCIATE TASK

Visual exploration is one of the critical tools that infants use to learn about their surroundings. This is especially amazing because they have the ability to distinguish between objects that they have seen before and new objects. Research shows that this ability is critical to early word learning and that children tend to think that a new word refers to the most novel object present.

The Visual Paired Associate task study aims to understand how vocabulary size is linked to a child’s ability to remember what objects they have seen before and what they saw them with. Children between 20- and 26-month-of-age participated in this eye-tracking study. The picture shows an example trial. Children are shown a pair of objects side by side on a screen e.g. a sun and a spoon. A probe object is then shown alone in the middle of the screen e.g. the sun. The next screen is the test. It shows two objects, one that was paired with the probe (target) and a new item (distractor), e.g. a glass. We manipulate the kind of stimuli we use so some trials used pictures of everyday objects that children should be familiar with while other trials used novel objects that the children would not know. We also manipulate the difficulty of the test by making the distractor either a completely new item not seen in the study or an item previously seen paired with something else.

A preliminary analysis of our dataset shows some exciting findings. Children are attracted by novelty. On the stimulus choice screen, children tend to look longer at the newest object which has not been shown before. Critically, however, on the harder trials with the distractors that were seen previously in the study, children are more likely to look to the target, especially with the novel objects. Also, we have found that children’s vocabulary plays a role in their ability to remember which objects went together. Children with more words in their productive vocabulary looked more at the target objects suggesting that they remember more object pairs.

Overall, the data suggests that children are successful at remembering pairs of visual objects from around 20 months, although they are distracted when presented with completely new things to look at. Findings such as these are particularly crucial to understand the impact that novelty has on infant development. In the future we hope to use a version of this task to look at differences in object memory for children who are developing their vocabulary at the expected speed and those who are struggling.

Stimuli used in Visual Paired Associate Task

3RD YEAR UNDERGRADUATE EXPERIENCES WORKING IN DDLABS CONT’D

Sushila Ghose Coveney

Working in the DDLabs during my undergrad has been such an incredible experience and opportunity for me. I started out as a volunteer intern at the beginning of my second year and was fortunate enough to have worked as a paid research assistant this year in my final year.

In my time working in the DDLabs I have gained invaluable research experience working with children and their families, whilst also learning lots of new practical skills that have not only helped me in my degree but have also prepared me for work within research and academia which I hope to pursue in the future.

I am also grateful for the support I have received from the PhD students and research staff within the lab throughout the last couple of years on both my lab work and in my degree as someone to talk to.

After I graduate this year, I will be doing a Master’s degree at the University of Edinburgh or the University of St Andrews. Either way I’ll be in Scotland!
DOES LANGUAGE EXPOSURE RELATE TO LATER LANGUAGE DEVELOPMENT?

Since before birth, infants are exposed to the language adults speak around them. Studies looking at parental talk to the child (also called language input), suggest that the quantity and quality of adult speech has an impact on the child’s later linguistic abilities. In the Developmental Dynamics Lab, one of our projects aims to investigate the relationship between the amount of linguistic input early in infancy and the child’s later language abilities. The image below shows a representation of our study. To measure linguistic input, we gathered home recordings of conversations between children and their caregivers when children were approximately 6 months of age. Since those recordings are 16 hours long, we used the LENA software to automatically extract the amount of adult words, conversational turns between adult and child, child vocalisations and noise (see the pie chart below for an example).

To measure children’s language abilities, the same set of children were tested when they were approximately 18 months of age, on the Early Language Processing (ELP) task. The ELP uses a portable eye-tracker to capture children’s eye movements. It includes four types of trials: speed of processing trials show a pair of highly familiar nouns which repeat several times during the task. Comprehension trials include pairs of familiar nouns, verbs and adjectives varying in difficulty. Referent selection trials include one well-known and one novel object. Children are prompted with a novel word as a test of novelty detection and fast-mapping (the ability to quickly link a new word to a novel object). Retention trials include a fast-mapped object and a novel object. We measure whether they look to the linked object or the novel object. The ELP provides “outcome” measures such as accuracy for known words (comprehension) and retention of new word-object mappings. It also includes measures of basic language processes such as novelty detection and speed of word processing. These measures are extracted using the child’s pattern of eye gaze over the course of each trial.

Preliminary data relating children’s language input at 6 months and ELP language measures at 18 months, show that children that heard more adult words and had more conversational turns, specifically turns that were initiated by the child, performed better in the ELP task. In particular, children with higher language input did better when they were presented with a novel word in ELP.

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This can be seen in the figure below.

The vertical axis shows children’s performance on ELP at 18 months, we use proportion to measure how much the child looks at the image that we ask for, the target. The horizontal axis shows the mean amount of adult words the child was exposed to at 6 months. Each type of ELP measure is shown in a different color. The lines for referent selection (green) and retention (purple) are sloping upwards. This suggests that more input is related to better performance on these trials.

Even though this is only a subset of all the children we have tested, these data show the impact of children’s early language experience on their later language skills, particularly in their ability to identify and learn a new word.

GATES VISUAL WORKING MEMORY

As many of you know, we are also collecting data in India. At the heart of the data collection in India is the same task many of you have seen in our lab at UEA, the visual working memory (VWM) task, where you see the flashing coloured squares. The beauty of this task is that there are no pictures of objects or people, so it is a good task to use across different cultures. Just like here in the UK, we are also using our fNIRS caps to measure brain activation during the task.

One of the things we are interested in measuring over in India, is the effects that factors such as air quality, nutrition and postnatal depression have on visual working memory. Visual working memory is so important because it is a key building block of early cognition, and it develops early. So it’s important to know which factors influence its development, and how it’s development might be different outside of a western context.

The results from our task are strongly related to well-known scales of early development, so we can be sure we are tapping into some good measurements of early cognition. We also see consistency in the results as participants grow older, which is a good sign that we are measuring individual differences. Performance is also sensitive to socio-economic status and gender, pointing to the influence of early adversity on VWM.

Our fNIRS results support this. We find activation in areas of the brain that are typically associated with visual working memory, which shows engagement in the task and replicates results from the US and the UK. We also see activation in some areas of the brain which vary with socio-economic status, giving us clues as to the importance of socio-economic factors in the development of visual working memory. We also see gender related differences in some of our results, which matches the overall task performance.

We’re still looking into all of the key factors which might affect the development of visual working memory, but so far we are learning a lot about the development of early cognition.

Measuring brain activity with the fNIRS cap
The plan was simple – finish data processing, analyse and write. A typical 3rd year PhD’s timeline. And, suddenly, you learn that you are in the middle of a pandemic! Phrases like “working from home”, “zoom”, “can you hear me?” became a common thing.

PhD was not meant to be easy. I knew that. Especially because you have to be motivated to do it. There is no 9am to 5pm during your PhD. You have to organise yourself and your day. So, working from home wasn’t a bad idea after all. It meant I could now concentrate on writing that can take a bit of a back seat otherwise. Or at least that’s what I thought! Little did I know how hard it would be to feel motivated during this time. And like most of us, I imagine, I tried to search for structure in the chaos. So I made a plan: Very conscious about not over doing it … and yet doing a bit of work.

<table>
<thead>
<tr>
<th>From</th>
<th>Until</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>9am</td>
<td>11am</td>
<td>Revise writing your introduction chapter</td>
</tr>
<tr>
<td>11am</td>
<td>11.30am</td>
<td>Break</td>
</tr>
<tr>
<td>11.30am</td>
<td>12pm</td>
<td>Check and respond to emails</td>
</tr>
<tr>
<td>12pm</td>
<td>1pm</td>
<td>Online Yoga</td>
</tr>
<tr>
<td>1pm</td>
<td>2pm</td>
<td>Lunch</td>
</tr>
<tr>
<td>2pm</td>
<td>3pm</td>
<td>Check on Parents in India</td>
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<tr>
<td>3pm</td>
<td>5pm</td>
<td>Read an Academic Paper</td>
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<tr>
<td>5pm</td>
<td>6pm</td>
<td>Gardening/ HIIT/ Ukulele</td>
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But reality looked somewhat different…. Prerna on her break during lockdown

<table>
<thead>
<tr>
<th>From</th>
<th>Until</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>9am</td>
<td>1pm</td>
<td>What does the news say? Read guardian.</td>
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<tr>
<td>1pm</td>
<td>2pm</td>
<td>Lay down on the couch</td>
</tr>
<tr>
<td>2pm</td>
<td>3pm</td>
<td>Check on parents in India</td>
</tr>
<tr>
<td>3pm</td>
<td>4pm</td>
<td>Lunch</td>
</tr>
<tr>
<td>4pm</td>
<td>4.08pm</td>
<td>Start reading academic paper</td>
</tr>
<tr>
<td>4.08pm</td>
<td></td>
<td>It’s not 5pm yet.</td>
</tr>
<tr>
<td>4.13pm</td>
<td></td>
<td>Maybe I should hoover? Or do laundry? Hmmm... whites or colour?</td>
</tr>
<tr>
<td>4.20pm</td>
<td></td>
<td>“Don’t make noise, I am trying to read a paper!”</td>
</tr>
<tr>
<td>4.25pm</td>
<td></td>
<td>Google “How do astronauts live in space in small spaces and isolation?”</td>
</tr>
<tr>
<td>4.27pm</td>
<td></td>
<td>Look outside the window</td>
</tr>
<tr>
<td>5pm</td>
<td></td>
<td>Is the Daily Briefing on yet?</td>
</tr>
</tbody>
</table>

But things changed. It all started with the regular “Hollywood square” at our regular DDLab meeting. I learnt that what we needed was physical distancing and NOT social distancing (Samuelson, 2020). I became more aware of the power of social interaction to feel motivated during your PhD. I learnt that the trips to Kofra for coffee with my colleagues and friends were not about the coffee but sharing your little struggles and achievements of the day. So, we started virtual coffees and drinks to check up on each other. I started doing improv online to wind down at the end of the day. John did a contactless delivery of a computer that helped me not only progress with my work, but also mark the work and home area as separate. Even though it just meant using work computer for work and personal laptop for other stuff, it just helped divide the two in my mind while being in the same physical space.

Looking back to the journey through the lockdown I have realised that it takes time to adjust. Feeling demotivated during this time is ok, take time to feel secure, alter the priorities, but take that step towards a routine even though the first step towards it is the hardest.
Thanks to all the families who have given up their time to take part in our studies. We are sincerely grateful to you and for giving us the opportunity to continue with our research here in the Developmental Dynamics Laboratory.

**Ellie Brown**

The Developmental Dynamics Labs was a fun and friendly environment to work in and was a place where I learned a lot! I gained many valuable research skills that I wouldn't have been able to gain otherwise and that have helped me when applying for jobs since graduating.

I am now a Support Line Operator for Mind and have an interview lined up for an Assistant Psychologist job.

**Ciara Harrison-Gadsby**

I am so grateful to have had the opportunity to work in the Developmental Dynamics Lab over the past two years. Throughout this time I have gained new skills, new friends, and invaluable work experience. The friendly and welcoming atmosphere in the lab always made it an enjoyable and rewarding place to work!

I am hoping the new skills I’ve gained will facilitate my future career but wherever I end up, I will always look back with fond memories of my time as research assistant within the DD Lab at UEA. A big thank you to everyone on the team!

**Jessica Shindler-Glass**

As an undergraduate undertaking my final year research project, the DDLab provided first hand experience in aiding real-life, impactful developmental research. Helping out with home visits opened my eyes to how variable and enjoyable practical research is carried out within the UEA School of Psychology, an aspect of the degree I had never experienced before. As well as the hands-on side of the research, Laia guided me through R Studio, converting and utilising the data to give a clear set of statistics and comprehensive results. My project supervisor, John, allowed me to work closely with Jordan, Laia, and Jo, who each helped in building my research project experience and welcomed me into the lab supportively, and thus allowing me to reflect so positively upon the whole experience.

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**Thanks for partnering with us!**

Thanks to all the families who have given up their time to take part in our studies. We are sincerely grateful to you and for giving us the opportunity to continue with our research here in the Developmental Dynamics Laboratory.

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**Do you have any friends or relatives interested in their children taking part in our studies?**

At the Developmental Dynamics Laboratory, we research how children think, remember and pay attention to things and how these abilities change in early development.

For more information please contact us at:

child.scientist@uea.ac.uk or telephone 01603 597376

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Or find us:  [https://www.uea.ac.uk/developmental-dynamics-lab/home](https://www.uea.ac.uk/developmental-dynamics-lab/home)